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Reconsidering Registration: Homicide Reduction and the Canadian Firearms Registry

Thurley, Tim

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Reconsidering Registration

Homicide Reduction and the Canadian Firearms Registry



Tim Thurley (S1756397)
Leiden University
Faculty of Governance and Global Affairs
Master Crisis and Security Management
Supervisor: Dr. Marieke Liem
Second Reader: Dr. Pauline Aarten
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2 ABSTRACT

Firearm registration systems are large governmental exercises with associated spending implications. As they usually accompany other substantial firearm legislation reforms, the efficacy of registration has not attracted significant study in isolation. The Canadian non-restricted firearm registration system is unique in that, though it was contained within a larger bill, its implementation and repeal dates did not coincide with other major firearm-related legislative interventions. This research utilizes the Canadian firearm registration system as a starting point for further investigation into the efficacy of registration in reducing homicide and homicide by firearm. The paper found no statistically significant impacts on homicide attributable to the introduction or repeal of the long-gun registry. Further research on efficacy in other jurisdictions with universal registration is encouraged.

3 INTRODUCTION

Homicide and violent crime have been identified in security literature as ‘wicked problems,’ that is, problems defying straightforward answers and solutions (Newman & Head, 2015; Popp & McGuigan, 2016, pp. 27–28; Rittel & Webber, 1973). One globally-attempted method for reducing homicide has been the control of firearm availability, with measures directed at both specific groups and the general population. Reducing the availability of means with which homicide and violent crime may be committed is theorized by some scholars as a contributory factor to achieving an overall reduction in homicide and violent crime (Mozaffarian, Hemenway, & Ludwig, 2013). Most countries have incorporated some form of registration – an ownership record of a particular firearm maintained by the government – to track the presence of firearms within a polity and ostensibly limit their availability to authorized users (Alpers & Rossetti, 2017).

The Canadian long-gun registry,¹ a component of firearm law changes enacted in the *Firearms Act, 1995*² and implemented in 2003 represented an attempt by the 26th Canadian Ministry of Prime Minister Jean Chrétien to reduce violent crime and homicide in Canada. This took place in the highly-politicized aftermath of the 1989 École Polytechnique attack in Montreal, Quebec, which resulted in the deaths of fourteen female students. The legislation was immensely controversial (Brown, 2012, pp. 215–221), forming a component of each major party's election platform in multiple subsequent elections (Bryden, 2014; Conservative Party of Canada, 2011, p. 56; Liberal Party of Canada, 2000, p. 24; Reform Party of Canada, 1997, p. 15), and was subject to multiple repeal attempts in the House of Commons before final repeal by Parliament in 2012 (Davis, 2012; MacCharles, 2009; Parliament of Canada, 2012).

The efficacy of the registry was hotly contested in Canada before and after its introduction. Repeal of the legislation has made it possible to examine the effect of the legislation relative to the periods before and after its repeal. This paper will use quantitative means to demonstrate whether the Canadian Firearms Registry was associated with impacts on homicide and gun-related homicide in Canada.

3.1 SOCIETAL AND SCIENTIFIC SIGNIFICANCE

This thesis has three core purposes. The primary purpose is to examine whether firearm registration has the potential to be a useful and cost-effective legislative tool for homicide reduction. The second is to provide clarity regarding the historical development of Canadian firearms law to establish the necessary context for both the enactment and abolition of the registration requirement, primarily to establish the relevance of homicide to the contemporary debate. The third is to examine the utility of theories concerning firearm restrictions and availability in relation to homicide rates in the specific context of firearm registration. Combined, these components seek to inform the complex academic and societal debate surrounding firearm restrictions.

Analyzing the consequences of the firearms registry in the context of homicide may provide a useful addition to the Canadian firearm policy debate. Strict controls of sporting rifles and shotguns, as

¹ The non-restricted component of the Canadian Firearms Registry is alternately referred to as the long-gun registry, gun registry, firearms registry, etcetera. These terms were used in the political debate and common parlance to refer to the non-restricted registry, and carry that meaning in this thesis. Where the restricted and prohibited components are referred to instead, this will be made explicit.

² Otherwise referred to as Bill C-68.

established in the background section below, constituted an unusual development in Canadian legal history. The registration of non-restricted firearms outside of wartime was a significant change in the Canadian philosophy of firearm registration, and engendered significant opposition (Brown, 2012, Chapter 6; Stenning, 2003). While those in favour of and opposed to the registry provided numerous arguments unrelated to homicide, the veracity of attributing the observed reduction in Canadian homicide rates over the period examined by this thesis to the registry formed a key point of political discourse over the course of its introduction, implementation, and eventual repeal (Brown, 2012; McCarthy, 2002; Rock, 2008).

Multiple figures in Canadian politics have speculated as to which new firearms regulations may be introduced by future governments, including the possibility of new forms of registration (Hamilton, 2015; Rana, 2017; Ritz, 2017). Some public figures and organizations have called for the reduction or restructuring of Canadian firearm legislation due to a perceived lack of impact or undue infringement on civil liberties (Conservative Party of Canada, 2011, p. 56; Gurney, 2011, 2014; Raj, 2016). Others, such as Mayor John Tory of Toronto, have called for increased controls and the eventual reintroduction of registration (Rieti, 2016; Toronto Star Editorial Board, 2016). This research may inform whether potential homicide reductions constitute a valid reason for the development of these policy proposals.

In addition to a societal impact on Canadian public policy discourse, sufficiently generalizable research may cause reflection on the utility of registration systems elsewhere. This research may be especially applicable in comparable nations such as Australia, which introduced a national registration policy in 1996, and New Zealand, which abolished its registration requirement in 1983. If this thesis observes stark results indicating the efficacy of registration, governments may consider returning to, maintaining, or increasing their systems of registration. However, if no large or statistically significant effects are observed, widespread policy assumptions on the efficacy of firearm registration – 182 of the 243 national and sub-national jurisdictions examined by GunPolicy.org require registration of non-restricted equivalent firearms (Alpers & Rossetti, 2017) – may need to be questioned. Nations with firearm registration systems may consider reassessing registration systems and redirecting resources to crime reduction or public health policies with more beneficial impacts.

National registration systems have been subject to previous academic study only when grouped with other wide-ranging reforms, such as the Australian National Firearms Agreement (Baker & McPhedran,

2007a; Chapman, Alpers, Agho, & Jones, 2006; Santaella-Tenorio, Cerdá, Villaveces, & Galea, 2016). The concurrent implementation of registration alongside, or as a component of, these significant legislative reforms has made effects of registration on a national scale impossible to isolate. Furthermore, the only nation comparable to Canada also identified as having repealed a nation-wide registry has been New Zealand (Newbold, 1999, p. 65). Extensive searches conducted for this thesis uncovered no studies available to the public regarding the isolated impact of registration on homicide in New Zealand, Australia, or other comparable nations. A singular study in Canada incorporated the correct registration intervention year, but focused on the *Firearms Act, 1995* as a whole, included limited post-implementation data, and was conducted prior to the intervention removal (Langmann, 2012). The combination of a knowledge gap and limitations in existing research have been identified, and the consequent need for further research established (Gabor, 2003a, 2003b; Langmann, 2012).

Testing the efficacy of firearm registration provides a useful indicator regarding the utility of controlling the availability of firearms to criminals and at-risk individuals. Registration should in principle limit availability to authorized users and reduce straw purchases, the ostensibly legitimate purchases intended for illicit distribution. If registration results in a statistically significant reduction in overall homicide rates, it may indicate the utility of academic hypotheses holding that a reduction in the presence of firearms reduces violent crime. If registration causes a decline in gun-related homicides but overall homicide rates remain stable, or if no effect is observed, this may suggest the utility of other academic approaches.

3.2 RESEARCH QUESTION AND ORGANIZATION

This thesis will attempt to answer the following research question:

Did the Canadian Firearms Registry have a statistically significant impact on the observed reduction in Canadian homicide and gun-related homicide rates between 1993 and 2015?

This paper will be organized as follows. It will:

1. Provide background regarding the present and historical situation of firearms ownership in Canada, including the evolution of the legal framework and debates surrounding the long-gun registry from 1867 to the present;
2. Detail the major theoretical views of the relationship between firearm legislation and violent crime through the provision of a theoretical framework and literature review;

3. Provide an academic review of scholarly literature, primarily in the English language, related to firearm registration and homicide in Canada, Australia, New Zealand, and globally;
4. Combine the academic literature and contemporary perceptions of effectiveness into a working hypothesis;
5. Outline a coherent methodology, including justification of the selected data sets;
6. Provide a quantitative analysis of gun-related homicide and overall homicide in relation to the long-gun registry, and;
7. Discuss the results of the quantitative analysis in relation to the available hypotheses while providing selected research limitations and considerations for policymakers.

3.3 TECHNICAL NOTES

This thesis provides a background analysis of the history of Canadian firearm legislation. It assumes a background knowledge of Canadian history, politics, political parties, and legislative and governing institutions. *Arming and Disarming* provides a comprehensive analysis of the evolution of Canadian firearm legislation and constitutes the main secondary source for the history section, though this thesis does sometimes differ from that work in its assessment of historical development. Nonetheless, *Arming and Disarming* reaches far beyond this thesis in scope and is recommended for a greater understanding of the history of firearms in Canada (Brown, 2012).

This thesis uses the American Psychological Association, 6th edition as the primary reference style. Canadian legal citations are not included in the APA guide and have a unique citation format. The Simon Fraser University *Citing Canadian Government Documents* guide has been used to adapt Canadian legal citations to the APA style (Graebner, 2016).

4 BACKGROUND

4.1 HISTORY

This section provides an overview of Canadian firearm legislation to establish the implementation of the long-gun registry as a uniquely relevant evolution in Canadian history. It describes the historical context of legislative and societal evolution on firearm issues, in turn noting why, when, and how homicide reduction emerged as a central aim of the control movement in Canada.



Figure 1: Timeline of Major Firearm Legislation from 1867 to Present

4.1.1 Confederation to World War II

Canada and the United States share a continent, primary language, and historic background dating to the British Empire and the colonization of North America. Canadian national identity developed in the context of a more culturally, economically, politically, and militarily powerful neighbour, and often provided an explicit and even intentional contrast to American politics, national values, and perceived American dominance. The proximity of the United States – and concern over Americanization (eg. Grant, 1965) – has influenced the development of the Canadian national, intellectual, and cultural identities, and thereby also political sentiment (Bélanger, 2011, Chapter 6; Blake, 2004; Lipset, 1990).

Firearms restrictions are one example of the perceived national contrasts. Canadians have viewed the more stringent Canadian model of gun control in favourable terms compared to laws in the United States, with some identifying these differences as a component of cultural identity (Brown, 2012, pp. 1–2). A casual observer may perceive a historical consistency in that view. Where the United States Constitution enshrined life, liberty, and the pursuit of happiness as the cherished goals of a nation, the Canadian Constitution Act of 1867 referred to “peace, order, and good government” as a core principle (Brown, 2012, pp. 1–2; Cochrane, Blidook, & Dyck, 2017, Chapter 18).³

These popular divisions ignore the historical development of the two systems. While Canadian firearm laws are currently more restrictive than those in the United States, this was not always the case. Firearm use and ownership was and remains widespread in Canada, and early Canadian firearms legislation – which predated Confederation – could be categorized as permissive by modern standards (Brown, 2012, pp. 1–7, 236–241). Recent authors have identified three core reasons for the nature of early Canadian law. The primary reason was Canada’s identity as a predominantly rural, colonial, and frontier society. Guns were considered practical and necessary tools for significant portions of the population (Brown, 2012, pp. 18–20, 35, 47, 82–85, 90–91, 162), a sentiment which remains in elements of Canadian society (Kennedy, 2015). Society, advertising, and government programs emphasized the independence of the Canadian man alongside a culture of outdoorsmanship, hardiness, and the value of sport (Brown, 2012, pp. 8, 99).

³ The cited work provides greater background into the implications of the POGG clause on Canadian federalism.

A second reason was the prevalence of the Canadian militia – a term used to refer to Canada’s pre-1940 voluntary full- and part-time armed forces – in national culture. Militiamen were self-reliant and independent. This was exemplified by the willingness of Confederation-era militiamen to complain of the perceived ineptitude of their British officers, to the point where explicit orders to avoid public criticism of officers were issued (Wood, 2010, p. 90). This self-reliant attitude was reflected in firearm culture. Wood (2010) characterized the 19th century militiaman’s rifle as an emergent symbol of Canadian nationalism. Rifle clubs were established across the country to encourage marksmanship among able-bodied males. While the rifles and ammunition could be brought from home, the government supplied them free of charge. These clubs – at once social, practical, and patriotic – were intended to groom Canadian men into soldiers, yet proved popular even in areas lacking militia regiments such as rural Quebec and the Canadian West (Brown, 2012, pp. 47–51, 99–101; Wood, 2010, pp. 111–112).

Finally, attitudes toward firearms were informed by a tradition of British liberalism and Enlightenment thought regarding the rights of man. Many early Canadians, including Father of Confederation and first Prime Minister Sir John A. Macdonald, considered firearms an integral component of national and personal defence and their possession by British subjects a right – albeit limited – under British common law (Brown, 2012, pp. 10, 70–72). While not codified, the concept of a right to firearm possession was explicitly referred to in early parliamentary debate on the firearm issue (eg. House of Commons, 1885, pp. 3426–3427, 3432).

Early legislative restrictions in Canada did not emanate from concern over the possession of firearms themselves, but from concern over their possession by minority groups. Negative and explicitly hostile attitudes toward indigenous peoples, ethnic minorities, political dissidents, and youth were used to push early firearm access restrictions aimed at these groups. The attempts to deny firearms to these identifiable groups were the central factors behind much major firearm legislation until the Second World War.

The first effective push for regulation began in the two decades after 1867, when Canada underwent a spike in firearm importation from the United States (Brown, 2012, p. 63). These new firearms included a large supply of cheap revolvers, which led to public concern as accidents and high-profile criminal incidents involving them made the newspapers. Early comparisons sprouted between these incidents and firearm violence in the United States (Brown, 2012, p. 71). The consequences included the first

noteworthy blanket restriction on firearms usage in Canada. In 1892, the government imposed limits on the carrying of a handgun in public unless one feared for one's life or had the required permit. Sales to youth under the age of sixteen, however, were still permitted (Brown, 2012, pp. 78–79).

Foreign “aliens,” First Nations, and Canadian Métis were viewed with suspicion or outright hostility by the Canadian government. In 1885, the North-West Rebellion involving Métis, Cree, and Assiniboine men in the District of Saskatchewan led by Louis Riel – which had been precipitated by Riel's Red River Rebellion in Manitoba fifteen years before – led to the introduction of firearm laws in the North-West Territories (Brown, 2012, pp. 57–58; House of Commons, 1885, pp. 2965–2967, 3427–3433). Written permission from the Canadian government was required to possess rifled firearms and ammunition in the territory encompassing most of today's Western Canada (Brown, 2012, pp. 57–58). The legislation was all-but-explicitly directed at the disarmament of First Nations and Métis communities; on July 1st, 1885 Members of Parliament stood in the House of Commons explicitly to defend it on those grounds (House of Commons, 1885, pp. 2966–2967). Though the initial legislation was intended as a temporary measure (House of Commons, 1885, p. 2966) and never proclaimed for fear of upsetting local British settlers – Macdonald had spoken against applying the ban only to First Nations on the grounds arms entering with British settlers would be “difficult to trace” (House of Commons, 1885, p. 2966) – a later Order-in-Council prevented the provision of ammunition to indigenous individuals without written governmental permission (Brown, 2012, p. 60). These attempts at controlling possession of firearms by “certain classes” (Brown, 2012, p. 58) were the first large-scale attempt at legislating Canadian firearms possession (Brown, 2012, p. 61).

Smaller pieces of legislation followed. In 1913, Form 76 – an early permit – was required for pistol possession (Brown, 2012, p. 137). In 1919, in the aftermath of the First World War, Form 76 was required for all “foreign aliens” wishing to possess firearms (Brown, 2012, pp. 137–138). Disaffected soldiers and the perceived threat of riots sparked concern over the potential for a domestic insurrection if arms possession continued to be permitted without restriction. The Borden government extended legislation in 1920 that all British subjects – as Canadians legally were – would require Form 76 permits to own all firearms, shotguns excepted (Brown, 2012, pp. 138–139).

The requirement for Form 76 permits engendered the early use of many modern-day arguments against gun control. Opposition Members of Parliament characterized the laws as “hysterical” (Brown, 2012, p.

137) and a symptom of paranoia (Brown, 2012, pp. 138–139) on the part of the government. Canadian sportsmen resented the perceived suggestion of criminality. Rural residents argued that they would be unable to defend themselves against wildlife, and others argued that law-abiding citizens would be unable to defend themselves from criminals (Brown, 2012, pp. 139–140). This represented an early rural-urban fault line in the Canadian firearms debate, fed by a perception of a government refusing to acknowledge what the *Toronto Star* called a “wide difference between urban and rural conditions” (Brown, 2012, p. 139). Facing substantial opposition, the government repealed the general requirement for a permit – but kept permit requirements for handgun purchase or carry. Components forbidding the sale to or possession of rifles by those without a permit in cases where it was “in the public interest” to do so were also maintained (Brown, 2012, pp. 138–140).

The Great Depression, perceptions of criminality, and the example of the United States led to the next major development in 1934 and 1935 – the mandatory registration of handguns with the Royal Canadian Mounted Police. Records of sale were kept, and the government issued registration certificates by make and serial number for each firearm. Carrying a handgun for designated reasons remained possible (Brown, 2012, pp. 147–152).

Canada’s first mass registration of all firearms came during the Second World War, and was accompanied by other measures with the wartime logic of denying firearms to those groups considered potential enemies within – often, those of German or Italian descent (Brown, 2012, pp. 153–154). In 1940, the government of Prime Minister Mackenzie King instituted the first centralized national registry system. Gun owners were required to register all firearms, and copies of registration certificates were sent to the Royal Canadian Mounted Police Commissioner in Ottawa. Coordinating these efforts demanded substantial RCMP resources (Brown, 2012, pp. 154–158). Penalties included a five-hundred-dollar maximum fine⁴ or two years in prison (Brown, 2012, p. 154).

Brown argued that uncertainty surrounding the Depression, handgun crime, and the Second World War made regulations less controversial (Brown, 2012, p. 158), conditioned Canadians to accept state collection of private data (Brown, 2012, p. 155), and marked the increased confidence or desire of the state in its ability to regulate firearms (Brown, 2012, p. 11). Likewise, the temporary nature of the Second

⁴ Analogous to ~\$8000 in 2016 (Bank of Canada, 2017).

World War long-gun registry blunted controversy due to its perception as an unfortunate but necessary wartime measure directed at the enemy rather than as a domestic measure directed at the general population (Brown, 2012, p. 154). Canadian gun control in the period from Confederation to the Second World War, from a government perspective, was dominated by fears of “enemy aliens,” racial and ethnic minorities, and dissident social and political groups. While crime and accidents featured in debate, they were rarely the dominant concern in enacting controls (Brown, 2012, pp. 156–158).

4.1.2 Post-War, Cold War, and Changing Focus of Control: 1945 to 1989

In the twenty-year period following the Second World War, state concern with minority groups, crime, and political opponents staging armed insurrections lessened. Consequently, only minor changes to firearm laws were implemented (Brown, 2012, p. 159). One such example was new legal requirements for fully-automatic firearms, which were registered – but not banned or otherwise restricted – in 1951; many had been imported from Europe by military service members returning from deployment overseas (Brown, 2012, pp. 156, 160–161).

Changing social conditions in the 1960s and 1970s revived gun controls at the federal level. Urbanization, increasing violent crime, and comparisons to American controls prompted the formation of two constituencies: those concerned with the phenomenon, generally urban, who demanded heavy restrictions on firearms ownership; situated against a primarily rural constituency opposed to firearms controls and the expansion of the state (Brown, 2012, pp. 159–160).

The attempts made to regulate firearms in this period generally sought to avoid antagonizing hunters and outdoorsmen. The Criminal Law Amendment Act 1968-69, an omnibus bill which included liberal reforms to gambling, abortion, contraception, and homosexuality, included changes to firearm legislation (Parliament of Canada, 1969). Individuals with mental illnesses, under the age of sixteen, or with a firearm prohibition order bestowed under the new legislation were prevented from purchasing firearms. The modern categorizations of non-restricted, restricted, and prohibited firearms were introduced. Individuals in possession of restricted or prohibited firearms without a permit could have been incarcerated, but in the initial period the federal government was reluctant to categorize firearms as prohibited (Brown, 2012, pp. 164–166; Parliament of Canada, 1969).

Brown (2012, p. 167) believed that a lack of resistance to the legislation on the part of gun groups could be attributed to the limited effects of the bill, though the nature of omnibus legislation – those opposing one part of the legislation would need to oppose the entire bill – may have also muted opposition (Brown, 2012, p. 166). Later reluctant attempts by the government, including Bill C-83 – which would have required firearm licencing and guarantors for firearms owners – were met with opposition from indigenous groups, firearm owners, and hunters (Brown, 2012, pp. 175–185). C-83 divided the Liberal caucus (Brown, 2012, pp. 172, 189). The bill had not included a registration component, but was nonetheless so controversial as to be dropped from the order paper (Brown, 2012, p. 189).

To reconcile the competing demands of Liberal caucus factions, regulation advocates, and firearm owners' groups, Bill C-51⁵ was passed in 1977. Instead of a full possession licencing scheme, the Firearms Acquisition Certificate was introduced for non-restricted firearm purchases. Keeping a restricted firearm for property protection was forbidden (Mauser & Maki, 2003).

Bill C-51 provided a test of registration compliance. Though the concept of registration for all firearms had been dismissed by a government-commissioned report on the grounds of expense and difficulty in enforcement, several firearms were “upgraded” in classification by Orders-in-Council arising from the legislation (Brown, 2012, pp. 173, 190–192, 195). Some previously non-restricted firearms were recategorized as restricted. The firearms entering the restricted category required registration within the existing restricted registry, but initial compliance was exceptionally low – Brown cited a figure of under one percent after the first few months of implementation – and an amnesty was introduced to encourage further compliance (2012, p. 195).

The content and tone of the Canadian gun control debate shifted substantially from 1867 to the 1980s. Minority groups were no longer the explicit targets of firearm legislation; instead, the divide became one between urban and rural areas and the belief that firearm regulation would reduce crime. Brown saw C-51 as the first attempt to legislate *all* firearm owners in a permanent manner during peacetime. That effort led in turn to an increase in firearm advocacy organizations and a return to a rhetoric of rights which had been muted in wartime – moves which “established the parameters of future, highly polarized gun control debates” (Brown, 2012, p. 197).

⁵ Not to be confused with the *Anti-Terrorism Act, 2015*, another widely-debated piece of legislation also designated Bill C-51.

The change in focus contributed to the rise of Bill C-68. Though the short-term damage caused to the Liberals by Bill C-51 and the changing tone of debate in the 1970s shook the party – especially in western and rural Canada – the smaller cleavages in caucus caused by political realignment made it easier for the Liberals to pass legislation in the long term, as elaborated below. Likewise, the state had shown that it had the capability to introduce generalized regulations regarding firearm ownership.

However, it is also important to note what had not occurred by 1980. Firearm registration was rejected; though contemplated in government reports, the potential cost and risk of non-compliance were considered too great (Brown, 2012, p. 173). It is unlikely that registration would have passed in any case. C-83, which when considered was withdrawn due to controversy, shared many similarities with the *Firearms Act, 1995* besides the registration element. The registration portion had been considered among the most controversial elements of the *Firearms Act, 1995* (Brown, 2012, pp. 216, 230–234). Registration would likely not have met the criteria of a non-controversial bill by the standards of the 1970s Trudeau government.

While registration of non-restricted firearms was not considered politically or technically feasible, the trend toward it became apparent in this period. Some emergent challenges could also be foreseen. Non-compliance for registration of restricted firearms was believed to be prevalent following the enactment of Bill C-51 (Brown, 2012, p. 195). Amnesties were enacted to encourage individuals to register firearms, a move replicated on the same grounds during the Harper government before its abolition of the long-gun component of the registry (Brown, 2012, p. 195; CBC News, 2009).

4.1.3 C-17, C-68, and the Long-Gun Registry: Context and Debate, 1989 – 2016

The previous subsections have established patterns in Canadian firearm history from Confederation to the 1970s, a useful tool for understanding the historical paths of Canadian gun control. Substantial changes in the 1990s that led to the *Firearms Act*, the long-gun registry, and its eventual abolition represented a watershed moment in Canadian gun politics and paralleled a realignment in Canadian political culture. This section will contextualize the long-gun registry debate, thereby detailing its societal and political significance. Showcasing the developments leading to the registry aids the examination of testable claims made for and against it, and provide a sense of how homicide reduction became the dominant argument behind Canadian gun control.

The divisive nature of gun control made it anathema to the federal political leaders of the 1980s. Members of Parliament from the western provinces and rural areas strongly opposed additional controls, whereas those from the eastern and urban areas making up the “Laurentian Consensus” (Bricker & Ibbitson, 2013) favoured it (Brown, 2012, p. 200). However, the two major parties had representatives in both. The Liberals held several rural and western seats with large hunting and shooting communities in addition to their urban and eastern base. The Progressive Conservatives had a presence in less firearm-friendly areas: they held seats in Toronto and had won the Quebec popular vote in the 1984 and 1988 federal elections (Parliament of Canada, n.d.).

These divides were obvious in the Progressive Conservative caucus. Blaine Thacker of Lethbridge-Foothills, an Alberta constituency, introduced a private member’s bill to replace screening and background checks with a practical test. Alan Redway, his colleague from the urban riding of York East⁶ in Toronto, demanded harsher regulations (Brown, 2012, p. 202; Parliament of Canada, n.d.). The social-democratic New Democratic Party had a similar problem – Svend Robinson, a staunch self-identified socialist from the suburban riding of Burnaby, introduced a bill calling for more controls; James Fulton of Skeena, a large rural riding in the same province, called for reduced firearm restrictions in non-urban areas (Brown, 2012, p. 202; Parliament of Canada, n.d.; Truelove, 2013, pp. 4, 115, 186).

The leadership of all three parties saw these divisions as an obstacle to party unity and electoral victory. No party saw the issue as sufficiently important to risk caucus divisions or erosions in their bases of support (Brown, 2012, p. 200). Shades of what happened when internal tensions could not be held in check were seen in other divisive social issues; the abortion debate, including the Supreme Court decision in *R. v. Morgentaler* before the 1988 federal election, had shown evidence of damaging divides between and within parties. Party leaders had been forced to expend energy and political capital attempting reconciliation and compromise between entrenched caucus factions (Farney, 2012, p. 92).

Brown (2012) identifies two elements which changed to upset the fragile political stability. The first was a collection of incidents, accidents, and assaults involving firearms, the most important of which was the École Polytechnique massacre of 1989. Fourteen women in the engineering school were slain in a mass

⁶ Later Don Valley East.

murder-suicide by a man armed with a semi-automatic rifle and a knife who claimed to be “fighting feminism” (Brown, 2012, p. 203). It was one of Canada’s largest mass homicide incidents not involving an aircraft. The rifle in question had been legally obtained (Brown, 2012, p. 203).

The attack moved public opinion to favour further gun control, and many organizations and newspapers advocated for total bans on certain firearm types (Brown, 2012, pp. 204–205). That the victims of the attack had been selected for their gender meant that the incident was seen as a women’s issue (Brown, 2012, pp. 205–207). The role of firearms in domestic violence gained more prominence in the political debate. Firearms were also framed as an unhealthy indicator of masculinity, and opponents of new firearm laws were characterized in Parliament as having an unhealthy attachment to “phallic symbols” (Brown, 2012, p. 206).

Some persons affected by the massacre strongly disagreed with an emphasis on firearms; the brother of École Polytechnique victim Hélène Colgan, for example, later became the Quebec director of the Canadian National Firearms Association (Bruemmer, 2015). Nonetheless, public opinion moved to favour increased controls (Brown, 2012, p. 214). The Coalition for Gun Control was formed to advocate for more stringent regulations, controls, and prohibitions on firearms in Canada, and came to represent a prominent role in the debate (Brown, 2012, pp. 204–205).

The Oka Crisis of 1990 also permeated the debate, though it was less critical to the outcome. Activists from the indigenous Mohawk tribe barricaded access to a property development on a land claim site. A subsequent firefight between Quebec provincial police and members of the Mohawk tribe resulted in a police retreat following the death of an officer. The Mohawk present considered themselves a legitimate armed force, and some had prior military experience (Swain, 2010, pp. 60, 217). Police alleged the Mohawk were armed with firearms ranging from common non-restricted rifles and shotguns to prohibited Kalashnikovs and two heavy machine guns (Kopel, 1991; Swain, 2010, p. 60). Concerned with the inability of the police to cope with the situation, Quebec Premier Robert Bourassa requested federal military support by invoking the National Defence Act (Swain, 2010, Chapter 8). While the federal government reached a peaceful negotiated solution with the tribe, the images of Canadian soldiers confronting armed Mohawk entered the Canadian political consciousness (Brown, 2012, p. 208; Swain, 2010).

Initial attempts by the Progressive Conservative government to legislate on the firearm issue after the École Polytechnique attack failed due to caucus division (Brown, 2012, pp. 207–209). Bill C-17 was introduced as a compromise solution (Brown, 2012, pp. 209–211). It reclassified several firearms as restricted or prohibited, limited magazine sizes, introduced more stringent storage requirements, increased minimum ages for firearm ownership, and introduced waiting periods, references, and a safety course for a Firearms Acquisition Certificate. In a concession to gun owners, it provided a general amnesty for owners to surrender firearms without fear of prosecution, did not ban most of the semi-automatic firearms popular among hunters, shooters, and farmers, and included a grandfathering clause for newly-prohibited firearms. It also allowed a parliamentary veto over the prohibition of firearms or ammunition (Brown, 2012, p. 211).

Disliked by both pro-firearm and pro-control advocates, C-17 was not a tenable long-term solution to the vigorous gun control debate. Hunters and sportsmen resented the imposition of a new measure by a political party perceived as an ally, as well as several requirements they did not believe would enhance public safety (Brown, 2012, p. 212). Gun control groups, on the other hand, were dissatisfied by what they perceived as a low number of outright bans and continued to advocate for more stringent requirements (Brown, 2012, p. 211).

The second Canadian political shift allowing for changes in firearm regulation was the electoral earthquake of the 1993 federal election. The pre-election Progressive Conservatives had been a coalition of western and rural conservatives and libertarians, Laurentian Red Tories, and Quebec nationalists. The election caused the tenuous coalition to collapse, and the Progressive Conservatives sunk from 156 seats to 2 – both east of Ontario. Its western base joined the nascent Reform Party, whereas many of its Quebecois supporters joined the Bloc Quebecois (Bittner & Coop, 2013; Farney, 2012).

The 1993 election upended Canadian political culture. The prior structure had relied on brokerage-style cadre parties – elite-driven outfits who had sought to gain parliamentary majorities through compromise between multiple factions according to broad national political sentiment. The new parties, unlike the old guard, began as mass grassroots movements who could more strenuously advocate for the positions of a particular base (Sayers, 2011; Wiseman, 2007, pp. 79, 116–117).

The realignment had ramifications for many issues, gun control among them. Quebec – more comfortable with many elements of state intervention and one of Canada’s more socially left-wing provinces – was dominated by the pro-independence Bloc Quebecois, who sought election only in that province (Brown, 2012, p. 212; Parliament of Canada, n.d.). The Reform Party ran candidates nationwide, but held the vast bulk of its popularity in Western Canada and in rural areas (Parliament of Canada, n.d.). Reform members had less trust in government intervention and spending as effective or beneficial tools, preferring to cut perceived government waste and empower individual decision-making (Brown, 2012, p. 213; Farney, 2012, Chapter 6).

This left the Liberals. Though ostensibly a national brokerage party, the Liberal core supporter post-1993 resided in the populous and urbanized Laurentian corridor running across southern Ontario into Quebec (Bricker & Ibbitson, 2013; Brown, 2012, p. 213). This geographic concentration meant that support was brokered between Ontario supporters – who either tolerated gun control, or whose opposition to it was divided between the remaining Progressive Conservatives and new Reformers – and Quebec voters, who were the most favourable in the country to new controls (Brown, 2012, p. 213). Brown argued that a personal discomfort with firearms by some senior Liberals, a perceived Liberal opportunity to counter a “soft-on-crime” narrative from the Reform side, and a pro-control leaning among the general population provided added incentives for the Liberals to legislate (Brown, 2012, Chapter 6).

The Liberals began to develop new firearm legislation, placing Justice Minister Allan Rock of Toronto in command. Rock preferred policy solutions which would reduce the number of privately-owned firearms in Canada. In his words, he declared the “firm belief that the only people in [Canada] who should have guns are police officers and soldiers” (Brown, 2012, p. 215). His comments, and indeed his selection, outraged farmers, rural Canadians, civil libertarians, indigenous groups, and hunters. Opposition parliamentarians deemed the comments “patronizing” and indicators of “statism” (Brown, 2012, p. 215). Rock’s initial legislative inclinations included a complete handgun ban, a general prohibition on firearms in urban areas with limited exceptions, and other proposals representing a change from an incremental pace of regulatory change in Canada (Brown, 2012, pp. 215–216).

Further consultation caused Rock’s initial proposals to be altered (Brown, 2012, p. 216). The eventual Bill C-68 included a requirement for all firearm owners to be licensed, instead of just new purchasers, and recategorized many handguns to the prohibited category – including all those in .25 and .32 calibres.

Licence applicants were required to pass the Canadian Firearms Safety Test, and a notification requirement for conjugal partners was introduced (Brown, 2012, pp. 218–221; *Firearms Act, 1995*; RCMP, 2016b). The original draft of C-68 also allowed entry by law enforcement into any household where a firearm was suspected (Brown, 2012, p. 219). Firearms could be reclassified by Order-in-Council, and Chief Firearms Officers for each province and territory were appointed (*Firearms Act, 1995*). These officers had some power of interpretation over federal regulation within their jurisdictions, including over the 1996 regulatory changes which required an authorization to transport permit for individuals wanting to take a restricted firearm to an authorized range (RCMP, 2015a, 2016b).

The contentious core of the legislation was the long-gun registry (Brown, 2012, p. 218). Previous musings over long-gun registration, as discussed above, had been dismissed as too costly, too likely to meet with non-compliance, or too ineffective to be worth the expense. The government believed it could address these problems: improvements in computerization would assist ease of implementation and reduce costs, while the introduction of unregistered possession as a criminal offence with a penalty of incarceration would encourage compliance (Brown, 2012, p. 217).

Firearms owners resisted C-68, and especially the registry requirement. More than eight thousand individuals attended a protest on Parliament Hill in Ottawa (Brown, 2012, p. 222). Thirty Liberals had expressed misgivings with the legislation, both in caucus and publicly (Fleming, 2012, p. 122). After initially resisting any amendments, the government sought to alleviate damage by limiting grounds for police entry to homes having ten or more firearms, and reduced the penalty for possession of an unregistered non-restricted firearm to a maximum of six months in prison (Brown, 2012, p. 220). On the final vote, nine Liberals voted against, in addition to eight of the nine New Democrats – Svend Robinson provided the vote in favour – and almost all of the Reform caucus (Brown, 2012, p. 220; Truelove, 2013, p. 180).⁷

The implementation of C-68 was staggered: the main portions of the legislation came into effect on December 1st, 1998, and licences were mandated as of January 1st, 2001. Firearms owners could register firearms from then until January 1st, 2003, at which point criminal penalties applied to those failing to register. Controversy over implementation remained. Some firearms organizations encouraged members

⁷ Reform Members of Parliament cited constituent preference as the reason for their votes (Brown, 2012, p. 220). The Reform platform emphasized the reduced use of the party whip and increased freedom for MPs to represent the views of their constituents over the views of the party (Reform Party of Canada, 1997, pp. 5, 21–25).

to avoid compliance with the legislation (Brown, 2012, pp. 225–226). Some provinces initially refused to authorize their police forces to charge individuals who failed to register firearms (Brown, 2012, p. 225). Provinces also challenged registration in the courts as *ultra vires* in relation to the constitutional powers of the federal government, though the challenge was unanimously dismissed by the Supreme Court (2000 SCC 31). Public opinion gradually shifted against the registration component of the legislation as costs rose and perceptions of effectiveness declined, with some polls indicating a majority favouring abolition by 2004 (Brown, 2012, pp. 230–233). The registry was considered by some Liberals to be a core reason for their loss of rural seats and defeat at the hands of the Conservative Party in 2006 (Rana, 2017). The Conservatives were formed in 2003 as a merger of the Canadian Alliance – which had replaced Reform – and the Progressive Conservatives, and campaigned multiple times on the abolition of the non-restricted firearm registry (Conservative Party of Canada, 2004, p. 37, 2011). The Conservative government of Stephen Harper made multiple attempts to abolish the long-gun registry, and succeeded with the passage of C-19 in 2012 (Brown, 2012, pp. 235–236; Parliament of Canada, 2012).

Brown (2012) concluded that the registry debate was important for two reasons in the history of Canadian firearm legislation. First, that it showed increased faith of the state in its ability to implement changes with significant political and bureaucratic consequences, in contrast to the incremental changes made throughout most of Canada’s history. Second, that the perceived failure of the registry as a cost-effective tool to reduce violent crime reduced the confidence of the public in the ability – or necessity – of the federal government to introduce regulatory programs on a large scale (Brown, 2012, p. 234).

4.2 CONTEMPORARY PERCEPTIONS OF REGISTRATION: EFFECTIVENESS OR WASTE?

This section presents the salient contemporary arguments for and against the registry in relation to its effectiveness in reducing homicide. Detailed arguments relating to qualitative aspects not innately tied to homicide, such as culture and civil liberties, are beyond the scope of this thesis and have been excluded.

The primary crime prevention aspect of registration was the ability for law enforcement to trace firearms. Police could thereby ensure that firearms were removed from potential domestic violence situations, more easily enforce court-ordered firearm bans, check if firearms were present before entering a home, recover stolen firearms, and reduce straw purchases (Rock, 1995). The prevention of straw purchases had the theoretical benefit of removing firearms from criminal groups and gaining a new charge with which to imprison their members. Minister Rock cited the potential to reduce violent crime by cutting “down on

the number of firearms stolen and traded in the underground” and “[choking] off the sources of supply for the underground market” (Rock, 1995, sec. 9707).

Rock also cited ancillary benefits, particularly the potential for registration to enhance compliance with other elements of the law. Compliance with storage regulations through the possibility of government inspection of owners was a component. Rock cited the applications of this in crimes of passion, where “[if] registration, as the police believe, will encourage owners to store firearms safely so those impulsive acts are less likely, the results may be different” (Rock, 1995, sec. 9709). His logic for the firearm legislation included the explicit logic of the means availability thesis, that “if a firearm is not readily available, lives can be saved” (Rock, 1995, sec. 9709). The government also disputed self-defence as a valid reason for firearm ownership in Canada (Rock, 1995, sec. 9706), with some Members of Parliament disagreeing on the grounds of Canadian values *vis-à-vis* the United States (Mitchell, 1995, sec. 11111) and others disagreeing on the grounds that firearms owned for self-defence could cause increases in homicide or accidental death rates (Barnes, 1995, sec. 13747).

The central claim made by the government was that the firearms registry would reduce firearm violence. In an article for the *Windsor Star*, Allan Rock claimed that “registration and licencing ... made Canada safer,” citing statistics regarding reduced firearm deaths (Rock, 2008). In a separate instance, Rock claimed approximately three hundred lives per year⁸ would be saved due to the new firearm legislation (McCarthy, 2002). The Liberal Party platform for the 2000 federal election directly attributed the fall in Canadian crime rates to new firearm legislation (Liberal Party of Canada, 2000, p. 24), and Senator Hervieux-Payette argued the same before the Senate Standing Committee on Legal and Constitutional Affairs (Mauser et al., 2012, p. 86).

The overall claims cited by the government are quantifiable and may be directly examined. The overarching argument of the government was that firearm registration would reduce violent crime. This was held to occur due to expansions in safe storage, reduced domestic violence leading to homicide, and a reduction in both criminal access to firearms and the criminal base providing illegal firearms to the populace. These testable claims provide a *prima facie* logic for the potential of the registry to reduce homicide.

⁸ “[You] have to ask yourself, what are 1,240 lives worth?”

Others disagreed with the potential for the *Firearms* Act and long-gun registry to be effective. Stenning, a University of Toronto criminologist, deemed Rock's claim of three hundred lives saved to be "totally outrageous ... completely unjustified, insupportable" (McCarthy, 2002). The Reform Party suggested that the targeting of all firearms was unnecessary, and preferred to increase criminal penalties for the illegal use of firearms (Reform Party of Canada, 1997). Mauser and Stanbury (2003) believed that inaccuracies within the data would hamper effectiveness; concerns regarding data quality were raised by the Canada Firearms Centre and the Auditor General (Canada, 2006, pp. 111–114).⁹ Mauser further disputed that self-defence using a firearm was not effective in Canada (Mauser, 1995; Mauser & Maki, 2003), a sentiment loosely echoed by Prime Minister Stephen Harper before the Saskatchewan Association of Rural Municipalities in 2015 (Kennedy, 2015).

A cited measure of effectiveness was the number of hits per day generated by police queries to the registry. RCMP figures for 2007 indicated an average of 6,900 daily queries to the online firearm registry (National Program Evaluation Services, 2010, p. 25), which represented a continuous increase from previous years (National Program Evaluation Services, 2010, p. 28), though some alleged that registry hits were incidental by-products of general searches rather than firearm-specific searches (eg. Mauser et al., 2012, p. 103). Toronto Police Chief and later Conservative Cabinet Minister Julian Fantino backed the suggestion that registration had limited utility to police (Stenning, 2003), which was in turn disputed by the Canadian Association of Chiefs of Police (National Program Evaluation Services, 2010, Appendix E) and Fantino's eventual successor as Toronto Police Chief, the eventual Liberal Cabinet Minister Bill Blair (CBC News, 2010).

The inability to measure compliance was a key point made against the effectiveness of the registry system. The government, through the Canada Firearms Centre, estimated an approximate compliance rate of 90% by 2003-2004 with approximately 7 million firearms registered, but did not provide a figure for 2004-2005 due to difficulties in obtaining clear estimates (Canada, 2006, p. 108; Cotter, 2014, p. 9). The 90% figure was disputed by opposition parliamentarians, firearm advocacy groups, and some academics opposed to the legislation, who variously estimated compliance rates of 30-70% (Canadian Shooting Sports

⁹ A redacted 2012 copy of the Canadian Firearms Registry was made available to Global News through an access-to-information request (Cain, 2015). The complete document may be downloaded at the link referenced in the citation or obtained on request from the author of this thesis.

Association, 2003; Mauser et al., 2012, p. 21). The 2007 Small Arms Survey estimated an average of 9,950,000 firearms in Canada, suggesting an approximate compliance rate of 70% (Karp, 2007, p. 47). The 2010 Canadian Firearms Program Evaluation Report indicated that 46.5% of non-restricted firearms seized by police between November 2008 and February 2010 were registered (National Program Evaluation Services, 2010, pp. 29–30).

The above section has provided the reasoning behind the registry, as well as the common practical arguments made against it, with respect to its intended impacts on homicide. Advocates for and against the registry provided other arguments regarding additional aspects, including culture and civil liberties. The following sections will examine portions of the logic used by advocates in the context of academic research to determine a hypothesis.

4.3 LEGAL BACKGROUND

4.3.1 Requirements of Registration

The *Firearms Act, 1995* required that all non-restricted firearms be registered with the centralized Canadian Firearms Registry by January 1st, 2003 (*Firearms Act, 1995*). Data collected by the registry included the make, model, serial number, calibre, and category of the firearm, as well as the personal details of the registrant. The registry mandated that all sales and transfers be reported to the authorities and recorded in the centralized registry. Possession of a non-restricted firearm without a registration certificate after January 1st, 2003 constituted unauthorized possession under Criminal Code subsections 91(1)¹⁰ or 92(1)¹¹, the punishments for which included the potential for a prison sentence up to six months (Brown, 2012, p. 220; Criminal Code, n.d.).

The 28th Canadian Ministry of Prime Minister Harper extended amnesties to those who had failed to register non-restricted firearms, beginning in 2006 and lasting until the abolition of the registry. The measure was undertaken with a stated goal of encouraging compliance with licencing and registration requirements (CBC News, 2009). While criminal prosecution no longer applied to those committing subsection 91(1) or 92(1) offences with a non-restricted firearm while the amnesties were in place,

¹⁰ Unauthorized possession of a firearm.

¹¹ Unauthorized possession of a firearm with knowledge.

individuals were still required to report all sales and transfers, to maintain registration certificates, and to register new firearms (eg. Order Amending the Order Declaring an Amnesty Period, 2006).

4.3.2 Canadian Firearms Law: A Summarized Legal Framework

This section details federal and provincial legal requirements surrounding firearms ownership and registration in Canada, including both legislation and practical enforcement. The law has been characterized as complex (2000 SCC 31); this section provides only the most relevant and salient aspects.

The legal framework of firearms acquisition, possession, and use in Canada is primarily governed by federal law and administered by the Royal Canadian Mounted Police under the authority of the Criminal Code and Orders-in-Council issued by the relevant Minister. It is further supplemented by the regulatory discretion of the Chief Firearms Officer in each province, who administers aspects of federal firearms law pertaining to that province, such as issuing Authorization to Transport (ATT) and Authorization to Carry (ATC) permits (RCMP, 2015a).

Firearms are categorized into three groups: non-restricted, restricted, and prohibited. This paper concerns itself with non-restricted firearms, which are defined in relation to the other two categories: a non-restricted firearm is any rifle or shotgun not otherwise classified as restricted or prohibited (RCMP, 2016a).

Restricted firearms include: any handgun not classified as prohibited; any firearm that is not prohibited, has a barrel under 470mm long, and is capable of discharging centrefire ammunition semi-automatically; any firearm which has been designed or adapted to fire with a total length of under 660mm; or any firearm prescribed as such by the Criminal Code Regulations SOR/98-462 on the authority of the Governor General in Council on the advice of the Justice Minister (RCMP, 2016a; Regulations Prescribing Certain Firearms [SOR/98-462], 2015). Many firearms which would be classified by their technical merits as non-restricted, including AR-15 variants, fall into the restricted category under the Regulations (SOR/98-462, 2015).

Prohibited firearms include: any handgun with a barrel length equal or less than 105mm long or designed or adapted to fire 25 or 32 calibre ammunition, unless for use in an International Shooting Union-governed competition; any firearm altered from a rifle or shotgun to be less than 660mm in total length or with a

barrel under 457mm in length; any automatic firearm, including firearms modified to no longer be automatic; or any firearm similarly prescribed by the Regulations mentioned above. Prohibited licences are, in practice, only issued to those with legal possession of a prohibited firearm before the firearm became prohibited (“grandfathering”), the familial heirs of those possessing certain categories of prohibited firearm, and those requiring them for business purposes (RCMP, 2016a).

Restricted and prohibited firearms must be registered with the RCMP, and a registration certificate carried or stored with the firearm (RCMP, 2015d, 2017). Transfers of firearms to those with the same licence category must be registered with the RCMP. Non-restricted firearm transfers are conducted without police records or involvement, but a non-restricted firearm may only be transferred to someone appropriately licenced (RCMP, 2015d).

Non-restricted and restricted firearms may be acquired by most Canadians with a Possession and Acquisition Licence (PAL). Those seeking to acquire non-restricted firearms must pass the Canadian Firearms Safety course, including one written exam and one exam covering safe handling of a firearm. Those seeking to acquire restricted firearms must also pass the Restricted Firearms Safety Course and an additional written and safety exam (RCMP, 2017). Licence applications mandate the provision of references, include a variety of questions on personal circumstances such as mental health, and require the notification of an applicants’ spouse (*Firearms Act, 1995*). These conditions are reviewed by the RCMP, who conduct a background check and – following a waiting period of twenty-eight days – issue the licence, request additional information, or refuse the application (RCMP, 2015b).

Ownership of a firearm is restricted to individuals above the age of 18, though individuals aged 12 to 17 – or younger, if the Chief Firearms Officer determines they must hunt or trap for sustenance – may borrow non-restricted firearms and purchase ammunition with a Minor’s Licence. Parental consent and the successful completion of the Canadian Firearms Safety Course are required, and additional conditions may be required by the Chief Firearms Officer (RCMP, 2015c).

There are exceptions to the three categorizations, including antique firearms, black powder firearms, and airguns with a maximum muzzle velocity of 152.4 metres per second and/or a maximum muzzle energy of 5.7 joules (RCMP, 2012a, 2012b, 2012c). A firearms licence is not required to possess or purchase ammunition for these categories. It is important to note that provincial hunting regulations or the Criminal

Code of Canada may consider items to be firearms which are not considered as such by the *Firearms Act*, including various air guns (RCMP, 2012a). No firearms licence is required to possess any item not regulated by the *Firearms Act*.

Some provinces and municipalities enforce additional rules and regulations, though the federal government retains the exclusive power over criminal law. The most significant changes have been in Quebec, where in 2016 the National Assembly passed legislation to establish a provincial non-restricted firearms registry by 2018 (Moreau & Coiteux, 2016). This registry is separate from the former Canadian Firearms Registry, which was a federally-regulated program applied to all provinces with criminal penalties for violation and had been abolished before the introduction of the Assembly bill. Anastasia's Law, introduced in the National Assembly in 2007, requires the reporting of suspicious behaviour on the part of gun owners, bans firearm possession in schools, daycares, and on public transportation, and requires the supervision of restricted firearm discharge at gun clubs while requiring the clubs to keep a log and certify member visits. Contravening these regulations is punishable by a fine (Canadian Press, 2007; CBC News, 2007; Dupuis, 2007).

Self-defence using a firearm is legal in Canada provided the force used is proportional. Carrying a restricted firearm for protection requires an ATC permit issued by the CFO and is usually issued for purposes of employment (CBC News, 2012; RCMP, 2015e). An ATT is required for restricted firearms to be transported to designated locations such as a range or a gunsmith, though the *Common Sense Firearms Licensing Act* 2015 incorporated the ATT and PAL into a single document for restricted firearm owners (Common Sense Firearms Licensing Act, 2015). Requirements to transport restricted firearms securely, and to only legally authorized destinations by a reasonably direct route, were retained (Common Sense Firearms Licensing Act, 2015). Storage requirements differ by firearm classification category. Non-restricted firearms must be trigger or cable locked or secured in a locked container or room (RCMP, 2013, 2016b).

5 THEORETICAL PERSPECTIVES

The previous sections have established the political and historical background of the long-gun registry, and identified contemporary arguments provided by politicians, law enforcement, interest groups, and academics pertaining to its establishment. To form a valid methodology for assessment of the long-gun registry's effectiveness in reducing homicide rates in Canada, existing academic literature must also be

examined. This section will examine academic views regarding the strength of any associations between firearm regulation and homicide.

This theoretical framework is not meant as an exhaustive review of global literature on firearm homicide. Its purpose is to introduce and categorize major perspectives of the relationship between firearm accessibility, restrictions, and interpersonal violence. It will seek to identify any consensus or debate between these perspectives leading into the literature review section, which will provide specific analysis of existing research related to firearm regulation in Canada and comparable nations, as well as the utility of firearm registration on a global scale. This will allow for an analysis of which impacts should be expected to arise from firearm regulation and registration in Canada, which methods have met with success in past examinations, and which theoretical lens may be most applicable for analyzing them.

Literature for the theoretical framework and review was located using a combined forward and backward snowballing to identify commonly cited literature, a technique recommended by Webster and Watson (2002). A modified version of the technique was used for literature relating to Canada, New Zealand, and Australia, where an attempt was made to capture a greater portion of overall research to compare methodologies applicable to these specific nations.

The primary question to answer is that posed by Kleck, Kovandzic, and Bellows (2016, p. 489): why should firearm ownership levels and firearm legislation have an impact on interpersonal violence rates? Bill C-68, incorporating the long-gun registry, had the stated purpose of reducing homicide by reducing the availability of firearms to those likely to use them for criminal purposes (Rock, 1995, 2008). To establish whether this has a theoretical basis, three major perspectives on the relationship between firearm restrictions and violent crime rates have been identified. Other authors examining the topic have independently developed similar categorizations (eg. Altheimer, 2010).

Means Availability: Firearm Access and Increasing Violent Crime

The first general category is that increased societal access to firearms – and generally, the availability of means to commit crime – increases violent crime. There are a few hypotheses suggesting why this may be the case. Altheimer (2010) cites the facilitation hypothesis and the triggering hypothesis. The facilitation hypothesis holds that access to firearms would enhance the benefits and reduce the potential costs of criminal activity by raising the strength of the criminal relative to that of the victim. The triggering

hypothesis postulates that individuals are likely to react to the presence of a firearm with more hostility, leading a potential offender to act with increased aggression.

A further hypothesis relating to the potential for firearm access to increase the severity of violent crime is alternately referred to as opportunity theory (Konty & Schaefer, 2012), the Zimring-Cook hypothesis (Kovandzic & Marvell, 2003), and the weapon instrumentality hypothesis (Altheimer, 2010). It holds that firearm availability does not necessarily increase overall crime, but can instead increase the lethality or success rate of criminal action. Criminals, by this perspective, will select the most effective tool available to commit a crime. Interpersonal conflicts where firearms are accessible will thereby result in increased injury due to the more effective tools available. The increased effectiveness of the weapon should result in increased lethality, which may include attempted homicides or assaults becoming completed homicides (Konty & Schaefer, 2012).

More Guns, Less Crime: Deterrence and Rational Criminality

The second category holds that increased firearm availability causes a reduction in crime. Three closely-related explanations have been cited, all pertaining to defence or deterrence. The first is utility theory, taken from the economic concept of the same name (Mauser & Maki, 2003). It holds that criminals are rational actors motivated by utility – the economic concept of preferring certain goods to others – and calculate the relative utility of an action using a tangible cost-benefit analysis. Reduction of risk to the perpetrator, and the maximization of reward obtained from the victim, both have high utility to a potential criminal. Increased risk to the perpetrator, such as that arising from an increased likelihood of armed resistance by the victim, introduces a deterrent effect.

Potential criminals need not have the ability to consider the precise probability of all outcomes; a perception of increased civilian firearm prevalence would alter even a rudimentary cost-benefit equation and reduce likelihood of engaging in criminal activity (Kovandzic & Marvell, 2003). Tark and Kleck (2004) cite a social learning perspective: the idea that active criminals are less likely to reoffend upon receiving physical pain or failing to obtain a reward, that potential criminals are less likely to offend upon witnessing the consequences inflicted on others, and that effective consequences are more likely to be inflicted by private citizens than the justice system.

Similarly, the actual defensive use of firearms may lower the probability of criminal act completion. The authors advocating this perspective hold that aggressors provide the public with the ability to directly disrupt ongoing criminal activity before agents of the state – such as police – are able to arrive (Alzheimer, 2010; Lott, 2010). The victim may also be able to use a firearm to prevent the aggressor from holding disproportionate power, making the commission of a crime less likely as the aggressor perceives a shift in the balance of power and associated cost-benefit equation (Alzheimer, 2010; Tark & Kleck, 2004).

Substitution and Intention: No Impacts and Offsetting Impacts

The third and final category of authors includes those of the opinion that access to firearms does not impact overall levels of crime. The first of these views may be termed the deliberate intention perspective – that criminals begin the commission of a crime with the primary purpose of achieving a successful outcome to that crime, and that the tools used to accomplish it are incidental (Stroebe, 2013; Wolfgang, 1957, 1958). Criminals will substitute means and methods as appropriate, but will still carry out the intended crime regardless of means availability (Alzheimer, 2010).

The second view is that offsetting impacts occur as firearm availability changes. When firearm availability increases among the general population, firearms may become more accessible to criminals, who would then be more likely to use them in the commission of a crime. Criminals would simultaneously be aware of the increased availability of firearms among the general population, and the consequent defensive or deterrent effects would prevent an increase in crime, even with increased access to more effective tools (Moody & Marvell, 2005). Any changes in violent crime patterns among the general population are therefore less likely to be noticed (Alzheimer, 2010).

6 LITERATURE REVIEW

6.1 REVIEW: REGISTRATION IN THE GLOBAL CONTEXT

Firearm regulations encompass a broad variety of tools of varying effect (Kleck et al., 2016; L. K. Lee et al., 2017). It is therefore critical to review literature examining firearm registration. Google Scholar and the Leiden University library catalogue were used to locate literature matching the search term “[firearm OR gun] and registration.” Quantitative analyses conducted post-implementation were preferred, though

some speculative analyses were included in the above background section to show the perspective of contemporaries regarding the potential for long-gun registration effectiveness.

Few works were found. Search terms were consequently expanded to include all peer-reviewed articles in English related to firearm registration and published between 1950 and 2017 and matching the categorized topics of gun control, public health, firearm laws and regulations, and firearms. These 480 results were narrowed again to include only the topics of gun violence, crime, mortality, homicide, and violence. The ensuring 204 results were examined manually. Articles discussing topics unrelated to homicide – such as constitutionality and agenda-setting – were discarded. Articles examining wide-ranging legislative change incorporating but not isolating registration, such as Brazil’s wide-ranging 2003 firearm legislation (Santaella-Tenorio et al., 2016), were similarly discarded.

Ten related studies were found, including those which reviewed other literature. Most of these discussed registration in the United States (Hahn et al., 2005; Kleck et al., 2016; Kleck & Patterson, 1993; Koper, 2014; Moorhouse & Wanner, 2006; Stroebe, 2013; Task Force on Community Preventive Services, 2005; D. W. Webster, Vernick, & Hepburn, 2001). Lack of isolation was a persistent problem. One study conducted a review of twenty-two laws and found association in some cases between more stringent firearm laws and reduced firearm death rates. Some of these legislative changes incorporated registration, but unfortunately its effects were not isolated (Santaella-Tenorio et al., 2016). Similarly, Moorhouse and Wanner (2006) also used registration as a component of an analysis examining whether firearm laws followed crime or vice versa, but did not isolate it. One review (Hahn et al., 2005) examined licencing and registration, with two of the reviewed studies incorporating registration. The authors did not separate licencing and registration in their results. They noted that eight cases examined showed increases in violent crime and another eight showed decreases, while two showed no significant effects.

Two studies gathered data for cities in the United States and sought to analyze whether a raft of gun laws were associated with a reduction in violent crime in each jurisdiction (Kleck et al., 2016; Kleck & Patterson, 1993). Registration was among the laws examined. Both studies found that, while some firearm control laws may have been associated with reductions in some types of violent crime, registration had no significant impact on homicide or aggravated assault (Kleck & Patterson, 1993), but was weakly associated with an increase in robberies (Kleck et al., 2016).

Webster, Vernick, and Hepburn (2001) examined cities in jurisdictions with and without registration schemes. Those with full or partial registration schemes included Boston, Detroit, Jersey City, New York, St Louis, Baltimore, Inglewood, Los Angeles, Philadelphia, and Salinas. It is important to note that the definition used by the authors included states where police maintained records of handgun purchases, which is not necessarily analogous to a full registration scheme. The authors found that registration reduced the likelihood that firearms sold within the state were recovered from crime scenes, and therefore that it may reduce the availability of firearms to criminals. They also noted the potential for nearby states to provide new sources of firearms.

Webster, Vernick, and Hepburn's findings were contradicted by Kleck (2012), who held that registration was likely irrelevant due to criminals being less likely to receive firearms through a concentrated trafficking model of mass straw purchasing and more likely to engage in a diffused trafficking model of trading firearms stolen at a small scale. Similarly, Koper (2014) found that firearms purchased in Maryland post-reform were not less likely to be used in crime than those purchased pre-reform. This coincides with the findings of Stolzenberg and D'Alessio (2000) that, while the prevalence of illegal firearms impacted crime rates, the prevalence of legally owned firearms did not.

Two further studies emphasized the perceived importance of registration. Stroebe (2015) argued that a lack of registration impeded the ability to conduct analysis of firearm ownership in America due to a lack of data regarding ownership and availability. However, such an argument must assume a high – or at least predictable – compliance rate. One final report noted that registration may reduce firearm deaths by “increasing likelihood of legal and legitimate firearms use, allowing tracking of firearms abuse, and deterring unlawful users from firearm acquisition,” but found no sufficient evidence to determine its effectiveness and recommended further study (Task Force on Community Preventive Services, 2005). Other studies speculated that registration could improve the ability of law enforcement to track firearms (Kleck, 2012) and to raise the acquisition cost of illegal firearms (D. W. Webster et al., 2001). These academic arguments parallel those made in the Canadian registry debate.

6.2 REVIEW: FIREARM LEGISLATION AND VIOLENT CRIME IN NEW ZEALAND, AUSTRALIA, AND CANADA

6.2.1 Challenges to Generalizability of American Research: Selection of Alternatives

Researching comparable nations facilitates the examination of research models which have met with success in areas with similar social, cultural, legal, and economic structures. This may result in a more critical evaluation of Canadian literature and show a broader range of potential research methods. Examining the results of analyses conducted in these jurisdictions may lead to an improved hypothesis through comparative analysis.

Most research on firearm homicides, and much of the research detailed above, has examined the politically contentious and globally-acknowledged role of firearms in the United States (Baker & McPhedran, 2007a). Comparisons between Canada and the United States have been made in academic work (eg. Hemenway, Shinoda-Tagawa, & Miller, 2002; Kopel, 1991; Mundt, 1990; Newman & Head, 2015; Richardson & Hemenway, 2011). However, the United States not only constitutes a possible outlier on firearms research (eg. Hemenway et al., 2002; Hepburn & Hemenway, 2004; Konty & Schaefer, 2012; McPhedran, Baker, & Singh, 2011; van Kesteren, 2014), but makes a poor comparator to Canada.

Many American study designs involve comparing differences in crime or injury indicators across states with differing legislation (eg. Kalesan, Mobily, Keiser, Fagan, & Galea, 2016; Siegel et al., 2014; Simonetti, Rowhani-Rahbar, Mills, Young, & Rivara, 2015), a model not applicable to the federal-level legal frameworks for firearms extant in Canada, New Zealand, or Australia (W. S. Lee & Suardi, 2010). The even national application of Canadian firearm legislation may improve the effectiveness of legislation by shifting firearm sources from comparatively deregulated jurisdictions within the polity to those outside an international border, where legal and illegal import attempts may be monitored at the point of access (D. W. Webster et al., 2001).¹²

The jurisdictional differences in assessing legislation parallel other important legal, cultural, and demographic differences between the United States and Canada, including political institutions, immigration levels and origins, laws, political and national values, regional cultures, economic rules and

¹² See Section 6.2.5.

regulations, inequality levels, infant mortality rates, and healthcare provision models. These critical differences have the potential to affect results and reduce comparability (Brookman, 2005, pp. 100–111, 138–139; Cochrane et al., 2017; Lipset, 1990; Nadanovsky & Cunha-Cruz, 2009; OECD, 2015; Pridemore, 2011; Wiseman, 2007).

Finally, the United States is estimated to have significantly more firearms per capita than most high-income nations – some research estimates up to 97 firearms per 100 individuals in the United States compared to 38 per 100 in Canada (Karp, 2007) – and unique models of enforcement, differences which may make research conducted in the United States less generalizable to other nations (McPhedran, 2016). Therefore, while it is useful to consider literature examining the United States – if only due to its prevalence and ability to use other states as rudimentary controls – it is important to ensure comparable nations are the primary focus of the examination to formulate a consistent hypothesis and analysis.

The selection criteria for comparable nations need not be exhaustive, but must consider core commonalities. Canada is a peaceful, highly-developed nation on the upper end of estimated firearm ownership levels according to the Small Arms Survey (Karp, 2007). Countries with similar firearm ownership levels, with low or no local conflict, and with a high level of human development include Switzerland, Norway, Finland, France, Iceland, Austria, Germany, Greece, New Zealand, and Denmark. Of these, Australia and New Zealand have similar Anglo-colonial cultural backgrounds, welfare states, large indigenous communities, governing institutions on the Westminster model, levels of immigration and diversity, national foundational values, and market economies governed by similar regulations (Armitage, 1995, Chapters 1, 8; McPhedran et al., 2011). Each nation has undergone major firearm law reforms between the 1980s and the present day. While differences exist – such as unemployment rates and population sizes and densities – these nations are the most readily comparable, and their “similar social histories” have formed the basis for previous firearm homicide analysis (McPhedran et al., 2011).

6.2.2 Firearm Legislation and Homicide: Research in New Zealand

New Zealand would be a ready comparator to Canada due to the similarities in their firearm regulations. Firearm regulations in New Zealand have historically emphasized licensing and training owners rather than registering and tracking individual firearms. Indeed, New Zealand abolished a registration system for firearms equivalent to the Canadian non-restricted category in 1983, replacing it with an owner testing

system (Newbold, 1999, p. 65). The reasons cited for abolition and lack of reinstatement included a lack of utility, inaccurate records, and the prohibitive cost of restoring data to a workable standard for little perceived payoff, as well as opposition from the shooting and hunting communities (Newbold, 1998). Both the abolition and the arguments for it parallel Canadian developments.

Unfortunately, there is little empirical and quantitative research regarding the impact of New Zealand's registry abolition on homicide. Previous authors attempting to analyze firearms and homicide in Canada, New Zealand, and Australia were not able to locate reliable New Zealand data from before 1986, three years after the *Arms Act 1983* abolished the registry system (McPhedran et al., 2011). The research instead compared the post-registry system in New Zealand to the universal registration systems of Canada and Australia, and concluded that – though New Zealand maintained the most permissive system of the three – New Zealand also experienced the “most pronounced decline in firearm homicide” (McPhedran et al., 2011). A further study categorizing firearms deaths in New Zealand found no significant changes to the homicide rate after the registry was abolished and described firearms as not being a “major public health problem” in the country (Newbold, 1999; Norton & Langley, 1999). Some additional literature exists indicating a potential link between New Zealand firearm regulations and firearm suicide, though a link with an overall suicide decline was not established (Beautrais, Fergusson, & Horwood, 2006).

6.2.3 Firearm Legislation and Homicide: Research in Australia

Australia has produced considerably more research on firearm homicide than New Zealand, perhaps due to the rapid changes to firearm legislation made in 1996. Before 1996, Australian states generally governed their own legislation on firearms. After several high-profile incidents during the 1980s and 1990s, increased state-level controls culminated in the National Firearms Agreement, drafted and passed after a lone attacker with a firearm killed thirty-five people in Port Arthur, Tasmania (McPhedran, 2016; Stroebe, 2015). The NFA¹³ harmonized state laws, created a national firearm registry, introduced waiting periods for firearm sales, increased storage requirements, increased licensing regulations, and required applicants to provide a valid reason for owning a firearm (Santaella-Tenorio et al., 2016). Many common firearms were banned outright, and a buyback scheme organized by the government resulted in the surrender of 650,000 civilian firearms for destruction (Leigh & Neill, 2010).

¹³ This is not to be confused with the Canadian National Firearms Association, an advocacy group which abbreviates itself as the NFA.

Research into the NFA has not only failed to produce an academic consensus as to its efficacy in reducing either firearm or overall homicide rates, but has resulted in two competing camps of authors producing diametrically opposed analyses using the same sources of data and similar methods (W. S. Lee & Suardi, 2010). This section will examine a selection of major papers regarding the efficacy of the NFA, and propose to what extent they may be sufficiently generalizable to the Canadian context.

The first study examined analyzes three periods in the legislative history of Victoria: pre-reform, post-state-level reform, and post-NFA (Ozanne-Smith, Ashby, Newstead, Stathakis, & Clapperton, 2004). This is a potentially useful example, as initial state-level reforms in 1986 included the registration of firearms. The study also had the luxury of using the rest of Australia as a comparator for part of the analysis. The analysis found that overall rates of homicide and suicide remained steady despite a significant decline in firearm suicides, indicating method substitution and a potential counterpoint to the means availability thesis. The declining trend in firearm-related deaths by assault was not statistically significant ($p = 0.108$). However, the study could not demonstrate a causal relationship with the methodology used.

A series of studies conducted in succession over the late 2000s form the core of the Australian academic debate. The first examined pre- and post-NFA deaths by firearm using an ARIMA time series design with data from 1979 – 2004 (Baker & McPhedran, 2007a).¹⁴ With a focus on homicide by firearm, the study also included suicide, accidental death, non-firearm homicide, and non-firearm suicide. The authors argued against the elimination of – or special attention to – outliers caused by mass shootings, and found no significant difference in firearm homicide between the actual post-NFA trend and the assumed trend without the intervention. The conclusions did not support method substitution for homicide, but did for suicide. The authors suggested the partial applicability of rational choice theory, where the legislation may impact method used due to micro-level changes in cost-benefit, but is unlikely to impact the global trend.

The second study sought to address perceived flaws in Baker's work (Chapman et al., 2006). The authors separated firearm and non-firearm deaths, total deaths for homicide, and total deaths for suicide to account for potential method substitution. They then utilized a negative binomial regression model to detect the significance of changes in trend. The authors concluded that firearm deaths, firearm suicide,

¹⁴ Chapman obtained advance access to this document, as noted in their references (Chapman et al., 2006).

and firearm homicide were all reduced post-reform, with no evidence of method substitution. However, they noted an increase in unintentional firearm deaths. It is critical to point out that – though the authors asserted the NFA was responsible for a decline – several of these changes failed to reach statistical significance, an unexplained contradiction noted by other researchers (Baker & McPhedran, 2007b; W. S. Lee & Suardi, 2010). A later work by Chapman using negative binomial regression found no decline in firearm deaths attributable to the NFA (Simon Chapman, Alpers, & Jones, 2016). A further study of the Australian firearms buyback found a significant decrease in suicide, but found no statistically significant reductions in homicide related to the buyback (Leigh & Neill, 2010).

The affiliations of the authors should be noted. Chapman retained an affiliation with the Coalition for Gun Control, whereas Baker and McPhedran both acknowledged affiliation with various firearm sporting associations (Baker & McPhedran, 2007a, 2007b; Chapman et al., 2006).

Outside authors sought to address the divide. Lee and Suardi (2010) noted a lack of consensus, and developed a model specifically to account for perceived deficiencies (Hemenway, 2009) in research conducted by both sets of authors – a time series ARIMA design using unknown breaks. This type of model may be useful for analyzing legislative impact, as the year in which a legislative change occurred may not be the one in which the impact was felt. While this model increases the probability of finding a statistically significant change by random chance, it is also less biased toward confirming the null and is more able to realize lag or anticipatory effects. While the authors found two structural breaks, both were well before the implementation of the NFA. No evidence was found suggesting impacts on either firearm homicide or suicide, or to suggest method substitution. The authors also noted the potential generalizability to Western nations excluding the United States, and the utility of examining Australia due to its relative geographic isolation.

Despite an apparent lack of consensus among Australian academics, some conclusions may be drawn. A review of the above firearm research in Australia – which found no significant impact of the legislation on firearm homicide rates – incorporated some methodological options which may be practical for this thesis. The review suggested isolating specific elements of legislative change. It also considered the Poisson, negative binomial, and ARIMA time series methods to be valid, especially as they have all confirmed similar results, while suggesting further research to identify those elements responsible for firearm

homicide declines (McPhedran, 2016). The first two elements may be straightforwardly incorporated in this paper, whereas the third remains beyond its scope and will require further research.

Further to methodology selection, most Australian studies preferred the use of straightforward time series designs. Most studies, even when reaching opposite conclusions, also indicated scepticism in adjusting for firearm ownership levels due to the potential unreliability of the data and confirmation bias in survey responses (Baker & McPhedran, 2007a; Chapman et al., 2006; McPhedran et al., 2011). The wide variation in Canadian firearm registration compliance estimates, elaborated on elsewhere in this paper, implies this choice is likely correct in the Canadian context as well.

The conclusions themselves provide insight into forming a hypothesis. Neither the most recent meta-analysis nor the main re-analysis of existing Australian data indicates any impact by the NFA as a whole on firearm homicides, in spite of Australia's strict legislative requirements, relative isolation, and strong ability to control its borders (W. S. Lee & Suardi, 2010; McPhedran, 2016). No studies analyzed only portions of the NFA, such as registration (McPhedran, 2016). Most recent studies did not detect an impact on homicide rates (Baker & McPhedran, 2007a; Chapman et al., 2016; W. S. Lee & Suardi, 2010; McPhedran et al., 2011). In a number of the Australian studies which did suggest a decline, that decline did not reach statistical significance (Baker & McPhedran, 2007b; Chapman et al., 2006; Leigh & Neill, 2010). No studies noted an increase in homicide due to the legislation. Due to these factors, it is unlikely that the registration of firearms alone would result in a statistically significant increase or decline in homicide rates in Australia.

6.2.4 Firearm Legislation and Homicide: Research in Canada

The above reviews of global and comparative nation literature confirm that work specifically regarding firearm registration as an isolated program is lacking. While some American studies have discussed registration of firearms, these studies are uncommon and rarely incorporate registration as the sole focus of study. Most importantly, these registries often did not occur in the same context as the Canadian registry, or dealt with other types of firearm such as handguns or automatic rifles (Alpers & Rossetti, 2017; Santaella-Tenorio et al., 2016; D. W. Webster et al., 2001) – both of which had registration requirements in Canada both before and after the long-gun registry was extant, and have been noted to follow different patterns of use and recovery (Morselli & Blais, 2014; Williams & Poynton, 2006). Studies in comparable

countries did not – or, in Australia’s case, could not – focus on registration alone, and some authors (eg. McPhedran, 2016) have noted this inability to separate interventions for individual study.

Canada-specific literature should lend more insight into the utility of domestic firearm regulation. Canadian literature retains the same three broad categories present in the general literature: a no-impact strand, encompassing ideas of either method substitution and displacement or offsetting increases in defensive use versus criminal use; a more guns, more crime thesis, tied to means availability; and a few examples of a more guns, less crime hypothesis emphasizing defensive usage or deterrence. Academic studies examining the three most relevant pre-2012 legislative interventions – Bills C-51, C-17, and C-68 – were found in the same manner as those in the theoretical framework and comparable nation sections, using the search term “Canada + [legislation] + firearm homicide.” Forward and backward snowballing yielded additional results, including a detailed French-language study (Blais, Gagné, & Linteau, 2011). The results of each major study will be examined in the order of the legislation,¹⁵ while the works incorporating more than one will be examined in the section of the last legislation studied.

Bill C-51 is the earliest of the three legislative instruments, as well as the most studied. Eight studies which contributed to quantitative research and were not sponsored by partisan organizations are incorporated in this study. Government-commissioned studies were excluded due to publication bias, following evidence that studies contradicting government perspectives were not released (Brown, 2012, p. 173). Available government studies have been added for context, but were not incorporated into the conclusions drawn.

Of the studies examined, two concluded that C-51 reduced homicide rates. The first split homicides into pre- and post-intervention blocks, from 1972 to 1976 and 1977 to 1982, with separate categories for firearm, overall, and non-firearm homicide. It then compared mean standardized rates between the two, and concluded that firearm homicide decreased, non-firearm homicide rates increased, and that victims killed per suspect decreased. The reduction in victims per suspect led the authors to the conclusion that access to firearms was effective in reducing firearm homicide, even though substitution was observed (Sproule & Kennett, 1988). However, others noted that the selected intervention points were incorrect.

¹⁵ For further detail on the contents of each intervention, please refer to the *History* section of this thesis.

Bill C-51 was not fully implemented until 1979 (Mundt, 1990), resulting in a skewed data set readily apparent upon visual inspection.

Another study examining all three major pieces of legislation concurred with Sproule and Kennett's C-51 results and is examined below (Blais et al., 2011). Two additional government reviews concluded that an intervention had an impact, though the full text of these reviews (eg. Scarff, 1983) could not be located for analysis. Authors critiqued the 1983 government-commissioned report for using incorrect intervention dates, with a break point of 1975 (Mundt, 1990).

Four authors studying C-51 found no impact, two of which will be discussed following the Bill C-68 section (Langmann, 2012; McPhedran & Mauser, 2013). The first in this section examined violent crime, suicide, and accidental death in a comparative analysis of rates in Canada and the United States (Mundt, 1990). The study was essentially exploratory, and most notable for examining methodological flaws in the works above. The conclusions suggested that C-51 had no impact on homicide, but that it may have flattened a potential increase caused by rising firearm ownership in Canada. However, as no reliable Canadian ownership data is available¹⁶ and the analysis was not subject to rigorous statistical analysis, this study is most valuable for its examination of previous works.

Mauser and Holmes (1992) used a pooled, cross-sectional time series design to analyze C-51. They sought to control for several potential causal factors, such as unemployment rates and the percentage of male youth in the population. The strongest linked factors were the proportions of the population consisting of indigenous peoples¹⁷ and male youth. When time was introduced as a factor to account for the homicide trend, any effect of Bill C-51 was reduced to insignificance, though the authors acknowledged the possibility of overcorrection (Mauser & Holmes, 1992).

The final study in the category explicitly focused on homicide examined C-51 using a linear multiple regression analysis, where C-51 was coded as a dummy variable. While the authors did find a significant decrease in overall homicide, no significant decrease in firearm homicide was found (Leenaars & Lester, 2001). The authors conclude an impact exists, but any association seems likely to be spurious. There is no

¹⁶ Refer to Section 4.2.

¹⁷ Status Indian is the term used by the authors and Government of Canada to denote official status. Indigenous is the contemporary preferred terminology.

apparent logical reason for a gun control law to impact the homicide rate but not the gun homicide rate; other factors in the timeframe not considered by the authors, such as criminal justice reforms occurring at a similar time – which included the abolition of the death penalty (Sproule & Kennett, 1988) – provide a more plausible explanation.

One paper studied robbery involving a firearm before and after the introduction of C-51 using a pooled, cross-sectional time series (Mauser & Maki, 2003). When using an ordinary least squares model, the authors found no significant impact on total robbery or armed robbery rates. However, when using a generalized least squares model and correcting for autocorrelation – which reduced the impact of provinces with outlying data – significant increases in the same were found. The authors cautiously interpreted the results as likely having no impact, but suggested a potential causal increase may have arisen from regulatory changes which eliminated the possibility of keeping a handgun for the protection of property or at a place of business. Though an unusual result in the Canadian context, some research conducted in other jurisdictions has suggested a potential deterrent effect from the defensive use of firearms (eg. Konty & Schaefer, 2012; Kovandzic & Marvell, 2003; Lott, 2010; Moody & Marvell, 2005).

One further study examined suicide rates and Bill C-51. While suicide and homicide constitute different – if sometimes related (Brookman, 2005, p. 196) – phenomena, and the study suffered from small sample sizes, it did provide useful insight into firearm use in Ontario and the impact of C-51 on accessibility. The authors noted a shift from suicide by firearm to suicide by other methods after the enactment of the legislation, which may suggest that C-51 impacted the ability of certain groups to impulsively acquire firearms (Rich, Young, Fowler, Wagner, & Black, 1990).

Bill C-17 was the least studied in isolation, with one study examining it separately (Bridges, 2004) and three examining elements of it in combination with other legislation. Bridges (2004) examined seven years pre- and seven post-intervention to determine an impact on suicide and homicide using a simple linear model. The results showed a decline in firearm suicide and firearm homicide rates, but did not demonstrate an impact on overall homicide rates. None of the other three studies detected an impact (Blais et al., 2011; Langmann, 2012; McPhedran & Mauser, 2013).

C-68, which incorporated the long-gun registry, is the most recent legislative portion. None of the studies found examined C-68 alone, but instead incorporated all three major legislative interventions. The earliest

of the three used data from 1977 to 2004 (Blais et al., 2011). The multiple time series regression model examined homicide and gun-related homicide rates, and sought to examine whether changes were more likely to be attributable to firearm availability or changes in criminal justice reform.

The authors found statistically significant decreases in firearm homicide rates following the implementation of C-68 and C-51, without observing method substitution. By examining proxies for firearm accessibility, including restricted and prohibited registration certificates and firearm importation, they reached the conclusion that this was likely due to decreased accessibility (Blais et al., 2011).

Some limitations are apparent in applying these conclusions to the long-gun registry. Registration compliance estimates and estimates of the number of firearms available in Canada differ substantially by source, as established above. Prohibited registration certificates are subject to “grandfathering,” and therefore to natural decline among individual owners as the population ages or transfers their last prohibited firearm (Mauser et al., 2012). The intervention points chosen by the authors may also be contested. 1998 was selected as the intervention point for C-68, though all portions of the legislation were not fully implemented until 2003 (*Firearms Act, 1995*; Langmann, 2012). Therefore, only one year with the long-gun registry fully implemented is examined in the study.

The second study examined violence against women by analyzing female homicide victimization rates (McPhedran & Mauser, 2013). Reducing violence against women was a rationale cited by proponents of C-68 (eg. Rock, 1995, sec. 9708). ARIMA and Zivot-Andrews structural break tests were used to examine and locate changes in trend. Actual firearm death rates among females, both domestic and total, did not differ significantly from the predicted trend based on pre-1995 data. The actual decline in male homicides was slower than would be expected based on the pre-1995 trend. Zivot-Andrews structural break tests failed to detect significant changes in firearm homicide for men, and female homicide rate breaks did not correspond with legislation passed apart from a potential delayed C-51 impact. Though the study suffered a potential limitation in applying legislative Royal Assent as a break rather than implementation dates, the Zivot-Andrews component was designed to overcome this limitation by locating statistically significant missed points.

The third available study was conducted by Langmann (2012) using an interrupted time series regression model, ARIMA, and Joinpoint analysis with data from 1974 to 2008. A multivariate analysis of other factors

related to homicide rates was also conducted and incorporated into the time series model. No statistically significant trend changes were observed surrounding C-17 or C-51. A significant step decline was identified alongside a trend increase in firearm and long-gun homicides following the introduction of C-68. Significant changes were not found when the intervention date was set at 2003. When significant variables found by the multivariate analysis were incorporated in the model, the step effect disappeared. Joinpoint and ARIMA analyses were used to confirm the interrupted time series model. Langmann's analysis failed to demonstrate an association between firearm legislation and homicide.

The Langmann analysis constitutes the most useful Canadian legislative study on firearm and non-firearm homicides for this thesis for five reasons. First, it was one of the few to differentiate between handgun homicide and long-gun homicide, while also incorporating spousal homicide as a separate category (Langmann, 2012, p. 2303). Second, it made the widest use of varied statistical analyses to confirm its assertions by incorporating three separate methods. Third, it avoided common pitfalls related to intervention dates by extending pre- and post- periods up to eight years around legislative points, which incorporated both the passage and implementation of each piece of legislation (Langmann, 2012, pp. 2306–2307). In doing so it also analyzed the registry introduction data point, finding no significant break or change in trend (Langmann, 2012, p. 2311). Fourth, it utilized the most recent data of the studies analyzing overall homicide, allowing for the immediate aftermath of C-68 to be more effectively analyzed. Finally, Langmann followed the common practice of not attempting to control for firearm ownership by proxy; as discussed above, there was no way to test the reliability of any non-restricted ownership proxy against actual data in Canada.

Ten studies were incorporated in this section, and two government reports were briefly discussed. Of the nine studies examining the impact of legislation on interpersonal violence: three – plus the two government reports – found a potential impact of firearm legislation to reduce violent crime; one found a potential increase in activity; five found no impact of significance. Authors were more likely to find impacts related to C-51 or C-68 than C-17.

The consistent theme in firearm homicide literature examined above has been the lack of consensus on the general efficacy of controls. However, most recent Canadian research indicates no significant impact of firearm legislation on overall homicide, even where impacts on firearm-related homicide may have been found. It is also possible that defensive use of firearms, or a deterrent effect, may have had an impact

on robberies in Canada at a particular point in time (Mauser & Maki, 2003). A minority of the studies cited suggested that the success or failure of legislation in controlling access to firearms was key to observable changes in homicide rates (eg. Blais et al., 2011).

Some limitations are also apparent. Many of the reviewed studies were simplistic or incorporated serious methodological flaws that impaired their ability to provide a sound backing for a hypothesis. The impossibility of tracking ownership data – though attempts have been made at assessing proxies – makes assessing the effectiveness of the legislation on limiting availability difficult. The limited number of data points, the inability to clearly identify intervention dates, and, in older works, a reliance on visual analysis or only basic analytical methods constitute technical flaws which reduce the utility of those frameworks for hypothesis development.

Figure: Canadian Literature Review Table – Firearm Legislation and Violent Crime

Study Information	Objectives of Study	Methodology	Dependent Variables	Results
Sproule and Kennett, 1988	C-51 Impact on homicide rates	Comparison of pre- and post-intervention blocks: 1972 – 1976; 1977 - 1982	Firearm Homicide Overall Homicide Non-Firearm Homicide	Decrease in firearm homicide rate; increase in non-firearm homicide rate; decrease in victims killed per suspect
Mundt, 1990	C-51 Impact on violent crime, suicide, and accidental death involving firearms	Comparison of homicide rates between Canada and United States; visual and exploratory comparisons	Accidental death involving firearms Suicide (firearm, non-firearm) Robbery (firearm, non-firearm) Homicide (firearm, non-firearm)	No observable “dramatic” changes Suggested firearms availability increased post-legislation
Mauser and Holmes, 1992	C-51 Impact on overall homicide	Cross-sectional pooled time series model analyzing overall homicide rate C-51 coded as a dummy variable Controls for immigration, unemployment, percentage registered Status Indian, homicide clearance rate	Overall homicide rate, broken by province	No significant impact of legislation on homicide
Leenaars and Lester, 2001	C-51	Linear multiple regression analysis C-51 coded as a dummy variable	Overall homicide rate Firearm homicide rate	Significant decline in overall homicide rate No significant change to firearm homicide rate
Mauser and Maki, 2003	C-51 Impact on robbery involving a firearm	Cross-sectional pooled time series regression model (OLS and GLS)	Firearm robbery Armed robbery	No impacts detected with ordinary least squares model

		C-51 coded as a dummy variable Eleven controls, including clearance rates, male youth and Status Indian population percentages, unemployment	Total robbery	Positive relationship found between legislation and robbery using generalized least squares model
Bridges, 2004	C-17 Impact on suicide and homicide rates	Simple linear regression model with seven years on either side of intervention	Suicide rate (firearm, overall, and other) Homicide rate (firearm, overall, and other)	Mean percentage of suicide by firearm decreased; offset by increase in suicides by other methods Decrease in firearm homicide rates; corresponding decreases in both overall homicide and non-firearm homicide rates
McPhedran and Mauser, 2013	C-68 (C-17 and C-51 also tested) Impact on violence against women	ARIMA model Zivot-Andrews break test	Firearm homicide, male and female Firearm domestic homicide, male and female	No effect on pre-existing trend found after 1995 intervention Breaks found around implementation of C-51 may indicate it resulted in a trend change
Blais, Gagné, Linteau, 2011	C-51, C-17, C-68 Impact on homicide rates	Multiple time series design using provincial data Proxies for firearm ownership rates	Homicide rates	Significant drops found in number of homicides committed with firearm after C-51 and C-68, but not C-17
Langmann, 2012	C-51, C-17, C-68 Impact on homicide rates, spousal homicide rates	Interrupted time series model with multivariate analysis incorporated ARIMA Joinpoint analysis	Homicide rates (firearm, overall, non-gun, handgun)	No significant impacts observed

6.2.5 Sources and Patterns of Crime Guns: New Zealand, Australia, and Canada

A central claim of registration advocates in Canada was the potential to reduce illegal firearm usage through reductions in straw purchasing and by the removal of firearms registered to ownership. Research discussing sources of illicit firearms was identified in the three countries. A survey conducted of New Zealand inmates convicted of aggravated robbery with a firearm, murder with a firearm, or illegal possession of a firearm was examined. Fifty-one subjects were identified, of whom three had no prior convictions (Newbold, 1999, p. 68). Of the firearms recalled by the subjects, 7.6% had been purchased legally by the perpetrator, 26.4% had been stolen by the perpetrator, and the rest had been acquired from

other individuals. These acquisitions may include straw purchases and smuggling schemes. (Newbold, 1999, pp. 72–73). The majority of criminals considered firearms easy to acquire (Newbold, 1999, pp. 73–74).

The National Homicide Monitoring Program in Australia and various academic and official sources in Canada have also provided estimates of acquisition patterns for firearms used in crime. In Australia from 2005 – 2006, 87% of offenders were not licensed to own the firearm used and 90% did not have the firearm registered to them; these numbers represented slight increases from 1997 – 1998 but decreases from 2004 – 2005 (Davies & Mouzos, 2007, pp. 2–3, 18). Registration to the victim was also rare (Davies & Mouzos, 2007, p. 18).

Crime firearms seized in Canada from 2010 to 2011 were most likely to originate in the United States (84%) with the remainder originating in Canada or other countries (Morselli & Blais, 2014). 72% of seized firearms were categorized as restricted or prohibited firearms. The provincial dataset for Quebec included firearms seized from 2000 to 2011. Most firearms in the Quebec database were in the non-restricted category, 63% of which were registered; non-restricted long-guns had a shorter time-to-crime and time-to-recovery statistic than handguns and other restricted firearms (Morselli & Blais, 2014). Other data indicate that 70% of firearms used to commit homicide in Canada from 2003 to 2006 were unregistered (Dauvergne & De Socio, 2008, p. 5). As noted above, the Canadian Firearms Program Evaluation Report indicated that 46.5% of non-restricted firearms seized by police between November 2008 and February 2010 were registered (National Program Evaluation Services, 2010, pp. 29–30).

Only New Zealand did not have a rifle and shotgun registration scheme during the time periods examined. Though the registration schemes in Canada and Australia may have skewed the results by reducing straw purchases and necessitating riskier illegal acquisition models – such as international smuggling or theft – the illegal acquisition of criminally used firearms was a consistent pattern in all three countries (Davies & Mouzos, 2007; Morselli & Blais, 2014; Newbold, 1999). Handguns, which made up a disproportionate number of crime guns in all three countries, had registration requirements in each.

7 METHODOLOGY

7.1 HYPOTHESIS

Two components must be addressed in the hypothesis section. It must be determined, based on past research, whether registration is likely to have had an impact on homicide reduction in Canada. Interrupted time series analysis also requires a proposed impact model. The model must indicate which effect registration would be expected to have were it effective in order to avoid ascribing a random fluctuation to the intervention (Lopez Bernal, Cummins, & Gasparrini, 2016).

Past research is mixed on the supposed efficacy of registration. Some research has indicated that registration may be effective in reducing the availability of crime guns by preventing straw purchases or reducing their time to recovery (eg. Morselli & Blais, 2014; D. W. Webster et al., 2001). A reduction in the availability of long-guns in the possession of criminals and potential criminals would suggest a reduction in long-gun homicide rates. Depending on the theoretical lens chosen, this reduction could be offset by an increase in other methods in the presence of substitution (Alzheimer, 2010; Stroebe, 2013), or accompanied by a decline in overall homicide should substitution not be present (Alzheimer, 2010; Chapman et al., 2006, 2016; Stolzenberg & D'Alessio, 2000).

However, empirical research on the matter in Canada and comparable nations has not established a consensus regarding the effectiveness of firearm law or registration in reducing homicide rates. C-51 and measures accompanying it, which included the recategorization of certain non-restricted firearms as restricted and thereby subject to registration, have sparked research both for (eg. Blais et al., 2011; Leenaars & Lester, 2001) and against (eg. Langmann, 2012; Mauser & Holmes, 1992; Mauser & Maki, 2003) its potential to be effective. These divides have been replicated regarding C-68 (Blais et al., 2011; Langmann, 2012; McPhedran & Mauser, 2013). The National Firearms Agreement in Australia, which incorporated a registration component, has also sparked disagreement regarding its homicide reduction efficacy (Baker & McPhedran, 2007a, 2007b, Chapman et al., 2006, 2016; Ozanne-Smith et al., 2004).

In the absence of a clear empirical indicator, this thesis must assume the null hypothesis. Consequently, it proposes:

The interventions in 2003 and 2012 – the creation and abolition of the long-gun registry – will not have a statistically significant impact on homicide which may be attributed to said interventions.

Interrupted time series design still requires a hypothetical impact model describing the appearance the intervention would take were it effective. Though based on exploratory data and past research, it should be noted that the hypothetical impact model remains a speculative exercise. A successful intervention, as defined by those who introduced it, would result in an additional decline in long-gun homicide rates appreciably greater than the underlying homicide trend.

It is important to consider when this would occur. Though compliance was not measurable, the assumed change should occur at or near the intervention point in 2003 or shortly thereafter and changes in the underlying trend should be rapidly visible. Registration became mandatory in 2003, allowing its enforcement. Enforcement would have the theoretical benefit of removing firearms from potential domestic violence situations and allowing law enforcement the increased ability to recover firearms. Additionally, there is no plausible reason why mandatory registration should require more than a year to have an appreciable effect on straw purchases, as new purchases were registered immediately at the point of sale. Finally, long-guns have been identified as having shorter time-to-crime and time-to-find lengths than handguns or restricted firearms, meaning that effects of their removal should be more rapidly appreciable.

If registration was effective, an immediate step change in the analysis should be perceptible as police use begins during the first year. Similarly, a continued fall in the long-gun homicide rate over time should occur as more firearms are entered into the new system or recovered from the underground market. The impact model proposes a step decline followed by a continuing decline in the homicide rate relative to the underlying trend.

7.2 OPERATIONALIZATION

A proper operationalization of the thesis topic requires a quantitative analysis capable of reasonably determining the validity of the null hypothesis: that the registry had no statistically significant impact on homicide rates in Canada. Homicide as a legal concept is a tangible phenomenon for which quantitative data could be directly collected. Statistics Canada's socioeconomic database (CANSIM) was utilized where

possible because: the database contained the most current available data, including 2015 homicide rates while other sources ended reporting at 2014 or earlier; past annual data were updated when new information became available (Statistics Canada, 2016a); and measurement of relevant variables was consistent among years studied, avoiding instrumentation. Furthermore, national statistical agency data have been utilized in Australian and Canadian firearm homicide literature (eg. Baker & McPhedran, 2007a; Langmann, 2012; Lee & Suardi, 2010). Maintaining resource consistency may enhance the comparative value of the research.

The Homicide Survey utilizes detailed information reported to Statistics Canada by police. Included are the Criminal Code offences of murder, manslaughter, and infanticide. Manslaughter and infanticide were added to the statistics in 1974 (Statistics Canada, 2016a). Homicide incidents not constituting criminal offences, such as non-culpable homicide and justifiable homicide, are excluded from the statistics (Statistics Canada, 2016e). Three questionnaires are completed for each incident: one includes the circumstances of the homicide; one includes the details of the victim; and one, used only for solved homicides, includes the details of the accused. The method of homicide is included in the Victim Questionnaire (Statistics Canada, 2016a).¹⁸

The primary dataset used consisted of annual homicides, categorized by method¹⁹ from 1993 until 2015, the most recent available year. CANSIM tables used were 253-0002 and 253-0005, with a modification date of November 23, 2016 (Statistics Canada, 2016c, 2016d). 1993 was selected as the starting point both to ensure a roughly equal amount of data points before and during the intervention, as well as to avoid using data points from before the passage of Bill C-17 in 1991. Data from 1980 – 2015 were extracted for a confirmation test. Monthly data may have improved findings of significance by introducing more data points, but were unavailable. Canada-wide data were used due to the federal nature of the *Firearms Act* and its implementation. Population data from the same time periods were extracted from CANSIM table 051-0001 and utilized to determine rate data (Statistics Canada, 2016b).

The effectiveness dates of major legislative reform related to firearms were collected from the public record (*Firearms Act, 1995*; Parliament of Canada, 2012). 2003 was the first year in which registration was

¹⁸ For further details on Statistics Canada methodology, please see the link in the citation.

¹⁹ Methods included are shooting, stabbing, beating, strangulation, fire, other, and unknown. When multiple methods were used, the primary one causing death is selected (Statistics Canada, 2016a).

mandated, and was consequently used as the intervention introduction year in other literature (Blais et al., 2011; Langmann, 2012). This paper also tests 2001 as an intervention point in case effects were detectable from the date of voluntary registration, as explained in the following section.

Statistics Canada firearm homicide categorizations for the relevant dataset were: rifles and shotguns; handguns; sawed-off firearms; fully automatic firearms; and firearm-like objects, such as nail guns (Statistics Canada, 2016c, 2016e). The primary analysis was conducted using the rifle and shotgun category. These non-restricted firearms were the focus of the 2003 – 2012 registry. Sawed-off firearms are usually considered prohibited; though the firearms they were modified from may have been categorized as non-restricted, restricted, or prohibited, this was not possible to determine. Assuming the initial identification of these firearms would constitute a methodological error. Sawed-off firearms were consequently not incorporated into a merged rifle and shotgun category. They were not removed from the firearm homicide or overall homicide categories.

7.2.1 Exclusions

It is also important to note data which were not included. No consistent data could be located indicating compliance with storage laws or defensive firearm usage in Canada. Ownership and compliance rates were excluded due to a lack of reliable data on the subject in Canada. Regular ownership surveys, as conducted by state and private bodies in the United States, have not been made available in Canada. The Small Arms Survey, RCMP data, and surveys conducted by private organizations were either not collected with sufficient regularity, differed in their totals by millions of firearms, or originated with advocacy groups with stated public agendas related to firearm control (eg. Canada, 2006; Canadian Shooting Sports Association, 2003; Karp, 2007; Mauser et al., 2012; National Program Evaluation Services, 2010).²⁰ Measures of the registration status of firearms recovered by law enforcement are also insufficient, both due to a lack of annual data and the potential for the registration status of recovered firearms to be unrepresentative of the overall compliance rate. Some authors have also criticized ownership data for its potential to provide spurious associations when a legislative impact is the focus of study (eg. Kleck et al., 2016). The lack of reliable ownership and compliance data for non-restricted firearms means this paper cannot examine the efficacy of the Canadian government in achieving compliance with the registration component of the *Firearms Act*, but rather the effectiveness of registration *as implemented*.

²⁰ See Section 4.2.

Data on aggravated assault and attempted homicide would have been desirable inclusions to analyze the utility of the weapon instrumentality hypothesis. However, the incident-based crime statistics including the relevant data and with confirmed measurement consistency were available only from 1998 to 2015 (Statistics Canada, 2016f). This five-year gap renders a complete comparison futile at the time of writing, though future authors may wish to examine the incorporation of these data.

7.3 ANALYSES CONDUCTED

This section defines the specific statistical and analytical methods used to complete the analysis.

Multiple components were considered when selecting a suitable research methodology. The nature of the data informed the longitudinal, observational, quasi-experimental nature of the design – a randomized controlled trial or a multiple interrupted time series design, for example, were not options. An additional factor was ensuring the ability to compare the results of this research to others. As the efficacy of firearm registration has not been studied quantitatively in isolation, it was not possible to examine previous research to determine methods for measuring firearm registration. It was similarly impossible to extrapolate from many American designs, which had the ability to use state-level data as a point of comparison or control (eg. Kleck et al., 2016). Methods from previous research on firearm legislation in Canada and Australia, both of which had national-level firearms legislation impacting the entire population at a defined point in time, were examined and incorporated where appropriate. Methods commonly identified were ordinary least squares models (eg. Mauser & Maki, 2003), ARIMA (eg. Lee & Suardi, 2010), and interrupted time series regression (eg. Langmann, 2012).²¹

Three methods were selected and combined to generate the analysis. The first component consisted of an exploratory analysis to visually examine apparent relationships. The second component consisted of an interrupted time series regression, designed to identify changes both in level and rate at the points of intervention. The third component consisted of a Joinpoint analysis, conducted as an additional test to determine if changes in trend could plausibly match the intervention points. The selection of these methods will be elaborated on below.

²¹ Refer to Sections 6.2 and 6.3 for a detailed summary.

7.3.1 Exploratory Analysis

A proper exploratory analysis of data is critical to establishing parameters for rigorous statistical analysis (Hartwig & Dearing, 1979). Visual analysis provides a method by which to inform or alter hypotheses arrived at through theory, to consider appropriate methods for analysis, and to suggest potential limitations or areas for further research.

A visual exploratory analysis was conducted in Microsoft Excel. Rate data were used, with rates calculated per 100,000 individuals. Data were visualized using scatterplots and simple linear and logarithmic trendlines in order to establish areas for further examination. Points of interest are noted briefly in the *Analysis* section below.

7.3.2 Interrupted Time Series Regression Analysis

The quasi-experimental interrupted time series design was used to investigate the impact of the long-gun registry introduction and removal interventions, applied to the aggregate longitudinal time-series data. This form of analysis has been identified as a powerful and useful method for investigating interventions over the course of a time series in cases where conducting a randomized controlled trial is unethical or otherwise not possible and controls are not available, including in health-related topics (Wagner, Soumerai, Zhang, & Ross-Degnan, 2002). Interrupted time series designs overcome the weaknesses of cross-sectional models in accounting for pre-existing trends (Wagner et al., 2002, p. 308) and are not commonly affected by slow time-varying confounders (Lopez Bernal et al., 2016) or accompanied by covariates (Kontopantelis, Doran, Springate, Buchan, & Reeves, 2015). ARIMA analysis was not available due to the minimum data point requirements of 25-50 not being met; though ITS designs with minimal data points should be interpreted with caution, there is no clear underlying limit (Langmann, 2012; Lopez Bernal et al., 2016; Wagner et al., 2002).

Interrupted time series designs lacking control groups suffer from several limitations. Interventions require a clear time definition. They must account for history bias; that is, they cannot coincide with cointerventions which could have a plausible impact on the results – the critical problem with analyzing federal registration programs in other nations which this thesis seeks to overcome (Soumerai, Starr, & Majumdar, 2015). Result interpretation must include caution regarding the potential for instability and regression to the mean (Biglan, Ary, & Wagenaar, 2000). The nature of the data used meant that common

methods used to improve the strength of ITS designs were not possible to use in this case: the addition of multiple groups with staggered intervention points, the addition of multiple replications, and comparisons to an isolated control group were not possible due to the federal implementation of the legislative intervention at a single defined point in each area under its jurisdiction.

However, some methods to improve the design were possible to include. The removal of the treatment occurred in 2012, allowing for the removal to be measured alongside the introduction. Non-equivalent dependent variables not expected to be impacted by the treatment could also be added as rudimentary controls. To that end, non-gun homicide and handgun homicide were used as tests alongside the main variables of overall homicide, firearm homicide, and long-gun homicide. While some of these dependent variables may be impacted by shifts in the pattern of homicide in the aftermath of an intervention, and different characteristics of victims could introduce selection bias (Soumerai et al., 2015), the presence and direction of any change may be indicative of the utility of the intervention. The value of their inclusion was bolstered by the potential for the detection of aggregate method substitution after the introduction of the first intervention.

The initial interrupted time series model was developed using a Poisson regression model and conducted in SPSS version 24. A Poisson model was fit due to the nature of the data, which met the initially observable assumptions required for a Poisson fit: dependent variables consisting entirely of count integer data; an independent variable consisting of continuous data; and independence of observations (Lopez Bernal et al., 2016). Poisson fits assume a variance equal to the mean, and the presence of overdispersion may interfere with results. Runs which showed signs of overdispersion were run again using a negative binomial model. Negative binomial regression is a modified form of Poisson regression which does not require the variance to equal the mean and has an established history of use in past firearm literature with similar design characteristics (Langmann, 2012; Lopez Bernal et al., 2016).

The final implementation dates of the registry portion of the *Firearms Act, 1995* and the *Ending the Long-Gun Registry Act* – 2003 and 2012 respectively – were used as intervention points. Pre-2003 consists of the pre-intervention phase, 2003 – 2011 the intervention phase, and 2012 – 2015 the post-intervention phase. All data sets were run using the base equation below, with the natural log of the population as the offset to calculate rate data:

$$Rv = e(\ln(Pop) + \beta_1 + \beta_2 * T + (\beta_3 + \beta_4 * (T - T_1))Int_1 + (\beta_5 + \beta_6 * (T - T_2))Int_2)$$

Where e refers to the base of the natural log (\ln), Pop is population, β_1 is the y-axis intercept, β_2 is the pre-intervention slope, β_3 is the level change following the first intervention, β_4 is the change in slope following that intervention, β_5 is the level change following the second intervention, and β_6 is the slope change following the second intervention. T_1 and T_2 refer to the time setting at the intervention points. Rv refers to the expected regressed value. Interventions are coded Int_1 and Int_2 with a coding of 0 pre-intervention and a coding of 1 for the time of intervention.

The sets run included the following categories: long-gun homicide, handgun homicide, overall homicide, non-gun homicide, and all-gun homicide. Each was run once without interventions, once with a single intervention in 2003, and again with two interventions in 2003 and 2012. Afterwards, models were tested with an intervention in 2001 and 2012 to capture potential effects from firearms registered before compliance was mandated. Both dual-intervention models were tested with a lag effect as well, with the 2003 intervention lagged into 2005 and the 2001 intervention lagged into 2003. The model used in each case is indicated in the attached table.

After the initial results were run, the dataset was extended from 1980 – 2015. The analysis remained otherwise identical to the above paragraph. This was done to see if improvements in significance at the break point could be attained through the addition of more data points. 1980 was selected as it immediately followed the full implementation of Bill C-51. The total number of data points, 35, was still below the recommended limit for conducting a Box-Jenkins analysis (Wagner et al., 2002).

7.3.3 Joinpoint Analysis

The final component consisted of a Joinpoint trend analysis. A key limitation of the interrupted time series design is the difficulty in establishing the precise time at which an intervention would have had an impact, as ITS regression requires the user to define the intervention (Lopez Bernal et al., 2016). Without the existence of reliable compliance data or other measurements of the speed of implementation, the possibility exists for a trend change to be delayed past the intervention date. Joinpoint avoids the user definition problem by detecting statistically significant changes in trend over the course of the time series and plotting the results accordingly, thereby allowing for the confirmation of intervention point selection or the detection of changes in trend missed by ITS. Though its primary application is disease research,

Joinpoint analysis has also been used in the context of suicide, and in at least one other paper on Canadian firearms legislation (Langmann, 2012).

Joinpoint analysis was conducted in Joinpoint version 4.4.0.0. It is not necessary to insert lag effects or intervention points in Joinpoint analysis, as the program automatically selects the optimal fit model. Joinpoint regression was initially conducted with a permutation test on homicide, handgun, and long-gun homicide rates. Each data set was tested to determine whether it was a best fit for a log-linear or linear Joinpoint model, and was tested using both uncorrelated and autocorrelated error grid search methods.

8 ANALYSIS: THREE METHODS

8.1 EXPLORATORY ANALYSIS

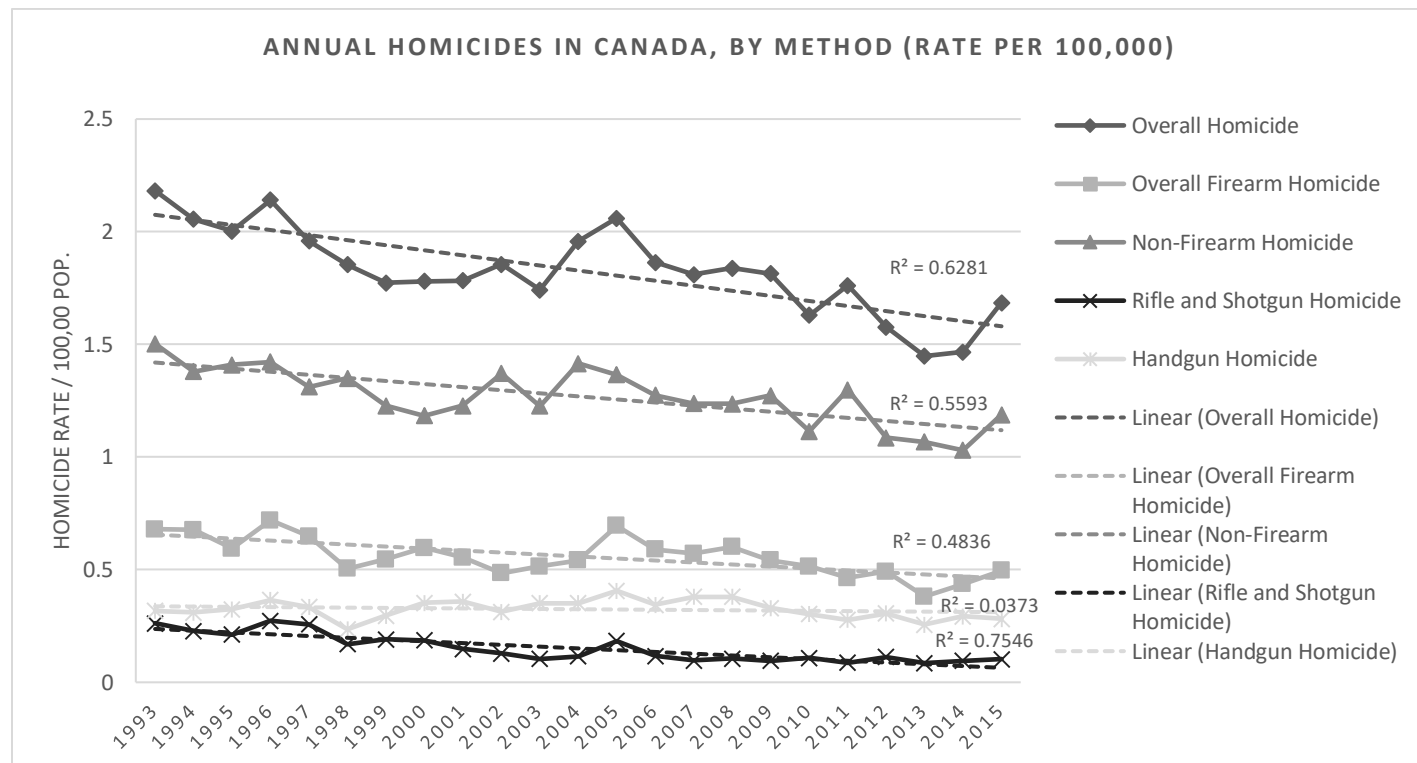
A downward trend in overall, non-firearm, rifle and shotgun, and firearm homicide rates is apparent over the entire time series and apparent in the table below. When broken down, this may be classified into three broad sections: a varying-but-consistent downward trend in homicides from 1993 to the early 2000s, followed by a quick spike, drop, and stabilization at a significantly lower rate than at the beginning of the time series through 2014, followed by a slight uptick in homicide rates in 2015. The 2015 result exceeds the overall pre-2012 homicide rate only for 2010. A downward trend in overall firearm homicide is also apparent over the time series. Handgun homicide rates remained relatively stable over the time series. Homicide by sawed-off firearm was examined to confirm its exclusion. These homicides were relatively few – a low of 6 and a high of 23 cases per year, compared to a low of 134 total firearm homicides – and fluctuated dramatically year-to-year without a clear pattern.

Firearm-related homicide trends track overall homicide trends, though with a more stable decline over the 2005 – 2012 period and a slight reversal of the overall trend from 1998 – 2004. Firearm homicide rates since 2006 appear stable. Long-gun homicides also show a persistent decline from 1993 – 2015, though outlying events and changes in trend are not as visually apparent barring the brief spike and reversion to a stable decline in the mid-2000s, which is also apparent in non-gun homicide.

The 2015 uptick may be of interest, as it occurs three years after the abolition of the long-gun component of the Canadian Firearms Registry. While this could potentially represent a delayed impact, there are factors observable in the exploratory analysis indicating that this does not seem to be the case. A visual

inspection of the slope indicates that the observable increase in the long-gun homicide rate is closely tracked by a similar increase in the handgun homicide rate, and is outstripped by the increase in non-gun homicide rates.

Table 1: Exploratory Analysis - Homicide Rates in Canada



8.2 INTERRUPTED TIME SERIES REGRESSION ANALYSIS²²

The following results were found.

Without any interventions, each model except handgun homicide showed a statistically significant decline over the complete time series, though most were subject to significant overdispersion.

Table 2: Overall Time Series - No Interventions – Poisson Distribution Model – 1993 to 2015

Dependent Variable	θ (slope)	p	d/f
LGUNHOM	-0.053	<0.001*	1.497
ALLGUNHOM	-0.016	<0.001*	2.332

²² Relevant results tables have been included in-text. Complete data tables are available upon request to the author.

ALLHOM	-0.012	<0.001*	2.634
NOGUNHOM	-0.011	<0.001*	1.852
HANDGUNHOM	-0.004	0.168	1.741

*Significant at 95%

**Significant at 90%

This was not reflected when interventions were added. Significant changes in either level or slope in sets without significant overdispersion were found only twice in the long-gun homicide category. A statistically significant positive change in slope was found with a single intervention in 2003 ($\beta = 0.04$, $p = .032$, $d/f = 1.349$). However, with a second intervention point in 2012, significance was not observed in either slope or level change at either intervention. With intervention introduction set for 2001 and 2012, and no lag applied, a significant decrease in homicide levels at a 90% confidence interval was detected in 2001 ($\beta = -0.238$, $p = 0.068$, $d/f = 1.325$). This was also perceived in the lagged model ($\beta = -0.229$, $p = 0.088$, $d/f = 1.324$). Overdispersion was moderate but acceptable in both cases. Reruns with negative binomial regression showed no significant effects whatsoever. Significant effects, besides those listed above, were not observed in the long-gun homicide rate at any intervention point using either Poisson or negative binomial models.

Table 3: Long-Gun Homicides - Poisson Distribution Model - 1993 to 2015 – Intervention Points

Model	Intervention	β (level)	p (level)	β (slope)	p (slope)	d/f
2003	2003	-0.138	0.271	0.040	0.032*	1.349
2003 + 2012	2003	-0.080	0.572	0.025	0.321	1.464
	2012	0.084	0.718	0.025	0.747	
2001 + 2012	2001	-0.238	0.068**	0.006	0.804	1.325
	2012	0.082	0.720	0.024	0.755	
2003 + 2012 (lagged)	2003	-0.047	0.724	0.018	0.509	1.476
	2012	0.264	0.222	-0.060	0.433	
2001 + 2012 (lagged)	2001	-0.229	0.088**	0.007	0.794	1.324
	2012	0.079	0.730	0.023	0.763	

*Significant at 95%

**Significant at 90%

Significant effects were detected in other cases using Poisson regression. Handgun homicide rates with a single intervention showed a statistically significant increase in level in 2003 ($\beta = 0.207$, $p = 0.01$, $d/f = 1.136$), but an accelerated decline in slope ($\beta = -0.031$, $p = 0.018$). A similar level break was observed in 2003 when a second intervention point was added ($\beta = .202$, $p = 0.023$), though significance decreased for the decline in slope ($\beta = -0.03$, $p = 0.07$). The lagged 2003 model produced a significant level increase ($\beta = 0.364$, $p = .002$) and a slope decline ($\beta = -0.053$, $p = 0.005$) at the first intervention, but no significant

results at the second intervention. The 2001 unlagged model demonstrated a level increase ($\beta = 0.179$, $p = 0.047$), as did the lagged model ($\beta = 0.263$, $p = 0.016$). Changes in slope were observed in neither. All handgun models showing significant effects showed no or minimal overdispersion.

Table 4: Handgun Homicides - Poisson Distribution Model - 1993 to 2015 - Intervention Points

Model	Intervention	β (level)	p (level)	β (slope)	p (slope)	d/f
2003	2003	0.207	0.010*	-0.031	0.018*	1.136
2003 + 2012	2003	0.202	0.023*	-0.030	0.070**	1.258
	2012	-0.059	0.662	0.016	0.729	
2001 + 2012	2001	0.179	0.047*	-0.009	0.639	1.412
	2012	-0.098	0.461	0.002	0.969	
2003 + 2012 (lagged)	2003	0.154	0.082**	-0.038	0.036*	1.189
	2012	0.028	0.821	-0.012	0.786	
2001 + 2012 (lagged)	2001	0.154	0.118	-0.015	0.458	1.393
	2012	-0.089	0.507	0.004	0.928	

*Significant at 95%

**Significant at 90%

Overall gun homicide rate analyses showed too much overdispersion in Poisson regression to reliably detect results, except in the 2003 – 2012 lagged model where a level increase occurred at the 2003 intervention point ($\beta = 0.195$, $p = <0.001$, $d/f = 1.433$). No significant results were observed when overall gun homicides were analyzed using negative binomial regression.

Significant changes in overall homicide rates were observed in the lagged 2003 – 2012 model ($d/f = 1.337$), with a significant increase in level in 2003 ($\beta = 0.394$, $p = <0.001$), a rate increase in 2012 ($\beta = 0.05$, $p = 0.015$), and a level decrease in 2012 ($\beta = -0.142$, $p = 0.018$). All other Poisson results suffered from high overdispersion, and subsequent reattempts using negative binomial regression did not result in significance.

Table 5: Overall Homicides - Poisson Distribution Model - 1993 to 2015 - Intervention Points

Model	Intervention	β (level)	p (level)	β (slope)	p (slope)	d/f
2003	2003	0.135	<0.001*	0.002	0.720	2.098
2003 + 2012	2003	0.110	0.004*	0.009	0.187	1.814
	2012	-0.174	0.003*	0.036	0.072**	
2001 + 2012	2001	0.071	0.061**	0.023	0.002*	1.834
	2012	-0.192	0.001*	0.029	0.135	
2003 + 2012 (lagged)	2003	0.114	0.003*	0.008	0.266	1.619
	2012	-0.008	0.884	-0.054	0.005*	
	2001	0.095	0.021*	0.021	0.009*	1.984

2001 + 2012 (lagged)	2012	-0.192	0.001*	0.029	0.146	
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*Significant at 95%

**Significant at 90%

Finally, changes in non-gun homicide rates were observed in the 2001 – 2012 lagged and unlagged models, as well as in the 2003 lagged model. In all cases, 95% significance was attained for a level increase in 2001 or 2003 and a level decrease in 2012. The 2001 models both showed a positive change in homicide rates, though the unlagged model only attained 90% significance. The 2003 unlagged model suffered from some overdispersion ($d/f = 1.527$), with significant results including a level decrease in 2012 ($\beta = -0.171$, $p = 0.015$) and a less significant level increase in 2003 ($\beta = 0.083$, $p = 0.073$). It also recorded an increase in rate change in 2012 at 90% significance. No other significant results were found using Poisson or negative binomial regression.

Table 6: Non-Gun Homicides - Poisson Distribution Model - 1993 to 2015 - Intervention Points

Model	Intervention	β (level)	p (level)	β (slope)	p (slope)	d/f
2003	2003	0.106	0.010*	0.000	0.972	1.688
2003 + 2012	2003	0.083	0.073**	0.007	0.432	1.527
	2012	-0.171	0.015*	0.036	0.125	
2001 + 2012	2001	0.094	0.041*	0.022	0.016*	1.289
	2012	-0.182	0.008*	0.033	0.159	
2003 + 2012 (lagged)	2003	0.084	0.064**	0.008	0.384	1.427
	2012	-0.021	0.743	-0.048	0.037*	
2001 + 2012 (lagged)	2001	0.154	0.118	-0.015	0.458	1.373
	2012	-0.089	0.507	0.004	0.928	

*Significant at 95%

**Significant at 90%

When the time series was extended to 1980 – 2015, some minor changes from the 1993 – 2015 component of analysis were observed. Poisson regression analysis resulted in increased overdispersion when compared with the 1993 – 2015 dataset. Though significance sometimes increased, as with the single-intervention long-gun homicide slope trend ($\beta = 0.034$, $p = 0.008$), it was in each case countered by increased overdispersion ($d/f = 1.762$). Significance was also achieved for the 2003 lagged trend in the 2003/2012 double-intervention long-gun set ($\beta = -0.027$, $p = 0.008$), though again with increased overdispersion ($d/f = 1.659$). No other significant changes were achieved without the consequent overdispersion invalidating the assumptions of a Poisson distribution.

A negative binomial reanalysis of the 1980 – 2015 dataset confirmed significance for overall decline in the long-gun homicide trend without intervention. It also confirmed the pre-intervention trends in the single intervention long-gun series in 2003 and for the 2003/2012 lagged and unlagged data, but changes at the intervention points did not achieve significance. No changes of significance from the base 1993 – 2015 dataset were observed.

8.3 JOINPOINT ANALYSIS

The first Joinpoint analysis was conducted with long-gun homicide data using both uncorrelated and autocorrelated error grid search methods without log transformations. All tested models using the 1993 – 2015 data set returned a trend change in 2003 with the same or similar significance, regardless of whether an autocorrelated or uncorrelated grid search was chosen or whether a Poisson variance or standard error calculation were used. Overall homicide rates were tested using the same method. Trend changes were observed in 2000 and 2005. Changes in trend were not observed for non-gun homicides without autocorrelation correction, but were observed in 2000 and 2004 in the corrected model.

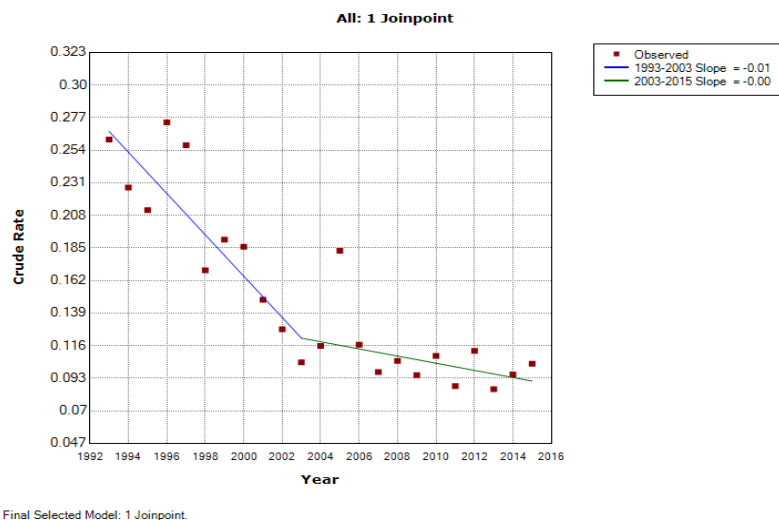


Figure 2: Joinpoint Model - Long-Gun Homicides - 2003 Joinpoint

Table 7: Joinpoint Analysis - Long-Gun Homicide Trend Change - Linear Model

Method	Joinpoints	Confidence Interval	Mean Squared Error	p	Significance
Standard Error Uncorrelated Permutation	2003	2000 – 2009	1.146	0.695	0.025

Poisson Uncorrelated Permutation	2003	2000 – 2009	1.146	0.695	0.025
Standard Error Autocorrelated Permutation	2003	2000 – 2009	1.146	0.687	0.025
Poisson Autocorrelated Permutation	2003	2000 – 2009	1.146	0.687	0.025

9 DISCUSSION AND CONCLUSION

9.1 EXPLANATION OF SIGNIFICANT RESEARCH FINDINGS

The interrupted time series analysis of long-gun homicides indicated a positive change in slope at the 2003 intervention point when only one intervention was considered. However, any changes in trend were reduced to insignificance when the intervention removal point was introduced 2012. A step decline in long-gun homicides was achieved on the model lagged in from 2001. This may be attributable to voluntary early registration, but the introduction of licensing in 2001 requires these results to be interpreted with caution. This is not to suggest that licensing did have an impact – licenses for handguns were introduced at the same time, and a step increase in handgun homicide was observed in 2001 – but that it may present an avenue for further research.

Other than a decline in the rate of handgun homicides in 2003 and a decline in the rate of overall homicides in 2012 utilizing the 2003/2012 intervention models, no changes in trend were observed. When combined with the lack of positive or negative trend changes observed in the long-gun model, neither of these changes in trend appear to have the potential to be attributable to the introduction of the long-gun registry.

The Joinpoint model was used to confirm the presence of a change in trend for long-gun homicides. The applied Joinpoint models all confirmed the occurrence of a change in trend in or around the year 2003, corresponding with the intervention point selected for the interrupted time series regression model.

Therefore, it is evident that the overall findings of the research cannot support a conclusion other than the null hypothesis: that the registry intervention had no statistically significant impact on homicide which could plausibly be attributed to it.

9.2 DISCUSSION AND RECOMMENDATIONS

9.2.1 Academic Discussion

This thesis has made two important additions to the academic discussion surrounding registration and its potential to reduce violent crime by controlling availability. First, it has made a direct contribution to address an existing knowledge gap in the Canadian literature by providing independent research regarding the efficacy of firearm registration (Gabor, 2003b; Langmann, 2012). Second, by analyzing the implementation and abolition of the Canadian Firearms Registry, it provides one of the few global data points on the isolated introduction and removal of a national registration scheme. This additional data point provides an important addition to state-level registration studies conducted in the United States, which may constitute an outlier regarding firearm research (Hemenway et al., 2002; McPhedran, 2016).

This research does not constitute a breakthrough regarding any available academic thesis; the design could not establish *why* registration did not have an effect, as the ability to control for certain critical variables – such as compliance – was not present. However, registration in Canada nonetheless constituted an attempt to reduce the availability of the means to commit homicide across an entire population. That registration had no apparent effect, including a lack of substitution effects, may indicate one of three causal categories.

First, it may show that limiting means availability in Canada, specifically regarding rifles and shotguns, is an ineffective homicide reduction strategy. There are some reasons provided above which hint why this may be the case. The availability of legal firearms may not be associated with criminal activity, unlike the availability of illegal firearms (Stolzenberg & D'Alessio, 2000). In Canada, firearms primarily recovered in crime tend to be handguns (Morselli & Blais, 2014). Therefore, controlling the availability of means may only be useful when applied to *some* means – which, in Canada, did not include rifles and shotguns. The type of homicide committed with rifles and shotguns may also be independent of registration – that is, those committing crimes with rifles and shotguns may not fall into a category likely to be impacted by registration. Those intending to acquire criminal firearms may substitute firearm sources as available. The

low registration rate of firearms recovered by police in Canada and Australia compared to compliance estimates may be indicative of a trend and should be examined further (National Program Evaluation Services, 2010, pp. 29–30).

Second, the operational ineffectiveness of the Canadian Firearms Registry – or even registration generally – may have been the contributing factor regarding the lack of impact. Data inaccuracies, a problem with the registration system in New Zealand, were also evident in Canada (Canada, 2006; Newbold, 1998). Though estimates of compliance differed from low to high depending on the source (Brown, 2012; Canadian Shooting Sports Association, 2003; Cotter, 2014) and were not considered reliable (Canada, 2006, p. 108), if a low compliance rate were present it may have hampered the effectiveness of registration. A carrot-and-stick approach of extended amnesties (CBC News, 2009) and prison sentences (Brown, 2012, p. 219; Criminal Code, n.d.) may not have been effective in raising compliance rates to a critical level; indeed, low trust of the government due in part to the proposed sentences may have discouraged compliance among firearm owners (Brown, 2012, pp. 218–220).

Third, the lack of impact may have been due to a combination of operational and theoretical concerns. For example, registration may have been made redundant by licensing. The above analysis indicates some trend changes occurring in 2001, when licensing was implemented. The strategy of controlling the availability of firearms to trusted owners may be a preferable alternative to tracking the firearms possessed by them. It should be noted that discernable changes surrounding licensing were not detected by other recent studies in Canada (Langmann, 2012).

This thesis has contributed to the academic debate, but not to the point of dismissing or confirming any particular theory. The results do not support the means availability hypothesis, as no impacts from registration were detected. However, it cannot dismiss the potential for means availability to have a marked effect in Canada until more details are known. Furthermore, though insufficient to determine the ability of criminals to rationally substitute some sources of crime guns for others, the potential for source substitution should be examined.

9.2.2 Policy Recommendations

The results of the analyses conducted by this thesis also have public policy implications in Canada. The lack of any observable decline in long-gun homicides shows that the claims made by proponents of the registration system that the legislation was responsible for a significant decline in homicide rates or a significant number of lives saved (McCarthy, 2002; Rock, 2008) do not appear to be supportable. Consequently, the significant funds (Canada, 2006) used to implement the program may have provided greater benefits to public health if allocated elsewhere. Furthermore, without an obvious benefit provided by a federal system, the implementation of registration systems applicable to individual provinces is less likely to provide discernible benefits, as crime guns may simply be sourced from other provinces. Other jurisdictions should consider examinations of their registration systems to determine whether they represent cost-effective homicide reduction measures. These examinations may include audits of compliance and data accuracy.

The policy recommendations should not be overstated. Homicide reduction is one component of the debate surrounding firearm registration, and others should be considered in a full analysis of any system. The findings in Canada also may not be applicable to other jurisdictions. The proximity of Canada to the United States, which provides the source of many illegal firearms used in Canada, may impact results – though illegally imported crime guns from the United States generally consist of handguns and other restricted or prohibited firearms rather than non-restricted firearms (Morselli & Blais, 2014). The possibility remains that registration systems may have strong benefits in other nations lacking this factor.

9.3 LIMITATIONS

Some limitations have been mentioned above, especially necessary exclusions such as compliance data. These limitations reduce – but do not eliminate – applicability to some theoretical explanations of homicide and firearms. They have been explained above. A further limitation may include the end of the data run in 2015, which may have resulted in reduced findings of significance for the 2012 intervention removal and therefore may have been insufficient to establish a post-registry trend.

The selected interrupted time series design, limited by the nature of data available in Canada, also has limitations worth additional consideration. Some methods of improving the design were not available: for example, no independent control group was available for comparative purposes, though other homicide

methods were observed to see if any concurrent changes could plausibly be attributed to long-gun registration. The single examined case may also have hampered external validity, and direct applications of this data to other nations with registration should be treated with caution (Biglan et al., 2000). Some threats to internal validity were possible. The analysis did account for history bias through careful selection of introduction points and ensuring sufficient data on both sides of each intervention where possible (Soumerai et al., 2015). The removal of the intervention at the second point should also have reduced the likelihood of co-occurring effects. The possibility of co-occurring events, however unlikely, cannot be ruled out, and the 2001 intervention point may have been contaminated by the licensing intervention (Britt, Kleck, & Bordua, 1996). The possibility of regression-to-the-mean also existed – some observable changes in trend, such as the 2003 observed step increase, may have been caused by a natural halt to an existing downward trend and should be examined further.

9.4 FUTURE RESEARCH

Some questions for future research have been raised above. The most critical of these is the continued re-analysis of the dataset as more data become available. More data may allow for the utilization of new techniques to confirm the results reached here (Wagner et al., 2002). Other models may also be considered with the introduction of a registration system in Quebec. Though not directly comparable due to a lack of criminal penalties or border controls, the new registration system may present an opportunity for comparative studies to take place (Langmann, 2012).

The introduction of additional metrics may provide insight into why registration was not effective in Canada. The success of governments in encouraging compliance with registration, and the use of amnesties as a tool to encourage compliance, should be examined. Further research on sources of crime guns, patterns of homicide with different firearm types, and the ability of criminals to substitute some firearms for others should also be examined in Canada. The reasons of some firearm owners for resisting compliance should also be considered, and may prove a useful addition to literature regarding the role of trust in governance.

Finally, external validity is limited by the selection of a single case. Examining the utility of registration in other jurisdictions to determine the presence of a similar effect may be useful for determining whether registration is an effective tool for reducing homicide, especially if licensing and other regulations may be controlled for.

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