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Financial History and Political Institutions

Bert S. Kramer

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university of
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Financial History and Political Institutions

PhD thesis

to obtain the degree of PhD at the
University of Groningen
on the authority of the
Rector Magnificus Prof. C. Wijmenga
and in accordance with
the decision by the College of Deans.

This thesis will be defended in public on

Monday 31 May 2021 at 14.30 hours

by

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Chapters 3, 4, and 5 of this thesis are joint works with one or two co-authors. I am indebted to each of them for their contribution to this thesis

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Arnhem, 24 March 2021

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Chapter 1

Introduction

The 2008 financial crisis took most economists by surprise. After two decades of financial and macroeconomic stability — a period that became known as the “Great Moderation” — academics, policy makers, and market participants alike were shocked by the global financial crisis. This crisis, and the recessions and sovereign debt crises that followed it, were an unwelcome surprise not just to those whose income and wealth were affected. The unwelcome surprise was felt just as painfully by those whose beliefs were proven wrong — in particular, by those within the economics profession who had been led to believe that major financial crises were something of the past (Reinhart and Rogoff, 2009).

Hamstrung by models and theories which neglected the role of financial and monetary shocks, economists shifted their interest to what history had to tell them. According to Eichengreen (2012), p. 289:

“This has been a good crisis for economic history. (...) Journalists, market participants, and policymakers all turned to history for guidance on how to react to this skein of otherwise unfathomable events.”

The global dimension of the financial crisis furthermore highlighted the importance of political and institutional factors. Such factors were important both in the run-up to and in the transmission of the crisis globally, as well as for the challenges that policy makers faced during its resolution.

Government-financed bank bailouts led to wide-scale protests against the financial sector by those that felt that it had neglected the interests of the working class. Likewise, the measures that were taken to tackle the European sovereign debt crisis are commonly seen to have enkindled sentiments against financial globalisation as well as a resurgence of economic nationalism (Guiso et al., 2017), reminiscent of historical turns towards nationalism in the wake of financial crises (Funke et al., 2016). Political and institutional factors are also crucial in understanding the deregulation, and the ensuing growth, of the financial sector in the decades before 2008 (Krippner, 2011). All this highlights how financial and political developments are fundamentally intertwined.

In this dissertation, I study the interaction between financial markets and political institutions in four historical settings. The body of this dissertation consists of four chapters that each address a distinct financial or monetary research question in a distinct historical setting. In each chapter, the political or institutional setting plays a key role.

The four studies that comprise the body of this dissertation each address a distinct research question, and the settings — the regions and time periods covered — overlap only to a limited extent. The chapters can therefore in principle be read on an individual basis. That said, there is some common ground across the four chapters in terms of their historical context, the economic, financial, and political economic literature to which they speak, and the methodological approach used. In the first half of this introduction I will elaborate on this common ground. Moreover, I will set the stage by outlining the longer-run developments which envelop the four studies included in this dissertation. In the second half of this introduction I will briefly summarise all four studies. In the epilogue that follows the body of the dissertation I will reflect on the bearing that the findings of each of the chapters have on the literature, on some of their limitations, and on what I see as promising avenues for follow-up research.

1.1 Financial Markets and Political Institutions over the Long Term

Recent decades have seen a rapid growth of the financial sector across the world, in terms of its size domestically as well as its spread across borders. High levels of financial development and financial globalisation bring many opportunities and challenges.¹ When seen in a longer-term perspective, these developments are not without precedent. In fact, financial globalisation — the extent to which financial markets work across national borders — has seen a pronounced fall and rise throughout the twentieth century. Figure 1.1 illustrates this development by plotting a typical measure of financial globalisation — the total worldwide gross foreign capital stock as a ratio of world GDP — since 1870.

Figure 1.1: Index of Financial Globalisation, 1870–2000

Source: Obstfeld and Taylor (2004), Table 2.1. Plotted here is the series “Assets/sample GDP” which equals the sum of all available estimates of national gross foreign capital stocks divided by the sum of the corresponding countries’ GDP.

¹See, among many others, Rajan and Zingales (2004) for more on the opportunities, and Rodrik (2011) and Schularick and Taylor (2012) for more on some of the challenges.

After a period of increasing financial globalisation during the middle of the nineteenth century,² the decades before the First World War saw levels of global capital mobility that were unsurpassed until the 1990s. Pivotal in spurring global capital movements was the international gold standard (Polanyi, 1944): a monetary regime that minimised transaction costs and risks for international investors. Global capital mobility collapsed in the interwar years in the wake of the Great Depression and the breakdown of international monetary and financial cooperation. The Bretton Woods system that followed the Second World War allowed for relatively free trade while curtailing financial cross-border flows; a system that was inspired by the transpiration of the risks of capital mobility during the interwar.³ From the 1970s onwards, a combination of deregulation and improvements in information technology allowed global capital mobility to first recover to, and then far exceed, its pre-1914 level.

As mentioned, these financial developments cannot be understood in isolation. Instead, both the collapse of global capital mobility after World War One and its resurgence from the 1980s onwards, are inextricably linked to the political and institutional setting. For instance, one commonly mentioned reason for the fall of global capital mobility in the interwar era — and one with which I will engage in more detail in chapter 3 — is the fact that policy makers were forced to respond to domestic democratic pressures to a much greater extent than before 1914 (Eichengreen, 1992, Simmons, 1994). Vice versa, the opening up of financial markets both domestically and globally in the 1980s and '90s was driven by a combination of ideological forces in the west and a wave of democratisation in the developing world (Eichengreen, 1996).

This brings me to another important development that has taken place in the course of the nineteenth and twentieth century: the global spread and deepening of democracy. Figure 1.2 illustrates that democratic institutions have become increasingly prevalent worldwide, but also that this has not been a monotonic process. Following Huntington (1991), one can say that

²International capital movements are of course much older. For example, for a discussion of international capital markets in the eighteenth century, see Neal (1990).

³See Nurkse (1944) for a seminal discussion of these matters at the time of Bretton Woods' inception.

there have been three “waves of democratisation”: the first wave being a prolonged one that lasted up until the early 1920s, the second one being a brief one in the aftermath of World War Two, and the third one starting in the late 1970s.

Figure 1.2: Share of Democracies Worldwide

Number of democratic countries as a share of all countries worldwide. Source: author’s calculations, based on Boix et al. (2013). A country is identified as a democracy by Boix et al. (2013) if the executive and the legislature are chosen in free and fair elections in which the majority of the male population is eligible to vote.

Whether or not countries are democratic does not only determine what policies will be pursued. The institutional context also determines the extent to which these policies will effectively achieve their goals. Autocratic regimes may also in this respect differ from democratic ones. According to van Reybrouck (2013), although policy-making in a democratic society has the benefit of legitimacy, democratic consultation can be time-consuming and might not lead to optimal policy choices in terms of effectiveness. On the other hand, others have stressed that legitimacy and effectiveness should not be seen as substitutes but as complements: according to Wittman (1989), democratic

decision making can achieve both goals simultaneously. In this debate too, a historical view is indispensable, because of the profound variation in political institutions that history has to offer.

The preceding discussion has highlighted that political institutions can have far-reaching consequences for the functioning of financial markets, but also that these consequences are most likely not uniform. Whether or not, for instance, democratic institutions are conducive or hostile towards globalised financial markets will depend on the exact institutional make-up, the international setting, the dominant ideology, and/or the roles of interest groups. For a deeper understanding, a look beyond longer-term global developments to more specific and episodic studies is therefore essential. For that reason, three of the four studies presented in this thesis focus on one particular country in a limited time-frame. Chapter 3, while performing a comparative cross-country study, zooms in on one particular monetary system.

1.2 Outline of the Core Chapters

Chapter 2 concerns currency stabilisation in Imperial Russia in the two decades following the Crimean War: 1856–1875. The main question in this chapter is to what extent the absolutist Tsarist government was able to credibly stabilise its currency.

The central monetary issue in the nineteenth century was that of currency convertibility: the question whether a country's currency was tied to a precious metal like silver or gold. In the nineteenth century, money in circulation was largely composed of paper currency as opposed to metallic coins or bullion. But paper currency was often formally tied to precious metal by convertibility. In such an arrangement, any holder of currency could have his bills cashed in gold and/or silver at a fixed rate and at little cost. Convertibility thereby ensured a stable value of the currency, in terms of both its domestic purchasing power and its international exchange rate. A monetary regime where the currency was convertible into gold, silver, or both, was known as a gold standard, a silver standard, or bimetallism, respectively.

Having entered the Crimean War on a silver standard, the Russian rouble became an inconvertible paper currency in 1856. This lasted until 1897

— the year of Russia’s adoption of the gold standard (Gregory and Sailors, 1976). The value of the Rouble declined persistently over this period, among others by frequent monetisation of government expenses.⁴ The Tsarist government pursued various attempts to stabilise the rouble, but none of these were successful until 1897 (Zieliński, 1898). In chapter 2, I study international expectations about the stability of the rouble, by relying on data from the Amsterdam stock exchange. Since Amsterdam was the most important foreign market for Russian government debt for much of the nineteenth century (Platt, 1984), I view this as a good reflection of international investors’ perspective on the Russian rouble.

Foreign borrowing by governments was very common for peripheral countries throughout the nineteenth century — by 1851, the Amsterdam stock exchange listed government bonds from over 30 different foreign polities (Dinger, 1851). However, unlike most peripheral countries which were only able to borrow in a currency like the guilder or the pound (Flandreau and Sussman, 2005), much of the Russian foreign debt was denominated in its own currency. Additionally, most government bonds at the time — including those of Russia — had long maturities of up to 30 or 40 years. For this reason, the long-term value of the rouble was important to foreign bondholders; as a consequence, a stable rouble was of key importance for Russia’s access to foreign capital.

I reconstruct long-term expected values of the guilder-rouble exchange rate using the two foreign loans issued by Russia during the Crimean War. Known as the fifth and sixth 5% loan, they were issued in 1854 and 1855 respectively. The two series of bonds were identical up to one exception: whereas all payments of the 1854 loan took place purely in roubles, the 1855 loan promised its Dutch clientele a fixed interest payment in guilders. Bonds from the 1855 loan were thus subject to less currency risk than those of the 1854 loan. I use this particular trait of the two Crimean War loans to distill this currency risk. I collect monthly prices of these two series of bonds from the official price list of the Amsterdam stock exchange. I convert these prices to yields and use the resulting spread in yields between the two series to reconstruct to what extent Dutch bondholders expected the rouble

⁴Monetisation in this sense means the printing of money to cover the government’s budget deficit.

to appreciate or depreciate.⁵

The nature of the bonds and timing of other monetary events allow me to reconstruct anticipated rouble exchange rates for the period 1856–1875. During this period, three major currency reforms were undertaken in Russia. Two of these (in 1857 and 1862) attempted to bring back convertibility but had to be abandoned before long. The third involved a more modest attempt to arrest the decline of the rouble’s exchange rate and lasted from 1867 to 1875. I find that for most of the period studied, the yields on the two Crimean War loans reflect an anticipated depreciation of the rouble below its current value.

Furthermore, using the series of long-term expected rouble exchange rates thus constructed, I study to what extent Dutch bondholders revised their expectations in response to these monetary developments. Specifically, I test for structural breaks in the series of anticipated appreciation of the rouble and examine whether these breaks coincide with any of the currency reforms, or the announcement or abandonment thereof. Only one structural break (in late 1868) can potentially be connected to Russian monetary developments, and even that is at best a speculative connection. All other structural breaks seem to have no relation to any of the Russian currency reforms. Instead, major revisions to the anticipated appreciation of the rouble are often connected to geopolitical events such as the outbreaks of wars. In most cases, the respective events do not even involve Russia as such. I then illustrate the mechanism behind this process using the case of the outbreak of the Second War of Italian Independence in 1859; an event which triggered a large downward revision of rouble exchange rate expectations.

Overall, chapter 2 contains two important findings. Firstly, for most of the 1856–1875 period, Dutch holders of Russian government bonds anticipated a substantial future depreciation of the rouble, despite the Russian government’s attempts to stabilise it. Ex post, these bondholders were validated, since the rouble was only stabilised in 1897 at a value far below its 1856 parity. Secondly, neither the currency reforms pursued nor the failures thereof triggered major revisions to the anticipated future value of the rouble. Instead, foreign bondholders reacted more strongly to geopolitical developments,

⁵This approach is analogous to that of Flandreau and Oosterlinck (2012), who study currency risk on nineteenth-century Indian loans.

even when these had no direct relation to Russia. I conclude that the Russian government was unsuccessful in influencing Dutch investors' perception of the rouble. Instead, the international perception of Imperial Russia's monetary affairs was to a large extent subject to the whims of international geopolitical and financial developments. The fact that an absolutist government of a major country had little influence over foreign confidence in its currency, casts doubt on its credibility and its effectiveness in pursuing the financial policies it desired.

Chapter 3 takes the study of currency convertibility to a broader perspective. In this chapter — joint with Petros Milionis — we ask the question why countries decided to either adopt or suspend the gold standard in the period between 1860 and 1914. We argue that whether or not countries adhered to this international monetary regime depended crucially on their domestic institutional setting. Specifically, we show that countries that had more democratic institutions were, all else equal, less likely to adhere to the gold standard.

The literature on the gold standard has generally portrayed the so-called classical gold standard — its pre-1914 edition — as a relatively stable and successful international monetary system (cf. Bordo and Schwartz (1984)). This view is especially pertinent when compared to the interwar gold standard (c. 1925–1936) which is nowadays seen as a major cause of instability at the time (Eichengreen, 1992; Morys, 2014). Although many nuances to the benign view of the classical gold standard are in order (Bloomfield, 1959; de Cecco, 1974; Bazot et al., 2016), what cannot be denied is that the classical gold standard was much more long-lived than its interwar counterpart. Many countries — especially those of Western Europe — stably adhered to the gold standard for three to four decades. In other regions however, such as Latin America or Southern Europe, exits from the classical gold standard were not uncommon.

The conventional wisdom among economic historians largely attributes the failure of the interwar gold standard to the fact that after World War One policy makers in many Western countries were increasingly constrained by domestic democratic pressures (see, among others, Eichengreen (1992) and Simmons (1994)). Adherence to the gold standard, so the argument

goes, requires a very firm commitment of authorities to refrain from actions that may compromise the stability of the currency. For example, under the gold standard, a government could not run prolonged budget deficits or pursue expansive monetary policy. However, these restrictions on policy may be incompatible with domestic objectives such as safeguarding full employment or increasing wages; objectives that gained prominence as working classes were increasingly enfranchised. It has been shown that during the interwar period, more democratic countries abandoned gold convertibility earlier (Wandschneider, 2008; Wolf, 2008) and that countries that did so consequently recovered faster from the Great Depression (Eichengreen and Sachs, 1985).

We study whether, similarly to the interwar, democratisation likewise worked as a check on gold standard adherence in the pre-World War One era. The spread of democratic institutions was a process that was already well underway before 1914,⁶ and thus one may wonder whether this too affected the timing of the adoption and suspension of the gold standard in this period. We address this question by analysing the timing of adoptions and suspensions of the gold standard between 1860 and 1914.

We construct a cross-country global database ranging from 1860 to 1914. We categorise each country's monetary regime in each year and relate this to a number of political and economic variables. Our main variable of interest is the extent to which a country's institutions can be seen as democratic. We model each country's probability of adhering to the gold standard in any given year as a function of democratisation and a host of (geo)political and economic control variables. We find that more democratic countries were, all else equal, less likely to adhere to the gold standard pre-1914. A related set of survival models separately estimates this effect for adoptions and suspensions of the gold standard, showing that this effect exists for both processes, though statistically significantly only for the former.

Chapter 3 thereby contributes to the literature by demonstrating that also for the classical gold standard there was, all else equal, a negative relation between democratisation and gold standard adherence. The result both affirms and challenges the conventional wisdom on the gold standard. On

⁶By 1905, 21 countries already had universal male suffrage (Przeworski et al., 2013).

the one hand, it affirms it by demonstrating that democratisation indeed functioned as a check upon adoption of, and adherence to the gold standard. On the other hand, the fact that this check seems to have been important for the classical gold standard — just as for its interwar counterpart — suggests that democratisation cannot explain the difference between the pre- and post-World War One monetary stability. In other words, the different track-records of classical and interwar gold standard cannot be ascribed to the extension of democratic institutions alone.

In **chapter 4** monetary affairs move to a background role, as the focus is shifted to fiscal shocks. It studies the effects of a series of tax changes that took place under the only regime in recent Dutch history that can be seen as authoritarian — in fact, as totalitarian — which is that of the German occupation of 1940–1945. Under the reign of the Nazis a series of far-reaching changes were made to the Dutch tax system, many of which were not repealed after the end of Second World War (Adriani, 1946; Essers, 2012). One particularly consequential tax reform — and the one which Abe de Jong, Philip Fliers and myself study in this chapter — is the introduction of corporate taxes in the form of the 1942 *Vennootschapsbelasting* and other related measures taken in 1940–1942. We study to what extent these tax changes led to a loss of shareholder value, and to a change in financial strategy, of Dutch corporations. We do so on the basis of a set of hand-collected data of daily stock prices and annual financial statements of all domestic Dutch listed firms.

There is a large literature in corporate finance on how taxes affect firms' stock-market valuations and financing choices (Rajan and Zingales, 1995; Graham, 2003). The effect of corporate taxes on a firm's optimal capital structure was first formalised by Modigliani and Miller (1963), who argue that the deductability of interest costs implies that attracting debt is more attractive in the presence of corporate taxes. In turn, the access of firms to these so-called debt tax shields should influence to what extent tax changes affect their stock market valuations. Hence, a potentially undesirable side-effect of corporate taxation can be that it may distort the choice between equity and debt in favour of the latter.

The literature on the effects of corporate taxes on capital structures faces a number of challenges, such as the fact that tax changes are often incremen-

tal, anticipated far in advance, or endogenous to domestic economic outcomes (Givoly et al., 1992; Chang, 2014). The corporate tax reform of 1940–1942, however, constituted a large change, implemented without much prior notice, and by a foreign power with no regard for democratic consultation. We are therefore interested to learn how this tax reform affected firms’ stock market valuations and capital structure. Meanwhile, in spite of several disruptions related to the war and the occupation, Dutch financial markets continued to function throughout much of the war. Dutch GDP was only severely hit by 1944 (Klemann, 2002), and the stock market stayed open and functional until late 1942 (de Vries, 1976). We are therefore interested whether the new corporate tax induced a shift towards debt financing, as the theory of Modigliani and Miller (1963) would predict. Additionally, the effect of the tax reform on firms’ stock market valuations serves as a measure of the wealth expropriated from shareholders. We also study whether firms pursued other strategies to minimise their exposure to the new corporate tax.

We study the effect of the tax reforms on stock market valuations by analysing daily price quotes from the Amsterdam stock exchange around two key announcements. The first is the announcement in November 1940 that the marginal rate of the profit tax — which had been introduced in July of the same year — would be drastically increased. The second is the publication of three new taxes on business, the foremost of which was the *Vennootschapsbelasting*, in May 1942. We estimate the aggregate cumulative loss of firm value in the days surrounding each announcement using an event-study methodology. We find that the total value lost amounts to over *f*100 million for each event; the total loss of firm value is therefore equal to an amount roughly 3% of annual Dutch GDP at the time. We also relate individual responses of stock prices to financial characteristics of the associated firms. This analysis shows that during the first event the loss of value was relatively uniform across firms, while during the second event firms that were less profitable lost most value.

Furthermore, we study how capital structures — the shares of debt and equity used by firms — and its determinants changed after the introduction of corporate taxes. We do so by analysing capital structure using annual data from 1938 to 1948. We find that between 1942 and 1948, which is the period

of our sample when firms were subject to the corporate tax, the ratio of total debt to assets increases by roughly 5 percentage points, conditional on other firm characteristics. When we allow the determinants of the capital structure to differ between the two periods, we find that the full increase of debt ratios is driven by changes of these determinants. The changes concerned, particularly the increased effect of profitability on the debt ratio, is consistent with the theory of Modigliani and Miller (1963). We find the same overall result when we use a so-called partial adjustment model: a model often used by modern-day studies of capital structure (Flannery and Rangan, 2006; Byoun, 2008). We do not find evidence that firms used discretionary accounting choices — a phenomenon we refer to as earnings management — on a large scale to lower taxable profits.

The results of chapter 4 show that corporate taxes had substantial effects both on firms' valuations and on their financial strategies. This is a striking result, as a naive assumption may be that during a turbulent period firms may have other priorities than the minimisation of tax expenses. Our results are therefore most in line with the strand of literature that argues that fiscal concerns are a primary concern for firms' financial strategies (cf. Faccio and Xu, 2015), in contrast to an opposing strand that ascribes at most a secondary importance to taxes (cf. Myers, 2001).

Whereas the preceding three chapters are concerned with how political decision making affects financial outcomes, the fourth substantive chapter of this dissertation asks how financial incentives affect politics itself. **Chapter 5**, joint with Christopher Kam and Daniel Irwin, studies the remuneration of members of Canadian parliaments. Our main research question is how these members have responded to changes to their remuneration — specifically, to their retirement allowances — in the second half of the twentieth century.

The policy analysis that we undertake in chapter 5 can be seen in light of a debate in political science and public policy about the compensation of public representatives. The compensation of parliamentarians is often a very contentious issue, and any increase to the compensation of representatives is almost guaranteed to lead to a populist backlash.⁷ But there are good reasons to pay politicians, and to pay them decently. Remuneration serves

⁷See Mause (2014) for a European perspective on this issue; for a perspective (much) closer to where this dissertation was written, see de Bruijne (2011).

to ensure that anyone — regardless of socio-economic status — can afford a political career. It also serves to counteract corrupt practices which may ensue if civil servants' salaries are limited (van Rijckeghem and Weder, 2001). Furthermore, remuneration serves to attract talented individuals to politics (Ferraz and Finan, 2008) and to entice them to remain in politics for lengths of time that ensure continuity of political representation.

In Canadian politics, this continuity was for a long time rather problematic (Atkinson and Docherty, 1992). For various reasons Canadian federal and provincial parliaments saw high levels of turnover. This was one key motivation for several of these parliaments to adopt defined benefits (DB) pensions for its members in the 1950s and '60s. From the late 1970s onwards, some of these pension schemes were later changed to much more parsimonious defined contributions (DC) plans in response to a general economic downturn. We study the effect that these changes had on members' willingness to stand for re-election — a trait we refer to as “electoral tenacity” — and members' success in achieving this, thereby evaluating whether the provision of pensions achieved one of its stated goals.

Aside from the historically short tenures of MPs, the Canadian context is a fruitful testing ground for this effect for another reason, which is the comparatively equal footing on which federal and provincial parliaments find themselves. In contrast to many European countries, where provincial politics is often seen as a stepping stone for a career in the national parliament, in Canada these careers can be seen more as parallels. Canadian prospective politicians are seen to sort into either branch of politics on the basis of policy interests (Barrie and Gibbins, 1989) and as having career options after life in politics that are equally attractive. This observation, along with the fact that pension schemes were adopted and altered at different moments across the four parliaments we study, provides the basis for the difference-in-differences research design that our studies uses.

Specifically, for four parliaments we study the effect of the adoption of DB pensions on members' electoral tenacity and the total length of their tenure in parliament, taking the parliaments where this adoption did not take place simultaneously as the control group. Technically, the methodological approach we use is a combination of a difference-in-differences research

design and a survival model. We likewise evaluate the effect of the policy changes that later replaced these DB pensions with less generous DC pensions, taking those parliaments that maintained DB pensions as the control group. Aside from the federal Canadian parliament, we study the parliaments of the provinces Ontario, Manitoba, and Saskatchewan; jointly, these four legislatures provide a large degree of useful variation of pension schemes over time.

Our findings show that the adoption of defined benefits pensions had a substantial effect on parliamentarians' willingness to stand for re-election. We furthermore show that most of this increased willingness carried over to members' average time in parliament (or tenure): the increased electoral tenacity due to pension schemes was only to a small extent offset by increased electoral competition. Specifically, we find that the adoption of DB pensions induced members to try to stay on for an average of 40 months longer, while the actual effect on average tenure was 32 months. These effects are particularly pertinent among first- and second-term members, which we ascribe to the vesting requirements of most pension schemes: the requirement that one needs to have spent a certain length of time in parliament to qualify for a pension. However, we do not find a robust effect of the policy changes that repealed DB pensions and replaced them with DC pensions.

Overall, the findings of chapter 5 add to the literature on the compensation of political representatives, by showing that offering generous pension schemes can have a substantial effect on their willingness to remain in politics. In countries where short tenures of MPs are deemed harmful to the quality of political representation and thus to the effectiveness of policy making, implementing such pension schemes may be advisable, despite the populist backlash that this may engender.

Chapter 2

Stieglitz and the Rouble: Russian Currency Risk on the International Bond Market, 1856–1875

2.1 Introduction

For most of its history, instability and variability have been hallmarks of the Russian rouble. During the nineteenth century, the official monetary standard of Russia was alternately based on copper, silver, gold, or some combination of the three. To complicate matters further, multiple types of paper roubles generally circulated in parallel to metallic currency and to each other, and whether or not these paper roubles were convertible into metallic roubles varied over time. The root of the instability of the rouble lay in a lack of fiscal discipline and the repetitive resort to excessive monetization of government deficits, especially in times of war (Zieliński, 1898). Although successive Russian finance ministers pursued attempts to stabilize the currency, many of these attempts were abandoned before long. Only in the 1890s, with the adoption of the gold standard, was Russia able to commit sufficiently to sound money to make the value of the rouble more durable (Crisp, 1953; Gregory, 1979).

The history of the rouble is exemplary of that of many currencies in the nineteenth century, for which convertibility was often far from certain, as policy makers repeatedly struggled to reconcile the quest for a stable currency with budgetary problems of the state (Ford, 1962; Martín-Aceña and Reis, 2000; Ögren and Øksendal, 2011). An inconvertible currency was seen as undesirable for many reasons: it brought price instability which complicated domestic economic affairs (Zieliński, 1898), it limited access to foreign capital (Bordo and Rockoff, 1996), and it lacked the “prestige” that especially a gold currency brought to the issuing country (Gallarotti, 1993).¹

At the same time, Russia was a large borrower on the international capital market, and much of this foreign borrowing was denominated in its own currency. This is in contrast to most other countries on the periphery of the world economy, which were only able to borrow abroad in a foreign currency like the pound or the franc, a phenomenon known as “original sin” (Hausmann and Panizza, 2003; Flandreau and Sussman, 2005; Bordo and Meissner, 2006). For this reason, the stability of the rouble was important not just to the Russian economy, but also to foreign investors. One may question therefore how the future of the rouble was viewed abroad, and whether foreign investors revised these views in response to important monetary developments in Russia.

This chapter addresses this issue for the period from 1856 to 1875, the first half of a prolonged spell of inconvertibility of the silver rouble. In this chapter, I measure the long-term expected value of the rouble, by relying on prices of Russian bonds on the Amsterdam stock exchange. I use these prices to answer the following research questions. First, at what points in time did foreign investors expect the rouble to appreciate or depreciate, and by how much? Second, when were these expectations revised? Third, with what events were these revisions coincident? Answering these questions allows me to determine whether the Russian currency reforms of this period were able to affect foreign expectations, or whether other events in Russia (or elsewhere) were more relevant in the eyes of foreign investors.

¹According to Thomas Owen, an additional drawback of the instability of the rouble is the headache it gives modern-day scholars: “Especially annoying to economic historians is the fact that the tsarist government failed to maintain a currency in which extended time series can be constructed” (Owen, 1989, p. 669). This concern is unlikely to have bothered nineteenth-century policy makers.

The opportunity to measure the long-term expected value of the rouble is provided by the same historical event that led to its inconvertibility: the Crimean War. To cover the costs of the war, the Russian state resorted to issuing two major foreign loans, in 1854 and 1855. The two loans were brokered by the St. Petersburg bank of Alexander Stieglitz and were issued in Amsterdam, Hamburg, and Berlin, as well as domestically in St. Petersburg.² Known prosaically as the fifth and sixth 5% loan, both loans had a size of 50 million roubles and had maturities of up to 30 years. What makes these two loans a unique case is that they were identical up to one exception: the currency of the coupon. Whereas the 1854 loan was denominated purely in roubles, the 1855 loan provided a fixed coupon payment in guilders to its Dutch clientele. Since the two bonds were equal except for the currency structure, the default risk will have been equal between the two, and any difference in yields must therefore have been a reflection of anticipated sub-par values of the rouble's exchange rate. For this reason, the two Crimean War loans can be used to infer the expectations that Dutch investors held about the value of the rouble for the long run. Since the Amsterdam stock exchange was the predominant market for Russian debt for most of the nineteenth century (Platt, 1984), the prices of Russian bonds in Amsterdam are arguably the best reflection of the expectations held by international investors at the time.

Traditionally, the measurement of exchange rate expectations in history relies on studies of the money market (see, for instance, Mitchener and Weidenmier (2015) on the measurement of currency risk under the classical gold standard). Assuming that uncovered interest rate parity holds, deviations of short-term interest rates between countries can serve as a measure of anticipated appreciations or depreciations. The shortcoming of this approach is that it allows one only to measure short-term expectations of up to a number of months. However, a plan to stabilise the currency, if it is expected to be successful, should lead to a revision of the expected exchange rate also for the longer future. Indeed, the whole purpose of pledging convertibility of the currency is to make a credible promise that its value will be maintained even in difficult times — or, if a major calamity necessitates a suspension of

²War with Britain prohibited a listing in London; see Anderson (1960).

convertibility, that the currency will be restored to its former value at the earliest possible moment (Bordo and Kydland, 1995). To measure such long-term expectations, one therefore needs to study financial instruments with long maturities.

On the other hand, the bond market typically does not provide a clean measure of long-term currency risk either. Although yields on government bonds reflect long-term risks, these yields are often seen more as a reflection of default risk than of currency risk (Flandreau and Zumer, 2004; Ferguson, 2006; Jopp, 2016). In reality, a government bond denominated in foreign currency is subject to both these risks, and the challenge is to decompose the two. The two Stieglitz loans of 1854 and 1855 provide a unique opportunity to do exactly that for the Russian case. This study thus traces the evolution of the value of the rouble, and the expectations that were held with respect to it, using an approach similar to that of Flandreau and Oosterlinck's (2012) study of Indian debt. The period for which this can be done extends from 1856 to 1875, which is the period for which both the Dutch guilder and the Russian rouble were denominated in silver.

I find that, from 1856 to 1859, the yield to maturity of the fifth 5% loan is only slightly below that of the sixth 5% loan. This implies that Dutch investors expected the rouble to appreciate, i.e. to recover to a level closer to its official parity. For most of the years thereafter, however, the spread between the two yields widens. This reflects a substantial expected depreciation, and the implied expected exchange rate declines to levels up to 15% below the actual exchange rate. This shows that from 1860 onwards, international investors were not optimistic about the future of the rouble. Furthermore, I use a series of Bai-Perron and Chow structural break tests (Chow, 1960; Bai and Perron (1998, 2003)) to statistically determine which months saw the most important revisions to the expected degree of appreciation (or depreciation) of the rouble. I find that none of the identified breaks coincides with any of the Russian currency reforms that were attempted between 1856 and 1875. Instead, all structural breaks take place during or shortly after major geopolitical events like outbreaks of war, in most cases not involving Russia itself. This result is robust to various alternative specifications. I therefore conclude that Russian monetary reforms did not play a leading role in the

expectations that international investors held about the future value of the rouble. Instead, how the future of the rouble was perceived was to a much larger extent the subject of global political developments.

The findings of this chapter contribute to the literature on public finances and foreign borrowing in the nineteenth century. Many studies have shown the importance of currency convertibility (Bordo and Rockoff, 1996) or geopolitical instability (Ferguson, 2006) for governments' borrowing costs. Whereas these studies tend to concentrate on default risk, I show that government bonds can also be used to make valuable inferences about currency risk. Additionally, this chapter contributes to the literature on foreign currency debt and financial fragility. Whereas many studies have emphasised that foreign currency debt may aggravate peripheral countries' exposure to global financial shocks (Eichengreen et al., 2005; Bordo et al., 2010b), I show that a similar exposure existed for Russia, despite the fact that most of its debt was denominated in roubles.

This chapter is structured as follows. The next section will first give more historical context about Russian public finances in the mid-nineteenth century, with a particular focus on the currency reforms that were undertaken during this period. It also presents the details of the fifth and sixth 5% loan. Section 2.3 discusses how to calculate and decompose yields on these loans, as well as the methodology used to derive the series of expected appreciation/depreciation of the rouble and its breakpoints. This section also discusses how I address another factor that may have differed between the two Crimean War loans: liquidity risk. Section 2.4 presents the data. In section 2.5, I first show that liquidity is unlikely to have led to any yield difference between the two loans. The remainder of section 2.5 then derives the future value of the rouble that Dutch investors expected at each point in time. It furthermore tests at what points in time these expectations were revised. The historical context of the identified breakpoints is discussed in section 2.6. Section 2.7 concludes and draws implications for nineteenth-century currency reforms more generally.

2.2 Historical Background

2.2.1 Public Finances and Monetary Reforms in Nineteenth-century Russia

By the time of the outbreak of the Crimean War in 1853, the monetary situation in Russia was relatively stable compared to earlier years (Zieliński, 1898).³ In the years between 1768 and 1843, Russia had experienced its first epoch featuring an inconvertible paper currency: the assignat. Initially issued by Catherine the Great with the official purpose of enlarging the money supply in circulation, the Russian government quickly realised the potential that a paper currency held for financing its many wars. The persistent use of monetary financing of the deficit, notwithstanding the many pledges of the government not to do so, led to a secular decline of the value of the assignat rouble. By 1814, an assignat rouble was worth just 0.24 roubles in silver or copper; the official bases of the bimetallic standard at the time (Zieliński, 1898, p. 438).

After several earlier unsuccessful attempts to stabilise the currency, a successful monetary reform was implemented by finance minister Georg Cancrin in 1839–1843. The rouble was changed into a mono-metallic silver currency and, more importantly, all assignat roubles were withdrawn from circulation. Instead of the assignats, the government issued newly created “credit notes” which were denominated in silver roubles and convertible at par.⁴ A reserve fund was set up for the convertibility of these credit notes, and the government pledged to maintain at all times a coverage ratio of at least one-sixth for the c. 230 million roubles in credit notes then in circulation, with full coverage required for any excess issues (Zieliński, 1898, pp. 452–459). These requirements were adhered to successfully between 1843 and 1853, and thus Russia entered the Crimean War with a stable currency that was a mix of

³The international literature on Russian monetary history for the period before c. 1880 is very limited. The authoritative work on this matter is still Zieliński (1898). More recent works such as Koppl and Yeager (1996), Ukhov (2003), Stepanov (2008), and Velde (2018) all touch upon pre-1880 Russian monetary history, but focus on different subjects. See Spasskij (1967) for a numismatic discussion of the rouble throughout history.

⁴To confuse matters more, these credit notes are also occasionally referred to as “credit roubles” in the literature. I prefer to use the term “credit notes” in this chapter, to prevent suggesting that these credit notes were a separate currency from the silver rouble.

metallic silver roubles and convertible credit notes. Meanwhile, the government used the renewed confidence of international markets to issue a series of foreign loans: between 1842 and 1850, six successive loans were issued for the construction of the so-called Nicholas railway between St. Petersburg and Moscow (Platt, 1984).

The Crimean War, however, changed all this. The war came at an estimated cost of around 800 million roubles (Ukhov, 2003, p. 9), and covering this purely through taxation and borrowing was too demanding. Hence, the government had to resort once again to monetary finance. Between 1853 and 1857, the amount of credit notes outstanding more than doubled from 333.4 million to 735.8 million roubles (Zieliński, 1898, p. 460), and most of these were issued without adequate coverage. As a consequence, the government saw no other option but to declare inconvertibility in 1856, after which metallic currency quickly disappeared from circulation and the credit notes sank substantially below par.⁵

Meanwhile, a part of the costs of the Crimean War was also covered by foreign borrowing. Two loans, each worth 50 million roubles, were issued in Amsterdam, Hamburg, and Berlin, as well as domestically in St. Petersburg. Like the loans issued in the 1840s, the loans of 1854 and 1855 were underwritten by the banking house of Stieglitz & Co, “Russia’s first great private bank” (Blackwell, 1968, p. 256). Originally founded by Ludwig Stieglitz, by the 1840s his son Alexander Stieglitz was in charge of this bank, which was seen as the court bank of the Russian government at the time. Both Stieglitz & Co. and the tsarist government itself maintained close relations with the Amsterdam banking house of Hope & Co., which had been Russia’s main foreign banker since the eighteenth century (Buist, 1974). Thus, in times of financial need, Russian finance ministers had no difficulty reaching out to Dutch investors; investors who, vice versa, had been well acquainted with

⁵The Russian imperial budget was notoriously unreliable until the 1870s. Hence, an exact estimate of the costs of the Crimean War is unavailable, and so is an accurate breakdown of how they were covered (Platt, 1984). Platt’s estimates for aggregate government expenses between 1832 and 1861 (Platt, 1984, pp. 54-55) show that of a total of 1,375 million roubles, 557 million roubles were covered by loans from Russian banks, 228 million roubles were borrowed abroad, and of the remainder the majority came from the printing of credit notes (or “bank notes” as Platt calls them). I thus conclude that of the costs of the Crimean War, the part not covered by the increase of credit notes or the two Stieglitz loans was predominantly financed by borrowing from domestic banks.

Russian government bonds for generations by the time of the Crimean War.

In years following the peace of 1856, the Russian government pursued various attempts to restore convertibility. The first of these, in April 1857, lasted just three weeks (Zieliński, 1898, p. 462). The announced reform consisted of a series of measures, the foremost of which was the redemption of credit notes. Convertibility was declared, and it was announced that for 1858 the goal was to withdraw 60 million roubles worth of credit notes from circulation. Other elements of the currency reform were the removal of bans on the export of specie, the sale of gold on behalf of the imperial budget, and the dedication of 19.8 million roubles to the stabilisation of the exchange rate. The official reserves, however, were far too small to instill faith in convertibility. When, after the first three weeks of the operation, more than 3 million roubles worth of credit notes had already been exchanged for specie, a return to inconvertibility was inevitable and the reform had to be cancelled.⁶

The second attempt to restore convertibility was initiated in April 1862 (Zieliński, 1898, pp. 471-473). To make this possible, a new 90 million rouble loan was issued in London, the proceeds of which were to be fully allocated to the reserve fund. The main element of the 1862 currency reform was, as in 1857, the withdrawal of the excess amount of credit notes outstanding. An innovative element was that the price at which credit notes could be converted would increase gradually in the course of 1862–1863, so as to more gradually restore the rouble towards parity. However, the public responded much more strongly than anticipated even at lower prices, and 60 million roubles had already been converted by August 1863. Like in 1857, the operation had to be discontinued due to the large conversions and hence drains of the official reserves. As it turned out, at both times the Russian public did not have sufficient trust in lasting convertibility to prevent a run on the currency.

Apart from a lack of reserves, Zieliński (1898) also blames the failures of 1857 and 1862–63 on the fact that times were more generally too turbulent to successfully pursue a large-scale monetary reform. 1861 saw the abolition of serfdom in Russia, leading not only to generally uncertain times but also

⁶Note that the measures relating to the 1857 currency reform, like those of 1862, were also announced in detail in the *Amsterdamsch Effectenblad* (see section 2.4). The fact that the Russian government chose to announce its currency reforms in the Dutch financial press suggests that foreign confidence in the rouble was one objective of the reform.

to an increase in the money demand, due to the effect this reform had on the importance of market transactions.⁷ That said, according to Zieliński (1898), pp. 473-474, the poor design of both currency reforms meant that they would have been bound to fail even in calmer times.

In the years after 1863, no further large-scale currency reforms were pursued until the 1890s. Between 1867 and 1875, however, the recently founded State Bank did pursue a program of silver and gold purchases at fixed prices, with the goal of building up reserves for the eventual resumption of specie payments.⁸ Although such a resumption was never actually attempted, the program did lead to a stabilisation of the exchange rate as long as it lasted. The purchase of gold and silver was halted in 1875 in the context of a global economic downturn. When another war with the Ottoman Empire broke out in 1877, the mistakes of the Crimean War were repeated, as yet another 400 million roubles worth of credit notes were printed in the course of the 1877–1878 Russo-Turkish war (Zieliński, 1898, pp. 478-479).

Whilst coping with the inconvertibility of the rouble, the Russian state also undertook an unprecedented industrialisation program, which included first and foremost the construction of railways throughout the empire (Falkus, 1972). The first year after the Crimean War saw the creation of the *Grande Société des Chemins de Fer Russes*, a railway company that would connect a large number of cities in western Russia (Platt, 1984). The following years saw the foundation of many others railway companies. In many cases, large foreign loans were issued, which generally were guaranteed by the state. As an illustration: by 1873, securities of sixteen different Russian railways were listed in Amsterdam (Dinger, 1873); twenty years earlier, this number had been zero. All in all, Russia needed to tap the international capital market not just to raise the reserves needed for its attempted currency reforms (like the seventh 5% loan of 1862), it also needed to do so for its railway program, and to pay for any unforeseen military expenses in case of domestic or international conflict (like the eighth 5% loan of 1864, issued to cover the costs of

⁷See Barkai (1973) for an analysis of the increasing importance of monetary transactions in late nineteenth-century Russia.

⁸The State Bank was founded in 1860 as the main monetary authority in Russia, and it came as a replacement of a number of other government institutions. At its helm we find a familiar face: Alexander Stieglitz was appointed as its first president (Blackwell, 1968, p. 259).

suppressing the Polish uprising).

To summarize, although the rouble had been stabilised successfully on a silver standard in 1843, this stability only lasted until 1856. From 1856 onwards, the Russian money stock was again predominantly composed of inconvertible paper money: the credit notes. In subsequent years, two serious attempts were made to bring back convertibility, in 1857 and in 1862–1863, but neither of these attempts led to the desired outcome. Between 1867 and 1875, a more modest attempt was made to stabilise the exchange rate by purchasing reserves (gold and silver), with the additional hope that these reserves could at some future point be used to finally restore convertibility. Meanwhile, Russia continued to borrow heavily abroad, and hence the confidence of international investors mattered to the Russian government. How these international investors perceived the stability of the rouble in the face of these developments and attempted currency reforms is therefore the question that the remainder of this chapter will address.

2.2.2 The Fine Print of the Crimean War Loans

As discussed in the introduction, the Russian loans of 1854 and 1855 — the so-called “fifth and sixth 5% loan” — offer a unique opportunity to measure the expected appreciation or depreciation of the rouble. It is therefore warranted to first discuss the details of these two bonds. A full translation of the decrees, or *ukases*, by which these bonds were issued can be found in Appendix A2.1.

Both loans issued during the Crimean War were long-term loans and paid an interest of 2.5% semi-annually. Instead of having a single maturity date, both loans were gradually amortised by the use of a sinking fund: the Russian treasury would each year purchase a pre-specified number of bonds of the 1854 (1855) loan starting in 1857 (1858) at their market value. From this, one can reconstruct that the final amortisation would take place in 1882 (1883). The final batch of bonds outstanding would be bought back at the par value. Starting twenty years after issuance, i.e. in 1874 (1875), the Russian treasury retained the right to purchase all bonds then outstanding at the par value; in other words, the treasury had a call option on the bonds once these would get close to the final maturity date. Hope & Co., as well

as other Amsterdam-based *Administratiekantoren*,⁹ took care of the coupon payments to their Dutch clients, thus minimizing transaction costs for both loans. Lastly, both loans had a size of 50 million silver roubles, were issued by Stieglitz & Co., and were listed in St. Petersburg, Amsterdam, Hamburg, and Berlin.

At first glance, therefore, these two bonds were very similar, apart from a one-year difference in the sinking fund and early-buy-back specifications. The *ukase* of the sixth 5% loan, however, included a new article which had not been included in that of the fifth 5% loan.¹⁰ According to article 4:

(...) for each coupon will be paid: at St. Petersburg by the Imperial Committee of Amortisation 12 Roubles and 50 Kopeks Silver, or with the intermediation of the Bankers Stieglitz & Co., either 23 Guilders 60 Cents Dutch, or 26 Marks 10 Schillings 11 Pfennig Hamburg Banco.

In other words, the bonds of the sixth 5% loan offered to their holders a fixed coupon in Dutch guilders, or an equivalent fixed payment in Hamburg marks banco.¹¹ On the other hand, the coupons of the fifth 5% loan were converted into guilders or marks at the going rate of exchange.¹² The main difference between the two Crimean War loans was thus that the latter eliminated part of the currency risk for its Dutch and German clientele. This difference forms the basis of the empirical study that now follows.

⁹Financial intermediaries that played an important role in the Amsterdam money market at the time; see Jonker (1996).

¹⁰Unfortunately, the reason why this new article was added is not known to me. Since a large number of excess credit notes had already been printed by the time the sixth 5% loan was issued, it is not unlikely that the exchange rate clause was added precisely *because* Stieglitz (or his contacts in Amsterdam or Hamburg) anticipated difficulties in attracting rouble-demoninated debt. Note that, even if this exchange rate clause was added for this reason, this does not invalidate the research design of this chapter.

¹¹When converted to decimals using Blunt (1822), the amount paid in Hamburg is 26.68 marks. At the rate of exchange in the 1850s between Amsterdam and Hamburg, *f*23.60 equals 26.71 marks, which is close enough to see these as equivalent amounts.

¹²The latter can be confirmed by tracing the coupon announcements in the *Amsterdamsch Effectenblad*; for each coupon payment of the fifth 5% loan, the implied exchange rate is indeed approximately the rate of exchange between Amsterdam and St. Petersburg. Details are available on request.

2.3 Methodology

2.3.1 Yields: Calculation and Decomposition

To infer bondholders' expectations of the future guilder/rouble exchange rate, I collect bond prices for the fifth and sixth 5% loan, and convert these into yields to maturity. The spread between the yields of the two loans can then be used to infer the expected exchange rate. The yield to maturity is the most commonly used measure of the return on a bond and should be favoured to the coupon yield (Nelson and Siegel, 1987; see Flandreau and Oosterlinck (2012) for an extensive discussion of this issue for the same historical period.) I calculate the yield to maturity in roubles. For the fifth 5% loan this is straightforward, since all payments take place in roubles. The yield to maturity for the fifth 5% loan can be found by solving for y_{Vt} in:

$$P_t^V = \frac{1}{y_{Vt}} \left(1 - \frac{1}{(1 + y_{Vt})^{T^V - t}} \right) R12.50 + \frac{1}{(1 + y_{Vt})^{T^V - t}} R500 \quad (2.1)$$

Here, P_t^V denotes the quoted price of a five-hundred rouble bond from the fifth 5% series at time t , and T^V is the final maturity of this series. This calculation is valid under a set of innocuous assumptions, concerning among others the amortisation of the bond over its life-cycle. For details on these assumptions, see the Appendix A2.2.

For the sixth 5% loan the calculation of a yield to maturity is less trivial, since some of the cash flows of these bonds are denominated in roubles whilst others are denominated in guilders. The calculated yield therefore depends on the guilder/rouble exchange at each future cash flow date, which in principle is a random variable. Here, I calculate the yield to maturity by assuming a fixed exchange rate of 1.888 guilders per silver rouble. This is the exchange rate that is implicit in the coupon: at $f1.888$, the value of the coupon payment in Amsterdam is equal to 12 roubles and 50 kopeks silver, which is the amount that is paid to St. Petersburg bondholders. This assumption makes the calculation of the yield to maturity on the sixth 5% loan analogous to that of equation 2.1.¹³

¹³Note that calculating the yield using the current exchange rate every month should

Given yields, one can conceptually decompose these into a risk-free interest rate component ($r_{f,t}$) and a risk premium. In turn, the risk premium on any bond can relate to risks of various types. I assume, like Flandreau and Oosterlinck (2012), that the risk premium on any Russian bond i at time t consists of three additive elements: a default premium $\pi_{d,it}$, a liquidity premium $\pi_{l,it}$, and a currency premium $\pi_{c,it}$:

$$y_{it} = r_{f,t} + \pi_{d,it} + \pi_{l,it} + \pi_{c,it} \quad (2.2)$$

The difference between the two Crimean War loans — which I refer to as the spread (S_t) — is therefore as follows, with V and VI denoting the fifth and the sixth 5% loan, respectively.

$$S_t \equiv y_{Vt} - y_{VI t} = (\pi_{d,Vt} - \pi_{d,VI t}) + (\pi_{l,Vt} - \pi_{l,VI t}) + (\pi_{c,Vt} - \pi_{c,VI t}) \quad (2.3)$$

It can be safely assumed that the first term of equation 2.3 is equal to zero. Eventhough default risk for Russia was most likely seen as non-zero by Dutch investors, the question is whether the default risk was different between the two bonds. Both Crimean War loans were uncollateralised, they were of the same size, and they were issued with the same purpose. Furthermore, both were issued in the same markets by the same banking house (Stieglitz & Co.).¹⁴ There is therefore no reason to assume that if Russia would at some point default, these two series would have been treated differently in case of a debt settlement.¹⁵ Hence, I conclude that the spread between the fifth and the sixth 5% loan is equal to the sum of a difference in liquidity premia and a difference in currency premia.

not be preferred. Doing so would mean that variations in the current exchange rate affect the yield to maturity, which would defeat the purpose of the analysis performed in this chapter.

¹⁴For evidence that the particular house which issued sovereign bonds mattered to yields, see Flandreau and Flores (2009).

¹⁵Note that the default risk on Russian government bonds never materialized before World War I; the Russian treasury faithfully paid its dues to bondholders up until 1914. After the Russian revolution, however, bondholders were less fortunate: the Bolsheviks repudiated the entire foreign debt in 1918 (Bernal et al., 2010).

2.3.2 Measuring Liquidity Risk

The first issue that I address is that of liquidity premia: could any of the difference in yields between the two 5% Stieglitz bonds be due to differences in liquidity? Recent research on asset pricing in the nineteenth century has emphasized that liquidity may have been more important for the pricing of sovereign bonds than previously thought (Alquist, 2010; Chavaz and Flandreau, 2017). It is therefore important to study the pricing of liquidity risk in the two Stieglitz bonds, and in Russian government bonds more generally, to evaluate if this may explain part of the difference in yields.

Conceptually, one can view the (il)liquidity of a bond either as a characteristic of that bond, or as a risk factor that determines its valuation. Liquidity as a characteristic refers to direct measures of the asset's liquidity like daily turnover or the bid-ask spread. Bonds that are less liquid in this sense will typically have higher returns, since investors want to be compensated for the increased difficulty of converting their bonds into cash (Amihud and Mendelson, 1986; Amihud and Mendelson, 1991; de Jong and Driessen, 2012). Instead, one can see liquidity as a risk-factor that determines an asset's price. This approach, first empirically implemented by Pástor and Stambaugh (2003) for the U.S. stock market, estimates how strongly asset prices covary with a measure of market-wide liquidity. Assets that lose value more strongly in the face of a decrease in market-wide liquidity are less liquid, in the sense of having more liquidity risk.

Typical direct measures of liquidity as a characteristic are unfortunately not available in the present setting. Conventional modern-day measures of liquidity — like the bid-ask spread or the daily turnover volume — were not reported for the Amsterdam stock exchange until after World War I. The only potential measure available is the incidence of price quotes: bonds frequently do not report any price at all on a given day, which reflects an absence of trading for that bond on that day. This measure is comparable to the zero-returns measure of liquidity used in modern finance (Lesmond et al., 1999).¹⁶ The first approach to tackle the issue of liquidity differences

¹⁶The rationale is that trade only takes place if the change in the value of an asset exceeds the trading cost. Since the latter is higher the less liquid an asset is, lower liquidity will lead to more frequent occurrences of zero returns.

is therefore to simply count the number of days on which the fifth and sixth 5% loans were quoted.

In contrast to a direct measure of liquidity, liquidity risk can be estimated in the absence of bid-ask spreads or volume measures. To do so, I regress the returns of each Russian bond on a measure of market-wide liquidity, while controlling for a measure of market returns; an approach inspired by Pástor and Stambaugh (2003). Each asset's comovement with the measure of market-wide liquidity reflects that asset's liquidity risk. Formally, I estimate the following model, where the return on bond i in month t is a function of market returns in month t (r_t^m), market-wide liquidity in month t (Liq_t), and a robust error term:

$$r_{it} = \beta_{0,i} + \beta_{m,i}r_t^m + \beta_{liq,i}\Delta Liq_t + \epsilon_{it} \quad (2.4)$$

If liquidity risk differs between bonds, this should be reflected in different values of $\beta_{liq,i}$. The hypothesis that I test, therefore, is that $\beta_{liq,i}$ does not differ between the fifth and the sixth 5% loan. I also test the more general hypothesis that $\beta_{liq,i}$ does not in fact differ between any of the Russian bonds listed in Amsterdam. These hypotheses are tested using a series of Wald tests on the equality of coefficients.

Given the previously discussed lack of availability of traditional liquidity measures, I decide to use the interest on lombards as the measure of market-wide liquidity. The typical lombard loan, or *prolongatie*, was a one-month loan collateralized with financial assets, much like modern-day repurchase agreements. In the Dutch money market of the nineteenth century, lombards were the dominant form of short-term credit (Jonker, 1996). An increase in the rate of interest on lombards can therefore be seen as a decrease of market-wide liquidity.

As a proxy of market returns, I use the returns on shares of the *Nederlandsche Handel-Maatschappij* (NHM). Unfortunately, no market index is available for Amsterdam for the period of this study, and the construction thereof is outside the scope of the present study. The NHM was the largest listed company in the Netherlands at the time, and it was active in diverse sectors like commodity trade, shipbuilding, agriculture, and manufacturing. Furthermore, the NHM had activities not just in the Netherlands, but was

also extensively involved in overseas activities. Lastly, the stock of the NHM is the only non-governmental Dutch security which is throughout the period of this study listed in the annual overview of stock prices of the *Amsterdamsch Effectenblad* (see section 2.4). Returns on NHM shares should thus be as good a proxy as any single stock for the returns on the whole of the investment opportunities of Dutch investors at the time.¹⁷

2.3.3 Inferring Rouble Expectations

Provided that the analysis thus described warrants the conclusion that there is no difference in liquidity risk between the fifth and sixth 5% loan — to give away the punchline of section 2.5.1: it does — the full spread between the two loans can be attributed to currency risk. That is: the reason that bonds from the fifth 5% series were consistently priced lower than those from the sixth 5% series, was the expectation that the rouble would consistently remain below par. How far below par it was expected to be, and at what points in time these expectations changed, is the focus of this study.

As explained above, for the sixth 5% loan there is no single yield to maturity that corresponds to its bond's price. Instead, the calculated yield is a function of the path that the guilder/rouble exchange rate will follow in the future. The assumption that I make in section 2.3.1 to calculate the spread is therefore that the exchange rate will be equal to $f1.888$ per rouble indefinitely. But alternatively, one can set the yield to maturity at time t to some prespecified rate — for instance, to y_{Vt} , the contemporaneous yield on the fifth 5% loan — and solve this for the future exchange rate. This is the approach I follow in order to convert the spread into expectations of the future guilder/rouble exchange rate.

Formally, let y_{Vt} denote the yield to maturity on bonds from the fifth 5% loan, i.e. y_{Vt} is the solution to equation 2.1. If P_t^{VI} is the quoted price of a five-hundred rouble bond from the sixth 5% series, then one can derive a unique value of the expected future guilder/rouble exchange rate at time t by solving the following for X_t^* :

¹⁷See de Graaf (2012) for a recent review of the history of the Nederlandsche Handel-Maatschappij. Towards the end of the nineteenth century, the NHM decided to concentrate on banking, divesting most of its activities in non-financial sectors.

$$P_t^{VI} = \frac{1}{y_{Vt}} \left(1 - \frac{1}{(1 + y_{Vt})^{T^{VI}-t}} \right) \frac{f23.60}{X_t^*} + \frac{1}{(1 + y_{Vt})^{T^{VI}-t}} R500 \quad (2.5)$$

The solution for X_t^* is what I will refer to as the “implied expected exchange rate”. One way to interpret this value is that the spread between the yields of the fifth and the sixth 5% loan at time t can be fully rationalized if the guilder/rouble exchange rate is expected to be equal to X_t^* from time t onwards. Note that this calculation implicitly assumes that investors expect a single exchange rate to hold for all future payments. In fact, the expected future exchange rate may follow any possible path $\{\tilde{X}_{t+1}, \tilde{X}_{t+2}, \dots, \tilde{X}_T\}$, so one may think of X_t^* as a weighted average of the full path of the expected future exchange rates.

The expected degree of appreciation of the rouble follows as the difference between the implied exchange rate X_t^* and the actual exchange rate. Financial transactions between Amsterdam and St. Petersburg in the 1850s, ‘60s, and ‘70s took place primarily through the use of two-month bills of exchange; no spot exchange market between the two places existed. The most accurate measure of the actual guilder/rouble exchange rate is therefore the price of such a bill of exchange, minus two months worth of interest. For this purpose, I again use the interest rate on lombards (r_t). Thus, the expected degree of appreciation (or depreciation, if negative) equals:

$$A_t \equiv X_t^* - \frac{1}{(1 + r_t)^{(1/6)}} X_t \quad (2.6)$$

The final stage of the analysis concerns the question at what points in time major revisions occur to this expected degree of appreciation. To address this, I perform a series of structural break tests on the expected degree of appreciation of the rouble. I follow the methodology of Bai and Perron (1998, 2003) to find breaks in the expected appreciation series. The Bai-Perron methodology allows one to endogenously determine both the number of structural breaks in a time-series and the temporal location of these breaks; in the absence of a strong prior, it is therefore preferred to tests that require an ex ante specification of breakpoints. It is also a commonly used methodology in similar studies (Waldenström and Frey, 2008; Jopp, 2016). I assume

that the expected degree of appreciation of the rouble can be modelled as a function of time, as follows:

$$A_t = \alpha_j + \beta_j t + \epsilon_t \quad j \in [1, J] \quad (2.7)$$

Here, J is the number of “regimes” or periods, the boundaries of which are the $J-1$ breakpoints in the series. In this specification, both the intercept α_j and the time-trend β_j are allowed to change between regimes. An alternative, more restrictive, specification assumes that the dependence on time is uniform for the whole time series, i.e. that β_j is equal for all j . Note that the even more restrictive option of excluding a time-trend is not feasible, since the expected degree of appreciation is only trend-stationary. Non-stationarity also precludes the application of the Bai-Perron test to other series used in this study like the yields to maturity or the spread between the two yields.¹⁸

Lastly, once the Bai-Perron test has identified the most likely candidates for breaks in the series, I use a series of Chow tests (Chow, 1960) to identify the breakpoints more precisely. The Chow test is different from the Bai-Perron test in that it requires one to prespecify the exact location of the break date at $t = \tau$; it then tests the null hypothesis of no break against the alternative hypothesis that there is a break at time τ . The approach I take is to first select the dates which were found in the Bai-Perron tests as likely breakpoints in the expected appreciation series; I call these the “suspected break dates”. For each suspected break date, I then perform a series of thirteen Chow tests, where the breaks are specified to occur in any individual month up to six months before and after the suspected break dates. The resulting series of F-statistics around each suspected break date allows me to determine when the break occurs exactly, and how “sharp” this break is. This is similar to the approach of Willard et al. (1996) and Flandreau and Oosterlinck (2012).

I perform the Chow tests on estimation windows which are constant for each of the suspected break dates and which always cover at least 36 months before and after the prespecified break date. Both the intercept and the time-

¹⁸The exchange rate series can in fact be made stationary if this is detrended by a quadratic time trend. The results of Bai-Perron tests, however, are highly sensitive to the exact specification. They should thus not be relied upon. Results of this analysis are presented in Appendix A2.3.

trend are allowed to vary between the two regimes. For illustrative purposes, assume that the first suspected break date is July 1859. The thirteen Chow tests around this date are then as follows, where D_τ is a dummy that equals one if $t \geq \tau$.

$$A_t = \alpha_0 + \alpha_1 D_\tau + \beta_0 t + \beta_1 D_\tau t + \epsilon_t \quad \begin{array}{l} t \in [1856M01, 1863M01] \\ \tau \in [1859M01, 1860M01] \end{array} \quad (2.8)$$

The F-statistic for each break date τ is the result of a test on the joint significance of α_1 and β_1 . The higher this F-statistic, the more likely it is that τ is the location of the break in the series of expected appreciation A_t .

2.4 Data

I collect bond prices from the *Amsterdamsch Effectenblad* for the period 1856–1875. The *Amsterdamsch Effectenblad* was one of the leading Dutch financial newspapers at the time. It was published at least twice per week and reported daily prices on all domestic and foreign securities listed on the Amsterdam stock exchange, as well as selected prices from foreign stock exchanges. Additionally, the *Amsterdamsch Effectenblad* published announcements from all issuing countries and firms, ranging from key announcements like the prospectuses of new issues or annual financial statements of borrowing countries, to fairly trivial ones like coupon payments and reports of lost bonds.¹⁹ The final issue of every year furthermore included an overview of the highest and lowest prices each month for all popular securities, as well as an index of all announcements made in the past year. Unfortunately, neither these annual overviews nor the daily price lists reported any information on turnover. The long-standing interest of Dutch investors in Russia discussed earlier is apparent from the bonds listed: no other borrower had as many series of bonds listed as the Russian state.

I collect the highest and lowest prices for each month of all Russian bonds issued before 1860, for the period 1856–1875. I choose 1856 as a starting year

¹⁹Issue no. 64, 1851, reports of a certain B. Kramer having lost a certificate from the Russian $4\frac{1}{2}\%$ series of 1850. The author denies all affiliation with this individual.

since this is when the sixth 5% loan was first listed. 1875 is the last year of the sample, since this is when the Netherlands adopted the gold standard (‘t Hart et al., 1997). Any currency risk from 1875 onwards is therefore not just a reflection of the value of the rouble, but also of the global gold/silver price ratio. Additionally, I collect monthly prices for all listed Dutch securities as well as interest rates on the Dutch money market.

For the years 1856–1860, I also collect daily price data for all Russian bonds, for the purpose of the study of liquidity. The practical difficulty of collecting daily prices from the *Amsterdamsch Effectenblad* necessitates a shorter period of analysis than the full 1856–1875 period when it comes to the occurrence of daily price quotes. I therefore decide to limit this part of the study to just the first five years after the issuance of the sixth 5% loan. Any substantive differences in liquidity are bound to be most prominent in the first years after issuance, when the bonds can still be considered “on the run” (Houweling et al., 2005).

Details of all bonds can be found in Dinger (1868): a compilation of all listed securities which was widely used by investors at the time. Table 2.1 presents the details of all Russian bonds issued before 1860. The two bonds issued during the Crimean War, the fifth and sixth 5% loan, are highlighted in bold.

I calculate yields to maturity for both the fifth and the sixth 5% loan. Figure 2.1 plots the full series for the period 1856–1875; the yields in June and December of each year are presented in Table 2.2.²⁰ As the graph and the table show, the yields on the two Crimean War loans are initially nearly equal. However, as time goes by, the spread between the two yields reaches substantial magnitudes. In 1859 the difference in yields is already close to 1%, and it reaches a maximum of approximately 3% in 1866–1867. At first glance, therefore, the guaranteed guilder coupon that was part of the sixth 5% loan became increasingly valuable over time.

In order to relate the pricing of these bonds to currency risk, I complement the series of bond prices with data on exchange rates. I collect monthly rates of exchange between Amsterdam and St. Petersburg from Schneider et al. (1991): a compilation that provides monthly rates of exchange for all major

²⁰A table of the full monthly series is available on request.

Figure 2.1: Yields to Maturity, Fifth and Sixth 5% Loan

Source: author's calculations, based on bond prices from the *Amsterdamsch Effectenblad*. See section 2.3.1 and Appendix A2.2 for details on the calculation.

Table 2.1: Russian Government Bonds Listed in Amsterdam until 1860

Bond name	Year(s) Issued	Issue Size (Silver Roubles) ^a	Currency	Issuing Houses	Days Quoted, (1856-1860) ^b
Russian bonds at Hope & Co., 5%	1798	51.8 M.	Guilders	Hope & Co. (Amsterdam)	99.54%
Inscriptions in Silver, 6%	1817	} 27.1 M. ^c	Silver Roubles	None ^d	0.50%
Inscriptions in Assignats, 6%	1817		Assignat (paper) Roubles	None ^d	21.83%
Certificates in Silver, 6%	1817		Silver Roubles	Hope & Co. (Amsterdam)	76.06%
Certificates adm. Hamburg, 5%	1820	40 M.	Silver Roubles	Sillem, Benecke & Co. and H.J. Stresow (Hamburg)	19.66%
Loan in London, 5%	1822	23 M.	Silver Roubles	Rothschild & Sons (London)	12.14%
Bonds 1828/1829 loan, 5%	1828 / 1829	21 M.	Guilders	Hope & Co. (Amsterdam)	89.84%
Certificates 3 rd and 4 th loan, 5%	1831 / 1833	20 M.	Silver Roubles	Hope & Co. (Amsterdam)	71.17%
Certificates at Hope & Co., 4%	1840-1847	} 67 M.	Silver Roubles	Hope & Co. (Amsterdam)	84.70%
Inscriptions at Stieglitz, 4% ^e	1840-1844		Silver Roubles	Stieglitz & Co. (St. Petersburg)	85.22%
Inscriptions at Stieglitz, 5 th loan, 4%	1847		Silver Roubles	Stieglitz & Co. (St. Petersburg)	11.74%
Loan in London, 4 th	1850	33 M.	Pound Sterling	Baring Brothers & Co. (London)	59.63%
Inscriptions at Stieglitz, 5th loan, 5%	1854	50 M.	Silver Roubles	Stieglitz & Co. (St. Petersburg)	86.81%
Inscriptions at Stieglitz, 6th loan, 5%	1855	50 M.	Guilders (coupon) / Silver Roubles (principal)	Stieglitz & Co. (St. Petersburg)	100.00%
Loan in London, 3%	1859	72 M.	Pound Sterling	Thomson, Bonar & Co. (London) and F.M. Magnus (Berlin)	96.32%
Loan in London and Amsterdam, 4 th	1860	48 M.	Pound Sterling	Baring Brothers & Co. (London) and Hope & Co. (Amsterdam)	100.00%

^a Sources: Author's compilation, based on Dinger (1868) and the *Amsterdamsch Effectenblad*.

^b Converted to Silver Roubles, at the parities of 1 Silver Rouble : 3.5 Assignat Rouble, 1 Silver Rouble : 2 Guilders, and 6 Silver Rouble : 1 Pound Sterling.

^c Percentage of days, 1856-1860, in which at least one price is quoted.

^d Jointly issued. Issue size not mentioned in Dinger (1868) but based on Platt (1984), p. 67.

^e The 1817 loan was issued in Russia without the intermediation of a banking house, but directly by the Russian treasury.

Concerns four consecutive 4% loans, whereas the fifth is separately listed. 4% certificates at Hope & Co. concern all five 4% loans.

Table 2.2: Yields to Maturity, Fifth and Sixth 5% Loan

Date	Yield to Maturity		Spread	Date	Yield to Maturity		Spread
	Fifth 5% loan	Sixth 5% loan			Fifth 5% loan	Sixth 5% loan	
1854, Jun.	6.45	-	-	1865, Jun.	8.40	6.47	1.93
1854, Dec.	6.51	-	-	1865, Dec.	8.96	6.94	2.03
1855, Jun.	6.56	-	-	1866, Jun.	11.49	8.31	3.17
1855, Dec.	6.74	-	-	1866, Dec.	10.65	7.62	3.02
1856, Jun.	5.60	5.54	0.06	1867, Jun.	10.86	7.96	2.89
1856, Dec.	5.53	5.41	0.12	1867, Dec.	11.08	8.54	2.54
1857, Jun.	5.19	5.09	0.10	1868, Jun.	9.75	8.15	1.61
1857, Dec.	5.55	5.31	0.23	1868, Dec.	9.73	8.14	1.60
1858, Jun.	5.18	4.95	0.24	1869, Jun.	9.79	8.00	1.79
1858, Dec.	5.17	4.88	0.29	1869, Dec.	10.70	8.21	2.50
1859, Jun.	5.92	5.39	0.53	1870, Jun.	9.97	7.82	2.15
1859, Dec.	5.84	5.09	0.75	1870, Dec.	10.65	8.39	2.26
1860, Jun.	5.90	5.13	0.77	1871, Jun.	9.99	7.86	2.13
1860, Dec.	6.32	5.52	0.79	1871, Dec.	9.76	7.31	2.45
1861, Jun.	6.56	5.44	1.12	1872, Jun.	9.13	6.98	2.15
1861, Dec.	6.91	5.74	1.17	1872, Dec.	9.37	7.03	2.34
1862, Jun.	6.87	5.89	0.98	1873, Jun.	9.17	6.90	2.27
1862, Dec.	6.54	5.84	0.70	1873, Dec.	9.16	6.73	2.43
1863, Jun.	6.53	5.91	0.61	1874, Jun.	8.72	6.97	1.74
1863, Dec.	7.36	6.26	1.11	1874, Dec.	8.68	6.80	1.87
1864, Jun.	7.84	6.65	1.19	1875, Jun.	8.64	6.34	2.30
1864, Dec.	8.61	7.09	1.52	1875, Dec.	9.36	6.35	3.01

Source: author's calculations, based on bond prices from the *Amsterdamsch Effectenblad*. All numbers represent the yields to maturity for fifth and sixth 5% loan in percentages. See section 2.3.1 and Appendix A2.2 for details on the calculation.

“-” indicates that the sixth 5% loan was not listed until January 1856.

markets based on primary sources. Throughout the full period of this study, the quoted rate refers to a two-month bill of exchange. Figure 2.2 shows the development of this rate of exchange for the 1843–1897 period. This is the full period for which the bills of exchange on St. Petersburg were payable in credit notes, and for which these credit notes were the dominant means of payment in Russia.

Figure 2.2: Rate of Exchange, Amsterdam to St. Petersburg

Source: Schneider et al. (1991), p. 194-195. The vertical lines in January 1856 and December 1875 mark the start and the end of this study's sample period.

As can be seen, the guilder/rouble exchange rate steadily decreases from around *f*1.80 at the end of the Crimean War to a trough of *f*1.18 in July 1866. The rouble then quickly recovers to a value just under *f*1.60 after which it no longer seems to trend downwards, although there is another prolonged dip around 1870. In the course of the Russo-Turkish war of 1877–1878, which is outside the scope of the present study, the rouble abruptly depreciates to a level around *f*1.20, around which level it stays for the remainder of the century. Note that the rouble is finally stabilised at a parity of *f*1.25 in 1897, which is the year that Russia adopts the gold standard.

2.5 Results

2.5.1 Liquidity Risk

The first issue to be addressed is whether liquidity plays a role in the spread between the yields of the two Crimean War loans. As discussed in section 2.3.2, I approach this issue first by studying the incidence of price quotes following Lesmond et al. (1999), and secondly by estimating liquidity risk using the model of equation 2.4.

The final column of Table 2.1 shows for each bond the percentage of all trading days from 1856 to 1860 on which a price is quoted in the *Amsterdamsch Effectenblad*. As can be seen, the sixth 5% loan does seem to have been traded somewhat more actively than the fifth 5% loan. In fact, the sixth 5% loan reports at least one price on every day for the 1856–1860 period, whereas the fifth 5% loan does not report a price in a little under one in seven days for this period. That said, the fifth 5% loan is still by comparison very actively traded; for instance, the 1820 Hamburg loan and the 1847 4% loan at Stieglitz & Co. do not quote a price on the vast majority of days. Prima facie evidence therefore suggests that both loans issued during the Crimean War were actively traded in the years 1856–1860, and that any difference in liquidity between the two bonds cannot have been large.

Results of the analysis of liquidity risk using the model of equation 2.4 are presented in Table 2.3. I exclude those bonds from this analysis that reported only very infrequent price quotes, i.e. the bonds from Table 2.1 which report a price less than 25% of the days in 1856–1860. These are the original 1817 inscriptions in silver and assignats (but not the Dutch certificates thereof), the 1820 Hamburg loan, the 1822 London loan, and the fifth 4% loan of 1847. These bonds can a priori be considered as illiquid based on the lack of regular price quotes.²¹

All estimates of $\beta_{m,i}$ and $\beta_{liq,i}$ have the expected sign. All Russian bonds are estimated to have a market-beta that is positive and substantially below 1; this is what one would typically expect for bonds, since bonds are a less risky asset than a stock like that of the *Nederlandsche Handel-Maatschappij*.

²¹A more practical reason to exclude these is that these bonds were not reported in the monthly overviews of the *Amsterdamsch Effectenblad*. In addition to this being itself a sign of little trading in these bonds, it also complicates the data collection significantly.

All estimates of the liquidity-betas are negative and most vary between -0.0035 and -0.0085; only the liquidity-beta of the 1817 loan has a larger magnitude (-0.0157). To interpret the magnitudes of these coefficients, note that the dependent variable is a return, whereas the independent variable is an interest rate. $\beta_{liq,i}$ should therefore be seen as a semi-elasticity: it measures the relative change of the security's price for a one-point increase of the interest rate on lombards. For example, for the fifth 5% loan, I estimate that a 1% (100 basis points) increase of the interest rate is associated with a 0.842% decrease of the price of the bond.

The liquidity risks of the fifth and sixth 5% loan seem virtually equal, with point estimates of respectively 0.842% and 0.846%. This is confirmed by an F-test on the equality of $\beta_{liq,i}$ for these two series ($p(F) = 0.9895$). Although for a joint test on all liquidity-betas the null hypothesis that these are equal is rejected ($p(F) = 0.0403$), this is purely driven by the 1817 loan. When this is excluded, the null of the equality of all $\beta_{liq,i}$'s cannot be rejected ($p(F) = 0.3552$). I conclude that all Russian loans had the same liquidity risk in this period, except for the 1817 loan for which this was higher. More specifically, there is no reason to believe that the fifth and the sixth 5% loan will have differed materially in terms of liquidity risk. The term $(\pi_{l,Vt} - \pi_{l,VIt})$ in equation 2.3 can therefore safely be assumed to be equal to zero.

Since the above estimation of liquidity risk is based on various proxies, I explore a number of alternatives. First, I inspect whether the daily spread between the reported lowest and highest price of each security can serve as a measure of liquidity, since it may proxy for the spread between bid and ask prices. I conclude that it cannot: the low-high spread is most likely more closely related to volatility than to liquidity. Second, I use two alternative potential proxies for market-wide liquidity. These are firstly the daily number of missing prices in the "Netherlands" and "Russia" section of the *Amsterdamsch Effectenblad*, and secondly the spread between the 2.5% and 3% inscriptions of the Dutch government debt.²² I conclude that the former captures market-wide liquidity to some extent, but that it performs poorly compared to the lombard rate, while the latter does not seem to capture market-wide liquidity at all. Third, I explore whether the estimation of

²²The latter proxy is inspired by Schwarz (2018).

equation 2.4 can be improved upon by using daily data rather than monthly data. I find that estimates become much more noisy when doing so. I therefore conclude that the estimates presented here are the best estimates that can be made of the relative (il)liquidity of the bonds studied, given the available data. Details of all these checks — performed for 1856–1860 rather than 1856–1875 for reasons of data availability — can be found in Kramer (2013); I omit them here since liquidity is not the main subject of this chapter.

2.5.2 Bondholders' Expectations Regarding the Rouble

Having established the lack of a significant difference in liquidity premia between the two Crimean War loans, I conclude that the full spread between the two loans can be attributed to currency risk. This validates the analysis of exchange rate expectations outlined in section 2.3.3. The results of this analysis are presented here.

Table 2.4 shows the results of my derivation of the expected exchange rate, on the basis of the spread between the fifth and sixth 5% loan. I tabulate the implied expected exchange rate and the actual exchange rate for June and December each year; the full monthly series is presented graphically in Figure 2.3.²³

To interpret this table and graph, recall from the discussion in section 2.3.3 that the actual exchange rate is the quoted guilder price of a bill of exchange on St. Petersburg, discounted by two months worth of lombard interest. The implied expected exchange rate is the solution of X_t^* in equation 2.5: it is the exchange rate which, if it would hold for all future payments, would equalize the yields on the fifth and sixth 5% loan. Taking June 1858 as an example, the table can be read as follows: on this date, the (discounted) rate of exchange from Amsterdam to St. Petersburg equals $f1.707$ per rouble. However, the exchange rate that Dutch investors expect to hold in the future equals $f1.808$ per rouble; this expectation is derived from the yields on the two Crimean War loans. Thus, I conclude that in June 1858, Dutch investors anticipate that the rouble will appreciate in the future, by about $f0.10$ per rouble (or 6 percent). Conversely, in December 1867 the same approach shows that Dutch bondholders anticipate a substantial future depreciation of

²³A table of the full monthly series is available on request.

Figure 2.3: Inferred Exchange Rate Expectations

Source: author's calculations, see main text. All exchange rates in guilders per silver rouble. The implied expected exchange rate is the future guilder/rouble exchange rate that can be inferred from the yields of the fifth and sixth 5% loans; i.e. it is the solution to X_t^* in equation 2.5. The actual exchange rate is the guilder price of a two-month bill of exchange on St. Petersburg, minus two months (lombard) interest.

Table 2.3: Liquidity Risk: Results

Bond:	$\beta_{0,i}$	$\beta_{m,i}$	$\beta_{liq,i}$
Russian bonds at Hope & Co., 5%	-0.000180 (0.000732)	0.179*** (0.0633)	-0.00646*** (0.00157)
Certificates in Silver, 6%	-0.00140 (0.00167)	0.506*** (0.128)	-0.0157*** (0.00314)
Bonds 1828/1829 loan, 5%	-8.14e-05 (0.000594)	0.102** (0.0516)	-0.00380*** (0.00101)
Certificates 3 rd and 4 th loan, 5%	-0.000466 (0.00138)	0.427*** (0.0813)	-0.00483* (0.00265)
Inscriptions at Stieglitz, 4%	-0.000707 (0.00223)	0.446** (0.195)	-0.00733** (0.00371)
Certificates at Hope & Co., 4%	-0.000703 (0.00144)	0.406*** (0.0840)	-0.00703** (0.00291)
Loan in London, 4 $\frac{1}{2}$ %	0.000230 (0.00104)	0.239** (0.116)	-0.00629*** (0.00174)
Inscriptions at Stieglitz, 5th loan, 5%	-4.33e-05 (0.00106)	0.211* (0.121)	-0.00842*** (0.00254)
Inscriptions at Stieglitz, 6th loan, 5%	0.000442 (0.000819)	0.137 (0.0873)	-0.00846*** (0.00191)
Loan in London, 3%	-0.000848 (0.00102)	0.341*** (0.0720)	-0.00628*** (0.00168)
Loan in London and Amsterdam, 4 $\frac{1}{2}$ %	-4.14e-06 (0.000981)	0.218*** (0.0762)	-0.00843*** (0.00170)
Observations	1,873		
R-squared	0.221		

Results of an OLS regression on the returns on Russian bonds, following equation 2.4. $\beta_{0,i}$ is a bond-specific intercept. $\beta_{m,i}$ presents the comovement of the return on bond i with a proxy for market returns $r_{m,t}$, which is the return on stocks of the *Nederlandsche Handel-Maatschappij*. $\beta_{liq,i}$ presents the comovement of the return on bond i with a measure of market-wide liquidity, which is the change of the interest rate on lombards. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 2.4: Inferred Exchange Rate Expectations

Date	Implied Expected Exchange Rate	Actual Exchange Rate	Expected Appreciation	Date	Implied Expected Exchange Rate	Actual Exchange Rate	Expected Appreciation
1854, Jun.	-	1.693	-	1865, Jun.	1.416	1.510	-0.095
1854, Dec.	-	1.706	-	1865, Dec.	1.411	1.462	-0.050
1855, Jun.	-	1.731	-	1866, Jun.	1.282	1.187	0.096
1855, Dec.	-	1.644	-	1866, Dec.	1.277	1.476	-0.199
1856, Jun.	1.866	1.788	0.078	1867, Jun.	1.303	1.541	-0.238
1856, Dec.	1.846	1.809	0.037	1867, Dec.	1.369	1.568	-0.200
1857, Jun.	1.853	1.809	0.045	1868, Jun.	1.510	1.567	-0.056
1857, Dec.	1.808	1.624	0.185	1868, Dec.	1.510	1.575	-0.064
1858, Jun.	1.804	1.707	0.097	1869, Jun.	1.471	1.459	0.012
1858, Dec.	1.785	1.692	0.094	1869, Dec.	1.356	1.404	-0.047
1859, Jun.	1.717	1.521	0.196	1870, Jun.	1.400	1.405	-0.005
1859, Dec.	1.647	1.640	0.007	1870, Dec.	1.392	1.429	-0.037
1860, Jun.	1.644	1.672	-0.029	1871, Jun.	1.400	1.511	-0.112
1860, Dec.	1.645	1.692	-0.046	1871, Dec.	1.333	1.569	-0.236
1861, Jun.	1.560	1.643	-0.083	1872, Jun.	1.374	1.590	-0.216
1861, Dec.	1.557	1.619	-0.062	1872, Dec.	1.341	1.562	-0.221
1862, Jun.	1.605	1.640	-0.035	1873, Jun.	1.349	1.558	-0.209
1862, Dec.	1.675	1.688	-0.013	1873, Dec.	1.317	1.542	-0.226
1863, Jun.	1.699	1.739	-0.040	1874, Jun.	1.443	1.591	-0.148
1863, Dec.	1.582	1.567	0.015	1874, Dec.	1.413	1.589	-0.175
1864, Jun.	1.571	1.586	-0.015	1875, Jun.	1.329	1.591	-0.262
1864, Dec.	1.512	1.404	0.108	1875, Dec.	1.217	1.550	-0.334

Source: author's calculations, see main text. All exchange rates in guilders per silver rouble. The implied expected exchange rate is the future guilder/rouble exchange rate that can be inferred from the yields of the fifth and sixth 5% loans; i.e. it is the solution to X_t^* in equation 2.5. The actual exchange rate is the guilder price of a two-month bill of exchange on St. Petersburg, minus two months (lombard) interest. The expected appreciation is the difference between the two series; negative values indicate an expected depreciation.

“.” indicates that the sixth 5% loan was not listed until January 1856; hence, no implied expected exchange rate can be calculated.

the rouble, of approximately 13 percent.

As can be seen from Table 2.4 and Figure 2.3, the exchange rate that investors expect for the years ahead is subject to the same secular decline as the actual exchange rate, but how the two series relate to each other varies over time. Up until c. 1859, the implied expected exchange rate is higher than the actual exchange rate; a sign that Dutch investors expect the rouble to recover towards parity. This changes after the brief crash of the rouble in 1859: although the exchange rate quickly recovers to nearly its former level, investors substantially adjust their expectations regarding the future value of the rouble downwards. This process continues up until the mid-1860s: both the actual and the implied expected exchange rate decline, but the latter is nearly always lower, implying that the depreciation process is expected to continue.

After a brief but large temporary depreciation of the rouble in 1866 it recovers to a level between *f*1.50 and *f*1.60. Another somewhat more prolonged depreciation follows around 1870. After 1866, and especially after 1869, Dutch investors consistently expect a substantial further depreciation of the rouble: the implied exchange rate stabilizes at a level between *f*1.30 and *f*1.40, significantly below current levels of the exchange rate. Although not visible from Figure 2.3 — since the period of the study ends in 1875 — these expectations are ex-post validated, since after the outbreak of war in 1877 the rouble's exchange rate plummets to a level around *f*1.20 where it remains for the years beyond (see also Figure 2.2).

The main conclusion to be drawn on the basis of Table 2.4 and Figure 2.3 is therefore that up until 1859, international investors expected the rouble to appreciate, whereas for most of the post-1859 period they expected it to depreciate. Another conclusion is that temporary swings in the implied expected exchange rate did not always follow those of the actual exchange rate.

2.5.3 Determining Structural Breaks

Having determined what the long-term expectations regarding the value of the rouble were across the 1856–1875 period, I can now ask at what points in time these expectations saw pronounced changes. Graphical inspection of

Figure 2.3 may shed some light on this, but a more formal analysis is preferred to facilitate a more precise dating of these changes. For this reason, I perform a series of structural break tests on the expected degree of appreciation of the rouble (A_t), following the methodology described in section 2.3.3.

Table 2.5, panel A, shows the results of this analysis, by showing the break dates found in the series A_t for two specifications: one in which the time trend β_j is allowed to vary between regimes, and one in which it is not. The Bai-Perron method allows the model to endogenously find up to four breaks given the length of the time window, but in some specifications only three breaks are found to be statistically significant. The first two columns of Table 2.5 show the break dates I find when estimating this model for the full 1856–1875 period.

Two break dates — September 1859 and July/August 1871 — are found in both specifications. The single-trend model finds only one additional break in September 1866; further structural breaks are statistically insignificant. On the other hand, the more flexible model of column 2 does not find the September 1866 break, but instead locates two additional structural breaks in May 1864 and May 1868.

As a robustness check, I also test for breaks in the series of the expected degree of appreciation (A_t) for two somewhat shorter periods: 1856–1871 and 1856–1873. The reason for this robustness check is that the early 1870s were a period of substantial monetary turmoil in Western Europe (Gallarotti, 1993), including the inconvertibility of the guilder in 1873 (de Jong, 1967, vol. II, ch. 16). Therefore the breakpoints found may be affected by events that relate more to the value of the guilder than to that of the rouble. Results for the 1856–1873 period are very similar to those for the full period, and the identified break dates are at most three months away from those found earlier. When the shorter period of 1856–1871 is used, the break in the summer of 1871 is no longer found, which is simply because this date is now too close to the boundary of the estimation window.

Additionally, it is worth checking for robustness to one other methodological choice made earlier: the discounting of the exchange rate. As explained earlier, I calculate the actual rate of exchange as the Amsterdam price of a bill of exchange on St. Petersburg, discounted for two months by the interest

Table 2.5: Structural Breaks in the Expected Appreciation of the Rouble

Panel A: Baseline Results

	1856 - 1875		1856 - 1873		1856 - 1871	
	Single Trend	Varying Trend	Single Trend	Varying Trend	Single Trend	Varying Trend
Break 1	1859, Sep.	1859, Sep.	1859, Sep.	1859, Sep.	1859, Oct.	1859, Sep.
Break 2	1866, Sep.	1864, May	1866, Sep.	1864, May	1866, Sep.	1864, May
Break 3	1871, Aug.	1868, May	1871, May	1868, Aug.	1869, Jan.	1868, May
Break 4	-	1871, Jul.	-	1871, May	-	-

Panel B: Alternative Discounting of X_t

	1856 - 1875		1856 - 1873		1856 - 1871	
	Single Trend	Varying Trend	Single Trend	Varying Trend	Single Trend	Varying Trend
Break 1	1859, Sep.	1859, Sep.	1859, Sep.	1859, Sep.	1859, Oct.	1859, Sep.
Break 2	1866, Sep.	1864, Jul.	1866, Sep.	1864, May	1866, Sep.	1864, Jul.
Break 3	1871, Sep.	1868, May	1871, May	1868, Aug.	1869, Jan.	1868, May
Break 4	-	1871, Sep.	-	1871, May	-	-

Panel C: No Discounting of X_t

	1856 - 1875		1856 - 1873		1856 - 1871	
	Single Trend	Varying Trend	Single Trend	Varying Trend	Single Trend	Varying Trend
Break 1	1859, Sep.	1859, Sep.	1859, Sep.	1859, Sep.	1859, Oct.	1859, Sep.
Break 2	1866, Sep.	1864, Jul.	1866, Sep.	1864, May	1866, Sep.	1864, Jul.
Break 3	1871, Sep.	1868, May	1871, May	1868, Aug.	1869, Jan.	1868, May
Break 4	-	1871, Jul.	-	1871, May	-	-

Breakpoints found by Bai-Perron structural break tests in the series of expected appreciation of the rouble A_t . The expected appreciation is the difference between the implied expected exchange rate X_t^* and the actual exchange rate X_t . Panel A presents the baseline results, where X_t is discounted for two months worth of interest by the Lombard rate. Panel B instead uses the long-term interest rate as the discount factor. Panel C does not discount the exchange rate at all. In all cases, the results referred to as “Single Trend” do not allow for changes in the time trend β_j , whereas the results referred to as “Varying Trend” allow β_j to vary between regimes j . “-” means that no statistically significant fourth structural break is found.

on lombards. The reason for this is that the price of a bill of exchange does not only reflect the relative price of two currencies, but also the time value of money inherent in the forward nature of bills of exchange. To determine whether this makes a material difference, I take two alternative approaches. The first is to use an alternative interest rate, namely the long-term interest rate. This is the yield on the Dutch perpetual 2.5% debt, the *Werkelijke Schuld* (Dinger, 1873). The second alternative is to simply ignore the forward nature of the bill of exchange altogether, and thus not to discount its price at all. Resulting structural breaks that I find by following these alternative approaches to the calculation of A_t are presented in Table 2.5, panels B and C.

The breakpoints that the Bai-Perron tests find in these specifications are virtually identical to those of panel A. In most cases, the structural breaks found when discounting using the long-term interest rate or when not discounting at all are the same as those when using the lombard interest rate. In some cases, the structural breaks deviate one or two months from those found earlier. I thus conclude that the results are robust to alternative choices for this methodological issue.

The final step of the statistical analysis consists of a more precise determination of breakpoints in the series A_t . Since the break dates found by the Bai-Perron tests vary across specifications by a couple of months, I run a series of Chow tests to pinpoint as precisely as possible when the actual breaks occur (see section 2.3.3). I perform this study for the four breakpoint candidates identified by the most general form of the Bai-Perron test, i.e. the form that allows the trend β_j to vary across regimes j . The results of this analysis are presented in Figure 2.4.²⁴

Figure 2.4 shows that in two cases, a fairly precisely dating of the breakpoint can be established. Both in September 1859 and in July 1871 we see sharp changes in the expected degree of appreciation. On the other hand, for the second and third suspected break date, the precise location of the break is a lot less clear; all that can be said is that these break-points lie somewhere in the second half of 1864, and in the first half of 1868, respectively.

On the basis of the combined evidence of Figures 2.3 and 2.4, and Ta-

²⁴Appendix A2.4 presents these results also in the form of a table.

Figure 2.4: Results of the Chow Breakpoint Tests

F-statistics associated with a series of Chow tests on the series of expected appreciation of the rouble A_t , following equation 2.8. The date at which the maximum value of the F-statistic is reached in each of the four estimation windows is represented by the vertical line. Estimation windows run from three years before the first potential date of the breakpoint to three years after the last, i.e. from March 1856 to March 1863, from December 1860 to December 1867, from December 1864 to December 1871, and from January 1868 to January 1875, respectively. In all cases, $p(F) < 0.01$.

bles 2.4 and 2.5, the following chronology of the value of the rouble can be reconstructed.

- I. From 1856 to September 1859, the rouble is trading slightly below par and there is a gradual decline of its value over time, but Dutch investors expect that it will appreciate in the future.
- II. In September 1859, investors revise this expectation; from this point on, a modest expected depreciation is reflected in the pricing of the fifth and sixth 5% loans. The rouble continues to lose value over time, except for a brief and temporary recovery in 1862. This situation continues up until the first half of 1864.

- III. From early 1864 to late 1868, the rouble stabilises at a rate of exchange between $f1.50$ and $f1.60$. The expected exchange rate also stabilises, but at a lower level; hence, Dutch investors continue to expect a substantial depreciation for future years.
- IV. From late 1868 onwards, Dutch investors adjust their expectations regarding the future value of the rouble upward; from this point on, little to no further depreciation is expected. When in the course of the next two years the rouble gradually depreciates to a level around $f1.40$, the expected exchange rate for future years follows suit. The two rates remain close to each other up until July 1871.
- V. From July 1871 onwards, the rouble exchange rate appreciates to a level around $f1.60$, but the implied expected exchange rate does not follow suit. Hence, eventhough the short-term value of the rouble recovers, investors do not expect this situation to last in the long run. In other words, a further depreciation is implicit in the pricing of the fifth and sixth 5% loan from July 1871 onwards. This situation lasts at least until the end of the sample period of this study, December 1875.

Eventually, the rouble's exchange rate falls to a level around $f1.20$ at the outbreak of the Russo-Turkish war in 1877 (see Figure 2.2). In other words, investors' pessimistic expectations towards the end of the sample period turned out to be validated.

2.6 Discussion

On the basis of the two Crimean War loans, I conclude that the main revisions to bondholders' long-term expectations about the value of the rouble occurred in September 1859, early 1864, late 1868, and July 1871. What does this say about the way in which the monetary developments in Russia — discussed in section 2.2.1 — were perceived by international investors?

Strikingly, none of the currency reforms that were pursued by the Russian government in the 1850s and '60s, nor their abandonment, coincides with any of the breaks in the series of the expected degree of appreciation A_t . Recall that plans to restore convertibility were initiated in April 1857 and April

1862; plans that were discontinued after approximately one month and one year, respectively. A more modest policy of stabilising the rouble's exchange rate without the immediate goal of convertibility was initiated in 1867 and continued until 1875. My empirical analysis shows that Dutch investors did not revise their views on the rouble in response to any of these currency reforms, since all the identified breakpoints occur at markedly different moments.

If the Russian currency reforms did not affect bondholders' views on the rouble, then which events did? Remarkably, most of the break dates either coincide with major geopolitical shocks, or trail such shocks by a small number of months. Furthermore, the breaks in the series of expected rouble appreciation in some cases follow a number of months after a temporary drop of the actual exchange rate. The first instance where this pattern can be observed is in 1859. The rouble itself plummets in Spring 1859 in the context of a global financial crisis, which is ignited by the outbreak of the Second War of Italian Independence in late April 1859 (Blumberg, 1990). Between April and June 1859, the exchange rate on St. Petersburg falls from *f*1.74 to *f*1.53. But recovery is quick, and by October 1859, the exchange rate is back to a level around *f*1.69. The implied expected exchange rate, however, permanently stays below its previous level from this point on. Dutch investors thus adjust their view on the future value of the rouble in the wake of a global financial crisis, which is ignited by a war in which Russia takes no part.

Similarly, the break in early 1864 coincides with the end of the Polish uprising (Leslie, 1969). Although Polish independence did not materialize, the uprising was a costly affair for the Russian state. This is reflected by the issuance of a new *f*70.8 million loan — 141.6 million roubles at par value — in April 1864 specifically to cover these costs (Dinger, 1873, p. 220). The sharp temporary fall of the guilder/rouble exchange rate in summer 1866 — identified as a breakpoint by the single-trend version of the Bai-Perron test, see Table 2.5 — takes place at the time of the Austro-Prussian war (Wawro, 1997).

The break in July 1871 comes in the wake of the Franco-Prussian war, an event of which the global monetary consequences have been extensively documented (Helfferich, 1898; Gallarotti, 1993; Flandreau, 1996; Meissner,

2005). Already by Spring 1871 it was widely known that a monetary reform on the basis of gold was one of the top priorities of the new German government, and that this might cause serious disturbances to global gold and silver prices (see Helfferich (1898), vol. 1, pp. 62, 134, and 156). The break in July 1871 is thus likely to be related to these global monetary developments.

Only the structural break in Fall 1868 seems unrelated to any major geopolitical development. Since this break — unlike the others — consists of an upward revision of exchange rate expectations, it might be that Russia's successful continuation of its exchange rate stabilisation program since 1867 (see section 2.2.1) persuaded Dutch bondholders to take a more positive view on the future of the rouble.

The pattern thus discussed presents a paradox: not domestic monetary developments in Russia, but geopolitical shocks elsewhere in Europe, were the primary force behind changes to Dutch investors' confidence in the future of the rouble. What mechanism may explain this paradox? For the episode of 1859, a contemporary piece from Karl Marx illustrates how Russia was affected. As mentioned, the outbreak of the Second War of Italian Independence led to a major financial crisis across Europe, including London. In the words of Marx:

Not less than twenty-eight failures of members of the [London] Stock Exchange were declared since Monday last, of which eighteen occurred on the 28th [of April 1859]. (...) With the failing British stock-jobbers, there went down at the same time the Russian loan of £12,000,000, which, but for the sudden resolution taken on the part of Austria, would have been swallowed by Lombard street.

Source: New-York Daily Tribune, 12 May 1859, "The Financial Panic" (Originally written on 29 April 1859; reproduced in Marx and Engels (2010).)

The sudden unexpected shortage of foreign funding brought the Russian treasury into serious difficulty, causing the aforementioned depreciation of the rouble. To prevent a further collapse of the exchange rate, the Russian treasury obtained an emergency loan from the house of Rothschild in Paris. To signal to Dutch creditors that it had obtained this emergency loan, the Russian treasury announced this fact in the *Amsterdamsch Effectenblad*:

From St. Petersburg, news reaches us that the government, with the assistance of the house of Kapherr & Co., has reached an agreement with the lords *de Rothschild Frères* in Paris, thus opening a credit worth £500,000 in London and in Paris, with the purpose of improving the unfavourable standing of the exchange rate.

Source: *Amsterdamsch Effectenblad*, 21 June 1859. Author's translation.

The Rouble quickly recovered to a level around *f*1.70 in June 1859. The London loan originally planned for May 1859 was eventually raised in August that year under the original conditions (Dinger, 1873, p. 243). The Russian treasury and the short-term value of the rouble thus escaped relatively unscathed. However, Dutch bondholders' confidence in the future of the rouble was permanently damaged.

The 1859 episode shows how foreign confidence in the rouble was to a sizable extent influenced by external events. Not the failed currency reform of 1857 but the inadvertent cancellation of a foreign loan in 1859 was what made Dutch bondholders change their mind about the rouble's future. This illustrates how, as the analysis of this chapter has shown, geopolitical developments elsewhere in Europe could have long-lasting repercussions for Russia's monetary stability.

2.7 Conclusion

This chapter has studied the history of the Russian rouble, and the view taken on the rouble by foreign investors, between 1856 and 1875. This was a period in which Russia had an inconvertible currency, which was subject to a secular process of depreciation. Although the government tried to improve upon this situation by pursuing several reforms of the rouble, none of these were successful. Since Russia was a major foreign borrower at the time, and since many of its foreign bonds were denominated in its own currency, this affected foreign bondholders as well. I therefore reconstruct what long-term expectations these foreign bondholders held regarding the rouble during these two decades, using two Russian bonds listed in Amsterdam at the time.

These bonds — both issued to meet the costs of the Crimean War —

allow the reconstruction of long-term expectations regarding the rouble because they were equal up to the currency structure: whereas one paid interest in roubles, the other promised a fixed amount in guilders. By comparing the yields on these two bonds, I find that until 1859, Dutch investors were relatively optimistic about the future of the rouble, and anticipated a recovery towards its par value. From 1860 onwards, however, bond prices show that the rouble is expected to depreciate in the long run, although there is substantial variation in how much depreciation is expected at each point in time. Furthermore, I find that most of the revisions of these expectations take place not during monetary events in Russia, but in the wake of geopolitical shocks, such as the outbreaks of war. In most cases, these are events in which Russia itself is not involved. The 1859 episode illustrates that this does not necessarily mean that Dutch bondholders were mistaken; rather, it illustrates how unforeseen developments elsewhere in Europe could have serious consequences for the stability of the rouble.

This chapter contributes to the literature in three ways. Firstly, I study a period in Russian monetary history on which there has so far been very little academic research. Although the history of the rouble from around the time of Russia's adoption of the gold standard (in 1897) has received a fair amount of scholarly attention (see, among others, Barkai (1973), Drummond (1976), and Gregory and Sailors (1976)), the international literature is remarkably silent on the preceding century. Admittedly, the present chapter only scratches the surface.

Secondly, my study demonstrates how the nineteenth-century bond market can be used to infer the expectations held by investors for currencies' long-run development. Although this approach relies on the existence of a particular set of bonds — ones that are identical up to the currency structure — it does not require any strong other assumptions regarding, for instance, market efficiency or international arbitrage. This shows that the approach taken by Flandreau and Oosterlinck (2012) for the case of Indian debt can be extended to other situations as well. This approach should thus be seen as a promising complement to estimations of short-term currency risk based on the money market, like that of Mitchener and Weidenmier (2015).

Thirdly, I show that the international confidence in the rouble was largely

unaffected by any of the currency reforms undertaken in Russia. Instead, geopolitical and financial crises elsewhere in Europe were in most cases the triggers that induced international investors to become more pessimistic about the rouble's future. This echoes with a large literature that shows how peripheral countries' currencies in the nineteenth and early twentieth century were often to a large extent at the mercy of international markets (Nurkse, 1944; Ford, 1962; Bordo et al., 2010a). At this study shows, foreign bondholders lost faith in the rouble, not upon the failure of currency reforms in Russia, but upon financial shocks that originated elsewhere in Europe.

Chapter 3

Democratic Constraints and Adherence to the Classical Gold Standard*

3.1 Introduction

Today's highly globalized world, where goods, money, information and ideas can cross borders at low cost, has been the result of systematic efforts over decades to foster international economic integration. In recent years, however, the tide of public opinion has started to turn against globalization, as the benefits of unrestricted trade and capital flows do not appear to be shared equally between countries, or even within countries between socioeconomic groups. Recent developments, such as the Eurozone crisis, the decision of Britain to leave the European Union, and the political backlash against large multi-country trade agreements and other attempts to lower trade barriers in different parts of the world, are all illustrative of this turn.

According to Rodrik (2011) the tensions created by globalization can be understood in the context of the following trilemma. Out of the three goals of national self-determination, economic globalization and a democratic political system, at most two can be pursued at the same time. While Rodrik uses this framework to understand the recent rise of the anti-globalization

*This chapter is joint work with Petros Milionis.

sentiment, these types of tensions are not a new phenomenon. Arguments along these lines have been invoked to explain the retreat from globalization that took place during the interwar period (Eichengreen, 1992; Simmons, 1994; James, 2001; Wolf, 2012). As this line of research has emphasized, the increased political pressure that policy makers faced after 1918 from stronger trade unions and a more broadly enfranchised population was crucial in undermining international cooperation and eventually led to the collapse of the interwar gold standard as the global monetary regime.

This chapter provides the first systematic exploration of these tensions during the first era of globalization before World War I. This era of growing economic and financial integration across borders is when the gold standard first emerged as the prevailing monetary system, becoming an essential pillar of the global economy during the 1870s (Bordo and Schwartz, 1984; Gallarotti, 1995). While the gold standard came to an abrupt end in 1914 with the outbreak of the First World War, retrospective accounts of how the system worked at the time often present it in a positive light in comparison with its resurrected version that was established after the end of the war and which only lasted from 1925 to 1936.¹

While this perspective is consistent with the longevities of the two systems, a benign picture of the stability of the classical gold standard, as the pre-WWI system is often referred to, may be deceptive. Crises of convertibility under the classical gold standard were not uncommon, especially in countries on the periphery of the world economy (Mitchener and Weidenmier, 2015; Mitchener and Pina, 2016), and forced several countries to abandon the gold standard already before 1914.² The gold standard was also politically contested in major economies, such as the United States in the 1890s, where a return to bimetallism was a seriously considered alternative (Friedman, 1990; Frieden, 1997).³ These tensions also came at a time when democratic political institutions started to spread globally. As part of the first wave of democratization (Huntington, 1991), which can be traced back to the 1820s and which continued until World War I, many countries opened up their

¹See, among others, Bordo and Schwartz (1984). Instead, de Cecco (1974) argues that these retrospective accounts are often of a hagiographic nature.

²This happened for instance in Argentina (1876 and 1885), Greece (1885), Portugal (1891) and Chile (1898).

³See Section 3.2.3 for more details.

political systems to broader strands of the population. This wave of democratization took place largely in tandem with the emergence of the gold standard as a global monetary system. This process is illustrated in Figure 3.1, which plots the share of countries world-wide that were part of the gold standard system and the global average of the polity score from the Polity IV project, a typical measure of democratic political institutions.

Figure 3.1: Evolution of the Gold Standard and Democracy

Global evolution of the gold standard and of democratic institutions, 1860-1913. Source: authors' calculations.

This figure presents a paradox: if the spread of democratic institutions eroded the stability of the gold standard, as is often argued for the inter-

war period, one would expect some signs of erosion well before 1914.⁴ Did countries that suspended the gold standard before 1914 do so in response to increased domestic political pressure as during the interwar period? A similar question can also be raised for the decision of countries to adopt the gold standard. Were the necessary monetary reforms easier in countries where policy makers faced weaker political constraints and, hence, had more degrees of freedom in determining economic policies? Moreover, it is worth considering to what extent the relative economic stability of the years before the First World War masked tensions in the system that originated from the sphere of politics.

These are the questions that we address in this chapter. Specifically, we focus on the years between 1860 and 1913 and investigate whether the decision of countries to adopt or suspend the gold standard can be partially explained by the democratic or non-democratic nature of their political institutions. For this purpose, we construct a data set containing information for 30 countries regarding gold standard adherence at an annual frequency between 1860 and 1913. The database includes information on several key economic variables such as GDP per capita, debt levels and trade flows, as well as different political indicators that reflect different aspects of each country's political regime. The countries in our database cover all major economies of the time and include all documented cases of pre-1914 suspension of the gold standard.

Using this data set we assess the importance of the link between gold standard adherence and political institutions employing a variety of econometric techniques. For our baseline analysis we employ a dynamic discrete choice model to compare the role of political institutions relative to other factors in determining the probability of gold standard adherence. In this context we provide clear evidence that more democratic countries were, other things equal, less likely to adhere to the gold standard. Measuring democratic political institutions based on the polity score, as we do in Figure 3.1, we find that the variation in the polity score across countries had a sizeable effect on the probability of adherence to the gold standard. This effect is comparable to the effects of other key determinants of gold standard adherence, such as the

⁴This is the view presented by de Cecco (1974): “[T]he tree felled by the [1914] crisis was already rotten” (p. 128).

level of GDP per capita or the extent of trade with other gold standard countries. Moreover, we show that increases in the polity score over time, that occurred in many countries over this period as part of the democratization process, also decreased the likelihood of adhering to the gold standard.

A deeper look at the mechanism behind our results reveals that the negative relationship between democratic political institutions and adherence to the gold standard is largely driven by one particular aspect of democratic politics: the degree of political competition. Other aspects such as the extent of institutional constraints faced by the executive, on the other hand, appear less relevant. Comparing the results across different groups of countries, we find the pattern that we identify to be more relevant for peripheral countries. We also distinguish further the determinants of gold standard adoptions from those of suspensions, by estimating various duration models for each type of decision, and find that democratic political institutions both decrease the likelihood of adoption and increase the likelihood of suspension of the gold standard.

The remainder of this chapter is structured as follows. In the next section we outline the key considerations faced by countries in their decision whether or not to adopt and adhere to the gold standard. In the context of this discussion we highlight the role of different political factors and explain in more detail why we should expect democratic political institutions to negatively affect adherence to the classical gold standard by discussing the historical experiences of several countries. Section 3.3 discusses the sources that we use for our data set, while section 3.4 presents the econometric approach of our analysis. The main results of our empirical analysis can be found in section 3.5. Section 3.6 provides a series of robustness checks for our main estimation results. Section 3.7 presents the results of the duration analysis. The final section summarizes our results and draws some broader conclusions.

3.2 Factors Determining Gold Standard Adoption and Suspension

The emergence of the classical gold standard as a global monetary system is often viewed in the literature as a process of diffusion, ignited by the decision

of the newly unified Germany to replace its silver-based monetary standard with one based on gold in 1871 (Gallarotti, 1993). Before that, the only countries using the gold standard were Britain, some members of the British empire, and Portugal. Following the German decision, most of the economically advanced countries in Western Europe and North America gradually adopted the gold standard during the 1870s, while several peripheral countries followed suit during the 1880s and 1890s.⁵

Overall this process was facilitated by the improvements in monetary technology which came about during the nineteenth century and which allowed for higher-quality token coinage (Redish, 1990). This eliminated the need of using precious metal like silver or copper for small transactions and enabled a monometallic standard based on gold. Beyond these common technological developments, though, the decision of individual countries to adhere to the gold standard was influenced by various factors, some of which were of an economic nature and some of which were not. Below we briefly outline the most important ones.

3.2.1 Economic Factors

First of all, trade considerations were an important factor behind a country's decision whether or not to adopt the gold standard. A country's incentive to join the gold standard would increase as more of its trade partners participated in the system. Such incentives were, according to Meissner (2005), one of the key drivers of the diffusion of the gold standard after 1871. Additionally, as shown by López-Córdova and Meissner (2003), trade was subsequently higher among countries that were on the gold standard.

In addition to trade flows, capital flows were also facilitated by the gold standard. As the system limited the ability of governments to use monetary finance to cover budget deficits, adherence to the gold standard was a credible signal that a government was committed to sound fiscal policy. This “good housekeeping seal of approval” provided by the gold standard, according to Bordo and Kydland (1995) and Bordo and Rockoff (1996), permitted the country access to foreign capital.⁶

⁵See Friedman (1990), Gallarotti (1993), Eichengreen and Flandreau (1996), Flandreau (1996), and Meissner (2005) for further details.

⁶Whether or not adherence to the gold standard materially affected borrowing costs

Another factor that made the gold standard more attractive was the increasing value of commercial transactions. As silver money is too bulky for large transactions, switching to a gold standard would reduce the costs of monetary transactions. For this reason, as argued by Eichengreen and Flandreau (1996), countries that were economically more advanced had stronger interests in adopting the gold standard.

Beyond these benefits, the gold standard system also implied significant costs for participating countries. First and foremost was that balance of payments deficits could not be absorbed through an adjustment of the nominal exchange rate, as with any fixed exchange rate regime. In case of sudden current or capital account reversals, therefore, strict adherence to convertibility would necessitate either more restrictive credit conditions or temporary deflation. This consideration was particularly important for peripheral countries, which were subject to large current account gyrations and where capital account movements were mostly determined by conditions in a small number of capital-exporting countries.⁷

A second important cost was related to the restrictions imposed upon fiscal and monetary policy. As with any monetary regime that involves a fixed exchange rate and free capital flows, the money supply is largely left beyond the control of policy makers.⁸ Similarly, the restriction on fiscal policy, already discussed above, further limited the ability of the government to stimulate economic activity in the event of an economic downturn or to use monetary finance to cover deficits.

A third notable drawback of the classical gold standard was that the system, for much of the time, generated prolonged deflation. As gold provided

has been the subject of a long academic debate. See Flandreau and Zumer (2004) for an alternative viewpoint.

⁷See Ford (1962), Llona Rodríguez (1997) or Reis (2000) for illustrations of how these balance of payments swings affected the gold standard in Argentina, Chile and Portugal respectively.

⁸While in practice adherence to the gold standard placed substantially more restrictions on monetary policy than an inconvertible paper currency, even under the gold standard central banks had some room for discretionary policy. This was firstly because the costs of international gold arbitrage implied a narrow range of fluctuation for exchange rates, and secondly due to the so-called gold devices: the tools and tricks that governments or central banks used to maintain gold convertibility. See Bloomfield (1959) for more on these gold devices. Bazot et al. (2016) study the use of gold devices in detail for the Banque de France.

the basis for the money supply in all participating countries, the rate of money growth was limited by the growth of the world's gold stock. In the absence of large gold findings, therefore, a growing world economy could only be facilitated by a secular decline in prices, as was particularly the case between 1873 and 1896 (Capie and Wood, 1997).

3.2.2 Political Factors

Apart from the aforementioned economic factors, political factors were also important in the decision of countries to adopt the gold standard. The role of political factors has been clearly recognized in the literature (Eichengreen, 1992; Gallarotti, 1993; Flandreau, 1996). For example, Eichengreen (1996), in his comparison of the operation of the classical and interwar gold standards, attributes the relative stability of the former largely to the absence of strong political pressure on policy makers to use the exchange rate and the money supply for stabilization purposes. This rationale has been explored further in the broader literature on the political economy of exchange rates, which has highlighted several political factors that can influence the choices made by policy makers regarding each country's monetary and exchange rate arrangements. In this section we discuss how these factors affected the decision of countries to adopt the gold standard and how the existing literature has studied them.

One of the factors that has received particular attention is the role of interest groups. In all countries that adopted the gold standard, or just considered adopting it, there were different interest groups that lobbied in favor of or against that decision. Gallarotti (1993), Frieden (1993) and Broz (1997) discuss how this was effectively a division between hard- and soft-money interest.⁹ The role of this division in the decisions of countries to adopt the gold standard is probably best exemplified by the case of the United States, where the gold standard was contested by proponents of a more flexible monetary regime in the form of a silver standard or inconvertible fiat money (Frieden,

⁹Gallarotti (1993, pp. 28-29) argues that industrialists, bankers and other urban interest groups were typically more in favor of the gold standard, whereas debtors, agriculturalists and landowners would be relatively more in favor of a more inflationary monetary regime. Yet, as this strand of literature shows, the exact way these interests groups were aligned differed occasionally between countries.

1997). Mitchener et al. (2010) highlight a similar pattern with adoption of the gold standard in Japan, where a coalition of hard money interests eventually succeeding in overcoming the opposition by soft money interests. Frieden (2015) also documents how these divisions have played out in other parts of world.

Beyond the role of interest groups, which can be active in any political regime, the literature has recognized that the specific nature of each country's political institutions can also affect its decision to adhere to the gold standard. Eichengreen (1992), Simmons (1994) and James (2001) have all argued that gold standard adherence before World War I was facilitated by the fact that most countries were not fully democratic, in contrast to the experiences of the interwar period. This pattern can also be seen in more recent years. Broz (2002), Carmignani et al. (2008) and Bearce and Hallerberg (2011) present evidence that in the post-Bretton-Woods era democratic countries were, other things equal, less likely to adopt and maintain a fixed exchange rate regime. Leblang (1999) shows that this is associated with the type of political representation: majoritarian versus proportional.

Finally, the regular electoral cycle present in a democracy is also bound to affect the ability of the government to remain committed to the gold standard. As we discuss in the section below, many of the adoptions and suspensions to the gold standard were contested at elections. This is in line with the evidence presented by Bernhard and Leblang (1999), and Bromberg et al. (2003), who show that governments prefer to avoid changes to the exchange rate regime before elections. At the same time, frequent elections and resulting political instability have been shown to make a fixed exchange rate arrangement less viable, as shown by Eichengreen et al. (1995), and by Klein and Marion (1997).

Beyond these domestic political factors, which are bound to influence the adoption of any rigid monetary regime, geopolitical factors also played a role in the adherence to the classical gold standard. Countries allied with Britain, such as Portugal or Japan, had an interest in sharing Britain's monetary standard. At the same time, Britain likewise had an interest in keeping its allies on the gold standard and tried to facilitate that, to the extent possible (Pittaluga and Seghezza, 2016). Moreover, hegemonic aspirations and

occasional conflicts between countries played a role as well. For example, Gallarotti (1993) highlights how the German choice to replace its silver-backed currency with the gold mark was largely motivated by an effort to rival the hegemony of the British pound, whereas Flandreau (1996) argues that the rivalry between France and Germany played a key role in the collapse of bimetallism in the 1870s.

3.2.3 Historical Evidence from Different Countries

The preceding discussion has highlighted how various political factors can influence a country's choice of monetary regime. Beyond this general discussion, it is worth noting how these factors played out in the historical experiences of different countries with the gold standard. As mentioned in Section 3.1, the emergence of the gold standard as a global monetary system took place at a time when many countries of the world made the first steps towards democratization. Starting with the calls for the extension of the franchise and the revolutions of 1848, a series of institutional changes in the political systems of many countries in Europe and the Americas was set in motion. This eventually led to new constitutions, new forms of representative government and new electoral processes with a broader participation of the population. By 1913 most countries that were politically independent had some form of legislative authority whose members were in most cases directly elected (Przeworski, 2008). In Western Europe at least two-thirds of all adult men had the right to vote in these elections (Cook and Paxton, 1978), while around the same time in the Americas most countries were also lifting wealth or literacy requirements on suffrage (Engerman and Sokoloff, 2005).

As a consequence of these political reforms, in the decades before World War I there was a marked increase in the number of institutionalized democracies. Based on the binary classification of Boix et al. (2013), 18 out of the 55 independent countries in 1913 are classified as democracies, while this number was only 2 in 1860. The average global polity score, which we report in Figure 3.1 as a broad measure of democratic political institutions, also shows a marked increase in the years between 1860 and 1913. This change is also reflected in the different dimensions of the polity score. Looking at three

key sub-indices of the polity score, reflecting how democratic the process of executive recruitment is, how strong the constraints on the executive are, and how much political competition is present, we see clear improvements in all these dimensions over this period.¹⁰

This new political landscape was bound to inflict with issues related to economic policy. In France, for example, the establishment of the Third Republic led to substantial changes in the distribution of political power, as the newly enfranchised classes began to demand a greater role in political life (Cook and Paxton, 1978). In this process the parliament sought a greater role in monetary affairs and took an active stance in promoting bimetallism (Einaudi, 2000). This created a tension with capitalist groups who pushed for the adoption of the gold standard (Broz, 1997). The experience of France can be contrasted with that of newly unified Germany where the unification of the country under Prussian leadership had endowed the new state with much more autocratic political institutions. The autocratic nature of German politics facilitated a strong coalition between agricultural and industrial interests in support of the gold standard (Frieden, 1993). Even though some groups had a preference for a less rigid monetary arrangement, these groups were never able to pose a serious threat to the government's commitment to the gold standard (Gallarotti, 1993).¹¹

This role of democratic political institutions in enabling interest groups to oppose the gold standard is even more striking in the case of the United States. After a period of monetary inconvertibility, which began with the civil war, the United States eventually demonetized silver in 1873 and adopted the gold standard in 1879 (Friedman and Schwartz, 1963). Nevertheless, both decisions were strongly contested politically by a coalition of populist monetary interests, first pushing for a return to the previous "greenback" paper money regime in the 1870s, and later in the 1890s for a return to bimetallism (Frieden, 1997). The US congress largely provided the forum for these

¹⁰The exact nature of these data series is introduced more formally in the next section, while the details are presented in Table A3.2 of the Data Appendix.

¹¹While for the case of France and Germany the process of adopting the gold standard was also largely influenced by geopolitical considerations, such as the hegemonic interests of both countries and the indemnity paid to Germany after the Franco-Prussian war (Gallarotti, 1993; Flandreau, 1996; Meissner, 2005), it is worth noting here that these considerations can not account well for the patterns of domestic support and opposition for the gold standard.

long-lasting political battles. It was there where in 1890 the Sherman Silver Purchase Act nearly succeed in remonetizing silver, if it had not been for the veto by president Cleveland (Rockoff, 1990). Subsequently, in the presidential election of 1896, the democratic candidate William Jennings Bryan elevated the return to bimetallism as a central point of his campaign. Even though he was eventually defeated by republican candidate William McKinley, his defeat occurred only at a narrow margin.

While in the cases of France and the United States, opposition to the gold standard only managed to delay the adoption process and not to derail it, in other countries opposing forces successfully managed to block its adoption. One of the countries that never officially adopted the gold standard was Spain. In the 1870s, Spain appeared on track to join the emerging gold standard, together with the other Western European countries. Following the monetary reforms of 1868, with the introduction of the peseta as the national currency, Spain was transitioning towards the monetary standards of the Latin Monetary Union. Yet, as argued by Martínez-Ruiz and Nogues-Marco (2017), in an environment of competitive central banking Spain lacked the strong government to push through the necessary reforms. While during the first decade of the twentieth century there were several legislative proposals to support the adoption of the gold standard, none of them was successful (Martín Aceña, 2000). According to the earlier analysis of Sardá (1948), this was partially due to persistent opposition by soft money interests and partially due to the frequent government changes in the fragmented political environment of the time.

In contrast to Spain, which never adopted the gold standard, Portugal had been one of the first countries to adopt it in 1854 and maintained it until 1891, as a result of careful management by the Bank of Portugal (Reis, 2000; Reis, 2007). In the 1890s a rapid reversal in the balance of payments necessitated strict monetary and fiscal policies in order to maintain convertibility. The domestic political situation, though, constrained the ability of the government to implement those policies. While Portugal was a constitutional monarchy at the time with power alternated between the two major political parties, a potential threat to the monarchy by the Portuguese Republican Party led successive governments to try to neuter this new competitor (Liv-

ermore, 1976).¹²

This strategy of neutralizing political competition, which was one of the reasons why the gold standard was suspended in Portugal, appears to have played out in a different way in the case of Japan. Japan adopted the gold standard in 1897, after several years of preparation with the aim of reducing its borrowing costs and aligning its monetary standard with that of its main trade partners. Yet, public opinion was split on the question of the gold standard, with some interest groups being in favor and others pushing to maintain a silver standard. Although Japan was not fully democratic at the time, the decision to adopt the gold standard required the authorization of the Imperial Diet in which there was sufficient opposition to the idea of the adoption. As the analysis of Mitchener et al. (2010) suggests, though, the necessary legislation was eventually approved thanks to a tactical move by the prime minister to secure the support of the main opposition party.

While the cases described so far highlight the potential of political competition to block the adoption or trigger the suspension of the gold standard, the lack of such competition in authoritarian regimes should have facilitated the adoption process as well. This is illustrated by the case of Russia that adopted the gold standard in 1897 as part of an ambitious industrialization policy. For a country the size of Russia the adoption of the gold standard required accumulating a large reserve of gold and foreign exchange, which took up about two-thirds of official borrowing abroad between 1885 and 1897 (Gregory, 1979). To this end, successive finance ministers pursued a policy of tight monetary conditions along with heavy taxation of the peasantry, both of which came at the expense of domestic consumption (Barkai, 1973). Contemporary Russians were not blind to the costs that the gold standard and the associated industrialization policies imposed; in fact, there was an active and highly critical debate in Russia on this issue, as shown by von Laue (1953). In spite of this debate, the Russian finance ministry was able to pursue the adoption of the gold standard without paying too much heed to it, as the lack of any democratic institutions effectively shielded the government

¹²In the words of Reis (2000, p. 97): “In 1891, therefore, there were only two solutions: violent deflation or inconvertibility, in the hope that in time circumstances would allow a return to gold. Political constraints determined that inconvertibility was chosen.”

from popular discontent with its policies.¹³

Overall, the different country experiences with the gold standard discussed above suggest that democratic political institutions did impose constraints on the willingness of governments to commit to the gold standard. While opposition to the gold standard typically originated from particular interest groups, the ability of these interest groups to influence the government in the choice of a monetary regime was largely the result of the existing institutional framework. As different institutional settings contributed to exposing or shielding policy makers to the pressures from interest groups, the exact nature of each country's political institutions should have played a role in the history of gold standard adherence. Below we provide some explicit hypotheses on this role.

3.2.4 Democratization and Gold Standard Adherence

The impact of economic factors on the adoption of the gold standard has often been analyzed in the context of the standard Mundell-Fleming model and of the associated policy trilemma between a fixed exchange rate arrangement, free capital flows and an independent monetary policy. When thinking about political factors though, it is instructive for our analysis to adopt a political economy perspective. According to this perspective, the decision to adopt the gold standard should be modelled as a decision of policy makers among different alternatives, with the aim of achieving a given policy target and maximizing the well-being of the electorate (Edwards, 1996; Tornell and Velasco, 2000; Méon and Rizzo, 2002).

What should be noted here is that along the process of democratization that policy target is bound to change. This is because many of the benefits of adhering to the gold standard, such as exchange rate stability and access to foreign capital, would end up accruing to a relatively small share of the population, active in sectors linked to international trade and investment. On the other hand, the domestic burdens associated with hard money and the lack of policy flexibility would be borne by wider shares of the population.¹⁴

¹³This absence of political constraints on policy making eventually did not last and gave rise to a revolution in 1905. Yet, at that point the transition to the gold standard was effectively completed.

¹⁴Note that this assumes that there is no widespread redistribution of these benefits and

Given this trade-off between policy stability and policy flexibility that will naturally emerge in this context (Frieden, 2015), it is evident that the gold standard would be viewed as a less favorable monetary regime, other things equal, in more democratic countries. Put differently, as a country becomes more democratic the median voter will shift increasingly towards individuals that put more weight on maintaining policy flexibility. This is the main reason why we should expect democratization to make adherence to the gold standard less likely.

This hypothesis has already been explored in a number of related studies in the context of the interwar period. Eichengreen's (1992) classic study on the instability of the interwar gold standard, for example, highlights the role of increased domestic political tensions, although it does not explore this relationship quantitatively. Simmons (1994) provides the first quantitative evidence that adherence to the interwar gold standard was less likely for democracies. This evidence is complemented by three more recent studies that focus on suspensions of the interwar gold standard (Wolf and Yousef, 2007; Wandschneider, 2008; Wolf, 2008) which document that the risk of suspension was higher for countries that were more democratic.

In spite of this evidence, the nature of the relationship between domestic political institutions and gold standard adherence has never been systematically analyzed for the classical gold standard era. While Meissner (2005) and Esteves and Ploeckl (2016) investigate the role of different factors in affecting the choice of countries to participate in the gold standard, their analyses focus on economic factors. Recent work by Mitchener and Weidenmier (2015), and Mitchener and Pina (2016) looks at how global markets perceived the probability of different countries abandoning the classical gold standard based on currency risk spreads. They show that for peripheral countries these spreads were sizeable and that they followed the movements in the prices of the main commodities exported by these countries. In their analyses, though, they do not link the behavior of these spreads with domestic political institutions either. This leaves open the question of whether the political tensions present during the interwar operated also during the classical gold standard era, and whether such tensions can likewise explain the timing of countries' adherence

burdens. As shown by Huberman and Meissner (2010), the rise of redistributive policies in this era can in fact be partly seen as a consequence of the pressures of globalization.

to this monetary regime. This is the purpose of the analysis in this chapter.

3.3 Data

To assess the role of democratic political institutions in determining adherence to the classical gold standard, relative to other factors, we construct a data set with annual information on the monetary regime of countries and various economic and political variables. The data set spans the years from 1860 to 1913 and covers 30 major economies of the time. The exact list of countries that we include in our analysis is reported in Table A3.1 of the Data Appendix. We also classify each of these countries as belonging to a core and a periphery group, based on their participation in the Atlantic economy following O'Rourke and Williamson (1999). The inclusion of countries in the data set was largely based on data availability and on the condition that the country was *de facto* an independent polity during the years covered in the data. In this section we outline the main variables that we use for our analysis and the source based on which we construct them. More detailed information for all variables is provided in the Data Appendix. Table A3.2 of the Data Appendix presents descriptive statistics for all the variables used in our analysis.

Classifying adherence to the gold standard in each year is not always clear-cut, since in practice the implementation of this system differed slightly from country to country. For the purpose of our analysis we consider a country to be on the gold standard if its currency is freely convertible into gold at a fixed rate. We also consider a country to have been on the gold standard if its currency was fully convertible into a gold-based foreign currency, or if a country legally commits to keeping its exchange rate fixed vis-a-vis other gold standard countries. We furthermore require the absence of any significant barriers to importing or exporting gold.¹⁵ The exact years during which each country is considered to have adhered to the gold standard based on this classification can be found in Table A3.1. Based on the same criteria we also classify countries which were on a silver or a bimetallic standard.

¹⁵As an alternative we also consider a stricter classification according to which a country is considered to adhere to the gold standard only in the case where its currency is actually convertible to gold at a fixed rate, thus excluding the latter group.

The exact sources based on which we classify the monetary regimes of each country are listed in the Data Appendix.

To measure the democratic nature of each country's political institutions, for most of our analysis we focus on the aggregate polity score, reported by the Polity IV project. We take this as our baseline measure of political institutions since it provides a broad composite index of domestic political institutions which is comparable across countries and over time. The composite nature of the index also enables us to assess separately the extent to which the different sub-indices of the polity score are related to gold standard adherence. As an alternative to this approach, we employ in our analysis the binary democracy indicator constructed by Boix et al. (2013) and some of the indicator variables reported by Przeworski et al. (2013), which capture particular characteristics of each country's political institutions. This allows us to explore the relative robustness of our results to the choice between binary and ordinal measures of democratic institutions.

Beyond measures of political institutions, we also consider other political factors that influenced a country's decision to adhere to the gold standard discussed in Section 3.2.2. In particular, to measure the strength of interest groups pushing for a flexible monetary regime we control for the share of agricultural exports in total exports available from the World Trade Historical Database of Federico and Tena-Junguito (2019). We use this measure as there is an agreement in the literature that agricultural interests were consistently opposed to rigid monetary regimes such as the gold standard (Frieden, 2015). To capture the effect of the electoral cycle we construct a dummy variable indicating the years of elections in which the office of the chief executive was at stake. This variable is constructed from the information reported in Przeworski et al. (2013).

In addition to variables reflecting domestic politics, in our analysis we use two other key geopolitical variables. The first of these is a dummy variable which equals one for any country that is involved in any kind of war in a given year. The other is a dummy variable which equals one if a country has some type of formal alliance with Britain in a given year. Both variables are coded based on data provided by the Correlates of War project (Gibler, 2009; Sarkees and Wayman, 2010). The inclusion of the war dummy is driven by

the observation that outbreaks of war were often accompanied by fiscal and financial crises that could lead to suspensions of the gold standard. The inclusion of the British ally dummy is motivated by the fact that the adherence of some countries to the gold standard was facilitated by the British government in exchange for geopolitical support, as discussed in Section 3.2.2.

In terms of economic variables, first of all, we control for GDP per capita using data from the Maddison project (2013). In line with the discussion in Section 3.2.1, we would expect wealthier countries to be more likely to adhere to the gold standard. We further control for population using data from Maddison (2003). This is based on the argument of Eichengreen and Flandreau (1996) that the adoption of the gold standard would be easier for smaller countries, since these did not have to take into account the general equilibrium effects on global gold- and silver markets of a potential change of their monetary system. Moreover, we include in our analysis the ratio of government debt to GDP from Reinhart and Rogoff (2011). Countries with higher government debt were less likely to be on the gold standard, since the temptation to default or to rely on seigniorage would be higher and their ability to attract additional foreign capital would be lower.

Adherence to the gold standard was also closely linked with the balance of payments of each country. Current account reversals were often the prelude to suspensions of convertibility. As current account information is not widely available for most countries pre-1914, we follow the literature and employ data on trade balances, which can be measured consistently across countries. To capture trade linkages, we further consider two additional variables in our analysis. Firstly, we include the overall level of trade openness, measured as the sum of exports and imports over nominal GDP, following Klasing and Milionis (2014). We expect this ratio to be positively associated with gold standard adherence, since more open countries will find exchange rate stability more important. Secondly, using additional information on bilateral trade from Fouquin and Hugot (2016), we measure each country's share of trade with other gold standard countries. The higher this share was, as emphasized by Meissner (2005), the larger would be the likelihood of a country wanting to be a member of the gold standard.

3.4 Empirical Strategy

For our empirical analysis we focus mainly on the period from 1860 to 1913. Over this period we estimate the effects of the explanatory variables described in the previous section on the probability of adhering to the gold standard for the 30 countries in our data set. In this section we explain the main econometric approaches that for use this analysis and the rationale for employing them.

For our baseline analysis, we model gold standard adherence as a binary choice: in every year, every country makes a decision whether to adhere to the gold standard or not. We then estimate the adherence probability conditional on the choice made the previous year and the lagged values of all other explanatory variables. This is because a country's choice regarding its monetary regime is highly inertial and changes in that regime will take time to be implemented. Thus, the choice made in a given year will depend crucially on the conditions prevailing in the previous year.¹⁶ Using lagged values of the explanatory variables also avoids biases due to reverse causality.

Formally, we estimate the following dynamic binary choice model.

$$\Pr(GS_{i,t} = 1 | \mathbf{X}_{i,t-1}, GS_{i,t-1}) = F(\boldsymbol{\beta} \mathbf{X}_{i,t-1} + \gamma GS_{i,t-1} + \delta_t + \epsilon_{i,t}) \quad (3.1)$$

Here, $GS_{i,t}$ is an indicator variable equal to one if country i is on the gold standard in year t and zero otherwise.¹⁷ $\mathbf{X}_{i,t-1}$ is the vector of explanatory variables, δ_t is a year fixed effect and $\epsilon_{i,t}$ is a stochastic error term, which we cluster at the country level. For the cumulative probability distribution $F(\cdot)$ our baseline choice is to assume that it is normal, which implies that equation 3.1 corresponds to a probit model. As part of our robustness analysis, however, we also consider the cases were $F(\cdot)$ is taken to be linear or logistic.

In all cases we are interested in the vector of coefficients $\boldsymbol{\beta}$, which captures the conditional effects of the different explanatory variables on the probability

¹⁶We also explore the robustness of our results to alternative lag structures. Although the use of first lags appears most appropriate, considering contemporaneous values, second lags, or third lags of the explanatory variables does not qualitatively change our results.

¹⁷In Section 3.6 we also consider alternative indicator variables which also capture adherence to silver and bimetallic standards.

of adherence to the gold standard in each year, conditional on the choice made in the previous year. This allows us to capture the effect of the lagged level of each variable included in $\mathbf{X}_{i,t-1}$ on the decision of a country to change its current monetary regime. In Section 3.6.3, we also consider an alternative setup that uses country fixed effects in order to control for time-invariant characteristics of each country and estimate how changes in the explanatory variables lead to changes in the country's monetary regime.

The main advantages of using the model of equation 3.1 are the relatively straightforward interpretation of the estimated coefficients and the use of all available observations in the estimation. Beyond estimating the probability of *adhering to* the gold standard, though, it may be instructive to estimate separately the determinants of *adopting or suspending* the gold standard in any given year and to check whether these determinants are symmetric. With that in mind, we estimate the following duration model.

$$h(t|\mathbf{X}_{i,t-1}) = h_0(t) \cdot \exp\{\beta\mathbf{X}_{i,t-1} + \epsilon_{i,t}\} \quad (3.2)$$

Here $h(t|\mathbf{X}_{i,t-1})$ reflects the instantaneous probability or hazard rate of a particular event occurring, given the baseline hazard $h_0(t)$ and the lagged value of the vector of explanatory variables $\mathbf{X}_{i,t-1}$. In our setup, these events are either the adoption or the suspension of the gold standard. $\epsilon_{i,t}$ is a stochastic error term, which is again clustered at the country level.

Duration models similar to that of equation 3.2 have been used in the literature by Meissner (2005) to study the adoption of the classical gold standard and by Wolf and Yousef (2007), Wandschneider (2008) and Wolf (2008) to study the suspension of the interwar gold standard. Yet, in all of these papers the focus of the analysis is either on the adoption or on the suspension decision. Hence, a formal comparison of the determinants of these two processes is still absent from the literature. When estimating equation 3.2, our baseline choice is to use a semi-parametric Cox proportional hazard model. In our robustness analysis, however, we also employ two more restrictive parametric models, the exponential and the Weibull. Doing so allows us to obtain estimates for the expected number of years until the typical country will adopt or suspend the gold standard.

3.5 Main Results

Table 3.1 presents the estimation results for the dynamic binary choice model of equation 3.1, specified as a probit model. The estimation is based on all 30 countries of our sample with the dependent variable indicating adherence to the gold standard in each respective year from 1860 up to 1913. This is regressed on a varying set of explanatory variables including the gold standard adherence indicator lagged by one year. All specifications include a full set of year fixed effects to control for global trends in the evolution of the gold standard system.

In column 1 we first present a simple specification where the sole explanatory variable, beyond the lagged dependent variable and the year fixed effects, is the polity score. The estimated coefficient for the lagged dependent variable is positive and statistically significant. As expected, the probability of a country adhering to the gold standard in a given year is higher if this was also the case the year before. Conditional on that effect, the effect of the polity score is statistically insignificant. This specification, however, does not control for many important economic and political determinants of gold standard adherence discussed in Sections 3.2.1 and 3.2.2.

One important factor is the level of economic development. As emphasized by previous research in the literature, countries that were more developed had a higher probability of adopting the gold standard. To account for this effect, in column 2 we include in our specification the natural logarithm of GDP per capita of each country. As expected, the effect of GDP per capita is positive and statistically significant. Conditional on that effect, we now see that the polity score has a sizeable negative and statistically significant effect on gold standard adherence. Given their level of development, countries that had more open and democratic political institutions, had a lower probability of adhering to the gold standard.

In column 3 we account for two other important economic determinants of gold standard adherence: country size, proxied by the natural logarithm of the population, and the government's fiscal position, proxied by the debt to GDP ratio. The estimated effects of both variables are statistically not different from zero, suggesting that the inclusion of these variables does not substantially alter the probability of a given country adhering to the gold

Table 3.1: Determinants of Gold Standard Adherence

	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficients					Magnitudes
Polity Score	0.0156	-0.0376**	-0.0378**	-0.0360**	-0.0441**	-0.0498**
$(t - 1)$	(0.0138)	(0.0156)	(0.0156)	(0.0164)	(0.0197)	(0.0207)
GDP per Capita (log)		1.148***	1.140***	1.146***	0.871***	0.891***
$(t - 1)$		(0.232)	(0.227)	(0.249)	(0.309)	(0.327)
Population (log)			-0.00375	0.0146	-0.107	-0.0909
$(t - 1)$			(0.0760)	(0.0849)	(0.0987)	(0.103)
Debt Ratio			-0.112	-0.0941	0.0234	0.137
$(t - 1)$			(0.248)	(0.257)	(0.285)	(0.273)
Trade Balance				-0.352	0.709	0.432
$(t - 1)$				(1.959)	(1.916)	(1.958)
Openness				0.0620	-0.0279	0.00555
$(t - 1)$				(0.246)	(0.249)	(0.244)
Gold Block Trade Share				0.593	1.200	1.255
$(t - 1)$				(0.721)	(0.782)	(0.775)
Agricultural Exports (%)					-1.567**	-1.795***
$(t - 1)$					(0.706)	(0.693)
Election Year					0.347	0.359*
$(t - 1)$					(0.217)	(0.216)
War						-0.818***
$(t - 1)$						(0.208)
British Ally						-0.0610
$(t - 1)$						(0.223)
Gold Standard						5.042***
$(t - 1)$						(0.278)
Constant						(0.286)
						-7.732**
						(3.212)
Observations	1,259	1,259	1,259	1,259	1,259	1,259
Countries	30	30	30	30	30	30
Pseudo R-squared	0.874	0.885	0.885	0.885	0.889	0.893

Estimates of the baseline probit specification for the full country sample over the period 1860-1913. The dependent variable is a dummy variable indicating adherence to the gold standard in the corresponding year. All regressors are lagged by one year. The specifications also include year fixed effects. Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

standard over our period of interest, given the factors that we already account for.

In column 4 we add control variables related to trade. In particular, we control for the trade balance as a share of GDP, the level of openness of a country, in terms of exports and imports relative to GDP, and the share of trade with the countries that are already on the gold standard. Again, we find the estimated coefficients for all three variables to be statistically insignificant, while the inclusion of these variables in the specification does not alter the estimated effects of the other variables.¹⁸

In column 5 we further control for two factors emphasized by the political economy literature: the share of agricultural exports and the years of elections. Based on the obtained estimates, the probability of adhering to the gold standard is reduced by a higher share of agricultural exports, while it increases in years following elections.¹⁹ While these effects are not surprising, given previous work in the literature, it is interesting to note that the inclusion of these variables gives rise to an estimated coefficient of the polity score that is even more negative. This suggests that the effect political institutions have on gold standard adherence, as reflected in the polity score, is distinct from that of factors related to interest groups and the electoral cycle.

In column 6 we also control for two dummy variables related to geopolitics: the involvement of a country in a war and the existence of an alliance with Britain. For the former we find a clear negative effect on gold standard adherence. For the latter the effect is statistically insignificant. Interestingly, we see again that the inclusion of these control variables further increases the size of the coefficient estimate for the polity score in absolute terms. Conditional on several key determinants of gold standard adherence, higher values for the polity score are associated with a reduced probability of gold standard adherence.

To properly assess how important the polity score and the other variables are in determining the probability of a country adhering to the gold

¹⁸While it is statistically insignificant in this regression, the estimated coefficient for the trade share with the gold block rises as we include additional control variables and approaches conventional levels of statistical significance.

¹⁹The estimated coefficient for the election year is slightly below conventional levels of statistical significance, but it becomes significant at the 10% level in column 6 when we include the full set of control variables.

standard, next to the estimated coefficients in column 6 we also report the corresponding implied effects. These effects indicate by how much the probability of adhering to the gold standard would increase following an increase in each respective regressor by one unit, while all other regressors remain at their mean values. For the continuous variables these correspond to the marginal effects and for the dummy variables the differential effects. For the polity score, which is a discrete variable, we report the differential effect at the average value which is almost identical to the average differential effect (-0.0156 instead of -0.0159).

As the reported effects clearly highlight, the strongest predictor of a country's status regarding the gold standard in a given year is its status in the previous year. This result is not surprising given the costs involved in the adoption or the suspension of the gold standard. The magnitude of this effect also illustrates the importance of controlling for the lagged value of the gold standard dummy, given the high degree of persistence of the gold standard as a monetary regime. Comparing the implied effects for the remaining variables, we see that the war and election dummies also play an important role in the decision of countries to adhere to the gold standard. The resulting probability of adherence is 29% lower following the outbreak of a war and 11% higher in the year after an election.

To compare the effects of the continuous variables we need to note their standard deviation, reported in Table A3.2. Combining those with the reported magnitudes in column 6 we find the strongest effects for GDP per capita, the agricultural export share and the trade share with the gold block. Specifically, we see that a one standard deviation increase in GDP per capita raises the probability of adherence to the gold standard by 17%, a one standard deviation increase in agricultural exports lowers it by 15%, and a one standard deviation increase in trade with the gold block increases it by 10%. Relative to these effects, which are well-established in the literature, the effect of the polity score is similar in magnitude. A one standard deviation increase in the polity score leads to a reduction of the adherence probability by approximately 10%.²⁰

²⁰For the remaining variables the implied effects that we obtain are substantially smaller and statistically insignificant. Hence, we do not discuss them explicitly. We should note here that this is not driven by the high correlation of the different regressors. Pairwise

An alternative way to look at this effect is to compare how the adherence probability changes across different levels of the polity score. This can be seen in Figure 3.2 which reports the predicted probability across the full range of values of the polity score, from -10 to +10. As the figure clearly indicates, an increase in the polity score over that range, assuming that the other variables remain at their average values, reduces the probability of gold standard adherence by 31% from 0.878 to 0.567. While this change in the polity score is too high to be relevant for most countries in our sample, there are several cases of major political transitions that took place over our sample period that resulted in big swings in the polity score.²¹ Based on our estimates, these transitions should have had a substantial impact on the probability of gold standard adherence. Of course, not all countries experienced such transitions. Yet, even if we focus solely on the average change in polity score or the average within-country standard deviation across the 30 countries of our sample, which correspond to 4.60 and 2.51 points, this implies respectively a 7.3% or a 4.0% reduction in the probability of adherence to the gold standard.

Exploring these effects further for different countries in our sample and different points in time also reveals interesting patterns. If we compute the implied effect of a one point increase in the polity score for the core countries, indicated in Table A3.2 of the Data Appendix, we see that this implied effect is higher during the earlier years of our sample.²² In 1875 it is around -0.015, but in the later years it drops close to zero. For peripheral countries, however, we see the opposite pattern. The implied effect of a one point increase in the polity score goes up over time from -0.004 in 1875 to -0.018 in 1890 and -0.020 in 1905. These effects very much reflect the pattern of expansion of the gold standard system, which first involved the core and only later on the periphery.

correlation coefficients between our regressors do not exceed 60%. Also, dropping some of the significant controls from the specification does not alter the statistical significance of the other controls.

²¹Out of the 30 countries in our sample, 14 experience an increase in their polity score by more than 5 points over our sample period. In most cases, this changes happened within a few years.

²²The following implied effects are computed separately for the countries in the core and periphery groups, assuming all other controls are at their mean values in that year for the respective group.

Figure 3.2: Predicted Probability of Gold Standard Adherence

Probability of adherence to the gold standard for different levels of the polity score. Estimated on the basis of column 6 of Table 3.1, with all control variables fixed at their means. The vertical bars indicate a 95% confidence interval.

We can also illustrate these effects by comparing the predicted probabilities of gold standard adherence for some historical counterfactuals. One counterfactual would be the contrasting experiences of two major European economies: France and Germany. Germany, whose institutions were more autocratic during the 1870s, adopted the gold standard several years earlier than France which had more democratic institutions at the time. Our model predicts that if France in 1876 had had the same polity score as Germany, -4 instead of 5, its probability of adhering to the gold standard in that year would have been 11% higher. Domestic political factors may thus have played a role in the differing experiences of France and Germany, above and beyond the role played by the geopolitics in the aftermath of the Franco-Prussian war discussed by Flandreau (1996). Similarly, we can consider the case of Russia, which adopted the gold standard in 1897 at the time when it was an absolute monarchy and had a polity score of -10. After the 1905 revolution and the ensuing political reforms, its polity score goes up to -6. Our model predicts that at this less autocratic level, its probability of adhering to the

gold standard would have been 6.4% lower. While these counterfactuals do not capture fully the historical context, like for instance the role of the gold indemnity after the Franco-Prussian war, they serve as useful illustrations of the magnitude of our main estimate.

These results overall suggest that political institutions played an important role in a country's decision to adopt and adhere to the gold standard during the first globalization era. These results echo similar conclusions obtained for the interwar period as well as for the post-1945 era by authors such as Simmons (1994) or Bearce and Hallerberg (2011). Yet, as the polity score is a broad indicator of a country's form of political institutions, this raises the question exactly which dimensions of institutions mattered the most in this period. In order to assess this, in Table 3.2 we employ in our analysis more detailed indicators than the polity score from the Polity IV database and other indicators of domestic political institutions.²³

In columns 1 and 2 of Table 3.2 we replace in our specification the polity score with each of its two main sub-components, the democracy score (*democ*) and the autocracy score (*autoc*), as indicated on the top of each column.²⁴ The estimated coefficients for the two variables are both statistically significant but with opposite signs: negative for the democracy score and positive for the autocracy score. This is not surprising. The presence of strong democratic political institutions in a given country is expected to constraint the ability of the government to maintain a rigid monetary regime, such as the gold standard, while the presence of strong autocratic political institutions is expected to have the opposite effect. Comparing the magnitudes of the two effects, though, suggests that the latter effect is stronger than the former. This implies that autocratic elements in a country's political institutions, by partially shielding the government from political pressure, may have been more important to maintaining the gold standard than democratic elements.

To understand better the types of political institutions influencing gold standard adherence, in the next three columns of Table 3.2 we replace the overall polity score in our baseline specification with three alternative indices

²³See Rota (2016) for a similar approach.

²⁴It should be noted here that the polity score reported in the Polity IV database for a given country in a given year is the difference between the separately computed democracy and autocracy scores.

Table 3.2: Comparison of Different Political Indicators

Source: Indicator:	POLITY IV				Boix et al.		PIPE		
	democ	autoc	exec	exconst	polcomp	dem.dummy	leg. exist	leg. direct	univ. suffrage
Indicator from Header									
$(t - 1)$	-0.0636*	0.123***	-0.0651	-0.0917	-0.0880***	0.00247	-0.600	-0.822***	-0.417*
	(0.0379)	(0.0380)	(0.0397)	(0.0620)	(0.0319)	(0.256)	(0.541)	(0.302)	(0.226)
GDP per Capita (log)	0.749***	1.037***	0.766**	0.770**	0.788***	0.527*	0.650**	0.753**	0.701**
$(t - 1)$	(0.315)	(0.320)	(0.303)	(0.335)	(0.290)	(0.315)	(0.286)	(0.299)	(0.279)
Population (log)	-0.0618	-0.121	-0.0676	-0.0597	-0.0527	-0.0536	-0.0414	-0.0997	-0.0446
$(t - 1)$	(0.101)	(0.109)	(0.108)	(0.0944)	(0.106)	(0.106)	(0.117)	(0.120)	(0.105)
Debt Ratio	0.133	0.116	0.114	0.112	0.0458	0.0650	-0.0917	-0.00971	0.167
$(t - 1)$	(0.285)	(0.253)	(0.287)	(0.277)	(0.273)	(0.293)	(0.267)	(0.287)	(0.283)
Trade Balance	0.313	0.844	0.802	0.0979	0.694	0.560	0.563	0.359	1.395
$(t - 1)$	(1.971)	(1.936)	(1.877)	(1.980)	(1.898)	(1.869)	(1.923)	(1.978)	(1.791)
Openness	0.109	-0.107	0.123	0.0834	0.0920	0.148	0.187	0.203	0.318
$(t - 1)$	(0.237)	(0.259)	(0.258)	(0.226)	(0.276)	(0.230)	(0.249)	(0.239)	(0.247)
Gold Block Trade Share	1.284*	1.184	1.342*	1.283*	0.909	1.133	1.130	1.110	1.290*
$(t - 1)$	(0.759)	(0.795)	(0.750)	(0.765)	(0.819)	(0.802)	(0.861)	(0.914)	(0.754)
Agricultural Exports (%)	-1.683**	-1.767**	-1.453**	-1.716***	-1.325*	-1.381*	-1.264*	-1.590**	-1.134*
$(t - 1)$	(0.672)	(0.711)	(0.669)	(0.657)	(0.729)	(0.739)	(0.664)	(0.690)	(0.654)
Election Year	0.364*	0.364*	0.367*	0.376*	0.379*	0.308	0.418*	0.363	0.447**
$(t - 1)$	(0.214)	(0.220)	(0.220)	(0.213)	(0.217)	(0.224)	(0.226)	(0.243)	(0.222)
War	-0.818***	-0.792***	-0.789***	-0.800***	-0.837***	-0.746***	-0.751***	-0.734***	-0.723***
$(t - 1)$	(0.209)	(0.207)	(0.210)	(0.222)	(0.214)	(0.215)	(0.237)	(0.250)	(0.234)
British Ally	-0.0372	-0.0549	-0.00867	0.0656	-0.0787	-0.0388	0.0894	0.0265	0.0242
$(t - 1)$	(0.220)	(0.235)	(0.226)	(0.228)	(0.239)	(0.250)	(0.224)	(0.183)	(0.232)
Gold Standard	5.066***	5.023***	5.090***	5.064***	5.042***	5.149***	5.020***	5.112***	5.114***
$(t - 1)$	(0.287)	(0.284)	(0.289)	(0.284)	(0.285)	(0.253)	(0.274)	(0.254)	(0.293)
Constant	-6.861**	-8.914***	-7.081**	-6.814**	-7.088**	-5.675*	-6.130**	-5.955**	-7.364**
	(3.077)	(3.191)	(2.932)	(3.112)	(3.091)	(3.236)	(2.783)	(2.889)	(2.861)
Observations	1,259	1,259	1,259	1,259	1,259	1,196	1,146	1,149	1,259
Countries	30	30	30	30	30	29	30	30	30
Pseudo R-squared	0.892	0.894	0.891	0.892	0.892	0.890	0.882	0.886	0.892

Estimates of the baseline probit specification (column 6 of Table 3.1) for the full country sample over the period 1860-1913. The dependent variable is a dummy variable indicating adherence to the gold standard in the corresponding year. First-row coefficients correspond to each of the different political indicators listed in the header. Columns 1-5 use sub-indices of the polity score reported in the Polity IV database, as explained in the text. Column 6 uses the democracy-dummy of Boix et al. (2012). Columns 7-9 use three indicators from the PIPE database (Przeworski et al., 2013), as explained in text. All regressors are lagged by one year. The specifications also include year fixed effects. Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

from the Polity IV database. These indices are the executive recruitment index (exrec), the executive constraints index (exconst) and the political competition index (polcomp). These indices are constructed in the same way as the polity, democracy and autocracy scores. Each of them reflects different aspects of each country's political institutions. Specifically, the first rates how competitive, regulated and open the recruitment process is for the country's chief executive, i.e. its president, monarch or other ruler. The second rates the presence and extent of institutionalized constraints on the decision-making powers of the chief executive. The third rates how open and transparent the competition between individuals and parties is in the political arena and in the electoral process.

Looking at the estimated coefficients for these three variables in columns 3, 4 and 5, we see that for all three we obtain negative point estimates. Thus, the probability of adherence to the gold standard was lowered by a more regulated form of executive recruitment, more institutionalized constraints on the executive, and greater political competition. Nevertheless, only the coefficient on the political competition index is statistically significant. This suggests that among these different aspects of political institutions, it is competition by other candidates who could replace them in office that most limited the willingness of policy makers to maintain their commitment to a gold standard, as also the discussion in section 3.2.3 indicates. This finding also explains why higher values for the autocracy score had a stronger effect on gold standard adherence: political competition was clearly limited in autocratic regimes, while constraints on executive recruitment and executive decision-making might still have been present.

To shed more light on the mechanism at play in our context, we turn to a series of binary indicators that signify the presence or absence of particular features in each country's political institutions. In column 6 we replace in our specification the polity score with a dummy variable indicating whether or not a given country in a given year was a consolidated democracy. This dummy is obtained from the classification of Boix et al. (2013). While this dummy variable is correlated with the polity score, its coefficient estimate is statistically not different from zero. This result suggests that being a consolidated democracy as defined by these authors is not the key feature of

political institutions that affected a country's probability of adhering to the gold standard.²⁵

In columns 7 and 8 we employ instead two other dummy variables indicating respectively the presence of a legislature in each country in a given year and whether that legislature was directed elected.²⁶ While in this case the estimated coefficients for both dummies are negative, the coefficient is only statistically significant in the latter case. This implies that just having a separate legislating body, constraining the actions of the executive, was not as crucial for gold standard adherence as having the members of that legislating body being elected by the public. This finding mirrors that of columns 3–5 as legislative elections created space for competition on policy platforms by different candidates.

This role of political competition is also evident from the results of column 9 where we employ a dummy variable indicating whether a given country had universal male suffrage.²⁷ In this case, we again see that the dummy variable has a negative and statistically significant effect on the probability of adhering to the gold standard. This is not surprising as universal male suffrage is bound to create more space for political competition compared to a political environment where suffrage is limited to smaller groups. These results taken together suggest that the opening up of the political process to broader segments of the population, which took place as part of the first wave of democratization, is what undermined the willingness of countries to commit to the gold standard.

3.6 Robustness Checks

Having established a clear relationship between the probability of a country adhering to the gold standard prior to World War I and key dimensions of its political institutions, we proceed to assess the robustness of this relationship.

²⁵According to Boix et al. (2013), a country is considered a consolidated democracy if it has a legislature to which the executive is accountable, for which at least half the male population has the right to vote.

²⁶Both of these measures, as well as the universal male suffrage measure, are primarily based on Przeworski et al. (2013).

²⁷This measure is therefore more restrictive than the indicator of Boix et al. (2013) used in column 6.

Specifically, we explore how our main results are affected by (a) changes to the composition of our sample, (b) changes to the variables that we employ and (c) changes to the econometric setup. In all cases we find our results to be largely unaffected by these changes. In this section we present the details.

3.6.1 Robustness to Sample Composition

Table 3.3 provides a first key set of robustness checks for our baseline probit specification by altering the composition of our sample. In column 1 we start by exploring the stability of our estimates when we expand the sample period to the years from 1850 to 1913. This allows us to also capture the determinants of early entries to the gold standard such as those of Canada and Portugal. In column 2 we do the opposite and shorten the sample period to the years from 1870 to 1913, the typical periodization of the classical gold standard. In both cases we find similar estimates for most regressors. Looking at the estimated coefficients of the polity score in particular, we see that they tend to rise as we exclude the years between 1850 and 1870. This result is not surprising given that most of the transitions in and out of the classical gold standard occur after 1870.

Next, we exclude from our sample different groups of core countries in columns 3 and 4. In particular, in column 3 we first exclude a narrow set of core countries, following Morys (2013) and Mitchener and Weidenmier (2015), whose commitment to the gold standard was perceived by international financial markets as steadfast. These countries includes Britain, France and Germany together with Belgium and the Netherlands. In column 4 we proceed to exclude from our sample a broader set of core countries, indicated in Table A3.1 in the Data Appendix, which during this period participated in the Atlantic economy following O'Rourke and Williamson (1999) and were able to borrow abroad in their own currency (Flandreau and Sussman, 2005). In both cases we see that restricting our sample to peripheral countries, defined broadly or narrowly, does not qualitatively alter our main result. Quantitatively, though, we see that the coefficient estimate for the polity score becomes more negative as we exclude from our sample many of the core countries.²⁸ This suggests that the political constraints that we are

²⁸The magnitude of the implied effect in column 4 is -0.0196 instead of -0.0159 in the

Table 3.3: Robustness Checks with Alternative Samples

	Altern. Year Samples		Altern. Country Samples	
Polity Score ($t-1$)	-0.0484** (0.0198)	-0.0500** (0.0211)	-0.0461** (0.0229)	-0.0451** (0.0207)
GDP per Capita (log)	0.813*** (0.306)	0.914*** (0.333)	0.785** (0.343)	0.899*** (0.337)
Population (log)	-0.106 (0.0965)	-0.0867 (0.104)	-0.113 (0.106)	-0.0387 (0.119)
Debt Ratio	0.0720 (0.236)	0.147 (0.281)	0.0869 (0.317)	0.163 (0.291)
Trade Balance	0.349 (1.905)	0.473 (1.969)	2.570 (2.231)	0.943 (2.069)
Openness	-0.00839 (0.248)	0.0175 (0.249)	-0.142 (0.260)	0.0121 (0.215)
Gold Block Trade Share	1.712* (0.921)	1.105 (0.750)	0.843 (0.831)	0.280 (0.967)
Agricultural Exports (%)	-2.013*** (0.645)	-1.757** (0.717)	-1.574* (0.887)	-1.266 (1.017)
Election Year	0.307 (0.202)	0.362* (0.218)	0.321 (0.228)	0.316 (0.236)
War	-0.784*** (0.219)	-0.801*** (0.207)	-1.156*** (0.254)	-0.817*** (0.211)
British Ally	0.0655 (0.195)	-0.0946 (0.240)	-0.120 (0.265)	-0.296 (0.246)
Gold Standard	5.065*** (0.296)	4.926*** (0.314)	5.018*** (0.350)	4.976*** (0.295)
Constant	-7.960** (3.320)	-8.490** (3.628)	-6.341 (3.359)	-7.857** (3.975)
Observations	1,339	1,151	739	989
Countries	30	30	19	24
Pseudo R-squared	0.896	0.882	0.880	0.883
Sample Period	1850-1913	1870-1913	1860-1913	1860-1913
Excluded countries	None	None	Core, narrow	Mon. Unions
			Core, broad	British Empire

Robustness checks for the baseline probit specification (column 6 of Table 3.1). Country sample and time period vary across specifications, as indicated in the bottom of the table. The dependent variable is a dummy variable indicating adherence to the gold standard in the corresponding year. All regressors are lagged by one year. The specifications also include year fixed effects. Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

highlighting were particularly important for peripheral countries for which commitment to the gold standard was not as firm as for core countries. This result is in line with the findings of Morys (2013) and Mitchener and Weidenmier (2015) regarding differences in the operation of the gold standard between the core and the periphery.

In column 5 we proceed to exclude from our sample the countries that there were part of a monetary union when joining the gold standard. These were the members of the Latin Monetary Union (Belgium, France and Switzerland) and the Scandinavian Monetary Union (Denmark, Norway and Sweden).²⁹ The rationale for doing so is that adherence to the gold standard for these countries involved some degree of official coordination with other countries. Hence, they were subject to constraints that extended beyond their domestic economic and political conditions. In column 6 we instead exclude from the sample Britain and its colonies and dominions. Britain had a long history of commitment to the gold standard and the convertibility of the pound was beyond doubt.³⁰ In both cases we see that excluding these countries leads to qualitatively similar results while the coefficient estimate for the polity score again increases slightly. This suggests that our main result is strengthened as we focus on countries for which domestic political constraints were more relevant and for which a commitment to the classical gold standard was more questionable.

3.6.2 Robustness to Alternative Variables

As an additional set of robustness checks for our baseline probit specification, in Table 3.4 we also consider variations in how we specify the explanatory and the dependent variables. A first check, which we report in column 1, is to add further lags of the polity score to our specification. The idea behind the addition of further lags is to assess whether the estimated effect of the polity score is mostly a reflection of current political institutions or of those of the past. With that in mind we also control for the second and third lag

baseline case.

²⁹Italy left the Latin Monetary Union in 1868, well before the Union transitioned to the gold standard, and is therefore best seen as monetarily independent for most of the period. See also Tattara (2003).

³⁰Additionally, as pointed out by Daunton (2006), the gold standard enjoyed wide popular support in Britain.

of the polity score beyond the first one. Doing so reduces the magnitude of the estimated coefficient for the first lag and increases the standard error. This was to be expected, given the fact that the lagged values for the different years are highly correlated. As the joint F-test reveals, though, the three lags together have a statistically significant effect on gold standard adherence.³¹ Moreover, despite their high correlation, we still find the estimated coefficient for the first lag to be larger in magnitude than the other two. This indicates that our estimated effect captures indeed a short-term effect of the current political environment.

In addition to time lags we also consider the role of spatial lags. This is because the decision of each country to adopt and adhere to the gold standard is likely to be closely related to the decisions of other countries with which there is a high degree of economic interaction.³² These countries could be close neighbors as well as large trade partners. Part of this effect, of course, is already captured by controlling for openness and the share of trade with the gold block countries. Yet, as these variables may not reflect the full extent of spatial interaction, in columns 2 and 3 of Table 3.4 we add to our specification a spatial lag of the gold standard dummy to capture interactions that operate beyond the trade channel. Specifically, in column 2 we include in our specification the lagged gold standard status of each country's five nearest neighbors from the sample, while in column 3 we include the lagged gold standard status of each country's five largest trade partners from the sample.

In both cases we find that the inclusion of these spatial lags does not alter our main findings. Our main variable of interest, the polity score, retains its magnitude and statistical significance. The same is true for the other significant controls. Moreover, we see that the estimated effect of the lagged gold standard status of each country's nearest neighbors and that of its largest trade partners has a negative effect on its probability of adhering to the gold standard. At the same time we see in both column 2 and 3 that the estimated coefficient of the trade share with the gold block becomes strongly positive and statistically significant. This suggests that, beyond the

³¹The associated p-value of joint significance is 6.48%.

³²This type of interdependence has also been analyzed recently by Esteves and Ploeckl (2016) using empirical network analysis.

Table 3.4: Robustness Checks with Alternative Variables

Extra lags	Spatial Models		Altern. Monetary Regime Classifications	
	Neighbors	Trade Partners	Strict Class.	Convertible
			Ordered (3)	Ordered (4)
Polity Score (<i>t - 1</i>)	-0.0480 (0.0661)	-0.0446** (0.0211)	-0.0430** (0.0217)	-0.0319* (0.0192)
GDP per Capita (log) (<i>t - 1</i>)	0.892*** (0.330)	0.962*** (0.332)	0.671* (0.347)	-0.0246* (0.0137)
Population (log) (<i>t - 1</i>)	-0.0917 (0.103)	-0.142 (0.111)	-0.153 (0.117)	0.256 (0.259)
Debt Ratio (<i>t - 1</i>)	0.137 (0.274)	0.164 (0.245)	0.208 (0.302)	0.204 (0.237)
Trade Balance (<i>t - 1</i>)	0.397 (1.996)	0.129 (1.986)	-0.0161 (2.415)	0.0414 (0.0694)
Openness (<i>t - 1</i>)	0.00364 (0.240)	0.0493 (0.267)	-0.0543 (0.218)	0.0831 (0.0831)
Gold Block Trade Share (<i>t - 1</i>)	1.238 (0.792)	1.763** (0.795)	1.682** (0.840)	0.104 (0.104)
Agricultural Exports (%) (<i>t - 1</i>)	-1.808*** (0.687)	-2.367*** (0.764)	-2.221*** (0.825)	-0.0269 (0.135)
Election Year (<i>t - 1</i>)	0.359* (0.217)	0.396* (0.214)	0.324 (0.231)	-0.140 (0.153)
War (<i>t - 1</i>)	-0.816*** (0.216)	-0.809*** (0.214)	-0.748*** (0.218)	0.200 (0.258)
British Ally (<i>t - 1</i>)	0.0221 (0.221)	-0.0174 (0.221)	-0.103 (0.287)	0.195 (0.190)
Polity Score (<i>t - 2</i>)	0.0820 (0.00666)	-0.00666 (0.0660)		0.267 (0.665)
Spatial Lag (<i>t - 1</i>)		-0.823* (0.493)		-0.522 (0.551)
Gold Standard (<i>t - 1</i>)	5.027*** (0.279)	5.140*** (0.285)	-0.594** (0.232)	-0.303** (0.120)
Monetary Regime (<i>t - 1</i>)				-0.280*** (0.133)
Constant	-7.707** (3.231)	-7.945** (3.331)	-8.211** (3.214)	-0.265 (0.0886)
Observations	1,251	1,259	1,259	1,259
Countries	30	30	30	30
Pseudo R-squared	0.892	0.894	0.895	0.845
			0.910	0.741
				0.677

Robustness checks for the baseline probit specification (column 6 in Table 3.1). For columns 1-3, the dependent variable is a dummy variable indicating adherence to the gold standard in the corresponding year. The dependent variable of column 4 is an alternative, stricter, classification of adherence to the gold standard. That of column 5 is dummy for any monetary regime with a convertible currency. Columns 6 and 7 use 3-level and 4-level monetary regime classifications, respectively. See main text for more details. All regressors are lagged by one year. The specifications also include year fixed effects. Standard errors are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1.

effects already captured by our main controls, the role of spatial interactions in the decisions of countries to participate in the gold standard was limited.

Another important check to consider is what happens to our results when we classify gold standard adherence in different ways. For our baseline classification we follow the common approach in the literature and treat countries to adhere to the gold standard even if they are simply “shadowing” it by maintaining a fixed exchange rate with the pound or other convertible currencies. In column 4 we instead adopt a stricter classification of gold standard adherence and classify countries as not being on the gold standard if they were only shadowing it. In column 5, on the other hand, we consider all convertible monetary systems, based not only on gold but also on silver or both metals, and distinguish them from systems based on fiat money, in line with Eichengreen and Flandreau (1996).

The results that we obtain in these two cases are very similar to our baseline probit specification from Table 3.1. Our main variable of interest, the polity score, continues to have a negative and statistically significant effect on the probability of adherence both to a strict gold standard regime and to any convertible monetary regime. Comparing the coefficient estimates in these cases, we see that the estimated coefficient for the polity score in column 5 is a bit smaller (in absolute terms). This suggests that political constraints may have been less important for adherence to silver and bimetallic regimes. This result is not entirely surprising, given the more flexible and inflationary nature of these regimes. Looking at the estimated coefficients of the other variables, the same factors predicting adherence to the gold standard appear to predict also adherence to convertible monetary systems more generally. Only the coefficient of GDP per capita is substantially smaller in column 5. This suggests that a country’s level of development mattered less for adherence to silver and bimetallic regimes, confirming the particular attractiveness of the gold standard for more developed economies, discussed in Section 3.2.

In columns 6 and 7 we go beyond a binary classification of each country’s monetary regime and use instead an ordinal scale following Esteves and Ploekl (2016). In particular we consider two such scales. For the first one we take the gold standard as being of the highest order (3) followed by a silver or a bimetallic standard (2) and finally an inconvertible paper money

regime (1). For the second one we further distinguish between silver and bimetallic regimes and follow the order (4) for the gold standard, (3) for a bimetallic standard, (2) for a silver standard and (1) for paper money. Using these ordered variables we estimate an ordered probit model instead of our binary choice model of equation 3.1.

Also in these two cases the estimation reveals qualitatively similar results. A higher value for the polity score, other things equal, reduces the probability of a country adhering to a more strict monetary regime, defined on the basis of either classification. This is reassuring, as it suggests that our results do not hinge on the exact way in which we classify monetary regimes. Comparing also the estimates between the two columns, we see that the coefficient estimates for both the polity score and GDP per capita are larger in absolute value as we switch from the three- to the four-level classification. Stricter monetary regimes appear to have been more attractive for more developed economies, but at the same time less attractive for more democratic countries.

3.6.3 Robustness to Econometric Setup

Having reported these robustness checks for our baseline probit specification, in Table 3.5 we explore robustness with respect to alternative econometric setups. In column 1 we estimate our main specification with the full set of controls assuming instead a linear probability model. In column 2 we do the same assuming a logit model. Although the estimated coefficients in these two cases are not directly comparable with those of column 6 of Table 3.1, qualitatively the pattern that emerges is very similar. The polity score has a negative effect on the probability of adherence to the gold standard, while the rest of the variables also have the same effects that we found previously.

Looking at the magnitudes of the implied effects across the three models, which we do not report for brevity, we generally see similar patterns for the logit model as for the probit model. For the polity score, in particular, the implied effect is -0.0164 rather than -0.0159. For the linear probability model the corresponding effects indicated by the estimated coefficients for all explanatory variables are quantitatively smaller. Yet, given that the linearity assumption for the equation (3.1) is not easy to justify given our outcome

Table 3.5: Robustness Checks with Alternative Econometric Setups

VARIABLES	Linear Prob.		Logit		Panel Logit		Panel Probit		IV Probit	
	Dynamic		Static		Dynamic		Static		2nd Stage	
Polity Score (<i>t</i> - 1)	-0.00196** (0.000931)	-0.104** (0.0466)	-0.382* (0.221)	-0.526*** (0.0895)	-0.0659** (0.0272)	-0.203*** (0.0373)				
GDP per Capita (log) (<i>t</i> - 1)	0.0389*** (0.0117)	1.801** (0.745)	-0.284 (2.955)	1.301 (1.417)	1.182*** (0.401)	1.644*** (0.369)				5.330***
Population (log) (<i>t</i> - 1)	-0.000338 (0.00416)	-0.200 (0.221)	6.636 (4.436)	6.039*** (1.822)	-0.120 (0.117)	-0.178** (0.0769)				-0.599***
Debt Ratio (<i>t</i> - 1)	0.00435 (0.0149)	0.317 (0.592)	-1.467 (1.364)	-1.881*** (0.721)	0.0806 (0.294)	0.166 (0.159)				0.518
Trade Balance (<i>t</i> - 1)	0.0854 (0.103)	0.746 (4.905)	9.761 (6.478)	10.22*** (3.727)	1.026 (2.278)	-1.284 (1.463)				-10.52***
Openness (<i>t</i> - 1)	0.00187 (0.00965)	0.0435 (0.539)	0.462 (4.225)	9.091*** (2.184)	-0.0987 (0.299)	-0.708** (0.322)				-4.786***
Gold Block Trade Share (<i>t</i> - 1)	0.0257 (0.0416)	2.423 (1.573)	3.503 (3.213)	3.778*** (1.303)	1.515* (0.920)	0.828 (0.551)				0.891
Agricultural Exports (%) (<i>t</i> - 1)	-0.0423* (0.0212)	-3.640** (1.439)	-16.63 (11.47)	-2.285 (3.202)	-2.175** (0.933)	-2.364*** (0.555)				-6.852***
Election Year (<i>t</i> - 1)	0.0138 (0.0112)	0.606 (0.491)	0.810 (0.620)	0.286 (0.262)	0.418* (0.165)	0.0783 (0.270)				0.0783
War (<i>t</i> - 1)	-0.0232** (0.00922)	-1.683*** (0.545)	-1.707* (1.038)	-0.553 (0.349)	-0.873*** (0.258)	-0.664*** (0.186)				0.0560
British Ally (<i>t</i> - 1)	0.00623 (0.0109)	0.246 (0.562)	0.660 (1.198)	0.368 (0.489)	0.00290 (0.241)	-0.510** (0.233)				-2.012***
Years with Cont. Elections (log) (<i>t</i> - 1)						0.241*** (0.0867)				0.306
Years since Independence (log) (<i>t</i> - 1)						-0.692*** (0.118)				
Gold Standard (<i>t</i> - 1)	0.918*** (0.0139)	10.21*** (1.042)	10.55*** (1.552)		5.157*** (0.357)	3.229*** (0.295)				-2.396***
Constant	-0.241** (0.118)	-15.68** (7.219)			-9.358** (3.701)	-10.97*** (2.497)				-24.26***
Observations	1,259	1,259	958	958	1,259	1,259				1,259
Countries	30	30	21	21	30	30				30
(Pseudo) R-squared	0.910	0.893	0.901	0.484						
Country Effects	None	None	Fixed	Fixed	Random	None				None

Robustness checks for the baseline specification (column 6 of Table 3.1) estimated as indicated in the header. The dependent variable is a dummy variable indicating adherence to the gold standard in the corresponding year. Models estimated are a linear probability model, a pooled logit model, a (dynamic and static) fixed-effects logit model, a random-effects probit model, and an IV probit model, respectively. All regressors are lagged by one year. The specifications also include year fixed effects. Standard errors are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1.

variable, we only report here the estimated coefficients.³³

In columns 3 and 4 of Table 3.5 we proceed to add country fixed effects to our specification. Given that this can not be done in the context of the probit model, we add the fixed effects to the logit specification of column 2. The only difference between columns 3 and 4 is that in the latter case we drop the lagged dependent variable from the specification. This is because the lagged dependent variable in the presence of cross-sectional fixed effects may lead to biased estimates.

As we can see in column 3, with the inclusion of country fixed effects the coefficients of all control variables, apart from the war dummy, become statistically insignificant. In spite of that, the coefficient of the polity score is still negative and statistically significant. Once we drop the lagged dependent variable in column 4, as expected, we see that several of the control variables, including the population level, the debt to GDP ratio, the trade balance, the openness ratio and the share of trade with the gold block are now estimated to have statistically significant effects on the gold standard adherence probability. For the polity score we now obtain an even larger coefficient in absolute terms compared to column 3.

Comparing the implied effects of the coefficients from the logit models with fixed effects from columns 3 and 4 with those of the previous ones is not straightforward, as the approach that we used to compute these effects is not applicable in a setup with fixed effects. Looking at the estimated semi-elasticities from the three logit setups and the probit, we find that both setups with fixed effects imply much larger effects for the polity score. Compared to a semi-elasticity of about -0.021 obtained from the probit and logit models, the models of columns 3 and 4 imply semi-elasticities for the polity score of -0.168 and -0.231 respectively. While these implied effects may appear as a bit too high, taken together they do clearly suggest that the changes in democratic political institutions did play a role in the decision of countries to adhere to the classical gold standard.

In column 5 of Table 3.5 we shift back to a probit model, but in this case use the panel probit estimator which allows for the inclusion of random effects. Given that we can not include fixed effects in our probit specifi-

³³See Horrace and Oaxaca (2006) for more on the limits of the linear probability model.

cation, the inclusion of random effects may allow us to account for part of the unobserved heterogeneity across our sample countries. Doing so does not qualitatively alter our main results, while quantitatively the estimated effect of polity score that we obtain is clearly larger than in our baseline. In this setup, we can further include lagged values of the polity score, following Wooldridge (2005) to account for potential bias from having a lagged dependent variable. As the estimates that we obtain in this case are very similar we omit them for brevity.

A final part of our robustness analysis is to also consider the potential endogeneity bias that may be present in our estimated coefficient for the polity score. This bias could be due to the fact that the polity score is an imperfect measure of a country's political institutions. Alternatively, a bias may arise from the omission of other important determinants of gold standard adherence that may be correlated with the polity score. To correct for this potential bias, we pursue an instrumental variable strategy where we use two instruments for the polity score: (a) the number of years since each country effectively became an independent polity and (b) the number of years each country has held elections without interruption. The two instruments together should capture the key events in the political history of each country as an independent democratic polity. Thus, they should correlate with the contemporary political institutions of each country, which are reflected in the polity score of each country. Yet, they should not relate to the probability of each country adhering to the gold standard, which was a monetary arrangement that only emerged in the second half of the nineteenth century, beyond their indirect effect via the country's political institutions.

Using this instrumentation strategy, we re-estimate our baseline probit specification in column 6, where instead of the actual polity score we use the predicted one from the first stage regression reported in column 7. As the second-stage estimates reveal, the instrumented polity score still has a negative and statistically significant effect on the probability of adherence to the gold standard, controlling for all other baseline controls. The estimated coefficient in this case is even larger in absolute value than the one reported in Table 3.1 and is closer to the ones reported in the fixed effects models of columns 3 and 4. It suggests that our baseline specification from Table 3.1

provides a conservative estimate of the true effect that democratic political institutions had on gold standard adherence.

Inspecting the first stage estimates in column 7 also confirms the strength and the validity of the instruments. Both instruments enter significantly in the first stage with their effects operating in different ways. Countries which have been independent for more years tend to have a lower polity score, while countries that have had a longer experience with elections in the past tend to have a higher polity score. This is not surprising in the context of the first wave of democratization, since countries that became independent during the nineteenth century had more modern and more democratic political institutions. Conditional on that effect, captured by our first instrument, their history of interrupted elections, captured by our second instrument, is also important. This is because democratization did not always evolve smoothly, as it was occasionally interrupted by wars, revolutions and coups. Together the two instruments reflect well the key historical forces that have shaped the political institutions of the different countries in our sample. This is also reflected in the joint F-test for the validity of the instruments. This yields a value of 27.1, which is safely above the critical threshold of 10 suggested by Staiger and Stock (1997). Similarly, the Sargant test of over-identifying restrictions suggests that assuming the validity of at least one of the instruments should not lead to the rejection of the validity of the other.

3.7 Separating Adoption and Suspension Decisions

Having established the robustness of our main results regarding the decision of countries to adhere to the gold standard, we now turn to investigate separately the role of domestic political institutions in the processes of adoption and suspension of the gold standard. For this purpose we estimate the duration model of equation 3.2, for the decision to adopt the gold standard and for the opposite decision to suspend it. Doing so we can assess whether the determinants of adoption and suspension decisions were symmetric and, more specifically, whether democratization contributed both to decreases in the chance of adoption and increases in the chance of suspension.

Since a country can only adopt the gold standard if it currently uses an

alternative monetary system, in any year the set of countries that are subject to the hazard — or in terms of duration analysis, are at risk — of adoption corresponds to those countries which do not adhere to the gold standard yet. The opposite is true for the case of gold standard suspension: only those countries already using the gold standard are at risk of suspension. Given that, the numbers of observations based on which we perform our estimations in these two setups are substantially smaller than in our baseline probit setup.

In the context of this analysis we, furthermore, need to clarify how to treat countries that drop out of the sample following an adoption or a suspension decision. In the case of an adoption, for example, a country leaves the sample once it has joined the gold standard. The same country, however, may end up in the future being subject to a renewed hazard of adoption, if in the meantime it ends up leaving the gold standard. As a priori it is not certain whether the determinants of adoption are similar for countries that have previously used the gold standard to those who never have, we estimate two versions of each hazard ratio: one based on all cases of adoptions or suspensions and one that leaves countries out of the risk-set permanently after their initial adoptions or suspensions.³⁴

Beyond these adjustments to our sample, we also stratify the sample into a core and a periphery group of countries, based on the classification reported in Table A1, to account for potential differences in the baseline hazard rates between these two groups of countries. Like before, we lag all regressors by one year. Thus, our estimates reflect how a change in any of the regressors in a given year would alter the risk of a country adopting or suspending the gold standard during the next year. The estimates of the Cox proportional hazard models for the adoption decisions are presented in Table 3.6.³⁵

Columns 1 and 2 present the coefficients of the model of equation 3.2 for the adoption of the gold standard, first only for initial entries (i.e. adoptions) and then for both initial entries and re-entries. The coefficient of our main

³⁴A related question here is about the effect that previous participation in the gold standard system might have on the likelihood of re-adoption. Unfortunately, though, the number of cases in which a country adopts or suspends twice is far too limited to analyze this systematically.

³⁵We also test all Cox proportional hazard models for the validity of the proportional hazard assumption. Proportionality of the full model is not rejected for any of the models of Tables 3.6 and 3.7, although the proportionality of the polity score is rejected in one case (column 2 of Table 3.7).

Table 3.6: Duration Models for Gold Standard Adoption

	Initial Entries	Incl. Re-entries	Non-Lagged	Non-Stratified	Stratified by:		Parametric	
					Narrow Core	Continent	Exponential	Weibull
Polity Score ($t - 1$)	-0.115* (0.0632)	-0.138*** (0.0448)	-0.165** (0.0693)	-0.107** (0.0512)	-0.116** (0.0482)	-0.129* (0.0675)	-0.103 (0.0718)	-0.153* (0.0813)
GDP per Capita (log) ($t - 1$)	1.403 (1.252)	0.949 (0.637)	1.766 (1.092)	2.508** (1.121)	2.741** (1.239)	2.686** (1.129)	2.315** (1.064)	2.108* (1.173)
Population (log) ($t - 1$)	-0.582** (0.234)	-0.321 (0.203)	-0.405 (0.308)	-0.329 (0.246)	-0.263 (0.250)	-0.376* (0.203)	-0.131 (0.316)	-0.565 (0.363)
Debt Ratio ($t - 1$)	0.965 (0.806)	1.090** (0.432)	0.496 (0.911)	0.283 (0.761)	0.580 (0.740)	0.389 (0.770)	0.317 (0.981)	1.419 (0.893)
Trade Balance ($t - 1$)	-0.943 (5.217)	3.964 (2.968)	-3.520 (5.024)	-2.632 (5.184)	-4.066 (5.554)	-2.548 (5.509)	1.307 (8.030)	1.860 (6.865)
Openness ($t - 1$)	-0.285 (0.424)	-0.116 (0.467)	-0.338 (0.506)	0.236 (0.461)	0.436 (0.518)	0.893 (1.121)	0.423 (0.476)	-0.241 (0.574)
Gold Block Trade Share ($t - 1$)	-1.424 (1.525)	-2.460 (1.842)	-2.019 (2.211)	1.625 (1.216)	1.924 (1.519)	2.676*** (1.005)	3.343** (1.413)	-1.020 (2.439)
Agricultural Exports (%) ($t - 1$)	1.415 (3.060)	2.879 (2.794)	1.157 (2.667)	-1.980 (1.954)	-2.268 (1.660)	-2.523 (2.724)	-2.677 (2.699)	4.698 (4.820)
Election Year ($t - 1$)	0.348 (0.472)	0.645 (0.400)	0.571 (0.643)	0.355 (0.528)	-0.0279 (0.460)	0.334 (0.495)	0.670 (0.485)	0.646 (0.404)
War ($t - 1$)	-1.270* (0.665)	-1.913*** (0.647)	-0.844 (0.699)	-1.399 (0.901)	-1.838*** (0.680)	-0.632 (0.850)	-1.473 (0.980)	-1.824** (0.832)
British Ally ($t - 1$)	0.988 (0.926)	-0.387 (0.787)	1.585* (0.885)	1.311* (0.739)	1.193 (0.733)	1.613** (0.810)	0.786** (0.385)	0.284 (0.935)
Observations	456	577	472	456	456	456	456	456
Entries	19	23	20	19	19	19	19	19
Countries	22	24	23	22	22	22	22	22
Log-Likelihood	-25.27	-42.18	-28.74	-31.51	-26.94	-19.97	-4.661	7.862

Estimates of coefficients (not hazard ratios) of duration models, where “failure” is the adoption of the gold standard. All models include the full country sample and cover the period 1860-1913. Columns 1-6 are based on Cox proportional hazard models, whereas columns 7 and 8 are based on the parametric duration models indicated in the header. All regressors are lagged by one year, except in column 3 where the contemporaneous regressors are used. The baseline hazard is stratified into a core and a periphery group, except for columns 4-6 (which are not stratified, stratified by the alternative core/periphery definition, and by continent, respectively). Standard errors are clustered at the country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

variable of interest, the polity score, is negative and statistically significant in both specifications, in line with our earlier findings. Thus, the hazard of adoption is lower in countries where the political institutions are organized in a more democratic fashion. In these two versions of the adoption model, we find statistically significant coefficients for the war dummy, for population size (in column 1), and for the debt ratio (in column 2). The signs of these coefficients are the same as those found in the probit model of Table 3.1. For the other control variables we do not obtain statistically significant coefficients, although in most cases the sign is the same for the two versions.

We then proceed to assess the robustness of these results based on a number of alternative specifications.³⁶ Firstly, we test whether the use of contemporaneous rather than lagged values of the independent variables makes a difference, the results of which are presented in column 3. Secondly, we test how our results change when we make alternative stratification choices. To do so, we estimate the model of adoptions by stratifying the baseline hazard in three alternative ways: in column 4 we do not stratify the baseline at all and assume a uniform baseline hazard for all countries, in column 5 we stratify on the basis of the narrow classification of core countries discussed in Section 3.6.1, and in column 6 we stratify countries on the basis of continent. Thirdly, we estimate two parametric versions of a duration model, which assume respectively an exponential or a Weibull distribution of the baseline hazard $h_0(t)$. The drawback of these parametric models is that they are more restrictive than the Cox model, while the upshot is that these models allow us to estimate the average expected time to adoption given levels of the covariates. The results of the exponential and Weibull parametric models are presented in columns 7 and 8.

In all specifications the coefficient of the polity score remains negative and statistically significant, with the exception of the exponential model. In some specifications we observe that the coefficient estimates for some additional control variables become statistically significant, such as that of GDP per capita, the trade share with the gold block and the British ally dummy. Across all specifications, though, the size of the coefficient of the polity score is quite stable, varying from -0.103 to -0.165. Thus, we can conclude that

³⁶All robustness checks cover only first adoptions, i.e. they are counterparts to column 1 of Table 3.6.

our main result is robust to alternative specifications of the adoption model.

As this analysis demonstrates, democratic institutions made the adoption of the gold standard less likely, all else equal, which is in line with the result found in Section 3.5. In terms of magnitude, the estimated effects in this case are somewhat larger than what we found using the probit model of Section 3.5. The coefficient of the polity score found in column 1 of Table 3.6 translates into a hazard ratio of 0.891. This means that for a one-point increase of the polity score, the hazard of adopting the gold standard decreases by 10.9%. This is substantially larger than the effect found in Table 3.1, which estimates that a one-point increase of the polity score decreases the probability of adhering to the gold standard by 1.6%. One should note however that the difference in interpretation between these two models lies in the distinction between the probabilities of adhering to the gold standard versus adopting it.³⁷

An alternative way to interpret these magnitudes is to ask what the expected time to adoption of the gold standard would have been for the average country, given its political institutions. As this method requires the use of a parametric model, we use the Weibull model to predict the expected adoption time for different levels of the polity score. We do so as the Weibull model is less restrictive than the exponential in its assumptions regarding the baseline hazard rate. Figure 3.3 shows the results of this exercise for three cases. These cases correspond to the average country being: (a) fully autocratic with a polity score of -10, (b) perfectly democratic with a polity score of 10, or (c) an intermediate case with a polity score of 0.³⁸

As is evident from the figure, the expected time to gold standard adoption decreases over the course of our sample period. This is the result of various factors, such as network externalities or the observed growth in GDP per capita, which have positive effects on gold standard adoption and therefore

³⁷There are also other reasons why the estimated magnitudes differ between these models. The estimates of the duration model are based on a smaller sample, as countries leave the sample once they have adopted the gold standard. At the same time the inclusion of the lagged dependent variable in our baseline probit setup actually downplays the importance of political institutions by attenuating the magnitude of the polity score's coefficient, as seen in Section 3.6.3.

³⁸All other covariates are fixed at their means. We estimate these curves on the basis of a non-stratified Weibull model, as our interest lies in the effect on the average country across the full sample.

Figure 3.3: Expected Time to Adoption

Expected time until a country adopts the gold standard. Estimated on the basis of a non-stratified Weibull model, with the control variables fixed at their cross-country annual means, and the Polity score fixed to -10, 0, or +10.

decrease the expected time to adoption. Conditional on these factors, Figure 3.3 makes clear that the expected time to adoption is also affected by each country's political institutions. For example, the average country in 1890, had it not adopted the gold standard yet, would have had an expected time to adoption of approximately 56 years if it had been fully democratic, whereas this expected time is only 18 years for a fully autocratic country.

In Table 3.7 we estimate a similar set of duration models for the process of gold standard suspension. However, since the number of cases in which a country suspended the gold standard before 1914 is fairly limited, we cannot include all the explanatory variables when estimating the Cox model for suspensions, since the model would become over-specified. For this reason, in the specification of the suspension model we limit the number of independent variables to six, based on their predictive power. Beyond the polity score, the specification therefore includes as controls only the level of economic development, population size, the war dummy, the share of agriculture in

total exports, and the degree of openness.³⁹

Given our focus on suspension decisions, in our baseline setup we use the contemporaneous levels of the explanatory variables rather than their first lags to predict the hazard of a gold standard suspension. The reason for this is that the suspension of the gold standard was in most cases a more short-term decision than its adoption. Especially for matters like political upheaval or the outbreak of a war, it is likely that the effects would have led to an immediate suspension of the gold standard in the same year rather than a year later.

Table 3.7 shows the results of these estimations, where the columns are ordered in an analogous fashion to Table 3.6. Column 1 provides the estimates when the model uses only initial suspensions, while in column 2 countries are allowed to re-enter the risk set once they adopt the gold standard again. Columns 3–8 test the robustness of the estimates of column 1 to alternative choices of timing (lagged independent variables), stratification, or parametrization of the baseline hazard. Comparing the obtained estimation results across columns, we see that estimated coefficients are a bit more sensitive in this setup. This is not entirely surprising given the small number of gold standard suspensions that took place before World War I. Nevertheless, in all cases we see that the effect of the polity score is always estimated to be positive and in most cases it is also statistically significant. This suggests that countries with more democratic political institutions were *ceteris paribus* more likely to suspend the gold standard after having adopted it.

To interpret the estimated magnitude of our main effect, we follow the same approach as before and estimate the expected time to suspension for the average country in each year given its political institutions. To do so, we use again the Weibull model, for which the estimated coefficient of the polity score is comparatively conservative.⁴⁰ Based on these estimates, Figure 3.4 presents the expected time to suspension for the same three hypothetical cases as in Figure 3.3.

Focusing now on a country which had adopted the gold standard by 1890,

³⁹We have estimated similar sets of models for other sub-groups of control variables. The result that the polity score's coefficient is generally positive, but its significance and size varies across models, is also something we find for these other choices of controls.

⁴⁰According to the estimates of column 8, a one-point increase in the polity score decreases the hazard of suspension by 16.3%.

Figure 3.4: Expected Time to Suspension

Expected time until a country suspends the gold standard. Estimated on the basis of a non-stratified Weibull model, with the control variables fixed at their cross-country annual means, and the Polity score fixed to -10, 0, or +10.

Table 3.7: Duration Models for Gold Standard Suspension

	Initial Exits	Incl. Re-exits	Lagged	Non-Stratified	Stratified by:		Parametric
					Narrow Core	Continent	
						Exponential	Weibull
Polity Score	0.585*** (0.155)	0.210 (0.145)	0.376* (0.202)	0.107* (0.0558)	0.104* (0.0594)	0.0670 (0.170)	0.151* (0.0800)
GDP per Capita (log)	-2.618* (1.575)	0.176 (1.437)	-1.457 (1.273)	-2.672** (1.077)	-2.270* (1.207)	-6.816* (3.910)	-1.678 (1.384)
Population (log)	-0.494 (0.484)	0.322 (0.425)	0.223 (0.396)	-0.247 (0.385)	-0.219 (0.376)	-0.616 (0.467)	-0.176 (0.419)
War	4.608*** (1.139)	2.124 (1.353)	2.191* (1.260)	2.409 (1.466)	2.716* (1.498)	1.567 (1.432)	1.285 (0.834)
Agricultural Exports	0.447 (4.037)	2.343 (3.642)	2.333 (4.919)	5.489 (3.563)	3.000 (3.494)	-4.810 (5.019)	1.992 (4.257)
Openness	2.963*** (0.931)	3.154*** (1.065)	4.061** (1.599)	0.868 (0.613)	1.398* (0.740)	0.372 (0.844)	0.888* (0.505)
Observations	668	693	664	668	668	668	668
Countries	26	27	26	26	26	26	26
Exits	7	8	7	7	7	7	7
Log-Likelihood	-5.331	-8.146	-7.209	-11.47	-10.74	-5.818	-3.155
							-3.155

Estimates of coefficients (not hazard ratios) of duration models, where “failure” is the suspension of the gold standard. All models include the full country sample and cover the period 1860-1913. Columns 1-6 are based on Cox proportional hazard models, whereas columns 7 and 8 are based on the parametric duration models indicated in the header. In contrast to other models, contemporaneous values of regressors are used, except for column 3 (see main text). The baseline hazard is stratified into a core and a periphery group, except for columns 4-6 (which are not stratified, stratified by the alternative core/periphery definition, and by continent, respectively). Standard errors are clustered at the country-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

if it was perfectly democratic with a polity score of 10, the expectation would be that it would remain on the gold standard for another 34 years. This expectation, however, would increase to 130 years if the country was fully autocratic. While these predictions should be interpreted with caution, given the relative variability of our estimates in Table 3.7, they clearly suggest that democratic political institutions also played an important role in the decision of countries to suspend the gold standard.

Taken together the results of this section indicate some degree of symmetry in the determinants of gold standard adoption and suspension decisions. Overall, participation in the gold standard system was more difficult for countries where domestic political institutions were more open and democratic and this made a adoption decision in any given year less likely and a suspension decision more likely.

3.8 Conclusion

In the extensive literature on the classical gold standard, the decision of countries to participate in the system is often analyzed in purely economic terms, with the countries balancing the economic benefits relating to trade and access to capital markets against the costs in terms of monetary and fiscal policy independence. The analysis presented in this chapter highlights an alternative political economy mechanism that affected the decision of countries to adhere to the gold standard. For the period between 1860 and 1913, during which many countries saw a gradual extension of the franchise and diffusion of democratic political institutions, we provide evidence that adherence to the gold standard was, other things equal, less likely in countries where domestic politics were organized in a more open and democratic fashion, as proxied by their polity score. This effect, which is typically only associated with the interwar period, is shown to be robust to various changes in the sample, variable choice and econometric setup. It also appears quantitatively relevant compared to the effect of other economic and political factors emphasized by the literature in explaining differences in the adherence probability across countries and over time.

Exploring further the pattern behind the main result, we see that the

constraining factor regarding the ability or willingness of a country to adhere to the gold standard appears to be related to particular elements of democratic politics. Looking at three more specific indices, related to the executive recruitment process, to constraints on the executive and to the extent of political competition, we see that only the latter has a strong negative and statistically significant relationship with gold standard adherence. This negative effect of political competition on adherence to the gold standard is further documented for countries that provided universal (male) suffrage and had institutionalized a directly elected legislature. Finally, when separating the processes of gold standard adoption and suspension, we find that higher values for the polity score not only decrease the probability of adoption but also appear to increase the probability of suspension.

Synthesizing these results suggests that adherence to the classical gold standard was largely facilitated by institutions that sufficiently shielded the government from pressures of public opinion and populist movements that opposed the system. Containing these pressures was important for policy makers in charge of managing each country's membership of this global monetary regime, as they needed to weigh the country's commitment to the regime against other, domestic, economic objectives. As political systems gradually transitioned in a more democratic direction in the decades before World War I, the pressures faced by different countries became stronger and adherence to the gold standard became more difficult or less desirable. In particular, the evidence presented in this chapter suggests that it was the increased political competition, that came as part of the overall democratization process, which was most detrimental for a country's commitment to the gold standard.

What bearings do these findings have on policy issues in the present era? Would a revived gold standard be a feasible option for the international monetary system in the twenty-first century, as some have advocated? For this system to be credible in the eyes of international financial markets, it would require long-term commitments by policy makers to exchange rate stability, fiscal discipline and limited control over monetary policy. In democratically organized societies, these long-term policy commitments by governments and policy makers are generally expected to give rise to the same tensions high-

lighted by our results. In today's political environment with open elections and universal suffrage firmly established in many countries of the world, it is questionable whether such commitments will be seen as credible.

Chapter 4

Corporate Taxes and Debt under the Nazi Occupation*

4.1 Introduction

How do corporate taxes affect companies? How important are fiscal considerations for firms' strategies and financing decisions? And to what extent are taxes reflected in firms' valuations on the stock market? Debates about corporate tax reform are taking place in various countries and, in light of current debates, informed answers to these questions are urgently needed.¹

However, empirically establishing the relation between taxes and corporate strategies and valuations is fraught with difficulty, and the jury is still out on some of the exact effects of corporate taxes.² Major changes to corporate taxes are few and far between, they are usually announced or expected well in advance, and disentangling the effects of corporate taxes and personal taxes is not always straightforward (Givoly et al., 1992; Graham, 1999; Doidge and Dyck, 2015; Faccio and Xu, 2015). Additionally, it is questionable whether tax changes can be seen as exogenous to economy-wide performance of the

*This chapter is joint work with Philip T. Fliers and Abe de Jong.

¹In the United States, corporate taxes were recently decreased from 35% to 21% by the 2017 Tax Cuts and Jobs Acts. In the United Kingdom, the desire to lower corporate taxes has often been mentioned as one argument by Brexiteers. In the Netherlands, the country on which this chapter focusses, a cabinet proposal to abolish dividend taxes was heavily debated in 2018.

²Graham (2003) reviews the literature on taxes and corporate policies, and discusses some of the empirical puzzles that this literature faces.

corporate sector (Chang, 2014). For these reasons, theoretical predictions about the effects of corporate taxes are hard to test convincingly.

In this chapter, we investigate a major change to the Dutch corporate tax code during World War Two to shed new light on these issues. The Netherlands was occupied by Nazi Germany from May 1940 onwards, and in the years 1940–1942 the new regime drastically altered the tax system of the Netherlands.³ One important element in the set of tax changes was the way in which Dutch limited liability corporations were taxed. Before the occupation, corporate profits were not taxed, and only paid-out profits were taxed with a small tax on dividends and management compensation. This changed abruptly during the war, in a series of fiscal changes that culminated in the corporate tax — the *Vennootschapsbelasting*⁴ — of May 1942. This chapter studies the effects of these corporate tax changes on firms' stock market valuations and financial policies.

Contrary to most modern-day corporate tax changes, those that took place in the Netherlands during World War Two were not the outcome of a broad consultation or a democratic process, they were not motivated primarily by domestic economic motives, and the implementation took place in abrupt manner without prior notice. At the same time, although the years of the occupation saw several serious economic impediments, there was no large-scale collapse of economic activity until the war's final stages. According to Klemann (2002), p. 429, Dutch GDP in 1943 was still 96% of its 1938 level,⁵ and despite various legal restrictions most markets found a way to maintain operation. This makes the 1942 introduction of corporate taxes an interesting historical setting to study how investors and firms react to substantial corporate tax shocks.

We study how corporate taxes affected firms and their investors, both in the short term and in the longer term. The short-term effect of the tax hikes is expected to be a loss of firm value: the decreased after-tax value of corporate profits will damage the value of firms to their shareholders. We study how much shareholder value was lost, by performing an event study of

³Discussions of fiscal events that took place during the occupation are Adriani (1946) and Essers (2012).

⁴Appendix A4 contains a list of all our translations of Dutch and German terminology used in this chapter.

⁵This includes clandestine production.

share prices around the days when the most important announcements were made about the corporate tax increases. We furthermore study the cross-firm variation in the loss of value, to find out to what extent investors discriminated between firms in their expectations about the incidence of these taxes. As for the longer term, we analyse how the corporate tax of 1942 affected firms' financial strategies. Firms could try to reduce the tax bill by reducing pre-tax earnings; the main routes to do so were earnings management and debt issuance (DeAngelo and Masulis, 1980; Fan et al., 2012). We therefore study the evolution of corporate finances in the period surrounding the years of the occupation, 1938–1948, where our main interest is how earnings management and capital structures changed during these years. We approach these questions quantitatively, by relying on financial data that was published in newspapers, periodicals, investor manuals, and other contemporary publications.

We find that stock prices were heavily affected by two tax measures: the announcement of increased taxes on businesses in November 1940, and the introduction of the corporate tax in May 1942. In total, these two announcements led to a loss of firm value of over *f*200 million; the equivalent of roughly three percent of annual Dutch GDP at the time. This estimated loss of firm value is a lower bound, since alternative specifications yield even higher estimates. For the initial announcement of November 1940, we find a value loss of up to 6%, and little evidence that investors were able to tell which firms would be most heavily affected: the loss of firm value was rather uniform across firms. The introduction of corporate taxes in 1942 led to a further drop in firm value, which on average equalled roughly 2%, and which was more differentiated. Firms that had been profitable in 1941 lost less value, even though these firms would arguably be most likely to pay the highest taxes in future years.

In terms of financing and accounting strategies, we find little evidence of earnings management. On the basis of historical sources, we identify the cost categories most likely to have been used for earnings manipulation. We tabulate the levels of these costs per year and distinguish these levels on the basis of profitability. We find that the levels of these costs evolve in a manner that is not entirely consistent with their being used as earnings management.

Moreover, we find that their magnitudes are generally very limited. We do find evidence that leverage increased in the 1938–1948 period, which is in line with an explanation of capital structures that attaches importance to debt tax shields. We relate firms’ leverage to their financial characteristics in an interaction model, to explore to what extent changes in capital structures can be explained by fiscal considerations. We find that profitability is a negative determinant of leverage before 1942 but is insignificant thereafter, which is in line with theories of capital structures that attach importance to tax debt shields (Modigliani and Miller, 1963; MacKie-Mason, 1990; Rajan and Zingales, 1995). Furthermore, we find that firms more quickly adjust their capital structure to its optimum from 1942 onwards, and that this increase in capital structure adjustment speed is particularly pronounced for firms below target debt; again, this is in line with theoretical predictions about the effects of corporate taxes on capital structures (Ozkan, 2001; Flannery and Rangan, 2006; Byoun, 2008).

This chapter is structured as follows. The next section will introduce the historical background, by giving the reader an overview of general economic and financial developments during the occupation, as well as giving more detailed information on aspects of the historical setting that will be of importance in the remainder of the chapter. It also discusses the introduction of corporate taxes that took place in 1940–1942. The third section traces to what extent the tax changes came as news to investors and thereby identifies the two events of November 1940 and May 1942 as the key shocks to investors. Section 4.4 discusses the data used for the empirical study. In section 4.5 we will then address the question of the effects of the introduction of corporate taxes in an event study setting, by studying daily stock prices surrounding the two key policy announcement dates. Section 4.6 will study longer-run effects of the corporate tax on the basis of firms’ annual accounts between 1938 and 1948. A brief conclusion follows.

4.2 Historical Setting

4.2.1 The Dutch Economy During the Occupation

On 10 May 1940, German forces invaded the Netherlands, as part of a combined attack on the Low Countries and France. After five days of fighting, the Dutch government saw the writing on the wall and was forced to surrender. This surrender marked the start of an occupation period that would last until the Spring of 1945.⁶ The Dutch royal family and the cabinet fled to the United Kingdom, while the higher echelons of the civil administration remained in place for the time being. Apart from Rotterdam, which saw the destruction of its city centre in the bombing of 14 May 1940, relatively little damage had resulted from the brief period of combat. Once the occupation had started, most individuals and firms tried to maintain “business as usual” as much as possible.⁷

A recent book by Klemann and Kudryashov (2012) carefully documents the exploitation policy of Nazi Germany. The Nazis pursued two different types of exploitation policy; one for the Western occupied countries and one for the Eastern ones. For the Western countries — France, Belgium, and the Netherlands — their goal was to leave economies intact as much as possible, while confiscating most of the production and profits. This required relative stability in the occupied countries. This policy was not just inspired by the fact that the Nazis saw the populations of the Western countries as racially similar to Germans, but also by the more pragmatic point that the economic power of these countries was too large to go unused. The Eastern countries immediately faced much harsher measures from their new rulers, as the Nazis there pursued a ruthless policy of theft and destruction from the outset.

In contrast to the other occupied countries, which were placed under German military rule, the Nazis installed a civil administration in the Netherlands, led by the Austrian Arthur Seyss-Inquart. Fellow Austrian Hans Fischnböck was appointed as *Generalkommissar für Finanz und Wirtschaft* and

⁶The southern provinces of the Netherlands were liberated in the Fall of 1944; the liberation of the rest of the country took place in the Spring of 1945. The German army formally capitulated on 5 May 1945.

⁷De Jong (1969-1994) remains the classic discussion of events in the Netherlands during the Second World War, while Klemann (2002) is the most comprehensive economic history of the occupied Netherlands.

thereby became the main person responsible for economic and financial policy in the occupied Netherlands. Much of the Dutch bureaucracy was left intact, but all ministries, as well as other important administrative organizations like the Dutch central bank or the tax administration, were placed under governance of the Nazi administration. A small number of large industrial firms that the Nazis deemed crucial for military production — key examples are the electronics company *Philips* and the steel manufacturer *Hoogovens* — were likewise placed under German supervision, by installing above the board a caretaker (referred to as a *Verwalter*). Some other firms were appointed a caretaker in a later stage of the occupation in the process of Aryanisation: the forced takeover of Jewish firms and the forced removal of Jewish board members (Aalders, 1999, ch. 5). Most non-Aryanised firms however were able to maintain operations without direct Nazi control.⁸

Despite the war, the Dutch economy fared relatively well during the earlier years of the occupation, while economic activity only took a serious dive after 1943. That the Dutch economy saw relative stability in the earlier years of the occupation is illustrated by the reconstructions of GDP and employment of Klemann (2002), reproduced here in Table 4.1. We should stress that we are speaking here of *relative* economic stability. A decrease in output as seen in 1942 would count as a serious economic downturn under normal conditions, but the key point here is that the war did not lead to a large-scale collapse of economic activity in the Netherlands until at least 1943, in contrast to the experiences of most Eastern European occupied economies (Klemann and Kudryashov, 2012).

4.2.2 Financial, Fiscal, and Monetary Affairs

The main method by which Germany financially exploited the Netherlands was by the use of occupation costs. Under international law, an occupying country was allowed to charge the occupied country compensation for the costs of the occupation. In practice, the amounts exacted from the Dutch treasury far exceeded any reasonable estimate of how much the occupation actually cost, and it was simply a form of financial exploitation (Oosterlinck,

⁸For example, none of the seven major merchant banks was appointed a caretaker at any point during the occupation; see Van Tielhof (2003).

Table 4.1: Macroeconomic Developments, 1938–1948

Year	Real GDP <i>Million f</i>	Employment <i>Thousands</i>	Occupation <i>Million f</i>	Costs Paid <i>Million f</i>	Government Debt <i>Million f</i>	Money Supply (M1) <i>Million f</i>	Inflation	Long-term Interest Rate
1938	5,709	1,606	N/A	N/A	4,058	2,163	2.4%	2.99%
1939	6,098	1,685	N/A	N/A	3,986	2,344 *	1.1%	3.56%
1940	6,045	1,685	477	477	4,218	2,994	14.7%	3.98%
1941	6,118	1,863	1,124	1,124	5,329	3,948	14.5%	3.68%
1942	5,579	1,840	1,181	1,181	6,858	4,755	7.5%	3.21%
1943	5,507	1,769	1,328	1,328	8,509	5,919	3.5%	3.11%
1944	4,991	1,683	1,757	1,757	10,303	8,066	2.7%	3.09%
1945	4,890	1,696	489	489	12,766	8,720**	15.0%	N/A
1946	5,960	2,004	N/A	N/A	17,913	N/A	9.1%	2.99%
1947	6,672	2,161	N/A	N/A	18,363	N/A	3.6%	3.06%
1948	7,330	2,362	N/A	N/A	21,586	N/A	3.5%	3.09%

N/A: Not Applicable.

All stock variables per the end of the year, except for *: April 1940, and **: April 1945.

Real GDP (in 1938 guilders) and industrial production include clandestine production. Employment excludes (voluntary or forced) labour in Germany. M1 for the immediate post-war years is not shown because of the monetary clean-up; see Barendregt (1993).

Sources: Klemann (2002) tables 12.1 and 12.2 for real GDP and employment; Trip (1946), p. 16 for occupation costs; CBS (1949), p. 155 for government debt; CBS (1943), p. 131, CBS (1944-1946), p. 140, CBS (1947-1948), p. 139, and CBS (1951), p. 104 for tax revenues; Barendregt (1993), p. 113 for M1; CBS Statline (<http://statline.cbs.nl>, accessed 23 April 2019) for inflation; Roos and Wieringa (1953), p. 253 for interest rates.

2010). Table 4.1 shows how much was exacted in this manner from the occupied Netherlands each year.

It was up to the Dutch ministry of finance to figure out how this bill was to be paid. From the typical mix of options for public finance — debt, taxes, and monetization — all three were used, albeit the latter one involuntarily so (Trip, 1946).

Regarding the expansion of money stock, two measures were of particular importance. Firstly, members of the German army could make payments using the Berlin-issued *Reichskreditkassenscheinen*, which the Dutch were forced to accept at face value. Secondly, the Nazi government decided to remove all capital controls between Germany and the Netherlands as of 1 April 1941, leading to a large inflow of depreciated Germany currency. Both of these measures led to a serious expansion of the money stock and inflation levels of up to 15% per year (see Table 4.1).⁹

Another key way of financing the occupation costs was to increase tax revenues. As a consequence, the period of the occupation saw the largest change of Dutch tax law in the twentieth century. In addition to the introduction of corporate taxes — the focus of this chapter — the period of the occupation saw profound changes to the Dutch system of income taxes, sales taxes, and wealth taxes, amongst others.

However, increasing tax revenues was not the only rationale behind this transformation. According to Essers (2012), Dutch tax policy between 1940 and 1945 was driven by four main goals. Firstly, a key objective was simply to increase total tax revenues. Secondly, tax policy should serve more instrumental goals for the occupied country, such as stimulating full employment or reducing after-tax income inequality.¹⁰ A third important goal of tax policy during the occupation was the interweaving of the Dutch and German economies, with the eventual goal of full integration of the Dutch economy into that of the Third Reich. This interweaving was to be eased by the alignment of tax laws and rates between the Netherlands and Germany. Lastly, a fourth goal of tax policy was to implement some of the darkest sides of

⁹See Barendregt (1993) for more on the development of the Dutch money stock during and immediately after the occupation.

¹⁰Essers (2012), p. 131: “In the eyes of the Germans [sic] the tax system was to be made more conducive to fighting unemployment and to stimulating economic growth in the Netherlands.”

national-socialist ideology; this was reflected in the unequal fiscal treatment of Jews and other marginalized groups.

The introduction of corporate taxes was motivated by many of the general reasons discussed above. However, a specific motivation for imposing new taxes and regulations on limited liability corporations in the Netherlands, was a more deeply rooted national-socialist aversion against this type of corporate entity (Dijker, 1946). The Nazis generally saw the corporation as an undesirable legal form for all but the largest firms; in their opinion, the limited liability of shareholders was orthogonal to the general interest of the Reich and its people (Klemann, 2002, pp. 163-169; Peglow, 2012, p. 215). Additionally, limited liability was seen as incompatible with the *Führerprinzip*: the national-socialist principle that authority within, and responsibility for, any organisation should lie with a single leader (Pauley, 1979). However, in pre-1940 Netherlands, many relatively small family firms used the limited liability corporate form as well (Klemann, 2002, p. 163). The occupation government therefore used a variety of measures — both sticks and carrots — to induce these firms to change their legal forms to partnerships.

As is shown in Table 4.2, tax revenues roughly doubled between 1940 and 1944. There was a sharp drop in 1945, which is explained by the collapse of the economy in the last year of the war, by the growing role of the black market by this time (see Klemann (2002), ch. 15), and finally by a backlog in tax collection.¹¹ The immediate post-war years saw a further hike in tax proceeds, which was the result of renewed economic activity, but also of new taxes raised for the purposes of reconstruction, including a temporary tax on wartime wealth increase.¹² Table 4.2 shows the proceeds for various types of taxes between 1938 and 1948. In absolute terms, labour bore the largest brunt of the increased tax pressure, in the form of income and payroll taxes. But the taxation of corporate profits also saw a marked increase: we see that the sum of the three taxes in this category increased more than fivefold between 1938 and 1944.

In addition to monetization and taxation, the Dutch government was forced to borrow large sums of money, which it mostly did domestically. Ta-

¹¹CBS (1951), p. 104 mentions that around 1.5 billion guilders of additional taxes relating to the occupation years were collected in 1946 and 1947.

¹²For more on this tax on wealth increase, see Meihuizen (2003), §3.3.

Table 4.2: Tax Revenues, 1938–1948

	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
<i>All in amounts in million f</i>											
<i>Taxes on Profits:</i>											
Tax on corporate payouts	25	26	11	-3	-2	0	0	0	0	0	0
Profit tax	0	0	23	137	99	26	3	0	2	4	5
Corporate tax	0	0	0	0	89	128	137	30	51	114	341
<i>Taxes on Labour:</i>											
Income tax	85	93	99	198	393	454	472	53	959	1,310	762
Payroll taxes	0	0	0	146	254	290	264	259	475	637	669
<i>Other Taxes:</i>											
Inheritance tax	50	44	42	66	65	56	48	49	87	74	62
Import tariffs	99	123	80	22	12	9	6	8	54	68	230
Excise duties	142	153	186	250	215	161	135	85	248	316	351
Sales tax	77	89	109	178	198	196	173	116	342	518	689
Postwar wealth levies	0	0	0	0	0	0	0	0	0	99	2,049
Miscellaneous	122	117	134	149	170	141	117	46	204	188	217
Total tax revenues	600	645	683	1,142	1,481	1,460	1,356	646	2,422	3,328	5,374
Total, excl. wealth levies	600	645	683	1,142	1,481	1,460	1,356	646	2,422	3,229	3,325

Includes only tax revenues of the national government. All amounts are nominal amounts, not corrected for inflation.

Sources: CBS (1943), p. 131, CBS (1944-1946), p. 140, CBS (1947-1948), p. 139, and CBS (1951), p. 104.

ble 4.1 presents the rapid increase of the Dutch government debt. Domestic borrowing was facilitated by the fact that the Amsterdam stock market remained open and functional for most of the occupation period. As this is important for our chapter, we will first briefly go into the developments on the Amsterdam stock market before discussing the fiscal changes that led to the 1942 corporate tax.

4.2.3 The Amsterdam Stock Exchange During the War

After the invasion, the Amsterdam stock exchange was closed to limit the effects of the outbreak of a financial panic.¹³ The stock exchange reopened on 15 July 1940, but at first under tight restrictions: only trade in a number of government bonds was allowed at this stage. These restrictions were gradually removed, and by 23 September 1940 trade in nearly all Dutch securities had resumed as before the occupation.¹⁴

Like all press, the financial press continued to operate during the occupation, but was subject to increasingly tight supervision by the Nazi authorities. Financial dailies like the *Nederlandsche Financier* or the *Amsterdamsch Effectenblad*, as well as general newspapers, continued reporting on firms and stock markets throughout the war.¹⁵ News reports on political developments or military prospects were highly skewed in favour of the Nazis, but corporate developments were reported in much the same way as before the war. Also other financial periodicals, like the annual *Van Oss Effectenboek*, were published during most of the war. Investors therefore had access to general news on corporate developments, at least to the extent that firms were based in the Netherlands, Germany, or other occupied countries. News from Allied countries or from the colonies was much more scarce.

To what extent investors had access to sensitive news — such as firms' involvement in military production — is hard to say. Given the relatively

¹³The discussion in this subsection relies on de Vries (1976), ch. V, discussions in the financial yearbooks (*Financieel Jaarboek*, 1912–1944, annual issues), and announcements in the financial press, unless otherwise noted.

¹⁴Foreign securities were subject to much tighter restrictions throughout the war.

¹⁵A comprehensive collection of newspaper scans can be found at www.delpher.nl, courtesy of the Dutch Royal Library. This repository includes all financial dailies as well as all known publications of the so-called underground press: illegal publications printed by the Dutch resistance. See Winkel (1954) for more on the underground press.

small group of members of the Amsterdam stock exchange (it had 703 members in 1940; see de Vries (1976), p. 148), it is likely that news that was not allowed to be printed still circulated among the financial elite. Unfortunately, this is hard for us to track, among others since there was little writing about financial or fiscal affairs in the underground press.

Securities trade continued with few restrictions up until September 1942, with the exception of a one-week interlude in December 1941 surrounding the outbreak of war with Japan in the Dutch East Indies. However, the Nazi authorities became increasingly concerned about surges of stock prices. This surge was driven primarily by monetary developments: the rapid expansion of the money stock led to excess liquidity, which quickly found its way into stocks. The Nazis believed that stock returns should be curbed, amongst others because they feared popular backlash against high profits in the stock market. For that reason, on 11 September 1942 the first measures were implemented to curtail movements of stock prices. These first measures prohibited changes in security prices by more than 1.5% per day (in either direction). Restrictions on the stock market were further changed several times, until on 3 March 1943 all prices were indefinitely prohibited from rising above the level of that day. As a consequence, securities trade effectively ground to a standstill that day, a situation which lasted until the end of the war.

The stock exchange did undergo profound organisational changes under the Nazi rule. Whereas the *Vereeniging voor den Effectenhandel* — the organisation that owned and ran the Amsterdam stock exchange — had always been an independent association, it was transformed into an official part of the bureaucracy and renamed the *Bedrijfsgroep Effectenhandel*. It was reorganized internally along the lines of the *Führerprinzip*. This gave most of the decision-making powers to the stock exchange director Carel Overhoff, who in turn had to answer to the secretary-general for special economic affairs Meinoud Rost van Tonningen, a notorious Dutch Nazi.¹⁶ The consequence was that the Amsterdam stock exchange was to a much larger extent subject to government control than before the occupation. A particularly sinister consequence of this came in March 1941, when it was decided that Jewish members were no longer allowed at the exchange (de Vries, 1976, p. 189).

¹⁶For more on Overhoff and Rost van Tonningen, see Meihuizen (1995) and Barnouw (1994), respectively.

Another series of antisemitic measures that affected the stock market was the theft of Jewish property, including financial assets (Aalders, 1999). From August 1941 onwards Dutch Jews were forced to deposit their assets with the Nazi-run bank *Lippmann, Rosenthal & Co, Sarphatistraat*, also known as *Liro*. Before long, *Liro* started selling Jewish-owned securities on the stock market. *Liro* initially did so in large batches at a time, leading to several very chaotic trading days on the Amsterdam stock exchange that would later become known as throwing days. Thereafter, the sale of Jewish securities by *Liro* continued in a more organised manner. In the course of post-war legal investigations, the timeline of the sale of looted Jewish securities was reconstructed. On the basis of archival evidence from these investigations, we conclude that these throwing days all took place between November 1941 and March 1942. Note that this period does not coincide with either of our analyses in section 4.5.¹⁷

We conclude that between 23 September 1940 and 11 September 1942, securities trade on the Amsterdam stock exchange took place without serious legal restrictions and with ample liquidity. Short-run price movements during this period should therefore accurately reflect information on the stock market, and are thus suitable for measuring the effect of news — in our case, news about fiscal shocks — reaching the stock market. Long-run price developments will be subject to more distortions, due to the surge of the money stock and the sale of stolen Jewish property. From September 1942 onwards, security prices become less informative as price rises were increasingly curtailed for existing securities. Nevertheless, the stock market did remain open though until September 1944, and there remained an active market for new issues of stocks and bonds.

¹⁷ *Archief Gerald Aalders*, Amsterdam, inv. no. L123, L421, L895, L907, L1227, and L1239. The only document naming a more extensive set of trading days — including 5–7 May 1942 — as throwing days is L421, a piece written by the Dutch embassy in Switzerland in 1951. Since the author of this document seems to have based this dating purely on days with excessive market turnover, and since it contradicts the other sources, we conclude that the author of this piece drew the incorrect conclusion regarding the classification of throwing days.

4.2.4 Wartime Changes in Corporate Taxation

One of the most pronounced changes to the Dutch fiscal system during World War Two was the way in which limited liability corporations were taxed. In this section, we describe the evolution of corporate taxation in the occupied Netherlands.

4.2.4.1 July 1940: the Profit Tax

Admittedly, pre-war taxation of firms in the Netherlands had been lenient by international standards. Until 1940, corporate profits were subject to tax only at the moment of payout, by the tax law on dividends and management compensation of 1917. In contrast, most other countries in Western Europe, as well as the Dutch East Indies, directly taxed corporate profits already in the early 1930s (see Adriani (1931), ch. 1). Plans to replace the tax on dividends and management compensation with a direct tax on profits had been around for most of the interwar, but had so far not been implemented.¹⁸ In fact, a parliamentary majority to institute a profit tax had been reached just before the invasion, as in April 1940 the Dutch lower house approved a proposal to do so. In the eyes of the Dutch government, this change in taxation did not represent a fundamental change of how firms were taxed, but only a difference in the moment at which corporate profits were taxed: at the moment profit as opposed to the moment of payout (Harmsen, 1946, p. 4). When the new German authorities formally implemented the profit tax on 26 July 1940, its design was completely in line with the pre-war proposal. The 1940 profit tax was therefore to a large extent a Dutch product, and not simply a German tax imposed on the Netherlands.¹⁹

The new profit tax was levied at a rate of 11.5%, including a 1.5% surcharge for the municipal government that collected the tax. According to the guide for entrepreneurs by Polak (1940), the two crucial aspects of the new profit tax were the rules — or rather, the lack thereof — on how the

¹⁸Debates about a direct tax on profits in the Netherlands go back at least to Treub and Wibaut (1924).

¹⁹The implementation of the profit tax was announced by resolutions VB 83/1940 and VB 84/1940 in the *Verordeningenblad voor het bezette Nederlandsche gebied*, the official announcement bulletin of the occupation government. All resolutions referred to as VB in this chapter refer to publications in the *Verordeningenblad*.

profit was to be calculated, and the rules regarding retained earnings from before 1940.²⁰ Under the profit tax, the leading principle on the calculation of profits was that it should follow from so-called sound business practice. This meant that firms were fairly free to follow their own judgment when it came to valuing assets, calculating depreciation costs, generating reserves, or smoothing profits across years, as long as their practice was consistent across time. This large room for manoeuvre implied, however, that firms should have easily been able to generate additional costs in a year when profits would have been high, thus avoiding part of the tax bill.

One element on which there were somewhat stricter rules was the treatment of pre-1940 retained earnings. With the 1940 tax reform, profits were no longer taxed at the moment that they were distributed, but at the moment that the firm generated these profits. To prevent that pre-1940 profits that had not yet been paid out would escape taxation altogether, the profit tax stipulated that pre-1940 retained earnings should be transferred to a special reserve account. This so-called transitional reserve would then gradually be taxed so that all profits — pre- and post-1940 — would eventually be subject to taxation.

4.2.4.2 Autumn 1940: a Drastic Raise of Tax Rates

The first serious wartime shock to corporate taxation came in the autumn of 1940, when the rate of the profit tax was raised from 11.5% to 26.5%-31.5%.²¹ The official resolution (VB 228/1940) for this was published on 14 December 1940, but *Generalkommissar* Hans Fischböck had already hinted at this raise explicitly at a lecture held on 8 November 1940:

The profit tax (currently 11.5%) will be raised before the end of the year. In Germany the profit tax amounts to 40% and due to other levies the total rate reaches 60 to 65%. However, the profit tax will not be raised to this rate this year.

Source: Amsterdamsch Effectenblad, 9 November 1940, “De Nederlandsche economie”, on the basis of an interview with Hans Fischböck.

Translation from the Dutch original by the authors.

²⁰See also the discussion in Harmsen (1946).

²¹The exact rate was a progressive function of the level of profit.

Other than the rate of taxation, resolution VB 228/1940 left the previous law intact, including the relatively flexible rules on the calculation of the profit.

4.2.4.3 August 1941: Dividend Cap and Liquidation-resolution

30 August 1941 saw the publication of two additional resolutions on the fiscal treatment of limited liability corporations. On this day both the dividend cap (VB 170/1941) and the liquidation-resolution (VB 172/1941) were announced. The former curtailed dividends by imposing a prohibitive tax (the so-called superdividend tax) on dividends above 6% of paid-up capital. The height of the tax — excess dividends were taxed at a rate varying from 50% to 400% — and especially its retroactive levy over 1940 were seen as unfair (Harmsen, 1946, p. 14). The same resolution also included provisions to make capital restructuring more attractive. These provisions were designed to motivate firms to replace debt with equity to avoid the tax on excess dividends.

The most complete fiscal guide for entrepreneurs on this new regulation (admittedly from an author with dubious credentials) was the one written by Rebholz (1941).²² As Rebholz explains, this resolution served two goals: not only did it make paying high dividends very unattractive, it also made it more attractive to increase the level of equity, since this served as the denominator for the dividend cap. The resolution further included a number of explicit rules to make recapitalization fiscally attractive.

The liquidation-resolution served a related purpose: it provided temporary tax benefits for firms that changed their legal form from a limited liability corporation to an unlimited liability legal form such as a partnership. These benefits, however, were only a blessing in disguise: it was made clear that limited liability corporations would be wise to use this temporary option, as further increases of taxes on limited liability corporations were looming. Since such a change of legal form would have been difficult for a large exchange-listed firm, this resolution was most material for smaller and less widely-held

²²Otto Rebholz was a banker who was heavily involved in the trade of confiscated Jewish property during the war, and one of the few to be convicted for financial crimes at an early stage after the war (Aalders, 1999). His affinity with national-socialist fiscal thought is also clear in some parts of his guide on the dividend cap.

corporations. On the other hand, the dividend cap is likely to have affected corporations of all sizes.

4.2.4.4 May 1942: Three New Taxes on Businesses

On 4 May 1942, another set of major revisions to corporate taxation was announced, which would replace the 1940 profit tax. Three new taxes were announced. First, the enterprise tax (VB 50/1942): a tax on profits of all firms, regardless of their legal form. It was levied at a progressive rate of up to 5%. Second, the corporate tax (VB 51/1942): a tax on profits of limited liability firms. Its rate was 55% of profits and the tax was implemented retroactively as of 1941 (albeit for this year at only 45%). Third, the wealth tax (VB 52/1942): a tax of 0.5% of the equity level of limited liability firms. Since the latter resolution stipulated a minimum levy of *f*120 per year, this tax was particularly painful for small limited liability firms that had decided not to use the provisions of the previously discussed liquidation-resolution.

As the discussion in Harmsen (1946, p. 27) shows, for typical levels of return on equity of a limited liability corporation, the sum of these taxes could easily reach 75% of corporate profits. In addition to the high rate of taxation, the corporate tax included stricter rules on the calculation of profits. In this respect, the new corporate tax was in many ways similar to its counterpart in Germany, the *Körperschaftsteuer*, which had been in place since 1934. The rate of 55% was much higher than any tax that the Netherlands had seen up to that point. Several newspapers also wrote rather critically about the new corporate tax at the day it was announced, displaying a level of criticism that was remarkable in light of the restrictions on the Dutch press at the time. Especially the retroactive levy over 1941, as well as the restrictive rules on the calculation of profits, were heavily criticized both during and immediately after the war.²³

The guide by Hamstra Pik (1943) details how firms were to handle the new regulations. For instance, the corporate tax included rules on the treatment of long-term debt, investments in (foreign and domestic) subsidiaries, the valuation of fixed assets, and the extent to which losses from earlier years could be carried over. This implied that, under the new corporate tax, there

²³See for instance Dijkster (1946).

was less leeway to adjust the reported level of profits than under previous legislation.

4.2.4.5 After May 1942

The introduction of the corporate tax in May 1942 was one of the last major fiscal changes that was implemented in the occupied Netherlands. From mid-1942 onwards, the Nazi authorities shifted their priorities to other, more short-term, objectives, as the outcome of the war starting looking increasingly bleak for them.

After the Netherlands were liberated in May 1945, many of the new taxes were left in place. Only the most punitive taxes, as well as all fiscal measures specifically directed against Jews and other minorities, were immediately abolished after the end of the Second World War (Essers, 2012, ch. VII). One reason why many taxes were left in place was that the reconstruction necessitated higher tax revenues than what had been typical before 1940. Additionally, many contemporary fiscal experts were in fact quite positive about most of the fiscal changes that had taken place during the occupation.²⁴

For our purposes, what is most important to mention is that the corporate tax and the related measures were all left in place. This was announced on 20 September 1944 by the Dutch cabinet in exile in resolution E93.²⁵ This resolution specified for all Nazi-era legislation how it would be treated after the liberation. All the aforementioned tax resolutions — with the exception of the liquidation-resolution, which had by this time already expired — were placed on list C, which meant that these would remain in place until further notice. As it turned out, the 1941 dividend cap was replaced by a somewhat more flexible variant only in 1950, whereas the 1942 corporate tax did not see fundamental changes until 1967.

As a synopsis of the preceding discussion, Table 4.3 presents an overview of the key events discussed so far.

²⁴This remarkably positive stance can be seen in the collection of essays on the wartime tax changes by Adriani (1946), although the enthusiasm was not uniform across all authors.

²⁵Published as “Besluit Bezettingsmaatregelen” in the *Staatsblad van het Koninkrijk der Nederlanden uitgegeven te Londen*, Series 1944-E.

Table 4.3: Timeline of Key Events

General Events	Fiscal Developments	Developments on the Stock Exchange
12 April 1940	Profit tax approved by lower house of parliament.	
10 May 1940	Germany invades the Netherlands.	Amsterdam stock exchange closes.
26 July 1940	Profit tax implemented.	
23 September 1940		Amsterdam stock exchange fully re-opened for trade in domestic securities.
8 November 1940	Hans Fischböck announces (unspecified) increase of tax burden on firms.	
14 December 1940	Rate of profit tax increased.	
1 April 1941	Capital controls between Germany and the Netherlands removed.	
1 May 1941		Jewish members evicted from Amsterdam stock exchange.
30 August 1941	Dividend cap and liquidation-resolution announced.	
8 December 1941	Japan declares war on the Netherlands.	
6 March 1942		Largest throwing day: <i>Liro</i> sells major batch of stolen Jewish securities.
4 May 1942	Three new taxes on firms announced, including corporate tax.	
11 September 1942		Securities trade curtailed.
3 March 1943		De facto standstill of securities trade.
Fall 1944	Allies liberate the south of the Netherlands.	Dutch cabinet announces which wartime taxes will be left in place.
5 May 1945	German capitulation; end of occupation.	

4.3 The News Value of Tax Announcements

The goal of the study of stock prices in section 4.5 will be to measure the loss of firm value in response to news on corporate taxation. Crucial for any event study is identifying at what point in time new information reaches investors (MacKinlay, 1997, pp. 14-15). This is harder to do in the context of World War Two than under normal conditions, because of the restrictions on press freedom that were in place at the time. Hence, we first discuss to what extent investors anticipated the tax hikes, and which dates can therefore be seen as the main shocks to the market at the time. Using the digitized archives of Dutch newspapers, we have searched newspapers around all tax announcements discussed in section 4.2.4 for writing about fiscal matters. Additionally, we searched the available scans of publications from the Dutch underground press, but these publications did not often discuss financial or fiscal matters.

Our conclusion is that two important tax announcements — those of 8 November 1940 and 4 May 1942 — came as shocks to investors. We draw this conclusion not just on the basis of little to no writing about the kind of measures that were eventually implemented, but also on the basis of the daily stock exchange report in the newspaper *Nederlandsche Financier*; *Dagelijksche Beurscourant* in the months surrounding November 1940 and May 1942, which clearly discusses the distress that the tax announcements caused. The first event mentioned is the announcement of Hans Fischböck on 8 November 1940 that taxes on businesses would soon be increased. This turned out to be the prelude to the increase of the profit tax, published 14 December 1940. The second event that we study is the publication of three new corporate taxes in the *Verordeningenblad* on 4 May 1942. The events of November 1940 and May 1942 both made it clear to investors that there would be serious increases in the tax burden on firms. Based on our reading of the financial press, we believe that in both cases the announcements were made after the stock market was closed. This means that the two event dates — the first trading days when the respective announcement could affect prices — are 9 November 1940 and 5 May 1942.

However, we do conclude that before May 1942, there was a general expectation that taxes would be increased at some point. Further tax increases

on the corporate sector had been feared at least since Fischböck's announcements of November 1940. Moreover, tax increases were to be expected given both the difficulties of the Dutch treasury and the fact that the corporate tax in Germany was still substantially heavier than that of the Netherlands. Nevertheless, as both contemporary newspaper reports and post-war discussions reveal, the content of the new tax rules of May 1942 was worse than anticipated. Stock market reactions around 5 May 1942 therefore will be a reflection of the difference between investors' expectations and the actual tax burden of these new taxes. Illustrative of how the new taxes were interpreted by the financial press are the opening lines of the *Nederlandsche Financier* of 5 May 1942:

The long expected — or rather, feared — taxes, that from now on will also burden business, were included in the *Verordeningenblad* of 4 May. In line with the prospect we repeatedly held up, they will weigh heavily on us, as even our boldest expectations have been exceeded. The stock market therefore had no reason to cheer at the birth of this triplet, although she had been urgently warned.

De Nederlandsche Financier; Dagelijksche Beurscourant, 5 May 1942, "Drie nieuwe bedrijfs-belastingen". Translation from the Dutch original by the authors.

For the increase of the profit tax we take the date of Fischböck's announcement as the event date rather than the date of official publication. Newspaper reports around 14 December 1940 confirm that the publication of VB 228/1940 did not contain any news value, and the stock market showed no reaction to it. Further testament to the importance of Fischböck's 8 November press conference, and the irrelevance of the 14 December publication, is the following account of events in 1940 in the *Financieel Jaarboek 1941*:

Then [after 8 November], however, a sore reaction set in, caused by the circumstance of Dr. Fischböck's announcement of a forceful increase of the taxes on profits of limited liability corporations (...) The influence of the aforementioned factors [a bull market during most of 1940] was so strong, that the market showed a remarkable immunity to the very drastic increase of the profit tax which was announced on 14 December.

Financieel Jaarboek 1941, p. 14. Translation from the Dutch original by the authors.

On the other hand, we discard the announcements of 30 August 1941 as an appropriate event; these are the announcements of the dividend cap and the liquidation-resolution. Although the dividend cap will have seriously hurt the value of firms that had before 1941 paid dividends above 6%, there is reason to believe that this resolution did not come as a surprise to the stock market. The most direct evidence for this is an article from the Amsterdam-based newspaper *De Telegraaf* on 16 May 1941, more than three months before the official publication of the dividend cap. The article is an account of statements made by Hans Fischböck at a Nazi conference on economic policy in the Netherlands. The article mentions that:

[Fischböck] pointed, as he had done in the past, to the overly generous dividend policies of the majority of businesses. The payment of such high dividends has as a consequence that more tax should be paid. Any payouts above, for instance, 5 or 6 percent should be seen as an object of taxation. According to this reasoning one may therefore expect a new tax law.

Source: De Telegraaf, 16 May 1941, "Een waarschuwing van min. Fischböck tegen het hamsteren. Rede over sociaal-economische vraagstukken", Translation from the Dutch original by the authors.

We have found no evidence that the liquidation-resolution was foreseen, but this resolution is unlikely to have affected the value of listed firms since it mostly targeted smaller and unlisted limited liability corporations (see page 126). To validate the choice to exclude these announcements, we do collect stock prices in an event window around 30 August 1941. The index of stock prices does not show any reaction to the announcements of 30 August, nor do firms that paid high dividends before 1941 show a different reaction.²⁶ We therefore conclude that the content of the dividend cap was already reflected in stock prices before its official publication.

Lastly, we also exclude the publication of the profit tax on 26 July 1940 as a potentially newsworthy event. The main reason for this is that this measure was announced and expected well in advance: as we discussed above,

²⁶Results available upon request.

this measure was to a large extent already planned before the invasion. Furthermore, in July 1940 the Amsterdam stock exchange was not yet fully reopened, which means that even if the publication did contain news value, it would be hard to measure how this affected the value of firms' stocks.

4.4 Data

We study Dutch firms with a listing on the Amsterdam stock exchange. Our choice to focus on exchange-listed firms is primarily driven by data availability: since non-listed firms were not required to publish their annual accounts, very little accounting information is available for these firms. Additionally, an event study of stock price reactions can naturally only be performed for listed companies. That said, most large firms in the Netherlands were listed limited liability corporations and our sample covers a wide variety of firms in terms of location and sector. For this reason we believe that these firms are representative of large firms more generally. We use the annual official guide of the Amsterdam stock exchange ("Gids", 1938–1948) to construct a list of all listed companies between 1938 and 1948.

We limit our sample to those firms whose main operational activities were based in the Netherlands, as opposed to in the colonies. Many firms listed as domestic securities were so-called free-standing companies which were headquartered in Amsterdam but which had all activities in the Dutch East Indies (Gales and Sluyterman, 1998). We exclude these, because firms in the Dutch East Indies were subject to a different tax regime, and because very little information about these firms was available in the Netherlands during the war. We also exclude banks and other financial intermediaries to concentrate on firms with real economic activities. This leads to a sample of 280 firms, active in various sectors such as trade, shipping, retail, real estate, and multiple branches of industrial production.

We collect the financial statements of this group of firms from the annual publication *Van Oss' Effectenboek*, editions 1940–1950. The *Van Oss' Effectenboek* was the leading investor manual in the Netherlands during the first half of the twentieth century. It published all the available financial statements of firms that were listed on the Amsterdam stock exchange, as

well as other key facts about these firms like board composition or dividend history. Each financial statement consists of a balance sheet, a profit and loss statement, and a so-called profit distribution: a specification of how the net profit was distributed between shareholders, managers, taxes, additions to specific reserve accounts, and retained earnings. The financial statements published in the *Effectenboek* typically use the exact same wording and format as those published in firms' annual reports.

Since there was no *Van Oss' Effectenboek* published between 1944 and 1947, for the accounts of 1943 and 1944 we rely on editions of *Van Nierop en Baak's Naamlooze Vennootschappen*: a periodical that likewise published copies of firms' annual accounts. Unfortunately, the annual accounts in *Van Nierop en Baak* do not report details on the profit distribution. We therefore reconstruct these as far as possible.²⁷ In a limited number of cases, firms published a single set of accounts covering multiple years. In cases like these, we use the balance sheet but disregard the profit and loss statement.

We should note that the annual accounts that we use are not fiscal accounts but commercial accounts, i.e. annual accounts as reported to shareholders as opposed to those reported to the tax administration. Spoerer (1998) shows that for interwar Germany, there could be substantial differences between the tax balance sheet and the commercial balance sheet. For some of the purposes of this study, it would be better to rely on fiscal accounts, especially since these show more explicitly how firms dealt with reserves and provisions. However, there is unfortunately no wide sample of fiscal accounts available for Dutch listed firms in our period. That said, many of the key outcome variables such as leverage or profitability are likely not to deviate much between the two sets of accounts.²⁸

After digitizing and cross-checking our data, we classify all entries on the balance sheets, profit and loss statements, and profit distributions into

²⁷To do so, we first reconstruct dividend payments on the basis of post-war editions of the *Van Oss Effectenboek*. Second, we compare successive balance sheets to reconstruct how much was added to specific reserve accounts from the profit distribution. Third, we assume that any net losses are carried over to the next year. Lastly, in case the amounts thus reconstructed do not add up to the net profit, we assume that the remaining part of the profits were distributed to internal accounts in the same proportions as in 1942.

²⁸Furthermore, as Van den Brand (2005), p. 132 mentions, according to the principles underlying the Nazi-era tax changes: "the tax balance sheet must be derived from the commercial balance sheet."

standardized categories. Firms were relatively free in the construction of their accounts, and as such a categorization of the eclectic set of posts is necessary. Finally, we use the profit distributions to calculate post-distribution balance sheets. This standardized set of accounts serves as the basis of our empirical analysis.

For the analyses that rely on stock price data, we limit the sample to those firms whose stocks are sufficiently liquid, since only then will share prices be informative. We operationalize this by excluding firms from the event study for which shares have zero turnover for more than two months in the year of the event. Monthly turnover values are taken from the annual *Financieel Jaarboek*.

Daily stock prices come from the *Officiele Prijscourant*, which was the official announcement bulletin of the Amsterdam stock exchange. In addition to the share price, the *Officiele Prijscourant* also reports the type of price quote and the volume that was traded on each day.²⁹ If a firm has multiple securities listed we take the price of either the common stock or the certificate thereof, unless another security (such as preferred stock) is by far the most intensively traded security. We correct prices for dividend payments, details of which are taken from the *Van Oss' Effectenboek*. The *Effectenboek* is also the source for the levels of nominal share capital outstanding for all securities, which we combine with year-end prices from the *Financieel Jaarboek* to construct index weights.

To estimate abnormal returns in the two event windows, we require an index of market returns. Since all Dutch firms are affected by the same corporate tax hikes, an index of stocks listed in Amsterdam is not an appropriate measure of market returns. We construct a so-called “Third Reich index” for this purpose: an index of daily stock returns in Germany, Belgium, France, and the Netherlands. During the years of the occupation the Dutch economy was part of the Third Reich’s economy, where most of the industrial production took place in Germany and the western occupied countries (Klemann and Kudryashov, 2012). For this reason, we believe that an index of major firms from these four countries can serve as a valid measure of market returns for this period.³⁰

²⁹The type of price quote — bid and/or ask — was only reported if no trade took place.

³⁰We thank Philip Drummond for suggesting this approach.

For this purpose we collect stock price data for a set of 73 stocks from the Berlin (26), Brussels (23), and Paris (24) stock exchanges. These 73 stocks are those stocks consistently reported across both event windows. We combine these with the sixteen most widely traded domestic stocks from Amsterdam to construct the Third Reich index.³¹ We also construct an alternative Third Reich index that excludes the Amsterdam stocks. Prices are taken from the *Amsterdamsch Effectenblad*, a leading financial daily. For Berlin, we obtain dividend data and stock market capitalization from Nachtigall (1996), which enables the construction of a value-weighted index for the Berlin market.³²

Table 4.4 presents the descriptive statistics of our data. The variables listed compose the set of corporate financial indicators that will serve as the main explanatory variables. These financial indicators are defined as follows. Firm size is the natural logarithm of total assets, deflated to 1938 prices using the CBS wholesale price index.³³ Profitability equals net profit as a ratio of total assets. Leverage equals total debt over total assets, which we decompose into a long-term and a short-term component. Liquidity equals current assets excluding inventory over total assets. Depreciation equals the depreciation costs (from the profit and loss statement) over total assets. Tangibility is the ratio of fixed assets over total assets. The variable “conservatism” is a dummy variable that equals one if all fixed assets of a firm have a book value of $f1$, which reflects a conservative valuation policy of fixed assets. Lastly, we include a dummy variable for whether or not a firm pays dividends in a given year. We winsorize all non-dummy variables at the first and ninety-ninth percentiles to minimize the influence of outliers.³⁴

³¹Of all the stocks listed in Amsterdam, around 50 are reported separately in the *Officiële Prijscourant* as so-called intra-day securities. These stocks’ prices are reported for each 10-minute trading window, reflecting their large liquidity. Turnover values of the intra-day securities is also generally much larger than those of other stocks. Limiting these stocks to non-colonial and non-financial firms and to one security per firm gives the group of sixteen stocks to be included in the Third Reich index.

³²Similar data is not available for the Brussels and Paris stock exchanges.

³³Note that this price index reflects official prices. Several markets were during World War Two subject to price controls; hence consumer prices on the black market often rose substantially above the official level (Klemann, 2002).

³⁴Winsorization of a variable is a procedure that transforms outliers to a value closer to the rest of the distribution. In case of 98% winsorization — the procedure used here — one transforms all values of a variable above the ninety-ninth percentile to the value of the variable at that percentile, and likewise for all values below the first percentile. Winsorization is common practice in financial studies and serves to remove the influence

Table 4.4: Descriptive Statistics, 1938–1948

	Mean	St. Dev.	Median	Q1	Q3	Comparison of Means:			F-statistic
						1938–1941	1942–1945	1946–1948	
Firm size (log)	14.6	1.3	14.5	13.7	15.3	14.7	14.5	14.5	9.432***
Profitability	4.2%	7.1%	3.7%	1.1%	7.4%	5.2%	0.6%	5.7%	119.791***
Leverage	34.7%	20.4%	31.8%	18.6%	47.7%	33.4%	29.5%	40.9%	49.835***
Short-term debt	26.3%	19.3%	22.4%	10.8%	36.7%	23.4%	22.5%	33.2%	60.175***
Long-term debt	8.1%	14.9%	0.0%	0.0%	10.8%	9.8%	6.7%	7.7%	7.065***
Liquidity	29.7%	19.0%	27.4%	14.8%	42.3%	25.8%	31.0%	33.0%	25.216***
Depreciation	2.3%	2.5%	1.6%	0.0%	3.4%	2.7%	1.7%	2.5%	25.735***
Tangibility	29.3%	26.1%	22.0%	9.1%	41.1%	35.0%	28.5%	23.5%	33.132***
Conservatism	0.086	0.280	0	0	0	0.082	0.088	0.087	0.086
Dividends (0/1)	0.570	0.495	1	0	1	0.596	0.338	0.720	80.441***

Sources: authors' calculations; see main text. Q1 and Q3 refer to the 25th and 75th percentile, respectively. Firm size is the logarithm of total assets in constant 1938 guilders. Conservatism and dividends (0/1) are dummy variables. All other annual variables are ratios where the denominator is total assets. All non-dummy variables are winsorized at the 2% level. F-statistics refer to an ANOVA test of equal means; *** p<0.01, ** p<0.05, * p<0.1.

For each variable, Table 4.4 also presents the means across three periods — 1938–1941, 1942–1945, and 1946–1948 — and the results of a one-way Anova test of equal means across periods. The first period can be seen as the years before the 1942 corporate tax, the second and third periods cover respectively the wartime and peacetime years after the introduction of corporate taxes. We see that nearly all variables’ means are significantly different across these periods. This implies that conclusions on the basis of simple descriptives are hard to draw and instead multivariate analyses are warranted.

4.5 The Value Effects of the Tax Changes

4.5.1 Methodology

To measure how much firm value was lost in response to the tax announcements of November 1940 and May 1942, we analyse the behaviour of stock prices in the days surrounding these announcements. Our methodology is based on Armstrong et al. (2010), Lewis and Verwijmeren (2014), and Grewal et al. (2019). We first construct a portfolio of all stocks in our sample. We then regress the returns on this portfolio on a measure of market returns and dummy variables for the event window, i.e. those dates for which we expect the returns to be affected by the respective tax announcement. The cumulative abnormal return, or CAR, in response to the tax announcement equals the sum of abnormal returns of all event dates. The estimated aggregate loss of firm value then follows as the product of the cumulative abnormal return and the total market capitalization. Formally:

$$r_{pt} = \alpha_p + \beta_p r_{mt} + \sum_t \gamma_{pt} \delta_t + \epsilon_{pt} \quad (4.1)$$

Here, r_{pt} is the daily return on the portfolio of Dutch firms on day t , while r_{mt} is the market return on day t . These market returns are defined as the return on the Third Reich index. δ_t is a dummy that equals one for the event window K and zero otherwise, while ϵ_{pt} is the robust error term. γ_{pt} is the abnormal return of the portfolio on day t . It follows that the cumulative

of extreme outliers (Ruppert, 2006).

abnormal return of the portfolio in the event window is defined as:

$$\mu_p \equiv \sum_{t \in K} \gamma_{pt}. \quad (4.2)$$

We calculate this cumulative abnormal return for event I of November 1940 ($\mu_{p,I}$) and for event II of May 1942 ($\mu_{p,II}$) and test whether this differs significantly from zero. We assume that the announcements will affect stock returns up to the third day after the event date, so that the event window K is specified as $t \in [0, 3]$. We also use the alternative event window $t \in [-1, 3]$ to allow for the possibility that news reached the market one day earlier.

The estimation windows for the two events run from 23 September 1940 to 30 November 1940 and from 1 April 1942 to 5 June 1942, respectively. Although estimation windows are usually specified as a series of trading days before the event date (MacKinlay, 1997), this is in both cases complicated by a confounding event. In 1940, the stock market is closed until 23 September, so the window cannot start before this date. In March 1942, the Amsterdam stock market was disrupted by the throwing days of *Liro* discussed in section 4.2.3, and for this reason we start the 1942 estimation window in April. To ensure an adequate length of all data series, we extend both estimation windows to cover a couple weeks after the respective event dates.

In addition to the aggregate loss of firm value, we are also interested in its cross-sectional variation. This variation shows which firms lost most value upon the news of increased taxes and can be related to these firms' characteristics. This approach allows us to determine whether investors anticipated that the tax hikes would be more damaging to some firms than others; for instance, to those firms that were most profitable or that had less scope to create tax shields. To estimate firm-level cumulative abnormal returns, we follow Schipper and Thompson (1983) and estimate the following model as a set of seemingly unrelated regressions (SUR).³⁵

$$r_{it} = \alpha_i + \beta_i r_{mt} + \sum_t \gamma_{it} \delta_t + \epsilon_{it} \quad (4.3)$$

Variables are defined in an analogous way to those of equation 4.1 and thus

³⁵This methodology is popular in similar event studies; see for instance Doidge and Dyck (2015) for a study of corporate tax reform in Canada in 2006.

we can define $\mu_i \equiv \sum_{t \in K} \gamma_{it}$ as the estimated cumulative abnormal return of firm i . We estimate the firm-level CARs separately for event I and event II. We then regress the estimates of CAR on firms' financial characteristics. For event I of November 1940, we therefore estimate the following model.

$$\hat{\mu}_{i,I} = \alpha + \beta \mathbf{X}_{i,1939} + \epsilon_i \quad (4.4)$$

Here, $\mathbf{X}_{i,1939}$ is a vector of firm-level financial indicators which serve as determinants of the cumulative abnormal returns. These indicators are measured at the end of the preceding accounting year, which for event I is 1939. For event II, the model of equation 4.4 is estimated analogously by using financial indicators from 1941 as the determinants. In all models, we include a full set of industry fixed effects.

In addition to firm size, we include the following explanatory variables. Firstly, we include profitability, dividend yield, and the market-to-book ratio, as variables that all capture the financial performance of firms; either currently or as expected for future years. Secondly, we include both the short-term and the long-term debt ratio to study whether investors take account of existing debt tax shields in their price reaction. Thirdly, we include the variables conservatism, liquidity, and depreciation as measures of the composition of firms' assets. Lastly, we include a dummy for stocks that trade on less than 40% of the days within the estimation window, to control for the fact that stock prices of these firms may not change regularly enough to immediately incorporate the tax announcements. Table 4.5 presents the descriptive statistics of these explanatory variables for both events.

4.5.2 Results

We first estimate the aggregate loss of firm value, in percentage points, as given by equations 4.1 and 4.2. The resulting estimates are presented in Table 4.6. In addition to the estimates of CAR using three alternative market indices, we also present the raw returns of the portfolio in the event windows.

The estimated cumulative abnormal return for event I varies between -2.4% and -6.1%, which in all cases is statistically significantly different from zero. The estimate is larger in absolute terms for the value-weighted portfolio than for its equally weighted counterpart, which suggests that firms with a

Table 4.5: Descriptive Statistics for Event Study

Panel A: Explanatory Variables for Event I

<i>Year = 1939</i>	Mean	St. Dev.	Median	Q1	Q3
Firm size (log)	14.8	1.3	14.8	13.9	15.6
Market-to-book	0.97	0.79	0.77	0.40	1.26
Profitability	5.4%	8.6%	5.9%	2.2%	9.1%
Dividend yield	6.6%	8.2%	5.4%	0.0%	10.3%
Short-term debt	23.2%	17.9%	18.1%	9.4%	29.7%
Long-term debt	9.8%	16.1%	0.0%	0.0%	15.4%
Liquidity	25.6%	16.9%	23.9%	11.3%	38.3%
Depreciation	3.1%	3.3%	2.2%	0.1%	4.9%
Conservatism	0.078	0.269	0	0	0
Limited trading activity	0.281	0.451	0	0	1

Panel B: Explanatory Variables for Event II

<i>Year = 1941</i>	Mean	St. Dev.	Median	Q1	Q3
Firm size (log)	14.6	1.2	14.5	13.7	15.3
Market-to-book	1.77	1.04	1.62	1.10	2.22
Profitability	5.4%	5.9%	4.3%	2.0%	8.6%
Dividend yield	2.9%	2.8%	2.8%	0.0%	4.0%
Short-term debt	23.9%	18.6%	20.6%	9.1%	30.5%
Long-term debt	9.1%	15.5%	0.0%	0.0%	12.6%
Liquidity	26.6%	17.9%	25.4%	12.5%	39.2%
Depreciation	2.3%	2.4%	1.9%	0.1%	3.2%
Conservatism	0.082	0.276	0	0	0
Limited trading activity	0.348	0.478	0	0	1

Sources: authors' calculations; see main text. Firm size is the logarithm of total assets in constant 1938 guilders. Conservatism and limited trading activity are dummy variables. Market-to-book is the ratio of the market and book values of equity as of 31 December 1939/1941. All other annual variables are ratios where the denominator is total assets. Limited trading activity is a dummy that equals one if a stock trades less than 40% of days in the respective estimation window. All non-dummy variables are winsorized at the 2% level.

Table 4.6: Cumulative Abnormal Returns, Portfolio Approach

Event Date:	Market Index:	Value Weighted Portfolio				No. of Shares:
		Equal Weighted Portfolio $t \in [-1, 3]$	Equal Weighted Portfolio $t \in [0, 3]$	Value Weighted Portfolio $t \in [-1, 3]$	Value Weighted Portfolio $t \in [0, 3]$	
I: 9 November 1940	Third Reich index	-2.4%***	-2.7%***	-3.6%***	-6.1%***	203
	Third Reich index, excl. Amsterdam	-4.6%***	-6.7%***	-7.3%***	-13.1%***	203
	Berlin index, value weighted	-4.6%***	-6.7%***	-7.3%***	-13%***	203
	Raw returns	-2.5%***	-4.9%***	-5.9%***	-11.8%***	203
II: 5 May 1942	Third Reich index	-3.0%***	-3.1%***	-2.7%*	-2.8%***	218
	Third Reich index, excl. Amsterdam	-3.7%***	-3.3%***	-4.7%***	-3.4%***	218
	Berlin index, value weighted	-4.1%***	-3.4%***	-5.4%***	-3.6%***	218
	Raw returns	-3.2%***	-2.8%***	-3.7%***	-2.2%***	218

Estimates of the cumulative abnormal return (CAR) on a portfolio of all Dutch domestic stocks, using the model of equations 4.1 and 4.2. Market returns are based on the Third Reich index: an index of the 89 most liquid stocks across the markets of Amsterdam, Berlin, Brussels, and Paris. The alternative Third Reich index excludes the sixteen stocks from Amsterdam. Asterisks indicate a test that the CAR equals zero; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

larger market capitalization were hit harder. We also see that the CAR for the event windows that include 8 November 1940 are substantially less negative than those that start on 9 November 1940. This reflects the fact that 8 November was a day of a marked rise of stock prices, which was cut short by Hans Fischböck's declaration that evening.

For event II, the variation between specifications is smaller, with the estimated CAR ranging from -2.7% to -3.1%. We observe that the difference between the $[-1, 3]$ and the $[0, 3]$ event windows is also less substantial than for event I; in fact, the estimated CAR becomes somewhat larger in absolute terms when 4 May 1942 is included. We conclude that the announcement of new taxes in May 1942, like that of November 1940, led to a substantial loss of firm value.

To quantify the aggregate loss of firm value, we multiply the estimated cumulative abnormal return with the total market value of the portfolio. For this exercise, the relevant CAR estimates are those based on the value-weighted index. The total market value of the stocks in the portfolio equals 3.15 billion guilders at the end of 1939 and 4.05 billion guilders at the end of 1941. Based on the more conservative value-weighted CAR estimates of -3.6% for event I and -2.7% for event II, the estimated losses of firm value around these events therefore amount to 113 million guilders and 110 million guilders, respectively. We conclude that Fischböck's announcement of increased taxes of November 1940, and the publication of the new corporate tax in May 1942, jointly cost Dutch investors over *f*200 million. This amount is in the order of magnitude of three to four percent of the annual Dutch GDP in the 1940s (see Table 4.1).

Two additional calculations put this estimate in perspective. Firstly, we showed in Table 4.2 the total tax revenues by category for the years 1938–1948. The sum of profit taxes and corporate taxes paid in these years equals *f*1.189 billion, but recall that this relates to all Dutch limited liability corporations and hence includes the corporations that we exclude (i.e. non-listed, financial, and colonial firms). The total book value of equity of all limited liability corporations at the end of 1939 equals *f*8.72 billion,³⁶ whereas that of our sample equals *f*3.24 billion. If we assume that the tax burden on our

³⁶See CBS (1948), Table VIII.4.

sample of firms is representative of the universe of corporations, the total amount paid in terms of profit and corporate taxes by our sample of firms is therefore estimated to have been *f*442 million up until 1948. The estimated loss of firm value in response to the November 1940 and May 1942 is roughly half as large (*f*223 million). This suggests that our estimate is in the correct range and may in fact be somewhat too conservative.

Secondly, although most firms' financial statements give very little detail on the taxes paid, there is a small number of firms each year that do report explicitly the amount of profit tax or corporate tax paid. We therefore search all profit and loss statements and profit distributions in our database for tax entries that can, by their description, clearly be earmarked as relating to these two types of taxes.³⁷ From 1940 to 1948, a total of 61 financial statements report such entries, at an average value of *f*188,920. If we make the assumption that these 61 observations are representative of the sample as a whole, this would bring the total tax bill of profit and corporate taxes for our sample to around 355 million guilders for the period 1940–1948. Again, this is somewhat larger than the estimated loss of firm value that we find in our event study. This exercise suggests, like before, that the estimated loss of firm value of *f*223 million is a lower bound estimate, and in the right order of magnitude.

We specify the model of equation 4.1 in a number of different ways to check the robustness of our result. Firstly, when the Third Reich index excludes the sixteen largest Dutch stocks, and is thus an index of stocks from the Berlin, Brussels, and Paris markets, the estimated CARs are substantially larger, varying from -4.6% to -13.1%. Secondly, when we use an index based on the Berlin market alone we find estimates that are likewise considerably larger than our original estimates. Thirdly, although not shown in Table 4.6 for brevity, we check for robustness to the alternative event windows $t \in [-1, 2]$ and $t \in [0, 2]$. Estimated cumulative abnormal returns range from -1.5% to -2.2% for event I and from -3.0% to -4.5% for event II. This shows that the negative effect of the tax announcements is robust to alternative specifications of the event window, and additionally that this effect still affects

³⁷Generally, tax-related entries are simply called “taxes paid” or even “taxes and other costs paid”, but in some cases the entries are more distinctively called “profit tax” or “corporate tax”. These are the entries used for this exercise.

prices on the third day after the event.

Having established an aggregate loss of firm value in response to the two major tax announcements, we proceed to study how this loss varied across firms. We regress the firm-level cumulative abnormal return from equation 4.3 on a set of firm characteristics. We do so for estimates of CAR for both the event window $t \in [-1, 3]$ and $t \in [0, 3]$. In addition to a standard OLS regression, we also estimate the model of equation 4.4 as a weighted least squares (WLS) regression, where the weights are the inverse of the standard deviation of each CAR's estimate from equation 4.3. We do this to give more weight to cumulative abnormal returns that are estimated with more precision. Results are presented in Table 4.7.

Table 4.7: Determinants of Cumulative Abnormal Returns

	9 November 1940				5 May 1942			
	CAR (-1,3)		CAR (0,3)		CAR (-1,3)		CAR (0,3)	
	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
Firm size (log)	0.003 (0.659)	0.002 (0.433)	0.004 (0.578)	0.002 (0.354)	0.001 (0.208)	0.001 (0.220)	0.001 (0.212)	0.001 (0.222)
Profitability	-0.048 (-0.713)	-0.038 (-0.588)	-0.123 (-1.115)	-0.109 (-1.062)	0.226*** (3.600)	0.227*** (3.620)	0.253*** (4.083)	0.253*** (4.094)
Dividend yield	0.083 (1.493)	0.069 (1.210)	0.086 (1.112)	0.076 (1.026)	-0.151 (-1.353)	-0.146 (-1.329)	-0.190** (-2.062)	-0.186** (-2.049)
Market-to-book	0.009 (1.165)	0.006 (0.933)	0.007 (0.721)	0.005 (0.608)	-0.008 (-1.503)	-0.008 (-1.500)	-0.007 (-1.289)	-0.007 (-1.284)
Short-term debt	-0.040 (-1.161)	-0.036 (-1.202)	0.002 (0.050)	-0.002 (-0.061)	0.010 (0.512)	0.010 (0.506)	0.014 (0.747)	0.014 (0.741)
Long-term debt	0.032 (0.619)	0.023 (0.467)	-0.013 (-0.166)	-0.015 (-0.219)	0.039 (1.615)	0.038 (1.566)	0.053** (2.503)	0.052** (2.451)
Conservatism	-0.005 (-0.303)	-0.009 (-0.569)	-0.012 (-0.699)	-0.016 (-0.991)	0.037*** (3.550)	0.037*** (3.560)	0.029*** (2.846)	0.029*** (2.851)
Liquidity	0.023 (0.676)	0.017 (0.544)	0.014 (0.341)	0.015 (0.439)	-0.023 (-1.282)	-0.023 (-1.258)	-0.017 (-0.982)	-0.016 (-0.963)
Depreciation	0.205 (1.293)	0.125 (0.851)	0.023 (0.135)	-0.043 (-0.280)	0.168 (1.028)	0.170 (1.046)	0.087 (0.516)	0.089 (0.528)
Limited trading activity	0.008 (0.547)	0.013 (0.939)	0.008 (0.547)	0.013 (0.939)	0.017* (1.934)	0.017* (1.949)	0.017* (1.959)	0.016* (1.952)
Observations	146	146	146	146	135	135	135	135
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.116	0.096	0.101	0.094	0.261	0.265	0.269	0.270
Adjusted R-squared	0.014	-0.008	-0.002	-0.011	0.168	0.173	0.176	0.178

Reported are OLS and WLS regressions, where the dependent variable is the firm's cumulative abnormal return (CAR), for different event windows. Market returns are based on the Third Reich index: an equal weighted index of the 89 most liquid stocks across the markets of Amsterdam, Berlin, Brussels, and Paris. In the WLS estimations, the firm's CAR is weighted by the inverse of its estimation error. t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

The explanatory power of the cross-sectional regressions for event I is relatively low, with an R-squared around 10%. Furthermore, none of the co-

efficients is significantly different from zero. It seems that the announcement of heavier taxes on the corporate sector led to a rather uniform collapse of stock prices, with fairly little discrimination between stocks. The conclusion is that, although investors realised the damning implications of Fischböck's fiscal plans for Dutch firms in general, they did not yet foresee differential implications for different types of firms.³⁸

The results tell a different story for event II. Strikingly, we see that profitability has a significant positive coefficient in all specifications, which means that more profitable firms lose less value in response to the tax announcements of May 1942. On the other hand, dividend yield is negative.³⁹ At first it may seem surprising that profits have a positive effect on the CARs, because the new tax was a fraction of profits. However, firms with low profits would have less after-tax profits left for capital expenditures, while high-profit firms could meet the tax obligations and still have funds for internal growth. The negative sign for dividend yield means that shareholders of firms that were paying more dividends may have feared that their dividends would be cut due to the tax effects, despite the typical policy of stable dividends in this period (Jong et al., 2019).

Additionally, we see that long-term debt is positively associated with the CAR around event II, i.e. firms with more long-term debt lose less value. This is fully in line with the presence of debt tax shields: firms with large amounts of long-term debt will be able to generate ample debt tax shields for years ahead, and apparently this is priced by investors. The variable conservatism is also significant and positive. This implies that firms that deliberately and openly undervalue their assets have less negative CARs. This is inconsistent with limited options to depreciate, and apparently signals the market's appreciation of firms' willingness to depreciate future assets rapidly.

Lastly, we see that firms of which the stocks were less frequently traded also lose less value. This is most likely a mechanical consequence of the

³⁸Note that the insignificant coefficient of firm size is somewhat surprising, in light of the results of Table 4.6, where we find larger CARs for value-weighted than for equally weighted portfolios.

³⁹Note that dividend yield loses its statistical significance when we drop profitability from the explanatory variables; the converse is not the case. Dividend yield is therefore only associated with more loss of firm value conditional on current profits.

fact that some of these stocks simply do not change price during the event window.

To summarize, the event study shows that both the tax announcements of November 1940 and of May 1942 dearly cost the investors of Dutch corporations; in both cases, more than $f100$ million was lost in terms of market value. The price reaction to the first of these announcements furthermore shows that this loss of value was rather uniform between firms. Rather than anticipating more damage for firms that were, for instance, less highly leveraged or more profitable, investors do not seem to have discriminated between firms at all. On the other hand, for the second event we find that firm-level price reactions correlate more strongly with firm characteristics. In particular, firms with more long-term debt lose less value, as these are the firms that will be able to generate a debt tax shield. Firms that typically pursue faster depreciation — as measured by the conservatism dummy — also lose less value, which points to their investors understanding the value of the non-debt tax shield that derives from depreciation policy. The fact that more profitable firms lose less value in reaction to the corporate tax is counterintuitive at first sight, but might be explained by seeing lower profitability as indication of a larger likelihood of future financial distress.

4.6 Corporations' Responses to the Tax Changes

4.6.1 How Could Firms Reduce the Tax Burden?

The new taxes on corporations will of course have affected not just their investors but also, and perhaps most importantly, the corporations themselves. Barring outright tax evasion, Dutch firms in the 1940s could resort to a number of strategies to decrease the corporate tax bill. On the basis of contemporary fiscal literature, guides and manuals, and annual reports of stock-market listed firms, we identify three main strategies that firms had available to avoid the corporate tax.

The first strategy we observe is the use of discretionary adjustments to the reported profit. We refer to this set of strategies as earnings management (Dechow et al., 1995; Burgstahler and Dichev, 1997; Healy and Wahlen, 1999). Eventhough the 1942 corporate tax contained a more restrictive set

of rules regarding the calculation of profits than the preceding 1940 profit tax, the corporate tax still left ample room for discretion. The modern-day literature on earnings management discusses several reasons why firms may tweak their reported profits. In addition to fiscal reasons, firms may alter profits for reasons of improved access to capital markets, in relation to managerial compensation, or due to regulatory constraints such as anti-trust laws. The series of tax changes in 1940–1942 fundamentally altered fiscal incentives for firms, as it created a large incentive to push down profits as much as possible; we therefore expect them to have adapted their profit calculation in response to this.

The room for discretion within both the 1940 profit tax and the 1942 corporate tax lay particularly in the valuation of two types of balance sheet categories: reserves and provisions, and fixed assets. In terms of fixed assets, a viable approach to decrease the reported level of profits would be to increase the depreciation on fixed assets.⁴⁰ Likewise, by increasing the level of tax-deductible reserves and provisions, firms could generate additional costs to decrease profits. In addition to reserves directly related to the fiscal treatment of pre-1940 retained earnings (see page 125 on these transitional reserves), the reservation of funds for payments to staff members was a key way to increase costs while keeping the money within the firm. One illustration of the role of fiscal incentives in these types of reservations is provided by the 1940/41 annual report of the textile firm *Vereenigde Nederlandsche Kleermakerijen*⁴¹ which mentions that “f100.000 [will be allocated] to a fund for members of staff, provided that the tax administration decides that this allocation will be seen as an operating expense for the purpose of the calculation of taxable profits.”⁴²

The second profit-decreasing strategy that firms could employ was to attract debt, thereby generating interest expenses. The corporate tax law of 1942, like almost all corporate tax laws, allowed for the deductibility of interest expenses, in contrast to dividends or other payments on equity. Therefore,

⁴⁰That depreciation costs played a key role in earnings management at the time is confirmed by Meij (1946), pp. 96-97: “[it] cannot be denied that the level of depreciation is strongly related to the amount that one would like to see as profit and potentially as loss.”

⁴¹Published in October 1941. See: *De Tijd : godsdienstig-staatkundig dagblad*, 16 October 1941, “*Vergaderingen*”.

⁴²Van Oss (1942), p. 734. Translation from the Dutch original by the authors.

the introduction of a major corporate tax like this will have made it very attractive for firms to replace equity with debt. This “debt tax shield” was first formalized by Modigliani and Miller (1963) and its presence and size remains a point of debate in the literature on modern-day capital structure.⁴³ Although the theory of the debt tax shield was first introduced in the 1960s, in practice this strategy was already known in the 1940s. Testament to this is the treatise of Meij (1946) on the development of capital structures in the Netherlands between 1926 and 1946. Meij writes:

In addition, a large importance [for changes in capital structures] can be attached to the increase of taxes that took place in recent years. Financing through bonds implies a decrease of the taxable profit. After all, the interest expenses from bonds are deducted from profits; dividends paid to shareholders form a part of the taxable profit.

Source: Meij (1946), p. 65. Translation from the Dutch original by the authors.

We should note that the 1942 enterprise tax was different in this manner: interest expenses were to be added to the profit that firms declared to the tax administration. Why this provision was made for the enterprise tax but not for the corporate tax is unknown to us, but at least it shows that the authorities were also aware of the fact that interest deductibility would lead to the unequal fiscal treatment of debt vs. equity.

However, there is reason to believe that the fiscal incentive to increase leverage will not have been uniform between firms, and that for some firms the incentive will have actually worked in the opposite direction. The reason for this is the dividend cap of August 1941. The dividend cap effectively restricted dividends to a maximum 6% of paid-up capital, and therefore the only way to maintain a high level of dividends would be to increase equity. As a matter of fact, one of the goals of the dividend cap was precisely this: to induce firms with low equity levels to recapitalize. As the report in the

⁴³A recent OECD-wide study by Faccio and Xu (2015) of changes in personal and corporate taxes finds that firms increase leverage by 0.41% for every 1% increase in the corporate tax rate, where the standard deviation of corporate tax rates is 6.35%.

Financieel Jaarboek 1943 (pp. 63-78) shows, a sizeable number of stock-market listed firms made use of this option.

The third strategy open to firms would be a more radical change of course. Whereas the previously discussed strategies are aimed at decreasing the taxable profit, firms could also entirely avoid paying the corporate tax by changing their legal corporate form. That is: since the 1942 corporate tax only applied to limited liability corporations, changing to an unlimited liability corporate form, such as a partnership, would no longer make the firm liable to corporate taxation.⁴⁴

To what extent firms changed to a partnership or another unlimited liability corporate form is a matter that we decide not to study further in our empirical analysis. The reason for this is that our sample of firms consists only of stock-market listed firms, and for these firms this strategy was in fact very rare. For a listed firm, changing to an alternative legal form to avoid the corporate tax will not have been a viable option. Changing to a partnership would imply delisting and the introduction of unlimited liability for all partners/shareholders; for widely held firms, these drawbacks would have been insurmountable. In fact, the only firm that delists and changes to an unlimited liability form in our sample is the textile manufacturer *Vitrage-Weverij Anglo-Holland* (Van Oss (1947/48), pp. 473-475). As this reorganisation takes place only in 1945 — years after the liquidation-resolution — it is questionable whether this was driven primarily by fiscal motives.

That said, non-listed limited liability corporations often did decide to change form because of the new fiscal measures. This is reflected in macro-level statistics on the number of limited liability corporations. Table 4.8 shows the number of foundations and liquidations of limited liability corporations per year in the Netherlands. There is a striking increase in the number of liquidations in 1942 and 1943. What is also striking is that the corporations that decided to liquidate between 1941 and 1945 were generally rather small: their capitalization averaged around *f*40,000. In contrast, the median capitalization of stock-market listed firms was *f*604,500.

Not all of the spike in liquidations in 1942 and 1943 can be attributed to

⁴⁴One of the three taxes of May 1942 — the enterprise tax — did apply to firms of all legal forms. The rate of this tax, however, was substantially lower than that of the corporate tax.

Table 4.8: Development of Limited Liability Corporations, 1938–1948

Panel A: Foundations			
Year	Number	Total paid-up capital (X <i>f</i> 1000)	Mean paid-up capital (<i>f</i>)
1938	1,035	59,674	57,656
1939	762	27,487	36,072
1940	448	11,158	24,906
1941	347	18,716	53,937
1942	118	8,363	70,873
1943	119	10,407	87,454
1944	130	5,502	42,323
1945	64	102,217	1,597,141
1946	330	24,234	73,436
1947	682	79,663	116,808
1948	1,068	137,901	129,121

Panel B: Liquidations			
Year	Number	Total paid-up capital (X <i>f</i> 1000)	Mean paid-up capital (<i>f</i>)
1938	-	-	-
1939	-	-	-
1940	426	32,562	76,437
1941	642	24,038	37,442
1942	2,146	81,660	38,052
1943	2,415	100,579	41,648
1944	906	30,339	33,487
1945	70	2,449	34,986
1946	107	10,786	100,804
1947	186	14,774	79,430
1948	294	14,054	47,803

- : Data not available.

Sources: CBS (1947-1948), p. 27 and CBS (1949), p. 33.

fiscal motives, as some of these liquidations will have been so-called Aryanisations — forced liquidations of Jewish firms. Exactly how many limited liability corporations were Aryanised is unknown.⁴⁵ That said, as the discussion of Dijker (1946) shows, fiscal motives did in fact in many cases induce smaller limited liability corporations to adopt an alternative legal form.

4.6.2 Earnings Management

To assess to what extent firms apply earnings management, we study the development over time of the main accounting categories that they can use for this purpose. That is: as the preceding discussion has highlighted, historical sources suggest that firstly depreciation costs were used for this purpose (Meij, 1946), and secondly that firms may have increased the costs for staff- and pension fund reserves to decrease the taxable profit. Additionally, the 1942 corporate tax law indicates that two further cost categories that were generally tax deductible were provisions and bad debts provisions.

We therefore tabulate the annual averages of these cost categories per year in Table 4.9. We refer to the sum of all aforementioned cost categories as discretionary accruals. Our approach is inspired by the model of Jones (1991) and Dechow et al. (1995), which is a commonly used approach in studies of earnings management.⁴⁶ In addition to the overall annual averages, we also tabulate the averages by two groups each year, depending on whether their profitability is below or above the median of that year. If changes to these three cost categories are driven by earnings management, these should be most predominant among profitable firms.

The most striking finding from this analysis is that costs made in the

⁴⁵Aalders (1999), p. 138 mentions that around 18.000 Jewish firms were liquidated in the process of Aryanisation, but does not specify how many of these were limited liability corporations.

⁴⁶In the approach developed by Jones (1991) and Dechow et al. (1995), one estimates a model of how the level of total accruals follows from other accounting variables in normal times, and then uses this model to predict total accruals in years where firms face incentives to alter profits either up or down. In our context, this would imply modelling total accruals as a function of other accounting data based on pre-corporate tax years (1938–1941) and then extrapolating this model to predict total accruals post-corporate tax (1942–1948). Although we have explored whether this approach is feasible for the current study, we conclude that the accounting data available to us is too limited to accurately estimate these models. Particularly the lack of data on firms' annual revenues complicates this. We therefore decide to follow a more descriptive approach.

Table 4.9: Overview of Discretionary Accruals & Profitability

Panel A: Full Sample

	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
Profitability	2.57%	5.43%	7.93%	5.44%	2.80%	2.03%	-0.83%	-1.50%	6.34%	6.33%	6.27%
Depreciation	3.06%	3.51%	2.94%	2.55%	2.19%	1.76%	1.76%	1.60%	2.22%	2.63%	3.31%
Additions to Staff- and Pension Funds	0.14%	0.15%	0.27%	0.31%	0.28%	0.34%	0.09%	0.11%	0.30%	0.43%	0.37%
Provisions and Bad Debt Provisions	0.04%	0.11%	0.06%	0.06%	0.02%	0.01%	0.04%	0.05%	0.05%	0.03%	0.03%
Total Discretionary Accruals	3.29%	3.84%	3.35%	3.01%	2.53%	2.21%	1.96%	1.89%	2.61%	3.15%	3.82%

Panel B: By Profitability*Above median profitability:*

	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
Profitability	8.14%	10.68%	13.11%	9.63%	5.96%	4.57%	3.21%	3.21%	10.29%	9.86%	9.69%
Depreciation	3.67%	4.37%	3.62%	2.81%	2.42%	1.92%	1.48%	1.48%	2.76%	2.77%	3.78%
Additions to Staff- and Pension Funds	0.20%	0.19%	0.34%	0.28%	0.36%	0.44%	0.13%	0.15%	0.32%	0.59%	0.50%
Provisions and Bad Debt Provisions	0.03%	0.13%	0.12%	0.06%	0.03%	0.02%	0.05%	0.06%	0.05%	0.04%	0.05%
Total Discretionary Accruals	3.93%	4.82%	4.22%	3.27%	2.87%	2.52%	1.76%	1.83%	3.17%	3.50%	4.46%

Below median profitability:

	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
Profitability	-2.94%	0.17%	2.81%	1.25%	-0.33%	-0.50%	-4.86%	-6.21%	2.44%	2.80%	2.88%
Depreciation	2.45%	2.64%	2.26%	2.28%	1.95%	1.59%	2.05%	1.71%	1.68%	2.48%	2.85%
Additions to Staff- and Pension Funds	0.08%	0.12%	0.21%	0.34%	0.19%	0.23%	0.05%	0.07%	0.27%	0.26%	0.25%
Provisions and Bad Debt Provisions	0.06%	0.09%	0.01%	0.05%	0.00%	0.00%	0.02%	0.04%	0.05%	0.03%	0.02%
Total Discretionary Accruals	2.66%	2.86%	2.49%	2.74%	2.20%	1.90%	2.16%	1.95%	2.07%	2.81%	3.19%

Source: authors' calculations; see main text. Panel A presents the annual mean values of profitability and three categories of accounting entries potentially used for earnings management, all as ratios of total assets. Depreciation includes additions to depreciation reserves. Total Discretionary Accruals equals the sum of depreciation, additions to staff- and pension funds, bad debts provisions and other provisions. Panel B presents the same annual means, but split in two groups based on the annual median profitability. Total Discretionary Accruals may deviate slightly from the sum of its parts due to winsorization.

identified categories are all very small. Depreciation costs form by far the largest component of our measure of total discretionary accruals, and even this rarely exceeds 4% of total assets. Costs made for staff- and pension funds are in all cases very small, with the mean across all firms never reaching 0.5% of total assets. The sum of provisions and bad debt provisions is even more diminutive.

The development of depreciation costs over time has a U-shaped pattern. That is, the average level of depreciation costs declines during the years of the occupation, only to reach its pre-war level by 1948. This pattern can be observed for the whole sample of firms and for both the below- and above-median profitability groups. We do observe that depreciation is larger for more profitable firms in all years except for 1944 and 1945. This suggests that annual depreciation costs are subject to some discretion, and that more profitable firms may increase depreciation costs beyond the required minimum. One reason why we do not find an increase of depreciation costs until 1948 might be the shortage of capital goods, a shortage which continued for a number of years after the liberation (de Jong, 1999, ch. 9). In other words, it might have been the case that firms wanted to generate more depreciation costs, but that the fixed assets which were to be depreciated were simply not available.

Costs made for staff and pension funds increase largely monotonically throughout the full period, with the main exception again being the two ultimate years of the war. Additionally, we find that these costs are generally larger for more profitable firms. These observations are in line with what one would expect if these reserves were used as a non-debt tax shield. Like for depreciation costs, however, there are other reasons to expect that these costs may be higher for more profitable firms, with tax avoidance just being one of them. Arguably, loss-making firms would have to cut costs, and these additions to staff and pension funds may have been the first to suffer. Regardless of the exact mechanism, the key conclusion from Table 4.9 is that all these cost categories remain very small throughout the full period. The tax effects on earnings management, if any, are therefore unlikely to have been of any economic importance.

4.6.3 Capital Structure

The introduction of the 1942 corporate tax may have also induced firms to change their capital structure. As discussed in section 4.6.1, corporate taxes will — all else equal — induce firms to attract more debt so as to generate deductible interest expenses. The potential of generating such debt tax shields (Modigliani and Miller, 1963) was already familiar to practitioners in the 1940s, as Meij (1946) shows.

That said, there are also several reasons why firms may want to minimize their leverage. Traditionally, firms are considered to make a trade-off between the benefits of the debt tax shield and the increased bankruptcy cost from increased debt usage (Taggart, 1977; Marsh, 1982; Jalilvand and Harris, 1984; Auerbach, 1985; Opler and Titman, 1994). Furthermore, while increasing leverage has the benefit of increasing the value of the firm's debt tax shield, firms might also have a preference to preserve debt capacity, or they may prefer the use of internally generated funds (Myers, 1984; Myers and Majluf, 1984; Lemmon and Zender, 2010).

We expect that considerations of bankruptcy costs, the preservation of debt capacity, and the use of internal funds, will have been relevant throughout the full 1938–1948 period. On the other hand, tax shield considerations are only relevant in the period after 1941. To examine whether this is reflected in firms' leverage ratios, we ask two questions. First, was there a structural change in the use of debt following the tax changes? Second, did firms indeed face new incentives to adjust their capital structure more quickly following the tax changes?

4.6.3.1 Methodology

To study the development of leverage in the period 1938–1948, we first compare mean values of leverage for the two periods 1938–1941 and 1942–1948, conditional on the effects of other firm characteristics. As shown in Table 4.4, leverage does increase throughout this period, but since firms' other financial characteristics also change simultaneously it is important to control for this. We do so by estimating the following model.

$$D_{it} = \beta_0 + \beta_1 Post41_t + \beta_2 \mathbf{X}_{it} + \epsilon_{it} \quad (4.5)$$

Here, D_{it} is the leverage ratio, defined as total debt to total assets, for firm i in year t . The vector $\mathbf{X}_{it}$ includes the firm-level characteristics which may explain this leverage ratio. $Post41_t$ is a dummy variable that equals zero for 1938–1941 and one for 1942–1948. If, as we hypothesize, leverage increases after the 1942 introduction of corporate taxes conditional on other determinants, we should expect to find a positive estimate for β_1 . Next, we study whether the same result is found when we allow the effects of all determinants to differ between the two periods. We specify the following interaction model.

$$D_{it} = \beta_0 + \beta_1 Post41_t + \beta_2 \mathbf{X}_{it} + \beta_3 \mathbf{X}_{it} Post41_t + \epsilon_{it} \quad (4.6)$$

Our interest thus lies in whether the determinants of leverage in the period 1942–1948 are different from those in the preceding years, as reflected by β_3 . We are also interested whether these changes in determinants explains the full difference in leverage, or whether there is a residual effect, which is reflected by β_1 . We include industry fixed effects in both models, as before. The inclusion of industry fixed effects is important, since different industries were very differently affected by the circumstances of the war, such as resource scarcity, trade restrictions, or price controls (Klemann, 2002).

The independent variables that we include are profitability, firm size, a measure of dividend policy (a dummy which equals one if a firm pays dividends), as well as a series of variables relating the composition of assets: liquidity, tangibility, depreciation, and the conservatism dummy. Our primary variables of interest are $Post41_t$ and profitability, where the coefficient on $Post41_t$ illustrates the structural changes in the firm's financing choice and profitability captures the firm's preference to use internal funds to finance its activities. That is, we expect firms with more profits to use less debt. However, following the introduction of corporate taxes, we expect this effect to become more positive. Additionally, the variables relating to fixed assets will capture whether changes in capital structure are correlated with usage of depreciation as a non-debt tax shield, since these two approaches may be related (DeAngelo and Masulis, 1980).

Although the models of equation 4.5 and 4.6 are fairly intuitive, they make the implicit assumption that the current leverage ratio D_{it} is the optimal

choice of capital structure for firm i in year t . However, firms will not be able or willing to change capital structure readily from one year to the next. Recent studies of capital structure have shown that, in fact, firms adjust their actual capital structure only partially towards its optimum value each year (Flannery and Rangan, 2006; Byoun, 2008). These studies typically find that the annual adjustment to capital structure equals only one-fifth to one-third of the amount required to reach the target. Firms with higher capital structure adjustment speeds face fewer costs when increasing their debt usage. That is, firms that operate below their optimal leverage ratio will adjust more quickly (Byoun, 2008).

We believe that the introduction of the 1942 corporate tax may have affected not only firms' desired leverage ratio, but also the speed at which firms adjusted to this desired ratio. Especially firms that were below their target debt ratio will now have had a stronger incentive to adjust towards this target, due to the presence of debt tax shields. We therefore estimate a series of partial adjustment models and study how the capital structure adjustment speed changes between the two periods and between groups of firms.

To estimate the capital structure adjustment speed for the full sample, we first estimate the target leverage ratio. This target is the fitted value of a regression of leverage on firm characteristics for the full sample, which we estimate using the model of Fama and MacBeth (1973). We then estimate the fraction of the gap between the actual and the target leverage ratio that is closed in the course of a year. This two-step estimation is represented as follows.

$$D_{it} = \gamma_0 + \gamma_1 \mathbf{X}_{it} + \epsilon_{it} \quad (4.7)$$

$$D_{it} - D_{it-1} = \alpha + \beta(D_{it}^* - D_{it-1}) + \nu_{it} \quad (4.8)$$

In equation 4.8, D_{it}^* is the target leverage ratio of firm i in year t ; i.e. D_{it}^* is the fitted value of equation 4.7. The coefficient of interest is β , which measures the capital structure adjustment speed. If firms always adjust fully to their optimal capital structure, β is equal to one; if the adjustment is only partial, we expect β to be smaller than one but greater than zero. All other variables are defined as before, and the error terms ϵ_{it} and ν_{it} are specified

to be robust to autocorrelation and heteroskedasticity.

We allow varying speeds of adjustment between the pre- and post-corporate tax period. As mentioned, we hypothesize that this speed will be higher for the years 1942–1948 than for 1938–1941, since it becomes more costly for firms to stay below their target leverage ratio.

Moreover, we also allow the adjustment speed to differ between groups of firms, as well as between the two periods. We group firms in two alternative ways. Firstly, we divide firms into two groups based on whether they are estimated to be below or above their target debt ratio. In line with Byoun (2008), we expect firms that are below their target leverage ratio to adjust more quickly after the 1942 tax introduction than those that are above their target ratio, as the incentive to generate a debt tax shield is more salient for firms below target than those above target.⁴⁷ Secondly, we divide firms based on their pre-1942 dividend policies. If a firm's average payout ratio in the years between 1938 and 1941 was above 6% — effectively the legal maximum after the 1941 dividend cap — it will have been differently affected by the changes in the tax regime. That is: the dividend cap may have induced these firms to actually decrease their leverage, since increasing the amount of equity was the only way to maintain high dividends after 1941. On the other hand, for firms that paid sub-6% dividends already before the dividend cap, this incentive will have been absent.

4.6.3.2 Results

Table 4.10 shows the determinants of leverage. Column 1 presents the estimates for equation 4.5 while columns 2 and 3 jointly present the estimates for equation 4.6. Column 2 shows the determinants for the first period and column 3 for the latter period; column 3 thus presents the estimates for the sum of β_2 and β_3 . We present results of the models of equations 4.5 and 4.6 for both total leverage and short-term leverage. The latter is motivated by the fact that short-term debt is the largest and most flexible component of overall debt. Instead, long-term debt will have been less flexible particularly in the later years of the war, when issuing bonds became more difficult.

⁴⁷The other main prediction of Byoun (2008), that the adjustment speed also depends on whether firms have a financial surplus or deficit, is hard to test in our setting given the

Table 4.10: Determinants of Capital Structure

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Debt / Assets			Short-term Debt / Assets		
	Full Period	1938–1941	1942–1948	Full Period	1938–1941	1942–1948
Post 1941	0.050*** (4.613)	-0.062 (-0.475)		0.039*** (4.025)	-0.080 (-0.676)	
Profitability	-0.101 (-0.839)	-0.238* (-1.714)	0.112 (0.836)	-0.171 (-1.329)	-0.323** (-2.242)	0.053 (0.397)
Tangibility	0.137** (2.354)	0.198*** (2.866)	0.086 (1.419)	-0.218*** (-4.682)	-0.133** (-2.393)	-0.284*** (-5.886)
Firm size (log)	0.034*** (3.157)	0.028** (2.174)	0.037*** (3.392)	0.018* (1.836)	0.010 (0.939)	0.022** (2.140)
Dividends (0/1)	0.041** (2.403)	0.032 (1.181)	0.044** (2.467)	0.053*** (3.840)	0.056** (2.573)	0.049*** (3.208)
Liquidity	-0.070 (-1.173)	-0.064 (-0.768)	-0.073 (-1.252)	-0.014 (-0.241)	0.030 (0.398)	-0.038 (-0.656)
Depreciation	0.252 (0.805)	0.260 (0.717)	0.329 (0.844)	0.785*** (2.856)	0.612* (1.926)	1.031*** (2.804)
Conservatism	-0.056 (-1.285)	0.007 (0.123)	-0.092** (-2.362)	-0.117*** (-2.903)	-0.065 (-1.251)	-0.147*** (-3.891)
Observations	1,881	1,881		1,881	1,881	
Industry FE	YES	YES		YES	YES	
R-squared	0.136	0.150		0.238	0.256	
Adjusted R-squared	0.129	0.140		0.232	0.247	

Reported are OLS regressions, where the dependent variable is the firm's leverage, measured either as total debt to assets or short-term debt to assets. Column (1) presents the estimates for equation 4.5, and columns (2) and (3) jointly for equation 4.6; likewise for columns (4) to (6). t-statistics in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Column 1 shows that, conditional on the values of the control variables, leverage is around five percentage points higher in the period 1942–1948 than in the period 1938–1941. Given the average leverage ratio of 33.4% for the 1938–1941 period, this corresponds to a relative increase of 15%. This shows that in the presence of corporate taxes, firms attracted substantially more debt. The estimates for the interaction model in columns 2 and 3 show that this increase can be fully explained by changes in the determinants of leverage. We conclude that the tax changes did not only change the average use of debt by Dutch firms; they also changed firms' considerations in determining their debt levels. We discuss the most prominent observed changes.

For the variable profitability, we find that during the period prior to the corporate tax, the preference for internal funds was important. Firms with more profits used significantly less debt, funding their activities without

available data.

resorting to external finance. However, after the introduction of the corporate tax firms had an incentive to avoid taxes if they were profitable. This is why the coefficient on profitability is no longer significantly negative. The fact that tangibility, the firm's ability to put up collateral when borrowing, is no longer significant highlights the same change in consideration. That is, we observe a significant shift from considering bankruptcy costs to tax incentives to increase debt use. An additional reason why collateral is no longer significant is the fact that in the period 1942–1948, new capital goods were less available than before. The ageing stock of fixed assets may thus have become increasingly unfit for the purpose of collateral in the course of the Second World War and the early post-war years.

Additionally, we find that after the introduction of corporate taxes, firms that paid dividends used approximately 4.4 percent more debt. This finding is quite intuitive as firms that are able to pay a dividend (especially during a war) are sufficiently profitable and therefore have an incentive to avoid taxes. Dividend payers also have better access to financial markets to increase their debt use without increased costs.⁴⁸ Consistent with our earlier results, we find that conservative firms — i.e. those firms that are openly willing to depreciate faster — use less debt. That is, rapid depreciation is a substitute for increasing the firm's tax shield by attracting more debt.

While we conclude that there was a significant shift in capital structure policies following the tax change, we also need to understand the components of this change. To this end we repeat — in columns 4, 5 and 6 of Table 4.10 — the analysis for the firms' short-term debt ratios. As mentioned, short-term debt will have been the most flexible component of corporate debt during most of World War Two and the early reconstruction years. We find that on average firms increased their short-term leverage by approximately four percentage points; in relative terms, this implies an increase of 16.7%. When we allow the determinants of short-term leverage to change over time, the level effect is again fully absorbed by the changes in the other coefficients. We conclude that the tax changes did not only change the average use of short-term debt but also its determinants.

⁴⁸Paying dividends is a signaling mechanism about the firm's permanent earnings; this positive signal allows it to obtain debt at lower cost. See Leary and Michael (2011) for an overview.

As in the analysis of total leverage, we find that profitability is a negative determinant in the 1938–1941 period while it is insignificant in the 1942–1948 period. This result is in line with the hypothesized effect of corporate taxation. The independent variables that relate to fixed assets — tangibility, depreciation, and conservatism — show the most pronounced differences with the estimations for total leverage. The role that fixed assets play as collateral is generally most relevant for long-term debt, since short-term debt is often uncollateralized or collateralized by financial assets. Therefore, we no longer find a positive coefficient for tangibility; in fact, the negative coefficient indicates that firms with ample collateral will substitute long-term debt for short-term debt. An alternative way to view this is as a form of maturity matching: the policy of coupling long-term debt with fixed assets, and short-term debt with current assets. This same maturity matching is also visible from the negative coefficient of annual depreciation: firms that depreciate more will have less fixed assets on their balance sheets and thus will more quickly attract short-term debt. The conservatism dummy is the only variable except profitability that has a significantly different coefficient in the two periods. As in the model for total leverage, we believe that this is a reflection of the substitutability of debt tax shields and non-debt tax shields (DeAngelo and Masulis, 1980).

The overall conclusion from Table 4.10 is that leverage increases once the corporate tax is in place, but that this is fully explained by the changes of its determinants. Most importantly, whereas profitability is negatively associated with leverage in the years up until 1941, it is insignificant thereafter. This points to the importance of the role of debt as a tax shield, as hypothesized.

Subsequently, we examine the speed at which firms adjusted their capital structure in the wake of the introduction of the corporate tax. Table 4.11 shows the results of the partial adjustment model. Panel A presents the coefficients of both short-term and total leverage in the model of equation 4.7, using the approach of Fama and MacBeth (1973) and allowing for heteroskedasticity and autocorrelation for up to the second lag. The fitted values from this model serve as the target leverage ratios used for panels B and C. These panels present the adjustment speeds that we find by estimat-

ing equation 4.8, where panel B presents the results for total debt to assets and panel C presents those for short-term debt to assets.

We find that the average capital structure adjustment speed of total leverage (short-term leverage) increases by a factor 2.6 (2.7) following the introduction of the 1942 corporate tax. This finding is consistent with our hypothesis that firms have an increased incentive to increase their use of debt to avoid taxes when their deviation from their target debt level is larger. Consistent with prior literature (Byoun, 2008; Faulkender et al., 2012), we find that there is an asymmetry between firms that operate above their target debt and firms that are below target debt. That is, the observed increase of the average adjustment speed is primarily driven by firms that are operating below their target debt. We find that on average firms increase their leverage (short-term leverage) approximately 2.5 (3.6) times more quickly following the introduction of the corporate tax when operating below their target debt. When faced with an increased incentive to reduce the tax burden, firms will thus adjust more quickly towards their target debt when operating below their target because of sufficient debt capacity.

As discussed, the dividend cap may have had an offsetting effect on the desire to increase debt levels, especially for firms that paid dividends above 6 percent until 1941. To examine whether this is reflected in capital structure adjustment speeds, we calculate this speed separately for two groups of firms, based on their dividend policies in 1938–1941. We find that firms that paid less or equal to (more than) 6 percent dividends increased their adjustment speed by a factor 2.7 (1.4) from 1942 onwards. Firms that were most affected by the dividend cap had an incentive to issue more equity, thereby reducing their leverage. Indeed we find that those firms increased their adjustment speed much less than others following the introduction of the corporate tax. This highlights that the dividend cap increased capital structure adjustment costs, leaving firms below their target debt.

Our analysis in this section warrants three conclusions. First, capital structures changed significantly in the wake of the introduction of corporate taxes in 1942. Second, the new taxes imposed by the Nazi regime prompted a significant change in how firms determined their capital structure, where considerations on the firm's tax shield replaced considerations on

Table 4.11: Capital Structure Adjustment Speeds

Panel A: Estimation of Target Debt

	Profitability	Tangibility	Firm size (log)	Dividends (0/1)	Liquidity	Depreciation	Conservatism	R-Squared	Observations
Total Debt / Assets	-0.336*** (-3.463)	0.152*** (4.999)	0.039*** (5.573)	0.012 (1.613)	-0.052*** (-4.592)	0.133 (0.733)	-0.044 (-1.544)	0.210	1,881
Short-term Debt / Assets	-0.290*** (-5.816)	-0.220*** (-5.384)	0.019** (3.079)	0.034** (3.119)	-0.011 (-0.581)	0.744*** (4.995)	-0.116*** (-5.538)	0.270	1,881

Panel B: Adjustment Speeds - Total Debt

	Baseline Estimation			Below (a) / Above (b) Target Debt			Dividends $\leq$ 6% (a) / $>$ 6% (b)		
	Full Period	1938-1941	1942-1948	1938-1941	1942-1948	1942-1948	1938-1941	1942-1948	
β	0.114*** (3.327)	0.072*** (3.022)	0.187*** (8.650)						
β_a				0.044*** (6.560)	0.121*** (2.644)	0.058*** (3.560)	0.155*** (6.717)		
β_b				0.209*** (6.193)	0.224*** (6.357)	0.174*** (6.482)	0.249*** (8.076)		
Observations	1,461	1,461			1,461		1,461		
R-Squared	0.106	0.131			0.152		0.144		

Panel C: Adjustment Speeds - Short-term Debt

	Baseline Estimation			Below (a) / Above (b) Target Debt			Dividends $\leq$ 6% (a) / $>$ 6% (b)		
	Full Period	1938-1941	1942-1948	1938-1941	1942-1948	1942-1948	1938-1941	1942-1948	
β	0.127*** (2.789)	0.082** (2.461)	0.219*** (7.639)						
β_a				0.058*** (3.136)	0.206*** (3.823)	0.070** (2.581)	0.182*** (5.996)		
β_b				0.223*** (6.520)	0.224*** (5.861)	0.189*** (7.750)	0.287*** (7.445)		
Observations	1,461	1,461			1,461		1,461		
R-Squared	0.107	0.134			0.148		0.145		

Panel A presents estimates of the Fama-French model of equation 4.7 to estimate target leverage ratios. Panel B and C present the estimated adjustment speeds, following equation 4.8. The grouping of dividends above or below 6% is on the basis of average payout for 1938-1941. t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

bankruptcy costs. Third, the tax changes prompted a significant increase in capital structure adjustment speeds, primarily for firms with sufficient debt capacity. Overall, we conclude that the capital structure was the primary mode through which Dutch firms avoided the increased tax burden.

4.7 Conclusion

The early years of the Nazi occupation saw a number of far-reaching changes to the Dutch corporate tax code, many of which were unforeseen before the war and unrelated to the performance of the Dutch economy. For this reason, we believe that this period in Dutch history provides an interesting setting to add a historical perspective to the academic debate about the effects of corporate taxes on investors and firms. This chapter discusses in detail the nature of corporate tax changes that took place during World War Two and the context in which these changes were implemented. The chapter then quantitatively studies the effects of the changes in corporate taxation from two angles: that of firms' valuations on the stock market, and that of firms' corporate financial strategies.

We estimate the amount of firm value lost by studying stock price reactions to two key announcements of tax increases. These announcements are a lecture by *Generalkommissar* Hans Fischböck on 8 November 1940 warning of higher taxes on business, and the publication on 4 May 1942 of a resolution introducing three new taxes on business, by far the heaviest of which was the *Vennootschapsbelasting 1942*. We find that investors lost more than 200 million guilders, an amount that equals between three and four percent of Dutch GDP at the time. Other approaches and a series of robustness checks indicate even higher amounts.

We study whether the firm-level cumulative abnormal returns can be related to firms' characteristics. Our results show that the loss of firm value in response to Fischböck's November 1940 lecture was fairly uniform: none of the independent variables yields a significant coefficient, and the fit of the model is very low in all specifications. On the other hand, cumulative abnormal returns around the event of May 1942 indicate that investors anticipated that the new taxes would cost some firms more dearly than others. Specifi-

cally, we find that more value was lost by firms that paid higher dividends, whereas it was lower for firms that were more profitable, had more long-term debt, and pursued more conservative depreciation policies. The latter two effects suggest that investors were aware of the value of the tax shields that leverage and depreciation policy may yield to firms in the face of corporate taxes.

A study of listed firms' annual accounts from 1938 to 1948 provides little evidence that earnings management played a role in the response to the new corporate tax. On the basis of historical sources we identify the main techniques that may have been used for the manipulation of profits, and then follow the development over time of the related accounting categories. Of these, depreciation costs are generally modest and do not show an increase over time. Tax-deductible reservations for staff- and pensions funds do increase from 1942 onwards, with a marked dip in 1944–1945, but these reservations generally are very small. Therefore, even if such techniques were occasionally used to decrease taxes, their effect cannot have been economically meaningful.

In contrast, we find that debt tax shields did play an important role, testified by the development of capital structures in the period 1938–1948. Conditional on a constant relation between leverage and other firm characteristics, we find that leverage increases by five percentage points from 1942 onwards. When we allow the determinants of leverage to change over time, we find that this increase is fully explained by the changing relation between leverage and other factors. In particular, whereas profitability is negatively related to leverage ratios before 1942, this relation is insignificant thereafter. This is consistent with theories of capital structure that assign an important role to the tax-deductibility of interest costs (Modigliani and Miller, 1963).

Moreover, when we study the development of leverage in the context of a partial adjustment model, we find that firms adjust leverage ratios much more quickly once corporate taxes are in place. The speed of adjustment increases by approximately a factor 2.5 to a value around 0.2; an estimate that is quantitatively in line with similar studies in a modern-day context. The increase of the capital structure adjustment speed is largest among firms that have leverage ratios that are below target, again suggesting that debt

tax shields played an important role in this process.

Overall, our results show that the introduction of corporate taxes in the occupied Netherlands induced significant and economically relevant losses for shareholders and prompted firms to use more leverage. Our chapter thereby contributes to the ongoing debate on the stock market effects of corporate taxes and the importance of taxes in corporate financial decisions. Whereas some contributions to this debate state that taxes are at best of secondary importance to investors' valuations and to firms' financial strategies (Cutler, 1988; Myers, 2001), others attach more importance to corporate taxes (Gordon and Lee, 2001; Faccio and Xu, 2015). Our chapter demonstrates that — even in dramatic times such as World War Two — fiscal motives played a role in firms' and investors' financial choices.

Our analysis suggests two ways forward for future research. Firstly, since our analysis has focussed largely on listed corporations, one question is whether privately-owned corporations were affected in the same way by the corporate tax changes. As our discussion highlights, one goal of the Nazis was to induce smaller corporations to change into partnerships or other unlimited liability structures. Although this response was rare among firms with a listing on the stock market, for smaller corporations this may have been more common (Dijker, 1946; Klemann, 2002). One open question is therefore how many such transformations were induced by the wartime tax changes, and to what extent this option was seen as a substitute or a complement to strategies concerning earnings management and capital structure.

Secondly, our analysis has highlighted the importance of fixed assets for firms' depreciation policies and capital structures, as the extent to which firms could generate debt tax shields was limited by the collateral available for borrowing. Both during World War Two and in the immediate post-war years, shortages meant that capital goods were less readily available, and the access to such goods was increasingly determined by governmental allocation (Barnouw and Stellinga, 1978; de Jong, 1999). For this reason, the extent to which firms were able to generate tax shields will have depended on their access to capital goods through non-market means. More information on firms' board networks, and their role in wartime and post-war production processes, could therefore serve to paint a more complete picture of how the

incidence of the World War Two tax changes differed between firms.

Chapter 5

Legislative Tenure and Electoral Tenacity in Canadian Politics*

5.1 Introduction

We remunerate politicians for many reasons, for example, to facilitate the entry of poorer people into politics, to discourage self-dealing by elected officials, and to encourage talented individuals to enter and remain in politics. This chapter concentrates on the last of these dynamics, that is, the link between how and how much legislators are compensated and how long they stay, or try to stay, in office. The standard economic assumption is that talented individuals enjoy attractive options in the outside economy. It follows that these individuals will not enter and remain in politics unless they are sufficiently compensated for doing so. This entails compensating individuals not only for the opportunity cost of a potentially more lucrative outside career, but also for the greater insecurity of a political career.

It was precisely this logic that encouraged the Canadian Parliament in 1953 to provide its members with generous defined benefits (DB) pensions.¹

*This chapter is joint work with Daniel Irwin and Christopher Kam.

¹A note on pension jargon: A *defined benefits* pension pays the employee a monthly or annual benefit (which might be indexed to inflation) for the remainder of the employee's lifetime. The total amount that is paid to the employee under a DB pension scheme is

The prime minister of the day (Rt. Hon. Louis St. Laurent) justified the measure as one that would “strengthen our parliamentary institutions” by “encourag[ing] the right kind of men to run for public office, and afterwards, when they had acquired experience, *to remain in public life as long as their constituents wished them to do so*” [our emphasis] (*Debates (Hansard)*, 25 June 1952, 3678). Agar Adamson, who spoke for the Opposition, largely agreed with the Prime Minister’s position: professionals could not be expected to give up the security of their careers and enter the House unless a pension scheme was effected to offset the inherent riskiness of a political career (*Debates (Hansard)*, 25 June 1952, 3687). At about the same time and for similar reasons many provincial legislatures also began to provide their members with DB pensions. However, an economic downturn in the 1980s and 1990s made parliamentarians’ DB pension plans appear inordinately generous. The three provinces that we study alongside the Canadian federal parliament (Ontario, Saskatchewan and Manitoba) responded to these pressures by converting legislators’ DB pensions into far less generous defined contributions (DC) plans. The Manitoba legislature subsequently reversed this decision and re-adopted DB pensions on the argument that DC pensions had discouraged individuals from running for and staying in office.

We consider the impact of changes in legislative pension regimes on legislators’ tenure in office and eagerness to seek re-election. We call the latter quality — the propensity of a legislator to stand for re-election — “electoral tenacity”. Our research design exploits the fact that pensions were adopted, adapted, and repealed at somewhat different times in the Ontario, Saskatchewan, and Manitoba legislatures than they were in the federal House of Commons. This variation allows us to specify a duration model of legislative careers that provides us with difference-in-difference estimates of the impact of these changes on legislative tenure and electoral tenacity. Our results indicate that the average effect of DB pensions was to increase the

thus open-ended. In contrast, a *defined contribution* pension consists of a finite fund that is built up via employer and employee contributions over course of the employee’s career. On retirement, this fund is delivered to the employee who may draw on it as they please until they die or the fund is exhausted. Pension plans typically require that an individual makes contributions for some initial period of time before they secure full claim on the plan’s privileges. This initial period is known as a *vesting* period, and at the end of this period employees are said to be *vested*.

median legislative tenure by 32-40 months. Our results suggest that this increase was mainly due to an increased propensity to seek re-election among first- and second-term members. This increased propensity to stand for re-election did not extend beyond the second term of office, however. This pattern of results is consistent with the argument that the member has a strong incentive to remain in the legislature until vested in the pension plan, but that this incentive subsides once the member is vested. Our initial analysis also finds evidence to indicate that these effects were reversed when DB schemes were converted into DC pension schemes, with the conversion to DC pensions substantially increasing the hazard of retirement among first-term legislators. This latter result does not survive a placebo test, however, and we conclude that the conversion from DB to DC pensions had no effect on legislative tenure or electoral tenacity. In contrast, the effects of DB pensions are robust to our placebo tests.

We care about the length of legislators' tenure because of its presumed connection to quality of the political representation. Ideally, legislators enjoy sufficient job security and time in office to hone their skills as public representatives, develop policy expertise, and take a longer view of political issues. In Canada, however, short legislative tenures and chronically high rates of turnover are said to have undercut the capacity and continuity of the country's federal and provincial legislatures (Franks, 1987; Atkinson and Docherty, 1992; Moncreif, 1998; Kerby and Bildook, 2011). In consequence, it is important to understand whether the adoption of DB pensions in these legislatures worked as intended, and further what were the consequences of their abolition. In doing so, we contribute to public debate about how and how much politicians ought to be compensated. The widely-held view in many countries is that politicians are overpaid. A dispassionate assessment of the impact of politicians' remuneration on their length of tenure is a useful counterweight to this sort of populist trope, serving either to inform a sound defence of these policies or provide a reasoned basis for their reform. Regardless, the quality of debate on the issue stands to be improved.

5.2 Related Literature

The broader literature provides no definitive answer as to how elected officials respond to changes in compensation. Certainly, there are studies that are consistent with the economic notion that employment tenure is affected by the level of remuneration. Cooper and West (1981, 290-292), for example, cite low pay levels as an important factor in U.S. Congress members' retirement decisions. Similarly, Groseclose and Krehbiel (1994) show that the revocation in 1989 of an obscure rule that allowed retiring Congress members to keep the amounts in their campaign war chests for themselves induced a number of members to retire earlier than they might have otherwise. Ferraz and Finan (2008) use a regression discontinuity research design to show that pay increases led Brazilian municipal politicians to extend their tenures in office. Fisman et al. (2015) show that the harmonization of salaries of members of the European Parliament (which implied significant raises for deputies from some countries, like Romania, and no raise for deputies from other countries) led to more persistence in running for re-election.

Equally, there are papers that question the extent to which elected officials respond to remuneration levels. Hall and van Houweling (1995), for example, specifically dispute Groseclose and Krehbiel's conclusion. Indeed, Diermeier et. al.'s (2005) long-run analysis of congressional careers indicates that Congress members respond only marginally to changes in salary. The latter result jibes with a good deal of literature, Canadian as well as American, that stresses that voluntary retirement by elected officials is largely due a personal sense of inefficacy and frustration and burnout (e.g., Frantzich, 1978, 262-265; Docherty, 1997, 237; Hibbing, 1982; Atkinson and Docherty, 1992; Theriault, 1998; Kerby and Bildook, 2011). Kerby and Bildook (2011) also point out that pensions do not necessarily induce members to stay in office; for older members who are fully vested, a lucrative pension may operate as an incentive to leave office. Their results were not consistent with this latter dynamic, however.

5.3 An Overview of Parliamentary Remuneration in Canada

5.3.1 The Federal Parliament

Prior to 1953, members of the Canadian Parliament (ministers excepted) were compensated via a *sessional indemnity*. The indemnity took the form of a per diem that was paid to the member for each day the House was in session up to a cap that depended on the length of the session. There was no pension scheme whatsoever. The amount of the per diem and the overall cap were periodically adjusted, but the essential features of this compensation scheme remained intact until July 1952. At that time, the government (with cross-party but not unanimous support) made two major changes to the way that Canadian federal parliamentarians were compensated. First, an amendment to the *Parliament of Canada Act* converted the sessional indemnity into an annual salary.² Second, and more substantially, the government passed the *Members of Parliament Retirement Allowances Act*. The Act provided members and Senators with defined benefits pensions contingent on their length of service and their parliamentary salary (which was higher for ministers, speakers, whips and committee chairs). The Act came into effect on 20 November 1952.³

Rates of accrual and compensation were initially such that members reached their maximum pensions (75 percent of their three best years' average salary) after 25 years service. These terms were comparable to those enjoyed by federal civil servants at the time. However, unlike civil servants, members qualified for their pensions after serving in two Parliaments (i.e., on securing re-election), and they were eligible to collect those pensions imme-

²Confusingly, the amounts paid to MPs were — and still are — called sessional indemnities to reflect the fact that MPs (unlike ministers) are not servants of the Crown. The conversion from sessional indemnities to salaries was revenue-neutral in that the amount that members were paid was simply made independent of the length of the session and paid out in twelve monthly installments rather than daily.

³The terms of the *Members of Parliament Retirement Allowances Act* applied only to members who took office after 20 November 1952. However, the Act offered sitting members the option of joining the pension plan by making contributions (plus interest) for prior service. We do not know how many members took up this offer, but we assume that any member who served in the 1949–1953 Parliament and stood for re-election in 1953 did so because it was well worth their while to do so.

diately on their departure from the House. These were exceedingly generous terms in as much as a forty year-old ex-member could conceivably receive a pension for life (albeit a modest one) after serving just 2-3 years in the House. In 1981, the rates of accrual and compensation for members were increased to 5 percent per year such that members (but not Senators) reached their maximum pensions (75 percent of their salaries) after 15 years service. The vesting (i.e., qualifying) period was also changed from “on re-election” to six years service. The rationale for these changes was that, on the one hand, parliamentary careers were so short that few members qualified for the maximum pension, but on the other hand, it was unseemly for members who had served just a few years in the House to collect life-time pensions. The generosity of the scheme was scaled back in 1995 in response to poor economic conditions: rates of accrual were adjusted such that members reached the maximum pensions after 19 years of service, and members were no longer permitted to collect their pensions immediately after leaving the House; they had to wait until they were 55.⁴

5.3.2 The Ontario Provincial Parliament

The history of parliamentary compensation in the Ontario provincial parliament is similar to that of the federal parliament in that a system of sessional indemnities paid out as a per diem changed over time into a system of salaries and DB pensions. The pace and pattern of reform was different in three respects, however. First, salaries (and just salaries, not pensions) were introduced in the Ontario parliament in 1949, four years in advance of their introduction to the the federal parliament. Second, parliamentary pensions in Ontario were introduced subsequently in April 1960 rather than simultaneously as in the federal parliament. Under the terms of the *Legislative Assembly Retirement Allowances Act, 1960*, Ontario members were vested in the plan after 10 years of legislative service and eligible to receive a full pension at 55 years of age. The pension reached its maximum value of 75 percent of the member’s six best years average annual salary after 25 years of service. In 1970, the time to vest was reduced to 5 years. Third,

⁴Further changes were made to the *Members of Parliament Retirement Allowances Act* in 2011, but these changes fall outside the study period.

and in a stark departure from the practice in the federal parliament, the Ontario members' DB pension plan was converted in June 1995 into a DC plan. The net effect of this last reform was financially significant. As the Osborne Report (2006, 8) noted,

The collateral effect [of the conversion to a defined-contribution plan] was that members from 1995 forward had virtually no pension plan if one were to recognize the purpose of such arrangements to be the provision of some income security in their retirement years for members who were defeated or who retired.

Nor, as a subsequent report on the pension changes noted, were members elected prior to 1995 necessarily grandfathered in; members whose rights under the former pension plan had not fully accrued in 1995 also suffered financially in the 1995–1996 pension conversion (Osborne, 2006, 8 n.4). Thus, the major difference over time in the compensation of federal and Ontario members concerns their pensions arrangements: Ontario legislators did not have a DB pension until 1960, seven years after one had been adopted in the federal parliament, and did not have one from June 1995 onward.

5.3.3 The Saskatchewan Legislative Assembly

Saskatchewan legislators also started out being paid via a sessional indemnity, albeit one that was paid out at a flat rate regardless of the session's length.⁵ Following the federal parliament's example, the Saskatchewan legislature adopted DB pensions for its members in 1954. Vesting initially occurred after three years of service, but this requirement was lowered to just one year in 1965. The pension accrued at 2 percent of the average of a member's five best years of salary, multiplied by the number of sessions they contributed, up to a maximum of 20 sessions. The maximum annual payment was capped at \$3,000 (subsequently increased to \$4,200 in 1962). As in Ontario, retiring Saskatchewan members could not collect their pensions until they reached 55 years of age.

⁵This structure meant that the conversion of the sessional indemnity into a salary in 1972 was largely a formality; it did not even alter (as it did to an extent in Ottawa and Ontario) the variance in members' compensation.

By the late-1970s the Saskatchewan government foresaw that it would soon be unable to meet its public sector pension obligations. Part of the government's response to this situation was to convert legislators' DB pensions into a DC plan in February 1979. Under this new plan, members contributed to a money purchase plan. The province matched the member's contribution and the resulting sum was used to purchase a life annuity at retirement, with benefits determined by prevailing annuity rates. Members elected prior to 1979 were grandfathered into the more generous DB pension plan (Chan, 1981). Thus the major difference over time in pension arrangements in the federal parliament and the Saskatchewan legislature is that from 1979 onwards incoming cohorts of Saskatchewan legislators no longer enjoyed DB pensions.

5.3.4 The Manitoba Legislative Assembly

A DB plan was made available to members of the Manitoba legislature only in 1967. Members were vested once they had served in three terms and were eligible to collect their pension at 50 years of age. The pension accrued at 3 percent of the average salary earned by the member during their last ten years in the legislature (or as many years as the member has served if less than ten). Benefits were capped at a maximum of 70 percent of the member's 10-year average salary.

Minor revisions to these terms were made in 1974 and 1980;⁶ wholesale change was effected in April 1995 when — as in Ontario — the plan was converted to a DC scheme. In contrast to Ontario, however, only incoming legislators were subject to the terms of the new plan; sitting members were grandfathered in to the old DB plan. Moreover, in June 2004 the policy was reversed and Manitoba legislators were once again offered a DB pension. The re-established DB plan did not displace but co-existed alongside the DC plan. However, members who had entered the legislature after 1995 were allowed to transfer their pension contributions into the DB plan — and it was financially worthwhile to do so.⁷

⁶The vesting requirement was modified to be three terms *or* eight years service (whichever was less), and members could collect their pensions provided that their age plus years of service in the legislature exceeded 55 years.

⁷See <http://www.reviewcommissioner.mb.ca/report04.pdf>. In the absence of infor-

Table 5.1 summarizes the variation in pension arrangements over time across these four legislatures.⁸ We use the variation in these arrangements to assess the impact of pensions on parliamentary tenure and electoral tenacity. The timing of the changes in pension regimes in these legislatures is such that we are able to consider, first, the impact of the adoption of DB pensions in the pre-1978 period; and second, the impact of transitioning from DB to defined-contribution pensions in the post-1978 period.

5.4 Conceptual Framework

In our framework of legislative careers the member decides at every point in time (or alternatively, at every election) whether to try to stay in parliament or to work in the outside economy. The member chooses between these two career choices by comparing the expected present utility value of a (continued) parliamentary career to that of a career in the outside economy. Our framework is closely related to that of Diermeier et al. (2005) except that we view the outside economy as one sector instead of two separate sectors (i.e., private and public), but this is not a fundamental difference. The flow of utility of employment in either politics or in the outside economy consists of two parts: a monetary pay-off (W) and other non-monetary utility (α). The latter is derived from things like status, the accomplishment of policy objectives, or simply the extent to which the individual enjoys their work. We allow this non-monetary utility to differ by individual i . Streams of future expected utility are discounted at a rate $r \in (0, 1]$. In this case the two present value utilities (PVU) that a legislator compares are:

$$PVU_i^{POL} = \int_{t=0}^{\infty} \exp(-r^{POL}) [W_t^{POL} + \alpha_{it}^{POL}] dt \quad (5.1)$$

mation as to which sitting Manitoba MLAs opted into the re-established DB plan, we assume that all did so.

⁸We limit our sample to these four legislatures mainly because these are the four legislatures that led the way in policy terms (e.g., the federal parliament first adopting pensions, and Saskatchewan first converting from DB to DC pensions). However, the size of the legislatures is also a consideration; the federal parliament and the Ontario legislative assembly are the the largest legislatures in country, and this provides statistical power to our analysis. By comparison, the legislatures of the four Atlantic provinces were not only less innovative in this policy area, they are also quite small — and that limits what they can contribute to this analysis.

Table 5.1: Pension Arrangements in the Federal, Saskatchewan, Ontario, and Manitoba Legislatures over Time

	pre-1953	1953	1954-59	1960-66	1967-78	1979-94	1995-2003	2004-
Federal	None	DB	DB	DB	DB	DB	DB	DB
Saskatchewan	None	None	DB	DB	DB	DC	DC	DC
Ontario	None	None	None	DB	DB	DB	DC	DC
Manitoba	None	None	None	None	DB	DB	DC	DB

DB = Defined Benefits
DC = Defined Contributions

$$PVU_i^{OUT} = \int_{t=0}^{\infty} \exp(-r^{OUT}) [W_t^{OUT} + \alpha_{it}^{OUT}] dt \quad (5.2)$$

where the superscripts *POL* and *OUT* refer to careers in politics and the outside economy, respectively.

We assume that that $\alpha_{it}^{POL} > \alpha_{it}^{OUT}$ at the outset of the legislator's career (else nobody would enter politics) and that $r^{POL} > r^{OUT}$ because a career in politics involves substantially more risk, notably the risk of failing to secure re-election. We also assume that W_t^{OUT} and α_{it}^{POL} vary over time in ways that accord with two observations in the literature. The first observation is due Diermeier et al. (2005), who show that the wage that US Congress members can obtain in the outside economy (W_t^{OUT}) increases with legislative tenure (albeit with diminishing marginal returns). The second observation is due to Kerby and Bildook (2011), who show that Canadian federal members often leave politics due to disappointment with their parliamentary accomplishments. The satisfaction of a parliamentary career thus appears to decrease with tenure. We incorporate the first observation into our framework by making W_t^{OUT} an increasing and concave function of t . We incorporate the second observation into our framework by making α_{it}^{POL} a decreasing and convex function of t . These effects are shown in Figure 1, with the legislator's present value utility functions intersecting at t^* . Prior to t^* the legislator prefers to be in politics, but from t^* onwards, the legislator prefers to leave politics. This is not only due to the growing disappointment with a political career that we mentioned above, but also because parliamentary experience may improve the legislator's options in the outside economy. Note well that the precise time at which t^* is reached still varies by individual, and indeed for some individuals the two curves may never intersect.

5.4.1 The impact of pensions on tenure

The most straightforward way to think about the introduction of DB pensions is as a decrease of r^{POL} . This is because a parliamentary pension makes a political career less risky, acting as it does as insurance in the case of an electoral defeat. This is especially true if there are no age restrictions on the pension, and the legislator can draw on the pension immediately after

Figure 5.1: Present Value Utilities Intersecting at t^*

leaving politics. In theory, a decrease in r^{POL} shifts PVU_i^{POL} upward and t^* outward. The effect is illustrated in Figure 2, with the political utility curve shifting up from $PVU^{POL|No\ DB}$ to $PVU^{POL|DB}$ and the timing of the legislator's exit from politics shifting rightward from $t^{*|No\ DB}$ to $t^{*|DB}$. The main effect of adopting a DB pension plan is thus to induce legislators to delay their retirements and extend their political careers. Note further that absent a pension the legislator stands for re-election only until $t^{*|No\ DB}$ whereas under the pension scheme the legislator stands for re-election until $t^{*|DB}$. The ancillary effect of DB pensions, then, is to increase legislators' propensity to contest elections (rather than retire in advance of them) — or as we phrase it — to increase their electoral tenacity.

Figure 5.2 also helps us to understand the impact on legislators' tenures of converting the pension scheme from DB to DC. To the extent that DC plans are less generous than DB plans — that is true, both generally and in these cases specifically — converting a DB scheme into a defined-contributions scheme implies exactly the opposite dynamic, i.e., a downward shift in the political utility curve and a leftward shift in t^* . In straightforward terms, then, we expect legislators to retire earlier under defined contributions plans

than under DB plans.

The legislator's propensity to stand for re-election — a quality that we call electoral tenacity — is implicit in this framework. If the legislator wishes to remain in office until t^* , and t^* extends beyond one term of office, the legislator will have to stand for re-election. In this regard, we can expect the introduction of DB pensions to increase electoral tenacity, and the conversion from DB to DC to reduce it. Indeed, to the extent that electoral tenacity is the main mechanism by which legislators can extend their careers, finding that electoral tenacity changed in response to changes in pension regimes is crucial to establish the basis of any relationship between legislative pensions and tenure.

Figure 5.2: The Impact of DB Pensions on Legislators' Careers

5.5 Empirical Strategy

5.5.1 Research Design

Figures 5.1 and 5.2 imply that the timing of the legislator's voluntary departure (i.e., t^*) is as much a function of the present value the legislator derives from an outside career as from a parliamentary one. Put differently, a rightward shift in t^* could be due to an increase in PVU^{POL} or decrease in

PVU^{OUT}. This impairs our capacity to evaluate the effect of parliamentary pensions on the length of members' careers. If parliamentary careers grow longer after the introduction of DB pensions, it may be because the improved remuneration encouraged legislators to stay somewhat longer in office. Alternatively, longer parliamentary careers may be a function of a deterioration in outside career options.

We can use a number of readily available variables to control for the costs and benefits of parliamentary life (e.g., we can use ministerial status to measure the prestige and policy influence that a legislator enjoys), but it is far more difficult to estimate the present value of legislators' outside options. One possible measure of the legislator's outside earning capacity, the legislator's occupation prior to entering politics, has several obvious shortcomings. First, many legislators provide generic and uninformative descriptions of their prior careers, e.g., as "self-employed" or "in business". These labels could describe a struggling small business owner or a wealthy capitalist. Second, the relevance of a legislator's prior profession to their economic opportunities after politics probably varies in a complex fashion with the time the legislator spent in office and the nature of their parliamentary role. Legislators who were tenured professors, for example, may be able to return smoothly to their old jobs, whereas legislators drawn from highly regulated sectors may find themselves cut off from their old professions after even just a few years in Parliament.

Instead of trying to find an adequate measure of legislators outside earning potential, we address the matter by comparing the tenure and electoral tenacity of legislators across similar jurisdictions. The essential logic of this comparison is that the abolition of DB pensions in the Saskatchewan, Ontario, and Manitoba can induce legislators only in those jurisdictions to curtail their parliamentary tenures. If federal legislators shorten their careers at the same time and in the absence of similar changes to their pensions, it would suggest that factors other than the removal of DB pensions were responsible for Saskatchewan, Ontario and Manitoba legislators leaving office. It is thus the difference in the tenure of legislators across these four jurisdictions following a change in the pension regime that identifies the impact of the pension regime on the length of parliamentary careers. In statisti-

cal terminology, this is called a difference-in-differences estimator (Angrist and Pischke, 2009). A similar logic applies to the effects of adopting DB pensions in the 1950s and 1960s: it is the difference-in-differences between parliaments that allows us to identify the effect that adopting DB pensions had on electoral tenacity.

This approach is valid to the extent that Canadian federal and provincial legislators respond similarly to changes in compensation. This assumption accords with a model in which aspiring Canadian politicians are drawn from a relatively homogeneous set of individuals who subsequently sort themselves into federal and provincial spheres based on opportunities (e.g., the nomination for federal or provincial candidacy coming open) and policy interests (e.g., national defence or provincial education) that are unrelated to their underlying earning potential in the outside economy. When these individuals leave politics, they enter a common market for “used politicians”. Thus, shocks to this unobserved market for used politicians have a similar impact on the career decisions of members of all four legislatures. This model is well-suited to the Canadian context, where provincial and federal political careers operate in parallel rather than provincial careers serving as stepping stones to federal politics (Barrie and Gibbins, 1989). Indeed, nowadays the vast majority of provincial legislators are full-time, professional politicians who spend their entire careers in provincial politics. In addition, the organizational isomorphism of political parties’ federal and provincial wings in Canada means that federal and provincial candidates are often selected from and supported by the same set of individuals (Koop, 2011). Our assumption of candidates being drawn from a homogeneous set of individuals is thus well-founded.

Our research design operates by comparing the legislative tenure and electoral tenacity of politicians serving in legislatures that altered their pension arrangements to those who served in legislature(s) that did not alter their pension regimes. To be compelling, the basis of this comparison should be held constant, and for this reason we divide our data into two periods: June 1945 – April 1967, and May 1967 – April 2015. The first period represents the era in which legislatures first adopted DB pensions. The first period thus compares the legislative tenure and electoral tenacity of “treated” politicians

who received DB pensions to “control” politicians who received no pensions whatsoever. The second period represents the era in which legislatures began to transition from DB to DC plans. The second period thus compares the legislative tenure and electoral tenacity of “treated” politicians who received DC pensions to “control” politicians who continued to receive DB pensions. We appreciate that pooling the data from the two periods would provide a larger sample size and smaller standard errors, but it would also undercut our efforts to maintain the constant basis of comparison that is required to draw valid inferences from the data.

5.5.2 Data

We collected data on the parliamentary careers of all legislators who served in these legislatures between June 1945 and June 2015.⁹ Our data thus extend from eight years *before* the introduction of defined benefits pensions in the federal Parliament to nineteen years *after* the elimination of defined benefits pensions in the Ontario legislature. We configured these data as a panel, with the individual legislator serving as the unit of analysis, and with each legislator contributing one record for each month of their career. This generated a data set of 3,906 legislator-careers and 405,226 legislator-months. We might well have configured our data set so that it contained just a single record per legislator because only a small fraction of legislators (5.8 percent) experienced an interruption in their careers, e.g., suffering a defeat that kept them out of parliament for a term after which they returned. However, a key advantage of the panel structure of our data set is that it allows us to model the length of the legislator’s career as a function of time-varying variables. We can, for example, record precisely when a legislator is promoted to or demoted from cabinet, and condition the legislator’s decision to retire or remain in parliament on that variation. Note that legislators who served in any of the three provincial legislatures as well as in the federal Parliament enter the data set twice, once as a provincial legislator and once as a federal legislator. There are only 76 such individuals in our data set (2 percent

⁹See: <http://www.parl.gc.ca/parlinfo/default.aspx?Menu=Home>; http://www.ontla.on.ca/web/members/members_all.do?locale=en; <http://www.saskarchives.com/services-government/seld>; <http://www.gov.mb.ca/legislature/members/index.html>. All sites last accessed 3 October 2017.

of 3,830 individuals in total), however; excluding these individuals from the analyses below does not materially alter our results.

A key assumption of a difference-in-difference research design is that control and treatments units would follow similar trends in the absence of the treatment. While this counterfactual assumption cannot be directly tested, we can at least consider trends in the average age at which members first entered the legislature and their average career spans in the two terms just prior to the respective legislature's adoption of DB pensions. We focus on the two terms just prior to the adoption of DB because our concern is to establish that trends (not levels) in entry age and career length were fairly similar across these legislatures prior to the introduction of pensions. Our focus on the age of entry and length of tenure is due to King's (1981) argument that the age at which members enter and the time they spend in politics is an indicator of the individual's professionalism: those who enter the legislature late in life and stay only briefly are amateurs; in contrast, members who enter a legislature early in life and stay for long periods are professionals. The distinction between amateur and professional politicians is important in as much as professionals are more deeply committed than amateurs to maintaining their political careers.

Table 5.2 shows the average age (in years) at which members entered the legislature in the two terms prior to that legislature's adoption of DB pensions. There was a very slight increase in the average entry age of incoming legislators in federal parliament in the run-up to the adoption of pensions. In contrast, the average entry age of incoming legislators in each of the provincial legislatures declined somewhat. However, only in the case of Ontario was the decline statistically significant at $p < .05$.

Table 5.3 shows the average tenure (in years) of members who exited these legislatures in the two terms prior to the respective legislature's adoption of DB pensions. These data take no account of censoring. Still, they are sufficient to make two points. First, the length of tenure was stable in the federal parliament but increasing somewhat in the three provincial legislatures in advance of the adoption of pensions. In no case, however, was the increase statistically significant. *From a statistical perspective, then the length of careers was stable in the run-up to the adoption of pensions.* Second,

Table 5.2: Average Entry Age of Incoming Legislators in Two Terms Prior to the Adoption of Pensions

	2 terms prior	1 term prior
Federal	44.9 <i>9.7</i> (110)	45.1 <i>9.9</i> (186)
Ontario	45.9 <i>9.9</i> (36)	41.4 <i>5.3</i> (28)
Saskatchewan	47.9 <i>10.6</i> (47)	46.4 <i>11.8</i> (23)
Manitoba	45.2 <i>9.4</i> (18)	42.8 <i>6.7</i> (9)

Standard deviations in italics.
Number of observations in parentheses.

the average career length in each legislature was quite short in this period, ranging between just 7.3 and 10.5 years. The averages are, in fact, inflated in each case by a few lengthy careers; the median career length in these legislature was 1-3 years shorter than the average. The start of our sampling frame (eight years *before* the introduction of the first defined benefits pensions in the federal parliament) is thus sufficiently long to serve as a baseline to judge the impact of pensions on legislators’ tenures.

5.5.3 Methodology

Our methodological approach resembles that of Kerby and Blidook’s (2011) in that it is predicated on a survival (or duration) model of legislators’ careers. The model is based on the idea that all subjects — in our case, the members of the respective legislatures — stay in parliament until they (voluntarily) retire at a certain time t^* , which is called the failure time. Since our main interest is in the timing of the legislator’s retirement given the prevailing pension regime, we define the legislator’s voluntary retirement as a failure unless otherwise

Table 5.3: Career Length (in years) of Outgoing Legislators in Two Terms Prior to the Adoption of DB Pensions

	2 terms prior	1 term prior
Federal	9.1 <i>7.0</i> (97)	9.0 <i>6.4</i> (102)
Ontario	8.7 <i>5.4</i> (20)	10.5 <i>7.1</i> (32)
Saskatchewan	5.0 <i>3.0</i> (29)	7.3 <i>6.7</i> (19)
Manitoba	6.1 <i>5.6</i> (16)	8.8 <i>6.4</i> (18)

Standard deviations in italics.

Number of observations in parentheses.

noted. We appreciate that legislators may retire strategically, in anticipation of an electoral defeat, for example, but these subtleties are secondary to our efforts here.¹⁰ The main point is to distinguish parliamentary careers that end via retirement from those that end involuntarily due to defeat or death. The latter are censored at the time of exit, t . The logic in such cases is that we never observe t^* , the moment the legislator would have retired voluntarily; the only thing we know for sure is that the time at which the legislator would have retired voluntarily lies beyond the moment of the legislator's electoral defeat or death, i.e. $t < t^*$.

We estimate the impact of the pension regime on members' legislative tenure and electoral tenacity via a Cox Proportional Hazards model. The model casts the hazard of retirement for legislator i , $h_{ij}(t)$, as a function of a baseline hazard function, $h_{0j}(t)$, the pension regime in the parliament in which the legislator is active (PEN_{ijt}), a series of dummies denoting the

¹⁰The issue is a secondary one in that it concerns the mechanism by which pensions affect the length of parliamentary careers, and not whether such an effect exists. In contrast, our central concern is to establish whether the introduction and alteration of pensions altered the average length of parliamentary careers.

legislator's N^{th} term of office ($N^{th}TERM_{k,ijt}$), and a set of control variables ($\mathbf{X}_{ijt}$):

$$h_{ij}(t) = h_{0j}(t) \exp(\beta PEN_{ijt} + \sum_{k=1}^3 \gamma_k N^{th}TERM_{k,ijt} + \sum_{k=1}^3 \theta_k N^{th}TERM_{k,ijt} \times PEN_{ijt} + \alpha_{ijt}' \mathbf{X}_{ijt} + u_{ijt}) \quad (5.3)$$

We denominate analysis time, t , in months, and we stratify the baseline hazard by legislature j . This allows each legislature to have its own baseline hazard but constrains the coefficients to be equal across legislatures.¹¹

We estimate two versions of Equation 5.3. We use the first to estimate the impact of the DB pensions on legislative tenure and electoral tenacity. To do so, we confine the analysis to the period prior to May 1967 and replace PEN_{ijt} with a dummy variable $DB_{ijt} = \{0, 1\}$ that distinguishes between legislators who possess DB pensions ($DB_{ijt} = 1$) and those who do not ($DB_{ijt} = 0$). Given the time frame, $DB_{ijt} = 0$ identifies legislators who have no pensions whatsoever.

We use a second version of Equation 5.3 to estimate the impact of the conversion from DB to DC pensions on legislative tenure and electoral tenacity. We do so by confining the analysis to the May 1967 – June 2015 period, and we replace PEN_{ijt} with a dummy variable $DC_{ijt} = \{0, 1\}$ that distinguishes between legislators who have defined-contribution pensions ($DC_{ijt} = 1$) and those who do not ($DC_{ijt} = 0$). The time frame means that DC_{ijt} discriminates between legislators with DB pensions ($DC_{ijt} = 0$) and those with DC pensions ($DC_{ijt} = 1$).¹²

The interactions of the PEN_{ijt} variable with $\sum_{k=1}^3 N^{th}TERM_{k,ijt}$ test how pension arrangements effect legislators' electoral tenacity. $\sum_{k=1}^3 N^{th}TERM_{k,ijt}$ is a vector of dummy variables that indicate legislator's first, second and

¹¹This is akin to including legislature fixed-effects in a linear regression model.

¹²The subscripts on DB_{ijt} and DC_{ijt} indicate that pension status varies over legislature j , time t , and legislator i . Pension arrangements can vary over individuals in the same legislature because some legislators may have been grandfathered into DB pensions when the legislature converted to its pension scheme to a defined-contribution basis, for example. Sitting legislators were not mandated to enrol in their legislature's newly-adopted DB schemes, but as it would have been financially worthwhile for them to do so and as we lack information to the contrary, we assume that all legislators opt into a DB scheme when one is offered.

third-plus terms of office. We limit $\sum_{k=1}^3 N^{th} TERM_{k,ijt}$ to three terms for three reasons. First, our data come from a limited window of time on either side of changes in these legislatures' pension regimes. There is little point in extending this window of time because doing so increases the possibility of other time-varying factors coming to bear on the legislator's propensity to retire. Second, 75 percent of careers in these legislatures end on or before the legislator's third re-election bid. Third, even the most stringent vesting rules adopted in these legislatures effectively vested legislator on successfully securing a third term (i.e., after two successful re-election bids).¹³ Negative coefficients on the $\sum_{k=1}^3 N^{th} TERM_{k,ijt} \times PEN_{ijt}$ terms in Equation 5.3 indicate that legislators who enjoy the pension benefits in question (DB or DC as the case may be) are more inclined to serve out the N^{th} term than legislators who do not.

Ideally, $\mathbf{X}_{ijt}$ would include legislator-specific fixed effects to account for unobserved factors that might effect politicians' willingness to continue in the legislature or retire. Unfortunately, we cannot include legislator-specific fixed effects in the context of a Cox PH model. (Doing so would lead to biased estimates because of an incidental parameters problem.) This is a drawback. However, the ease with which the Cox PH framework accommodates time-varying covariates allows us to control for temporal variation in the legislator's propensity to retire via a series of time-varying controls. For example, legislative retirements tend to be concentrated in the few months just before elections; we control for this cyclical effect by adding a dummy for the month of the election ($ELECTION_{jt}$) and a quadratic function of the months elapsed since the last election ($CIEP_{jt}$ and $CIEP_{jt}^2$) to the model. At the individual-level, we control for the legislator's age of entry into the legislature ($ENTRY AGE_{ij}$), the margin (in percent) by which the legislator won the last election ($MARGIN_{ijt}$), the log of the prevailing salary for backbench members of the legislature ($\ln WAGE_{jt}$), and dummies to indicate

¹³This condition was explicit in Manitoba, where members were vested on serving three terms, and it applied effectively in Ontario, where the length of terms ensured that any member who secured re-election twice would be all but certain meet the 10-year vesting requirement. Indeed, 99 percent of the legislators in our sample who successfully secured a third term met the vesting requirements of their legislative pension plan.

whether the legislator holds office (e.g., as a minister, leader of the opposition, or speaker — all positions which confer greater perks and influence) ($OFFICE_{ijt}$) or held it in the past ($PASTOFFICE_{ijt}$). Understand, also, that in parliamentary systems like these, legislators' career are closely tied to the electoral fortunes of their party as whole. Thus we include variables that indicate a legislator's membership in a major or minor party ($MAJOR_{ijt}$) and the government or opposition status of that party (GOV_{ijt}) — and then we interact $MAJOR_{ijt}$ and GOV_{ijt} with a full set of year fixed-effects until the model is saturated. The aim is to fully capture variation in the electoral fortunes of the legislator's party. Finally, we add a set of province fixed-effects for federal legislators.

5.6 Results

5.6.1 DB Pensions

Table 5.4 shows the results of the estimation of Equation 5.3 for the pre-1967 period in which DB pensions were introduced. Column 1 presents the determinants of voluntary retirement from parliament, while column 2 presents results of an alternative specification without year-government or year-party interactions. Results presented in columns 3–5 will be discussed in sections 5.6.3 and 5.6.4.

Our results show that members with a DB pensions were, all other things equal, less likely to leave parliament voluntarily than members without a pension plan. The coefficients of most control variables are as one would expect, though it is surprising that an individual's status as office-holder or as former office-holder does not show up as a significant determinant of exit.

We convey the substance of our main results graphically — these graphical representations are derived from the estimates shown in column 1. Figure 5.3 shows how the hazard ratio of retirement varies over the course of a legislator's first three terms of office contingent on the availability of a DB pension scheme. These hazard ratios are expressed relative to a first-term legislator without a pension. Thus bars that extend above a hazard ratio of 1 indicate an increase in the hazard or risk of retirement relative to a first-term legislator without a pension; correspondingly, bars that fall below a hazard

Table 5.4: Cox PH Models; Introduction of DB Pensions

<i>Nature of Failure</i>	Retirement 1	Retirement 2	Placebo 3	All exits 4	Electoral defeat 5
DB pension dummy	-1.123** (.506)	-1.055** (.497)	.289 (.526)	-.846* (.464)	-2.004*** (.874)
Second term	.762 (.480)	.550 (.468)	-.083 (.545)	.528 (.376)	.121 (.593)
Third term and above	-.064 (.544)	-.254 (.524)	-.253 (.578)	.183 (.385)	.226 (.582)
DB X Second term	-.865* (.512)	-.641 (.508)	.188 (.526)	-.622 (.382)	-.461 (.646)
DB X Third term and above	-.126 (.434)	.012 (.418)	-.148 (.444)	-.210 (.322)	-.271 (.534)
Age at entry	.038*** (.006)	.034*** (.006)	.038*** (.006)	.021*** (.004)	.007 (.005)
Victory margin in %	-.004 (.005)	-.002 (.004)	-.004 (.005)	-.024*** (.004)	-.045*** (.006)
Monthly wage, log	.394 (.392)	.303 (.387)	.351 (.400)	-.359 (.348)	-2.142 (.894)
Office-holder	-.165 (.191)	-.151 (.181)	-.164 (.192)	-.096 (.131)	-.089 (.165)
Former office-holder	-.014 (.337)	-.116 (.327)	-.026 (.334)	.164 (.226)	.476 (.276)
Month before election	3.468*** (.245)	3.515*** (.230)	3.471*** (.247)	4.400*** (.181)	5.736*** (.353)
Months since election	-.051 (.031)	-.055* (.029)	-.039 (.033)	-.060** (.028)	-.101 (.068)
Months since election, squared	.002*** (.001)	.002*** (.001)	.001* (.001)	.002*** (.001)	.003*** (.001)
Year FE	Included	Included	Included	Included	Included
Major party X Year FE	Included		Included	Included	Included
Government X Year FE	Included		Included	Included	Included
Province FE	Included		Included	Included	Included
N Failures	362	362	362	815	453
N Subjects			1361		

Main cell entries are coefficients (not hazard ratios).

Standard errors clustered by legislator in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Efron method used to resolve tied cases.

ratio of 1 indicate an decrease in the hazard of retirement relative to that baseline.¹⁴

We find three aspects of Figure 5.3 noteworthy. Firstly, DB pensions effected a 67 percent decline in the hazard of retirement among first-term legislators. This result can be phrased another way: legislators without DB pensions were three times more likely to retire in their first term of office

¹⁴The error bars in Figure 5.3 show the 95 percent confidence interval around the hazard of retirement.

Figure 5.3: Relative Hazard of Retirement Conditional on DB Pensions

than were first-term legislators with DB pensions. Secondly, the adoption of DB pensions completely offset a spike in risk of retirement among second-term legislators. Indeed, second-term legislators without pensions were more than twice as likely to retire (i.e., 114 percent more likely) than their first-term counterparts (though we do observe that the p-value attached to this result is $p = .11$). Once pensions were adopted, however, the hazard of retirement among second-term members declined by a factor of 7.38 (i.e., $2.14/.29 = 7.38$) such that second-term members were no more likely to retire than first-term members. Finally, by the third term of office we see that the provision of DB pensions makes no statistical difference in the risk of retirement. A synthetic interpretation of these results is that the adoption of DB pensions induced first-term members to stand for re-election in an effort to secure a second term and then also worked to offset a significant propensity to retire among second-term members. This pattern would be consistent with members striving to remain in the legislature long enough to guarantee that they met the vesting requirement of their pension plans — which tended to require at least two terms of office.

To give a sense of the substantive magnitude of these marginal effects, we construct survivorship functions for members of the federal House of Commons. This was the legislature that first adopted DB pensions and hence for

which we have the longest panel of data following the policy change. Figure 5.4 shows the survivorship functions for second-term federal MPs conditional on the presence of a DB pension plan. Figure 5.4 shows that the median survival time of second-term federal MPs increased from 26 months when no pensions were provided to 66 months once DB pensions were adopted. (Bear in mind that these figures must be considered in the context of the MP having already served a first term of office.) The 40-month increase in the median survivorship time would represent about one extra term of legislative service. This dovetails with the results in Figure 5.3 that suggest that the main effect of DB pensions was to induce first-term MPs to run for re-election and serve out a full second term.

Figure 5.4: Survivorship Functions of Federal MPs Before and After the Adoption of DB Pensions

5.6.2 DC Pensions

We conducted a similar analysis to assess the impact of the conversion from DB to DC pensions in the Saskatchewan, Ontario and (for a time), Manitoba legislatures. Results of the estimation of Equation 5.3 for the post-1967 sample are presented in Table 5.5, columns 1 and 2.

Table 5.5: Cox PH Models; Replacement of DB by DC Pensions

<i>Nature of Failure</i>	Retirement 1	Retirement 2	Placebo 3	All exits 4	Electoral defeat 5
DC pension dummy	.871*** (.375)	.55 (.375)	.943** (.370)	.475* (.287)	.255 (.611)
Second term	-.081 (.300)	-.060 (.292)	-.097 (.304)	-.259 (.186)	-.285 (.316)
Third term and above	-.285 (.389)	-.280 (.377)	-.324 (.391)	.064 (.254)	.678 (.423)
DC X Second term	-.873* (.490)	-.785* (.468)	-.689 (.434)	.180 (.313)	1.099* (.617)
DC X Third term and above	-.361 (.373)	-.307 (.387)	-.220 (.357)	-.139 (.303)	.367 (.665)
Age at entry	.046*** (0.004)	.046*** (0.004)	.046*** (.004)	.029*** (.002)	.011*** (.004)
Victory margin in %	-.010*** (.002)	-.010*** (.002)	-.010*** (.002)	-.022*** (.002)	-.033*** (.003)
Monthly wage, log	-.437 (.454)	-.586 (.414)	-.443 (.449)	-.551 (.402)	-2.083** (.920)
Office-holder	.097 (.094)	.150* (.087)	.096 (.093)	-.038 (.063)	-.132 (.098)
Former office-holder	.224** (.106)	.241** (.103)	.215** (.106)	.076 (.077)	-.102 (.115)
Month before election	4.996*** (.164)	4.996*** (.164)	5.017*** (.166)	5.886*** (.147)	7.989*** (.441)
Months since election	.084*** (.018)	.077*** (.017)	.084*** (.018)	.077*** (.015)	.047 (.039)
Months since election, squared	-.001*** (.000)	-.001*** (.000)	-.001*** (.000)	.001*** (.000)	-.000 (.000)
Year FE	Included	Included	Included	Included	Included
Major party X Year FE	Included		Included	Included	Included
Government X Year FE	Included		Included	Included	Included
Province FE	Included		Included	Included	Included
N Failures	1059	1059	1059	2217	1158
N Subjects			2697		

Main cell entries are coefficients (not hazard ratios).

Standard errors clustered by legislator in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Efron method used to resolve tied cases.

These results show that members with a DC pension were, again all other things equal, more likely to leave parliament voluntarily than members with

DB pensions. This result is sensitive to the inclusion of year-government or year-party interactions, however. Most control variables give similar coefficients as in the pre-1967 period, though in the post-1967 sample a member's victory margin and status as former office-holder do show up as significant determinants. This might be either due to the fact that the larger post-1967 sample allows for a more powerful statistical test, or because of substantive changes in members' decisions between these two periods.

Figure 5.5 shows how the hazard (or risk) of retirement varies over the course of a legislator's first three terms of office contingent on the nature of the pension scheme in effect. These hazards are expressed relative to a first-term legislator with a DB pension. Figure 5.5 shows a clear spike in the hazard of retirement at the end of the first term among legislators receiving DC pensions. Indeed, the risk of retirement was 139 percent greater among first-term members with DC pensions than it was among members with DB pensions. In contrast, Figure 5.5 shows that there is no statistical difference in the hazard of retirement among longer-serving legislators regardless of the nature of their pension scheme. Converting legislators' DB schemes into defined-contribution plans appears to have heightened the risk of legislators retiring after just one term in office, but it had no discernible impact on the risk of retirement among longer-serving members. In this respect, the conversion to DC pensions precisely offset the chief effect of DB pensions on first-term legislators, i.e., in inducing them to run for a second term.

Again, we construct a survivorship function to show the substantive impact that the conversion to DC pensions had on legislators' tenure in office. Figure 5.6 shows the survivorship functions for a first-term Saskatchewan legislator conditional on receiving a DB pension or a DC pension. Saskatchewan was the first province in the country to switch its legislative pension scheme from a DB to a DC basis, and hence it is the province for which we have the longest panel of data following the policy change. The median time until a first-term Saskatchewan legislator retired declined from 68 months under DB pensions to 44 months under DC. This is a substantial reduction in a province where the mean legislative career spans just 80 months.

Figure 5.5: Relative Hazard of Retirement Conditional on DC Pensions

5.6.3 Placebo Tests

We subject both of the analyses above to placebo tests. The placebo tests involve moving forward the policy intervention by one term of office. The Ontario legislature, for example, established its DB pension plan in 1960 and converted it into a DC plan in mid-1995. Under the placebo test, we code Ontario's DB pension plan as being in effect from 1955 to 1990, and its defined-contribution plan as taking effect in 1990. If the changes in the electoral tenacity of first-term members that appear in the previous analyses persist under the placebo coding, then it would suggest that such changes were underway in advance of the adoption of DB pensions or the conversion to DC plans.

Results of the placebo tests appear in column 3 of Tables 5.4 and 5.5. We observe that the coefficient on PEN_{ijt} changes/increases from -1.123 ($s.e. = .506$) to .286 ($s.e. = .526$) under the DB pensions placebo test, and likewise the coefficient on $PEN_{ijt} \times 2^{nd} TERM_{ijt}$ declines from -.865 ($s.e. = .512$) to .188 ($s.e. = .526$). In short, the effects of DB pensions disappear under the placebo test. This reinforces our confidence that the results in Figures 5.3 and 5.4 reflect the impact of DB pensions on legislative tenure and electoral tenacity. In contrast, the effects of DC pensions on career

Figure 5.6: Survivorship Functions of Saskatchewan Legislators Under Different Pension Arrangements

length and electoral tenacity persist under the placebo test. The coefficient on PEN_{ijt} increases from .871 to .946 and the standard error decline from .375 to .370. This suggests that the effects shown in Figures 5.5 and 5.6 — an increased risk of retirement among first-term legislators and a concomitant decline in the median legislative tenure, respectively — were likely underway in advance of the conversion to DC pensions in these legislatures.

5.6.4 The Net Effect of Pensions

We estimate the effects of DB pensions — i.e., 67 and 87 percent reductions in the hazard of retirement among first- and second-term legislators, respectively, and a 40 month increase in median tenure — having censored the tenures of members who left the legislature via defeat rather than retirement. That is a proper basis on which to evaluate the impact of pensions on legislative tenure because we ought not to count legislative careers cut

short by electoral defeat as failures of the pension policy. That said, if the aim of the pension policies in these legislatures was to strengthen the institutions' capacity to retain experience, we have to take account of the extent to which the policy was offset by any increase in the propensity of the electorate to vote out incumbents. We do this by re-estimating Equation 5.3 for DB pensions without censoring legislative careers that ended in defeat.¹⁵

Column 4 of Table 5.5 presents the results of this analysis; the main effect is illustrated graphically in Figure fig:ResultsDefeat. Figure 5.7 shows the hazard ratio of retirement or defeat conditional on the adoption of DB pensions. The decline in the risk of a first-term member exiting the legislature observed in Figure 5.3 shrinks (from .67 to .57) but remains largely intact. To be sure, the standard errors and confidence intervals are somewhat larger (the p-value for the first-term effect is .07), but that is to be expected in as much as there is an inherently random element to electoral defeat — and some incumbents will be defeated regardless of the legislative pension system in effect. Much the same can be said about the decline in the risk of a second-term member exiting the legislature, which even if not as dramatic as in Figure 5.3 remains very substantial.

Figure 5.8 is the counterpart to Figure 5.4; it shows the survivorship function of federal legislators once we consider careers ended via defeat alongside those ended via retirement. Taking defeat into account, we see that the median survival time of Canadian federal legislators under DB pension was approximately 52 months. By comparison, the median survival time prior to the adoption of DB pensions was 20 months. We thus estimate the effect of pensions on legislative tenure net of electoral defeat to be 32 months. This is only 8 months or 20 percent less than than 40-month treatment effect suggested by Figure 5.4, and it implies that the impact of DB pensions on legislative tenure was not offset by electoral forces.

¹⁵We conduct a similar analysis for DC pensions for completeness (see Table 5.5), but we offer no comment on those results as we consider the placebo test to have established that the conversion to DC had no effect. Additionally, for completeness we also estimate Equation 5.3 on just electoral defeats — in which case voluntary retirements are censored — results of which are presented in column 5 of both tables.

Figure 5.7: Relative Hazard of Defeat or Retirement Conditional on DB Pensions

5.7 Discussion

We structure our discussion of these results by moving from the narrow issue of whether these legislative pension policies worked as intended to broader issues of what these results tell us about the motivations of politicians and normative concerns related to how we compensate politicians. DB pensions were adopted in these legislature to improve their capacity to retain political talent and experience. We cannot comment on whether pensions attracted a better quality of politicians, but we can certainly say that the policy succeeded in retaining political experience. DB pensions induced first- and second-term MPs to run for re-election and serve an additional term in office. This in turn boosted the median survival time of legislators by between 32-40 months. In these respects, the adoption of DB pensions increased electoral tenacity and legislative tenure. DB pensions had no impact on the relative hazard of retirement of legislators who already served two terms of office, however. This pattern of results is consistent with a model in which legislators engage in costly effort to remain in the institution to qualify for their pensions but reduce their efforts once they have done so.

The conversion of DB pensions into DC plans does not seem to have accomplished much. Whilst our initial analysis suggested that the relative

Figure 5.8: Survivorship Functions of Federal Legislators in the fact of Defeat or Retirement

hazard of retirement spiked after legislative pensions were converted to a DC basis, a placebo test indicated that this dynamic was underway in advance of the policy change. This might well have been due to the fact that DC pensions were becoming commonplace in the outside economy at the same time that these legislatures converted from DB to DC pensions. Under such conditions, the conversion to DC pensions would not necessarily have provoked an exodus of sitting legislators. From a normative perspective, one could contend that this result implies that converting legislative pensions to a DC basis was merely a populist token that had no policy impact. An alternative normative perspective is that the conversion to DC pensions assuaged public opinion by ensuring that the structure of legislative pensions mirrored the general trend away from DB pensions in the wider Canadian economy — and did so without adversely effecting electoral tenacity and legislative tenure.

Our chapter also contributes to the political economy literature on the remuneration of politicians. As we noted in the literature review, findings

on whether politicians are motivated by or alter their behavior in response to changes in remuneration are mixed. We can count our chapter among those that finding that politicians do respond to changes in remuneration. The increase in electoral tenacity that we show followed the adoption of DB pensions, for example, parallels Fisman et. al.'s (2015) result that Members of the European Parliament were more likely to run for re-election following a large salary increase. We caution, however, that the introduction of DB pensions represented a significant increase in remuneration relative to the previous era when legislators received no salaries whatsoever. Our data show no countervailing response to the more subtle but financially important conversion of DB plans to a DC basis. We can only speculate that this is perhaps because incoming legislators had already factored the return on DC pensions into their decision-making or because their outside options increasingly featured similar DC pensions. Furthermore, the behavioural impact of DB pensions is mostly seen for early-career members; DB pensions induced first-term members to run for re-election rather than retire but they had no impact on the willingness of third-term (and longer-serving) members to remain in office. In this regard, our results connect to work that suggests that departure of longer-serving legislators is due more to non-monetary factors (e.g., Hibbing, 1982; Frantzich, 1978; Kerby and Bildook, 2011).

Chapter 6

Epilogue: implications, limitations, and suggestions for further research

This dissertation has presented four chapters, each of which has studied a particular research topic related to financial history and political institutions. After reading these four chapters, what have we learned? What are the implications of the findings presented here for our understanding of financial markets, political institutions, and their interconnections? And what questions are left unresolved, forming a potential stepping stone for further research? In this epilogue, I will attempt to answer these questions. I will take the liberty here to go beyond the findings of the chapters; for that reason, the views I present here should be seen as somewhat more personal and speculative than the conclusions presented in the chapters themselves.

In **chapter 2**, I have studied the pricing of Russian government debt between 1856 and 1875. This was a period in which the rouble was inconvertible, in which it experienced a pronounced depreciation against other currencies, and in which the Russian government made several unsuccessful attempts to stabilise it. Using prices of Russian bonds on the Amsterdam stock exchange, I make inferences about foreign investors' pricing of currency risk of the rouble. What I find is that for most of the 1856–1875 period, Dutch bondholders (correctly) expected a further decline of the value

of the Russian rouble in the long run. Furthermore, I study at what points in time this expectation changed, i.e. at what moments bondholders made major revisions to the level of depreciation they expected for the rouble. My findings show that these revisions did not take place in response to any of the currency reforms undertaken by the Tsarist government. Instead, major revisions to the expectations of Dutch bondholders came at moments when geopolitical crises occurred, in most cases outside of Russia. I conclude that these expectations were not so much influenced by Russian monetary affairs, but more by global shocks, indicating that foreign bondholders did not attach too much importance to Russian official plans to stabilise the currency.

In my view, two interpretations of this result are possible. On the one hand, it may be that a successful reform of the Russian rouble would in principle have been possible, but that the Tsarist government somehow lacked the credibility to succeed. In turn, various institutional reasons can be suggested for this failure. When seen in the context of rules versus discretion in monetary policy (Barro and Gordon, 1983), perhaps the currency reforms failed because the absolute power of the Tsar made it impossible for the Russian government to give credible signals that it would not resort to monetisation in the future. Perhaps the lack of credibility was a consequence of the preceding 100 years in which Russia had repeatedly resorted to monetary financing, thus costing it dearly in terms of reputation; an argument analogous to the role of reputation in sovereign default risk (Bulow and Rogoff, 1989). Or perhaps consecutive finance ministers simply made poor choices in terms of implementation: did they simply lack the monetary expertise to understand the measures needed to stabilise the currency? Some of the rudimentary mistakes made in the 1857 and 1862 currency plans, as discussed by Zieliński (1898), point in this direction. Also the fact that later, in the 1890s, a stabilisation of the rouble did succeed when it was integrated into a more encompassing economic strategy, suggests that currency reform may have been possible in earlier decades too.

On the other hand, an alternative interpretation is that external conditions at the time may have made it prohibitively difficult for Russia to successfully ensure convertibility, regardless of the capabilities of its government. In this view, Russia's currency was by and large at the mercy of

international markets, and there was little that its government could do to stop occasional depreciations of the rouble. The timing of some of the downward revisions that I find — one at the outbreak of the Second War of Italian Independence in 1859, another in the wake of the monetary shock caused by the Franco-Prussian War in 1871 — point in this direction. So too does the observation that the former event led to a loss of the rouble's value *because* it prevented, at a critical moment, the issuance of a new Russian loan. This interpretation would echo with a large literature on currency crises across historical periods that highlights the difficulty of peripheral countries — particularly those that rely heavily on foreign borrowing — to combine an open capital account with a stable currency (Ford, 1962; Nurkse, 1944; Stiglitz, 2000).

Further research is needed to understand which of these two interpretations is the most valid. Russian monetary history before c. 1880 is a subject which has received very little academic interest.¹ Therefore, much more research could be done on monetary developments in nineteenth century Russia.

In my view, research that builds on chapter 2 should take two complementary approaches, the one more econometrically focussed, the other more historically. As for the former, according to economic theory, expectations about the future exchange rate should be based not just on policies pursued, but also on economic fundamentals. Although Dutch bondholders' knowledge about Russian economic and financial affairs was limited at the time, they were not altogether in the dark. Investor manuals and the financial press regularly published statistics on the Russian economy and the public finances of the Russian state. A fruitful econometric route for further research would therefore be connecting such statistics to the measure of currency risk that I reconstructed. Key questions this can address is whether the process of bondholders' expectation formation can be linked to, for instance, the Imperial budget or macroeconomic developments in Russia. Such a study can shed more light on the sources of the structural breaks in investors' exchange rate expectations: were these driven by particular changes in underlying economic factors?

¹I admit that my lack of access to the Russian academic literature has probably closed off valuable sources on the subject to me.

The other, complementary, direction should focus more on a deeper understanding of the monetary decision making within the Russian government. What was the conceptual framework in terms of the workings of money and international finance that the Tsarist government relied upon at the time? For instance, why did the finance ministry not foresee that the 1857 plan would quickly deplete the Russian silver reserves? Did the government anticipate that it would be haunted by previous monetisations in terms of its credibility? And what was the role of key players' own interests; players like the finance ministers themselves, but also key financiers like the Tsar's "court banker" Alexander Stieglitz (Blackwell, 1968)? Answering these questions is particularly important in relation to the first possible interpretation discussed above: did the institutional setup of monetary policy making indeed hamper a successful and credible currency reform?

Chapter 3 has studied the role of political institutions in the classical gold standard, the monetary regime that was dominant between c. 1870 and 1914. As we — Petros Milionis and myself — show in this chapter, countries that had more democratic institutions were, all else equal, less likely to adhere to the gold standard throughout this period. We demonstrate this using a cross-country database of 30 countries, by relating the choice of monetary regime of each country in each year to a set of economic and political independent variables.

In my view, the contribution of the findings of chapter 3 lies primarily in adding to the academic debate on the differences and similarities between the classical and interwar gold standard. Whereas the former functioned comparatively well and was fairly stable, especially in the West, the latter is generally seen as a failure. The conventional wisdom in economic history is that the spread of democratic institutions undermined the functioning of the interwar gold standard. As a consequence of the extension of the franchise and the rise of trade unions, policy makers were forced to focus more on domestic economic objectives and therefore were unable to fully commit to the requirements of adherence to the gold standard (Eichengreen, 1992; Morys, 2014).²

²A second factor often invoked as a cause of instability is the comparative lack of international cooperation between central banks after World War I. See Eichengreen (1992) for more on this, or Flandreau (1997) for a dissenting view.

The findings of our research cast doubt on this conventional wisdom. As we show, a similar tension between democratic institutions and adherence to the gold standard existed before 1914. Therefore, this argument can not explain fully the differences in success and longevity between the classical and interwar gold standard. At the same time, our research also affirms the conventional wisdom — not in terms of the dichotomy between the classical and interwar gold standard, but rather on the point that there was a tension between democratic institutions and adherence to the gold standard. We affirm that this tension existed historically, and perhaps more universally than the literature on the gold standard has typically claimed.

Our results can also be seen in light of Rodrik's globalisation trilemma: a trilemma that states that out of the three objectives of national self-determination, economic globalisation, and democratic policy making, at most two can be pursued at the same time (Rodrik, 2011). In this light, a speculative conclusion of our research would be that a gold standard — or any other monetary system with firmly pegged exchange rates and open capital accounts — can only be achieved either if policies are made supranationally, or if democratic institutions are sacrificed.

Two distinct avenues for further research are suggested by our study. Firstly, within the present research design of a cross-country comparative study, a closer look at the role of central banks is warranted. The institutional setup of central banks differed markedly across countries in the late nineteenth century, and so did their official and unofficial objectives. Recent research has shown that central banks at the time sometimes played a pivotal role in the choice of monetary regime, and that depending on the context they may or may not have had an interest in a country's adherence to the gold standard (Martínez-Ruiz and Nogues-Marco, 2017). Additionally, core countries' central banks are often seen to have contributed to the stability of the gold standard internationally (Eichengreen, 1992; Gallarotti, 1995). More could be done in terms of integrating this aspect into our research design. Particularly the extent to which central banks were able to operate independently, and the relative degree to which different institutions influenced countries' choice of monetary regime, would be a welcome addition to this study.

Secondly, a more profound understanding of the role of political institutions, also in relation to the roles of interest groups and the electoral cycle, necessitates a look beyond the present setup. Although the benefit of a global study is the fact that it captures all the available heterogeneity, one drawback is the fact that the causal mechanism will invariably remain somewhat of a black box. Opening this box requires a more in-depth study of particular policy choices made by individual countries. One study that has done so, for the United States, is that of Frieden (1997), who shows that U.S. states with a larger presentation of agricultural interests were less likely to be in favour of the gold standard. Another interesting case that would be worth pursuing would be the Dutch adoption of the gold standard in 1875. As the discussion in de Jong (1967), vol. II highlights, the choice of the monetary regime in the Netherlands in the 1870s was one which saw several opposing views and interests of the central bank, the finance ministry, and various members of parliament. It would be worth studying more deeply the exact roles of these players, in particular in relation to their (constituents') interests, and the moderating role that the Dutch institutional setup played in this. What furthermore makes the Dutch 1875 adoption of the gold standard interesting from a monetary perspective is the fact that the Dutch guilder experienced a brief period of inconvertibility between this adoption and the suspension of silver convertibility in 1873; a period during which, despite inconvertibility, the guilder's exchange rate did not depreciate.

In **chapter 4**, Abe de Jong, Philip Fliers, and myself have studied the introduction of corporate taxes in the Netherlands during World War II. Whereas the Dutch tax system did not have a direct tax on corporate profits before 1940, this changed drastically during the Nazi occupation, leading to the introduction of the *Vennootschapsbelasting* in 1942. We show that the introduction of corporate taxes cost listed Dutch corporations over $f200$ million in terms of shareholder value; the equivalent of around 3% of annual Dutch GDP at the time. Furthermore, we find that these corporations increased their leverage — the ratio of total debt to assets — by around 5 percentage points in the wake of the introduction of this tax, conditional on firms' other financial characteristics. Our analysis of the determinants of leverage suggests that fiscal motives were an important driver of this change

in financial strategy.

The contribution of our study lies primarily in adding a historical perspective to the academic debate on the relation between taxes and capital structure (DeAngelo and Masulis, 1980; Rajan and Zingales, 1995). Our study confirms a result that has often been found for modern-day settings, which is that the tax deductibility of interest costs may induce an increase of debt financing by firms. Therefore, our study chimes better with those in the literature who ascribe importance to fiscal motives for firms' financial strategies (Faccio and Xu, 2015), than with those who argue that taxes are more of a second-order consideration (Myers, 2001).

In my view, the value of the historical perspective that we offer to this debate is twofold. Firstly, it is striking that tax changes had a substantial effect on financing choices even in times of war. The Second World War was one of the most dramatic periods in modern history, and one may argue that Dutch firms and investors at the time will have faced more pressing matters than changes to the corporate tax system. Be that as it may, our results show that even in troubled times such as the 1940s, fiscal motives did play an important role in corporate financial decision making. Secondly, what is remarkable is that we find the effect of corporate taxes on capital structures in the 1940s, well before the formalisation of the theory of debt tax shields in the 1960s (Modigliani and Miller, 1963). Practitioners in the Netherlands were thus well ahead of the international academic debate in their understanding of the use of debt tax shields. This is an interesting result in terms of the interrelation between theory and practice in the field of corporate finance.

In terms of the historical literature on the occupied Netherlands, we add to a growing body of literature on economic developments during World War II (de Jong, 1999; Klemann, 2002; Meihuizen, 2003). This literature sees the wartime period as one during which, despite being aberrant in many ways, various economic processes and mechanisms continued to work. Furthermore, the tax changes that occurred during World War Two in the Netherlands have received very little academic attention from Dutch fiscal or economic scholars — a notable exception being Essers (2012) — despite the profound and long-lasting impact that these had. We provide the first economic analysis of the

introduction of corporate taxes in the Netherlands; a corporate tax that, in approximately its 1942 form, lasted until 1967.

There are many more questions that can be addressed on this topic, and I hope that our study will form the basis of further research. A number of avenues for further research are suggested by the limitations of our data, which consists of stock prices and public commercial accounts of listed Dutch corporations. As other research has shown (Spoerer, 1998), there could often be marked differences between the commercial accounts published in firms' financial statements and the accounts submitted to fiscal authorities. Although I believe that our study of capital structures has not been materially affected by this, our study of earnings management — the extent to which firms manipulated the calculation of taxable profits — may have been more seriously hampered. Access to firms' fiscal accounts would thus be valuable, but unfortunately these are not available on a large scale. Additionally, broadening the scope of the study to smaller, non-listed, corporations would be informative for understanding what effect the 1942 *Vennootschapsbelasting* had on corporate forms. As contemporary sources mention (Dijker, 1946), many smaller corporations responded to the tax change by reforming to a partnership, thereby avoiding this tax altogether. Quantifying this effect would serve to more comprehensively gauge the effects of the 1942 tax change.

The data that we do have already also offers a wealth of options for further research, especially when complemented with information on the functioning of the Dutch economy during World War Two. One particular piece of information that we collected, but decided to leave out of the present chapter as it would broaden its scope too much, relates to firms' involvement in the Third Reich's war economy. That is: using the archives of the *Zentralauftragstelle*, the main office responsible for the Nazi government's coordination of military production in the Netherlands,³ we have reconstructed the payments that this office made to each of the firms in our sample. This can serve as a measure of these firms' involvement in the war economy. Connecting this to the financial information we have used in our study could serve to paint a more complete picture of how firms' financial performance and strategies were dependent on their economic role during the occupation.

³See Klemann (2002), ch. 3.

Lastly, my joint research with Christopher Kam and Daniel Irwin, presented in **chapter 5**, has studied the effects of pension reforms in Canadian parliaments in the second half of the twentieth century. In this chapter, we study the effects of the introduction of defined benefits pension schemes for members of four parliaments — the federal Canadian parliament, and those of the provinces of Saskatchewan, Manitoba, and Ontario — and their later replacement with less generous defined contributions pensions. We study to what extent these introductions and reforms induced members to extend their time in parliament, or at least to attempt to do so, which was one of the stated policy objectives of the pensions' introduction. The fact that these measures were taken at different moments across parliaments underlies our difference-in-differences research design. We find that the introduction of defined benefits pensions had a large positive effect both on members' willingness to stand for re-election and on their average tenure, while the later reform to defined contributions pensions did not have a measurable effect on either.

This finding contributes to the academic debate on the remuneration of politicians. In this debate, there are opposing views about whether or not the level of remuneration plays a substantial role in politicians' choice to stand for (re-)election.⁴ Our results show that politicians do indeed increase their effort to stay in parliament — as we call it, they increase their electoral tenacity — if the monetary payoff is larger. Additionally, we show that most of this increased effort translates into longer average tenure of members of parliament. The implication of this study is that, if increasing the continuity of parliament is a policy objective, offering a generous pension to members can be an effective measure. To put it differently: it pays to pay politicians, and to pay them well.

That said, our study only allows us to judge the pension reforms' effect on electoral tenacity and parliamentary tenure. Whether or not offering pensions also leads to better political representation is an open question. Answering this question would be informative, since improving the quality of political representation is a more universal policy objective than increasing its continuity. For this, more research is needed. In particular, by measuring

⁴For examples of important studies in this debate, see Fisman et al. (2015) for evidence that it does, and Diermeier et al. (2005) that it does not.

the quality of political representation, our research design could be used to address this issue too. Although the quality of political representation is an elusive concept, studies such as Ferraz and Finan (2008) and Gagliarducci and Nannicini (2013) have shown valuable approaches to tackle this matter.

Additionally, one finding of our chapter that calls for further research is the fact that most of the effects are found for first- and second-term members of parliament. More senior members respond to a lesser extent to changes in pension schemes. We believe that this is most likely the consequence of rules that state that one can only qualify for pensions after having spent a minimum amount of time in parliament. But there are other possible explanations; for instance, senior MPs may leave more often for non-monetary reasons, or the effect of parliamentary tenure on job opportunities outside politics may be non-linear. To make a more informed judgement about which of these explanations is most warranted, more research is needed. Explicitly including information in our study on which members qualify for a pension would be a natural way forward; a more ambitious approach would be to study more deeply the reasons for political exits of (a selection of) members of parliament.

Overall, in my view, the research presented in this dissertation highlights two important lessons. The first of these is that studying the history of money and finance can provide invaluable insights for contemporary economics. In other words, in addition to being itself a fascinating subject matter, financial history also holds many clues to key questions in research on financial markets.

The second lesson from this dissertation is that political institutions matter for the functioning of monetary systems and financial markets. The institutional setting plays a key role in what policies are feasible, and how effective these may be. Anyone who tries to understand the workings of money and finance, or anyone whose goal is to design effective financial policies, but who ignores the political and institutional context, does so at their own peril.

Appendices

A2 Appendices to chapter 2

A2.1 Ukase of the Fifth [Sixth] 5% Loan

“In the interest of increasing the funds in the Imperial Treasury in light of the present circumstances, we have given You the right, in accordance with your proposal, to issue, with the intermediation of Our Banker, the state councillor Baron Stieglitz of St. Petersburg, a loan of 50 Million Silver Roubles under the terms agreed to by us, and We thereby order You to take into account the following stipulations:

1. This loan will be inscribed in the ledger of the Russian public debt under the name of the Fifth [Sixth] 5 percent loan.
2. The Imperial Committee of Amortisation will issue inscriptions for this loan of the values 500, 1000, 2000, 3000, 4000, and 5000 Silver Roubles [each inscription worth 500 Silver Roubles].
3. These inscriptions will carry an interest of 5 pct., starting 1 April [1 October] of the current year. Every inscription will include 20 coupons, at the presentation of which the interest payments will be made on the due date.
4. [The payment of this interest will take place for each half year, from 1 April until 1 June, and from 1 October until 1 December, and for each coupon will be paid: at St. Petersburg by the Imperial Committee of Amortisation 12 Roubles and 50 Kopeks Silver, or with the intermediation of the Bankers Stieglitz & Co., either 23 Guilders 60 Cents Dutch, or 26 Marks 10 Schillings 11 Pfennig Hamburg Banco.]

5. After the first 10 years all inscriptions then still in circulation will receive new coupons.
6. The amortisation of this loan will commence in 1857 [1858] and for this purpose a special fund will be allocated, not to be mingled with the other loans, which will comprise two pct. of the nominal value of the loan per annum. This sinking fund, which will from then on further increase with the interest available due to the amortisation of inscriptions, will be used for the purchase of inscriptions at the market price, as long as this has not risen above the nominal, that is the par, value. After twenty years, that is from 1874 [1875] onwards, the Government retains the right to purchase any inscriptions still in circulation at the nominal value.

St. Petersburg, 23 June 1854 [26 November 1855]”

Source: *Amsterdamsch Effectenblad*, 7 July 1854 and 21 December 1855. Author’s translation.

A2.2 Yield to Maturity Calculation

The transformation of bond prices into a yield to maturity is non-trivial for bonds like the bonds studied in this study for various reasons. Firstly, the currency structure has to be dealt with. Conceptually, there is not really such a thing as *the* yield for the sixth 5% loan, since the cash flows of this bond are denominated in various currencies. In contrast, for the fifth 5% loan all cash flows are denominated in roubles. I therefore decide to calculate the yield to maturity of the latter in roubles, whereas for the former I fix the exchange rate at 1 silver rouble : 1.888 guilders. This is the exchange rate that is implicit in the currency option, i.e. at $f1.888$, the value of the coupon payments of both bonds are equal at 12 roubles and 50 kopeks silver. An alternative would be to use the current rate of exchange, but this would mean that variations in the exchange rate would affect the yield to maturity, whereas the goal of this investigation is to separate the two.

I make two other simplifying assumptions. The first is that Dutch bondholders would always choose to cash the coupon of the sixth 5% loan in Amsterdam. Technically, these coupons gave the bondholder a currency op-

tion, as the coupon could in principle be cashed in St. Petersburg in roubles instead. However, as we saw in Figure 2.2, this option was always well out of the money, since the rate of exchange on St. Petersburg was always substantially below $f1.888$. The second assumption is that the early buy-back option of the Russian treasury did not affect yields. Again, this assumption seems warranted *ex post*: the option would only hold value for the treasury if prices would be above par, but in practice they were always well below it.

The sinking fund provisions do not affect yields: since amortisation takes place at market values rather than at par, the bonds can be treated as if they are held to maturity. Lastly, note that all prices quoted in Amsterdam are so-called “clean prices”, i.e. accrued interest is not included in the quoted price (see Dinger (1868), p. 2).

A2.3 Bai-Perron Structural Break Tests on the Actual Exchange Rate

The methodology of Bai and Perron (2003) that I use in section 2.5.3 can also be applied to the exchange rate itself (X_t), rather than to the expected degree of appreciation (A_t). This can be done by subtracting a quadratic time-trend from the series X_t , since this generates a stationary series. The results of the Bai-Perron tests on this series are presented in Table A2.1. Interestingly, the break in 1859 is generally found to be located in May 1859 rather than in September 1859; hence, the adjustment to the expected rouble value trailed the actual rouble value by around four months. Aside from this first breakpoint, the other dates found are much less robust across specifications than those of the expected degree of appreciation. I therefore conclude that this exercise is less informative than that of Table 2.5.

A2.4 Tabulated Results of the Chow Tests

Table A2.2 presents the results of the Chow tests of section 2.5.3. The results from this table are equivalent to the graphical results of Figure 2.4.

Table A2.1: Structural Breaks in the Guilder/Rouble Exchange Rate

Panel A: Baseline Results					
1856 - 1875		1856 - 1873		1856 - 1871	
Single Trend	Varying Trend	Single Trend	Varying Trend	Single Trend	Varying Trend
Break 1	1864, Jul.	1859, May	1863, Dec.	1859, May	1862, Apr.
Break 2	1867, Jul.	1864, Sep.	1867, Feb.	1864, Jul.	1864, Aug.
Break 3	1871, Nov.	1869, May	1871, May	1869, Jun.	1866, Dec.
Break 4	-	1872, May	-	-	1869, Aug.
Panel B: Alternative Discounting of X_t					
1856 - 1875		1856 - 1873		1856 - 1871	
Single Trend	Varying Trend	Single Trend	Varying Trend	Single Trend	Varying Trend
Break 1	1859, May	1859, May	1863, Dec.	1864, Jul.	1859, May
Break 2	1864, Jul.	1864, Sep.	1867, Feb.	1867, Feb.	1864, Aug.
Break 3	1867, Jul.	1869, May	1871, May	1869, Jun.	1866, Dec.
Break 4	1871, Nov.	1872, May	-	-	1869, Aug.
Panel C: No Discounting of X_t					
1856 - 1875		1856 - 1873		1856 - 1871	
Single Trend	Varying Trend	Single Trend	Varying Trend	Single Trend	Varying Trend
Break 1	1859, May	1859, May	1863, Dec.	1864, Jul.	1859, May
Break 2	1864, Jul.	1864, Sep.	1867, Feb.	1867, Feb.	1864, Aug.
Break 3	1867, Jul.	1869, May	1871, May	1869, Jun.	1866, Dec.
Break 4	1871, Nov.	1872, May	-	-	1869, Aug.

Breakpoints found by Bai-Perron structural break tests in the exchange rate series X_t . The exchange rate series is first detrended using a quadratic time trend, which yields a stationary series. Panel A presents the baseline results, where X_t is discounted for two months worth of interest by the lombard rate. Panel B instead uses the long-term interest rate as the discount factor. Panel C does not discount the exchange rate at all. In all cases, the results referred to as “Single Trend” do not allow for changes in the time trend β_j , whereas the results referred to as “Varying Trend” allow β_j to vary between regimes j . “-” means that no statistically significant fourth structural break is found.

Table A2.2: Results of the Chow Breakpoint Tests

Breakpoint 1		Breakpoint 2		Breakpoint 3		Breakpoint 4	
Date	F-statistic	Date	F-statistic	Date	F-statistic	Date	F-statistic
1859, Mar.	9.3	1863, Dec.	28.7	1867, Dec.	33.0	1871, Jan.	31.2
1859, Apr.	10.1	1864, Jan.	28.3	1868, Jan.	36.9	1871, Feb.	32.9
1859, May	10.1	1864, Feb.	31.6	1868, Feb.	41.0	1871, Mar.	40.4
1859, Jun.	12.5	1864, Mar.	35.9	1868, Mar.	44.8	1871, Apr.	50.5
1859, Jul.	23.4	1864, Apr.	42.6	1868, Apr.	44.4	1871, May	55.5
1859, Aug.	34.8	1864, May	46.2	1868, May	41.7	1871, Jun.	64.6
1859, Sep.	43.5	1864, Jun.	48.6	1868, Jun.	36.3	1871, Jul.	71.3
1859, Oct.	40.7	1864, Jul.	51.3	1868, Jul.	30.3	1871, Aug.	67.7
1859, Nov.	32.3	1864, Aug.	51.7	1868, Aug.	28.3	1871, Sep.	63.2
1859, Dec.	28.9	1864, Sep.	51.1	1868, Sep.	25.2	1871, Oct.	53.3
1860, Jan.	27.9	1864, Oct.	51.9	1868, Oct.	21.2	1871, Nov.	47.4
1860, Feb.	24.3	1864, Nov.	49.3	1868, Nov.	18.3	1871, Dec.	39.1
1860, Mar.	19.4	1864, Dec.	45.5	1868, Dec.	17.2	1872, Jan.	30.9

F-statistics associated with a series of Chow tests on the series of expected appreciation of the rouble A_t , following equation 2.8. Estimation windows run from three years before the first potential date of the breakpoint to three years after the last, i.e. from March 1856 to March 1863, from December 1860 to December 1867, from December 1864 to December 1871, and from January 1868 to January 1875, respectively. In all cases, $p(F) < 0.01$.

A3 Data Appendix to chapter 3

This appendix describes all the variables that we employ in our empirical analysis explaining how each variable is constructed and based on which sources. Table A3.1 provides the list of countries that we include in our analysis, while Table A3.2 provides the key descriptive statistics for each variable.

Information on the **monetary regime** of each country is taken from a variety of country-specific sources. See page 74 for details on our criteria for the main classification of monetary regimes, and page 94 for details on the alternative, strict, classification. Our main references for each country are: Ford (1962) for Argentina and the United Kingdom; Pope (1993) for Australia; Lazaretou and Scheiber (2014) for Austria-Hungary, Bulgaria, Greece, the Ottoman Empire and Romania; Flandreau (2004) for Belgium, France, Germany and Switzerland; Fritsch and Franco (2000) for Brazil; Dick and Floyd (1992) for Canada; Ma (2012) for China; Llona Rodríguez (1997) for Chile; Ocampo (2000) for Colombia; Bordo and Jonung (2003) for Denmark, Norway and Sweden; Tattara (2000) and Bordo and Jonung (2003) for Italy; Mitchener et al. (2010) for Japan; Kemmerer (1916) for Mexico; Hart et al. (1997) and de Jong (1967) for the Netherlands; Reis (2000) for Portugal; Drummond (1976) and Ukhov (2003) for Russia; Officer (2008) for South Africa; Martínez-Ruiz and Nogues-Marco (2017), Martín Aceña (2000) and Sabaté et al. (2006) for Spain; Friedman and Schwartz (1963) for the United States; and Hanson (1938) for Uruguay.

GDP per capita data for all countries are taken from the Maddison Project (2013) and are in constant 1990 international dollars. For the countries for which data are not available in some years we interpolate the missing values assuming a constant growth rate between the years for which data are available.

Population figures for all countries are taken from Maddison (2003). For the countries for which data are not available in some years we interpolate the missing values assuming a constant growth rate between the years for which data are available.

The **ratio of government debt to GDP** for most countries is taken from Reinhart and Rogoff (2011). For countries for which the reported series are missing or are incomplete we use instead information from other primary or secondary sources. For Austria-Hungary, Denmark, France, Japan, Mexico, Switzerland and Uruguay we compute the ratio using nominal debt levels from Paxton (1864–1880) and nominal GDP levels from Klasing and Milionis (2014). For Germany we expand the reported series in Reinhart and Rogoff (2011) to cover the period 1871–1880 using public debt to GDP estimates for the Zollverein from Rahlf et al. (2012).

The **trade balance relative to GDP** is constructed as the difference between total exports and imports relative to GDP, all in current US dollars, based on the data provided by Klasing and Milionis (2014). For the years before 1870 the ratio is constructed based on the data provided by Federico and Tena-Junguito (2019).

The **openness ratio** is constructed as the sum of export and imports relative to GDP, all in current US dollars, based on the data provided by Klasing and Milionis (2014). For the years before 1870 the ratio is constructed based on the data provided by Federico and Tena-Junguito (2019).

The **trade share of each country with the gold standard block** is constructed based on the bilateral data reported by Fouquin and Hugot (2016). The numerator of the share is the sum of bilateral trade flows with all gold standard countries and the denominator is the sum of bilateral trade flows with all countries.

The **share of agricultural exports in total exports** is based on polity-specific series reported by Federico and Tena-Junguito (2019). It reflects the share of primary products (SITC 0 to 4) out of all exported goods.

The **war dummy** is constructed based on the information provided by Sarkees and Wayman (2010). This variable is coded as one for any year where a given country is involved in at least one intra-state, extra-state or inter-state war and is coded as zero otherwise.

The **British ally dummy** is constructed based on the information provided by Gibler (2009). This variable is coded as one for any year where a given country has any type of formal alliance — defense pact, neutrality pact, non-aggression pact, or entente — with the United Kingdom and is coded as zero otherwise.

The **years since independence instrument** is constructed for each country by subtracting the current year from the year when the country gained its independence de facto according to the information reported in the CIA World Factbook (2017).

The **polity score** for each country as well as its sub-components the **democracy score (democ)** and the **autocracy score (autoc)** are drawn from the Polity IV database (Marshall et al., 2013). The democracy score (democ) provides a composite indicator based on an additive eleven-point scale (0-10) of how mature and internally coherent democratic political institutions are in a given country based on several sets of criteria. Similarly the autocracy score (autoc) provides a composite indicator based on an additive eleven-point scale (0-10) of how mature and internally coherent autocratic political institutions are in a given country based on several sets of criteria. The polity score combines the information in these two indicators to provide a broader classification of a country's political regime. In particular the polity score is computed by subtracting the autocracy score from the democracy score. Hence, the resulting indicator ranges from a value of +10, reflecting a country with strongly democratic political institutions, to -10, reflecting a country with strongly autocratic political institutions.

The **executive recruitment index (exrec)** is a constructed variable reflecting how institutionalized, competitive and open the mechanisms are for selecting a political leader. The variable is coded on an 8-point scale (1-8) and is obtained from the Polity IV database. For this variable we interpolate the reported value to replace the standardized authority codes (-66, -77, and -88) following the approach suggested in the users' manual.

The **executive constraints index (exconst)** is a constructed variable reflecting the extent of institutional constraints on the decision-making pow-

ers of the chief executive. The variable is coded on a 7-point scale (1-7) and is obtained from the Polity IV database. For this variable we interpolate the reported value to replace the standardized authority codes (-66, -77, and -88) following the approach suggested in the users' manual.

The **political competition index (polcomp)** is a constructed variable reflecting two dimensions of political competition: (a) the degree of institutionalization, or regulation, of political competition and (b) the extent of government restrictions on political competition. The variable is coded on a 10-point scale (1-10) and is obtained from the Polity IV database. For this variable we interpolate the reported value to replace the standardized authority codes (-66, -77, and -88) following the approach suggested in the users' manual.

The **binary democracy indicator** is drawn from the database provided by Boix et al. (2013). The indicator classifies a country as a democracy if its political leadership is chosen through free and fair elections and if these elections are conducted in an open fashion where the share of the population that can participate meets a given threshold value of suffrage.

The **election year dummy** is constructed based on the information provided by Przeworski et al. (2013). This variable is coded as one for any year in which the office of the chief executive was at stake. This considers legislative elections if the chief executive is a prime minister or presidential elections if the chief executive is a president.

The **legislature existence dummy** is constructed based on the information provided by Przeworski et al. (2013). This variable is coded as one for any year in which there was a body in the country that legislates without performing executive functions.

The **direct election of legislature dummy** is constructed based on the information provided by Przeworski et al. (2013). This variable is coded as one for any year in which the main legislating body in the country was a directly elected by the electoral body. This information corresponds to the lower house in case of multiple legislating bodies in the country.

The **universal male suffrage dummy** is constructed based on the information provided by Przeworski et al. (2013). This variable is coded as one for any year in which the right to vote in national elections was legally extended to all men and possibly women.

The **years of continuous elections** variable is constructed based on the information provided by Przeworski et al. (2013). It counts the number of years during which elections were held regularly resulting in a smooth transition of election winners in the office of the chief executive. This transition should not be interrupted by a coup, an unconstitutional usurpation of the chief executive office or an occupation force.

Table A3.1: Country Sample

Country	Gold Standard Years	Core / Periphery	Country	Gold Standard Years	Core / Periphery
Argentina	1867-76, 1883-85, 1900-14	Periphery	Japan	1897-1917	Periphery
Australia	1821-1915	Periphery	Mexico	1905-13	Periphery
Austria-Hungary	1892-1914	Periphery	Netherlands	1875-1914	Core
<i>Belgium</i>	1878-1914	Core	<i>Norway</i>	1873-1914	Core
Brazil	1888-89, 1906-14	Periphery	Ottoman Empire	1881-1914	Periphery
Bulgaria	1906-12	Periphery	Portugal	1854-91	Periphery
Canada	1854-1914	Core	Romania	1892-1914	Periphery
Chile	1895-98	Periphery	Russia	1897-1914	Periphery
China	-	Periphery	South Africa	1821-1914	Periphery
Colombia	-	Periphery	Spain	-	Periphery
<i>Denmark</i>	1873-1914	Core	<i>Sweden</i>	1873-1914	Core
<i>France</i>	1878-1914	Core	<i>Switzerland</i>	1878-1914	Core
Germany	1871-1914	Core	United Kingdom	1821-1914	Core
Greece	1885, 1910-14	Periphery	United States	1879-1917	Core
Italy	1883-94	Periphery	Uruguay	1876-1914	Periphery

List of countries used in our analysis. Countries in *italics* are those countries that were a member of a currency union while they were on the gold standard. See main text for details on when we consider countries to be on the gold standard, and for details on the core-periphery distinction.

Table A3.2: Descriptive Statistics

Variable	Main Source	Observations	Mean	St. Dev.	Min.	Max.
Gold Standard	Various Sources	1,587	0.516	0.500	0	1
GDP per Capita, 1990 US\$ (log)	Maddison Project (2013)	1,590	7.415	0.589	6.273	8.883
Population, thousands (log)	Maddison (2003)	1,610	9.134	1.421	5.360	12.988
Debt (ratio of GDP)	Reinhart and Rogoff (2011)	1,394	0.538	0.405	0.001	2.438
Trade Balance (ratio of GDP)	Klasing and Milionis (2014)	1,480	-0.028	0.069	-0.441	0.305
Openness (ratio of GDP)	Klasing and Milionis (2014)	1,480	0.416	0.409	0.011	2.974
Gold Block Trade Share (ratio)	Fouquin and Hugot (2016)	1,609	0.687	0.263	0	1
Agr. Exports (ratio of total exports)	Federico and Tena-Junguito (2019)	1,601	0.812	0.258	0.105	1
War	Sarkees and Wayman (2010)	1,620	0.186	0.390	0	1
British Ally	Gibler (2009)	1,620	0.122	0.328	0	1
Years since Independence (log)	CIA World Factbook (2017)	1,620	4.714	2.049	0	7.434
<i>Polity IV Database:</i>						
Polity Score	Marshall et al. (2017)	1,498	-0.389	6.179	-10	10
Democracy (democ)		1,498	3.662	3.404	0	10
Autocracy (autoc)		1,498	4.049	3.004	0	10
Executive Recruitment (exrec)		1,498	3.867	2.639	0	8
Executive Constraints (exconst)		1,498	4.314	2.409	0	7
Political Competition (polcomp)		1,498	5.302	2.792	0	10
<i>Political Regimes Database:</i>						
Democracy Dummy	Boix et al. (2012)	1,408	0.261	0.440	0	1
<i>PIPE Database:</i>						
Election Year	Przeworski et al. (2013)	1,620	0.267	0.442	0	1
Existence of a Legislature (leg. exist)		1,332	0.946	0.226	0	1
Direct Election of Legislature (leg. direct)		1,314	0.774	0.418	0	1
Universal Male Suffrage (univ. suffrage)		1,620	0.261	0.439	0	1
Years of Continuous Elections (log)		1,444	2.515	1.514	0	4.844

Descriptive statistics for the variables used in our analysis, for the period 1860-1913 and the countries listed in Table A3.1. In several cases, data from mentioned “Main Source” are cross-checked against, and supplemented with, data from other sources. See text for more details.

A4 Appendix to chapter 4

Table A4.1: Glossary of Dutch and *German* terminology

Arisering	Aryanisation
Besluit op de Dividendbeperking	Dividend cap
Dividend- en Tantièmebelasting	Tax on dividends and management compensation
<i>Führerprinzip</i>	Leader principle
Goed koopmansgebruik	Sound business practice
Liquidatiebesluit	Liquidation-resolution
Naamloze Vennootschap	Limited liability corporation
Ondernemingsbelasting	Enterprise tax
Overgangsreserve	Transitional reserve
Personeelsfondsen & Bedrijfspensioenfondsen	Staff- and pension funds
<i>Reichskreditkassenscheinen</i>	<i>Reich</i> credit notes
Smijtdagen	Throwing days
Superdividendbelasting	Superdividend tax
Tijdvakfondsen	Intra-day securities
Vennootschap onder firma	Partnership
Vennootschapsbelasting	Corporate tax
Vermogensbelasting	Wealth tax
<i>Verwalter</i> / Beheerder	Caretaker
Winstbelasting	Profit tax

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Curriculum Vitae

Bert Simeon Kramer (1987) was born in Houten, Netherlands. He obtained a BSc degree in Economics in 2011 and a MSc degree in Economics & Business (Research) in 2013 at the University of Groningen, both cum laude. In 2013 he attended the Graduate Institute of Geneva as a visiting student to write his master thesis.

In 2013 he started a PhD in Economics at the University of British Columbia, which he chose to discontinue for personal reasons in 2015 (in good academic standing). In 2015, he started a PhD in Economics at the University of Groningen, the result of which is the present dissertation. As part of his Groningen PhD, he went back to the University of British Columbia in 2017 as a visiting graduate student. During his PhD he has been affiliated with the SOM Research School and the N.W. Posthumus Institute.

As of September 2019, he is employed as a policy researcher in the macroeconomics sector of the *Centraal Planbureau* / CPB Netherlands Bureau for Economic Policy Analysis.

Nederlandse Samenvatting

De kredietcrisis van 2008 kwam voor veel economen als een verrassing. Na decennia van relatieve financiële stabiliteit deed de crisis de wereldeconomie op haar grondvesten schudden. Maar ook de economische wetenschap kreeg met de kredietcrisis een gevoelige klap: veel van haar theorieën en modellen schoten tekort om de ontwikkelingen rondom de kredietcrisis en de daarop volgende mondiale recessie te doorgronden. Dit alles zorgde voor een hernieuwde interesse onder economen in de lessen die de geschiedenis te bieden had. Volgens Barry Eichengreen was de kredietcrisis daarmee “een goede crisis voor economische geschiedenis.”⁵

In de jaren na 2008 werd ook duidelijk hoezeer financiële markten en politieke instituties samenhangen. Enerzijds leidde de crisis tot grootschalige protesten zoals de Occupy beweging en wonnen antiglobalistische geluiden aan kracht, wat de traditionele politiek onder druk zette. Anderzijds zijn institutionele en ideologische factoren ook essentieel geweest in de groei en deregulering van de financiële sector in de decennia die vooraf gingen aan de kredietcrisis.

Er is voor economen, kortom, veel te leren uit de geschiedenis van financiële markten, zeker wanneer hierbij aandacht is voor de politieke en institutionele context. De vier studies die ik in dit proefschrift presenteer beogen dit te doen. Hoofdstukken 2 tot en met 5 vormen de kern van dit proefschrift, waarbij elk hoofdstuk een op zichzelf staand onderzoek presenteert. De vier onderzoeken houden zich op uitéénlopende wijzen bezig met de wisselwerking tussen politieke instituties en financiële markten in de negentiende en twintigste eeuw. Hieronder volgt voor elk van deze hoofdstukken een korte beschrijving van het onderwerp, de vraagstelling, de aanpak en de

⁵Citaat uit Eichengreen (2012), p. 289.

belangrijkste bevindingen.

In **hoofdstuk 2** presenteer ik onderzoek naar monetaire hervormingen in Rusland tussen 1856 en 1875. Dit zijn de twee decennia na de Krimoorlog; een oorlog die Rusland verloor en die haar financieel duur kwam te staan. De hoofdvraag in dit hoofdstuk is welke inschatting buitenlandse beleggers maakten ten aanzien van de waarde van de roebel over een langere termijn.

Hét monetaire beleidsthema van de negentiende eeuw was convertibiliteit. Convertibiliteit wil zeggen dat een valuta is gekoppeld aan een edelmetaal — doorgaans goud en/of zilver — waarbij de overheid een vaste koers tussen papiergeld en het betreffende edelmetaal garandeert. Convertibiliteit is één manier om de waarde van een valuta stabiel te houden. Ten eerste zorgt een aan goud gekoppelde valuta ervoor dat de wisselkoers met andere, buitenlandse, goudvaluta vastligt. Ten tweede beperkt convertibiliteit de mogelijkheden voor de overheid om haar kosten te dekken door geld te drukken: als ze dit namelijk te veel doet, dan kan ze de belofte van convertibiliteit niet meer waar maken. Op deze manier zorgt convertibiliteit er voor dat het publiek meer vertrouwen zal hebben in de waardevastheid van de valuta.

De Russische roebel was in de negentiende eeuw lang een zorgenkindje. Sommige periodes was de roebel convertibel in zilver, dan weer een periode niet, en uiteindelijk werd de roebel in 1897 gekoppeld aan goud. Tot het uitbreken van de Krimoorlog in 1853 was de roebel al enige tijd een zilvervaluta. Maar doordat de hoge kosten van deze oorlog voor een groot deel gedekt werden door roebels bij te drukken moest de Russische staat de zilverconvertibiliteit aan het einde van de oorlog (1856) loslaten. Er volgde vier decennia van inconvertibiliteit, ondanks herhaalde — mislukte — pogingen van de Russische staat om de munt te stabiliseren.

De Amsterdamse beurs was voor Rusland in deze tijd één van de belangrijkste bronnen van kapitaal. Zo ook tijdens de Krimoorlog. Tijdens de Krimoorlog gaf Rusland twee series obligaties uit in het buitenland, elk ter grootte van 50 miljoen roebel. De eerste serie obligaties was uitgedrukt in roebel: Nederlandse obligatiehouders kregen elk halfjaar 12.50 roebel betaald. De tweede serie echter betaalde een vast rentetarief in guldens: *f* 23.60. Tegen de wisselkoers die in 1856 gold waren deze bedragen vrijwel gelijk, maar als de roebel waarde zou verliezen zouden houders van de eerste se-

rie obligaties geschaad zijn, maar die van de tweede serie niet. Dit gegeven stelt mij in staat om op basis van obligatiekoersen te herleiden in hoeverre Nederlandse beleggers — in mijn ogen een goede representatie van Ruslands buitenlandse beleggers in algemenere zin — verwachtten dat de roebel in waarde zou dalen of zou stijgen.

In dit hoofdstuk verzamel ik daarom koersen van de Amsterdamsche beurs van de twee series obligaties die Rusland tijdens de Krimoorlog uitgaf. Op basis van deze koersen construeer ik een reeks die ik de “verwachte appreciatie/depreciatie” van de roebel noem. De hiervoor beschreven obligaties stellen mij in staat om dit te doen voor de periode 1856–1875. Vervolgens gebruik ik tijdreeks technieken om te bestuderen wanneer deze reeks grote wijzigingen — zogeheten structuurbreken — vertoont. Een structuurbrek duidt er op dat beleggers in korte tijd hun verwachtingen in sterke mate herzien, bijvoorbeeld dat zij plots verwachten dat de roebel op lange termijn aanzienlijk minder waard zal zijn dan wat zij eerst verwachtten.

Twee resultaten komen uit deze studie naar voren. Ten eerste blijkt dat gedurende een groot deel van deze periode beleggers verwachtten dat de roebel verder zou depreciëren, ondanks de wens van de Russische overheid om de roebel te stabiliseren. Ten tweede blijkt dat geen van de structuurbreken samenvalt met (aankondigingen van) grote munthervormingen in Rusland. In de meeste gevallen vallen deze breken juist samen met grote geopolitieke schokken — zoals uitbraken van oorlogen — elders in Europa.

Een voorval in het voorjaar van 1859 illustreert hoe dit mogelijk te verklaren valt. Rusland wilde juist een grote buitenlandse lening uitgeven, toen er in april 1859 oorlog uitbrak tussen Oostenrijk en Sardinië. De mondiale financiële crisis die hierdoor werd veroorzaakt zette zo een streep door de uitgifte van de nieuwe Russische lening, waarna Nederlandse beleggers snel hun verwachtingen ten aanzien van de roebel bijstelde.

Op basis van deze resultaten concludeer ik dat Ruslands monetaire hervormingen niet zwaar werden gewogen door haar buitenlandse obligatiehouders. In de ogen van deze beleggers waren voor de toekomst van de roebel geopolitieke ontwikkelingen van meer belang, en niet eens per se die in Rusland. Het gebrek aan belang dat Nederlandse obligatiehouders hechtten aan munthervormingen in Rusland zou te verklaren kunnen zijn doordat zij sim-

pelweg weinig vertrouwen stelden in de aankondigingen van de Russische overheid. Het zou echter ook te verklaren kunnen zijn doordat Rusland financieel te zeer een speelbal was van mondiale financiële ontwikkelingen.

Hoofdstuk 3 is ook een studie naar convertibiliteit, maar het perspectief is dit keer mondiaal. In dit gezamenlijke hoofdstuk met Petros Milionis bestuderen wij de zogeheten klassieke gouden standaard. Tot ca. 1870 waren monetaire stelsels wereldwijd vrij divers. Sommige landen koppel-den hun valuta aan goud, anderen aan zilver, weer een andere groep aan zowel zilver als goud — een stelsel dat een “dubbele standaard” of “bimetallisme” wordt genoemd — en tot slot waren er valuta die algeheel inconvertibel waren. Na 1870 stapten geleidelijk steeds meer landen over op een goudvaluta. Een land met een aan goud gekoppelde valuta werd gezegd deel te nemen aan de “gouden standaard”.

De vraag die wij in dit hoofdstuk proberen te beantwoorden is waarom landen er al dan niet voor kozen hun munt aan goud te koppelen. Meer in het bijzonder poneren wij de vraag of democratischer landen meer of minder snel geneigd waren dit te doen. Ons onderzoek toont aan dat het laatste het geval is: democratischer lander waren, gecorrigeerd voor andere factoren, minder snel geneigd deel te nemen aan de gouden standaard.

Dit resultaat is in de literatuur al vaker gevonden, maar tot nu toe alleen voor de gouden standaard van het interbellum. Tot 1914 was de gouden standaard relatief stabiel: er waren wel zo nu en dan landen die de standaard loslieten, maar zeker in Westerse landen was dit zeldzaam. Met het uitbreken van de Eerste Wereldoorlog werd de goudkoppeling in vrijwel alle landen abrupt beëindigd. In de jaren van het interbellum werd in veel landen de gouden standaard weer hersteld. Echter, de gouden standaard was tijdens het interbellum erg instabiel, en in de depressiejaren liet het ene na het andere land de goudkoppeling los ten faveure van binnenlandse monetaire bewegingsruimte.

Het verschil in stabiliteit tussen de klassieke gouden standaard (ca. 1870–1914) en de gouden standaard van het interbellum (ca. 1925–1936) is vaak toegeschreven aan grote veranderingen in politieke instituties die aan het begin van de twintigste eeuw plaatsvonden (Eichengreen, 1992). Democratische instituties zoals algemeen kiesrecht werden steeds wijdverspreider. Hierdoor

werd de druk op beleidsmakers vergroot om binnenlandse vraag te stimuleren door expansief monetair en financieel beleid, wat niet altijd te verenigen is met een goudkoppeling. Doordat instituties vóór 1914 doorgaans minder democratisch waren, aldus de literatuur, was de gouden standaard in haar klassieke periode stabiel. Het verspreiden van democratische instituties wereldwijd was echter ook al vóór 1914 volop in gang gezet. Zo hadden anno 1905 al 21 landen het algemeen kiesrecht voor mannen ingevoerd. Daarom testen wij of een dergelijk verband tussen democratische instituties en het vasthouden aan de gouden standaard ook tijdens haar klassieke periode bestond.

Voor dit onderzoek verzamelen wij op jaarbasis data voor een groep van dertig landen voor de periode 1860–1914. Op basis van zowel secundaire als primaire bronnen brengen wij in kaart in welke jaren landen toetraden tot de gouden standaard en in welke jaren landen weer uittraden; dit laatste komt vóór 1914 in totaal negen keer voor. We relateren de keuze van elk land in elk jaar aan de mate waarin de desbetreffende politieke instituties als democratisch kunnen worden beschouwd. Dit verband bestuderen we met behulp van een aantal regressiemodellen, hoofdzakelijk bestaande uit dynamische probit modellen en *survival* modellen. Als maatstaf voor democratisering gebruiken we als uitgangspunt de Polity IV data van Marshall et al. (2013), maar we vergelijken de resultaten ook met een aantal alternatieve maatstaven.

Onze studie toont aan dat de kans dat een land deel uitmaakte van de gouden standaard lager was als het democratischer instituties had, mits wordt gecorrigeerd voor een aantal andere economische en geopolitieke factoren. We bestuderen dit verband ook afzonderlijk voor alleen toetredingen tot, en uittradingen uit, de gouden standaard. Hier vinden we dat dit verband bestaat voor beide processen, al is het verband voor uittredingen niet statistisch significant, vermoedelijk door het kleine aantal uittredingen.

De resultaten van hoofdstuk 3 werpen daarmee een nieuw licht op de literatuur over de gouden standaard. Het negatieve verband dat wij vinden sluit aan bij de literatuur over het interbellum, waarin wordt betoogd dat de gouden standaard toen werd ondermijnd door binnenlandse democratische druk. Wij vinden een dergelijk verband ook voor de periode 1860–1914. En-

erzijds duidt dit er op dat het spanningsveld tussen binnenlandse democratische instituties en een stabiele gouden standaard universeler is dan tot nog toe meestal wordt gedacht. Anderzijds werpt dit de vraag op in hoeverre de instabiliteit van de gouden standaard van het interbellum kan worden toegeschreven aan democratisering. Als dit spanningsveld ook bestond vóór 1914 en de gouden standaard toen desondanks in veel landen vrij stabiel was, dan moeten andere verklaringen voor de verschillen tussen de twee varianten van de gouden standaard wellicht meer belang worden toegekend.

In **hoofdstuk 4** spelen monetaire zaken een bijrol; de aandacht gaat in dit hoofdstuk uit naar fiscaal beleid. Dit hoofdstuk — samen met Philip Fliers en Abe de Jong — bestudeert de invoering van de vennootschapsbelasting in Nederland. Dit vond plaats tijdens de Tweede Wereldoorlog, in mei 1942. Ten tijde van de Duitse invasie in 1940 was Nederland één van de weinige Europese landen zonder een directe belasting op bedrijfswinsten. Dit veranderde abrupt tijdens de bezetting: onder Duits bewind werd een aantal ingrijpende belastingwijzigingen doorgevoerd, waaronder een aantal nieuwe belastingen op het bedrijfsleven. Hoofdstuk 4 brengt de gevolgen hiervan in kaart voor de bedrijfsfinanciering van Nederlandse beursgenoteerde bedrijven. In het bijzonder bestuderen wij hoe en in hoeverre de nieuwe belastingen leidden tot een verlies in beurswaarde en bestuderen wij in hoeverre bedrijven hun financieringskeuzes wijzigden door toedoen van de vennootschapsbelasting.

In de hedendaagse literatuur over bedrijfsfinanciering spelen belastingen zoals de vennootschapsbelasting een grote rol. Grosso modo heeft elk bedrijf bij zijn financiering de keuze uit het aantrekken van eigen vermogen (aandelenkapitaal) of vreemd vermogen (schuld). In twee invloedrijke publicaties betogen Franco Modigliani en Merton Miller hierover twee zaken.⁶ Ten eerste zou het op theoretische grond in een perfecte markt voor bedrijven niet uit moeten maken welk soort vermogen er wordt aangetrokken: de totale financieringskosten zijn onafhankelijk van het soort financiering. Ten tweede verandert dit gegeven zodra er belasting wordt geheven op bedrijfswinsten: door de aftrekbaarheid van rente zorgt een vennootschapsbelasting ervoor dat vreemd vermogen aantrekkelijker wordt. Theoretisch zullen bedrijven

⁶Deze twee resultaten volgen uit respectievelijk Modigliani and Miller (1958) en Modigliani and Miller (1963).

dus meer schuld aantrekken als hun winst zwaarder wordt belast.

Empirisch is het exacte verband tussen de hoogte van de vennootschapsbelasting en schuld-quote — de verhouding tussen het totale vreemd vermogen en de totale activa van een bedrijf — echter moeilijk vast te stellen. Grote wijzingen in het belastingbeleid vinden niet vaak plaats, worden vaak ruim van tevoren aangekondigd en zijn niet los te zien van macro-economische omstandigheden. De invoering van de vennootschapsbelasting in 1942 vormt hierop een uitzondering: hier hebben we te maken met een plotseling rigoureuze belastingschok, die werd ingevoerd door een buitenlandse mogendheid en met als primaire motivatie financieel gewin voor de Duitse schatkist.

Tegelijkertijd biedt de Nederlandse economie tijdens de bezetting ondanks verschillende verstoringen voldoende houvast om economische processen te bestuderen. Ofschoon het economisch verkeer te maken kreeg met substantiële beperkingen, bleven financiële markten voor een groot deel van de oorlog functioneren. Op macro-economisch vlak bleef de Nederlandse economie de eerste jaren van de bezetting redelijk op peil: in 1943 was het bruto binnenlands product (bbp) nog 96% van het niveau van 1938 (Klemann, 2002). Om deze redenen zien wij de invoering van de vennootschapsbelasting in 1942 als een interessante casus om de financiële gevolgen van een belasting op bedrijfswinsten te bestuderen.

In ons onderzoek maken wij gebruik van een groot aantal primaire bronnen. We verzamelen beurskoersen voor alle binnenlandse Nederlandse beursgenoteerde bedrijven rondom een tweetal belastingschokken: een aankondiging van belastingverhogingen door de Duitse *Generalkommissar für Finanz und Wirtschaft* Hans Fischböck in november 1940 en de verordening ter invoering van de vennootschapsbelasting in mei 1942. Daarnaast verzamelen en standaardiseren we alle jaarrekeningen van dezelfde bedrijven tussen 1938 en 1948.

Op basis van de beurskoersen in november 1940 en mei 1942 onderzoeken we hoezeer beleggers geschaad werden door de nieuwe belastingen op het bedrijfsleven. Hierbij maken we gebruik van technieken uit de hedendaagse financieringsliteratuur voor het meten van aankondigingseffecten. We vinden dat rondom beide belastingschokken ruim f100 miljoen aan beurswaarde verloren ging. In totaal bedroeg de schade voor beleggers hiermee ca. 3% van het

toenmalige jaarlijkse bbp. We relateren het verlies in beurswaarde per bedrijf aan enkele financiële karakteristieken. Hieruit blijkt dat bij de aankondiging van november 1940 alle bedrijven in vrijwel gelijke mate werden getroffen: geen van de financiële karakteristieken kan het verlies in beurswaarde verklaren. Voor de aankondiging van mei 1942 vinden we dat bedrijven met een hogere winstgevendheid, en bedrijven met een hogere schuldquote, minder zwaar geraakt werden.

Op basis van de jaarrekeningen onderzoeken we allereerst of bedrijven gebruik maakten van winstmanipulatie om de belastbare winst te drukken, zoals bijvoorbeeld het versneld afschrijven op vaste activa. Dit lijkt niet in belangrijke mate het geval. Vervolgens onderzoeken we of bedrijven vanaf 1942 hun schuldquote vergrootten en hoe dit samenhangt met financiële karakteristieken zoals winstgevendheid en dividendbeleid. We vinden dat bedrijven vanaf 1942 hun schuldquote met gemiddeld 5%-punt verhoogden, wat geheel te verklaren valt uit een veranderd verband met deze financiële karakteristieken. In het bijzonder vinden we dat winstgevendheid tot 1942 negatief samenhangt met de schuldquote, maar vanaf 1942 niet meer. Dit resultaat, als ook een aantal resultaten op basis van zogeheten *partial adjustment* modellen, wijzen er op dat fiscale motieven een factor van belang waren in de keuze tussen eigen vermogen en vreemd vermogen.

Al met al toont ons onderzoek het belang aan van fiscale regelgeving voor de financiering van bedrijven. Onze resultaten laten zien dat de belastingwijzigingen die in Nederland tijdens de Tweede Wereldoorlog plaatsvonden grote gevolgen hadden voor zowel de beurswaarde als de financieringskeuzes van beursgenoteerde bedrijven. Deze resultaten lijken daarom aan te sluiten bij dat deel van de hedendaagse literatuur over bedrijfsfinanciering dat betoogt dat fiscale factoren een belangrijke rol spelen.

In **hoofdstuk 5** staat de politiek zelf centraal, waarbij de vraag is hoe deze wordt beïnvloed door financiële prikkels. Dit hoofdstuk presenteert gezamenlijk onderzoek met Daniel Irwin en Christopher Kam en bestudeert de effecten van beloningsbeleid in de Canadese politiek in de tweede helft van de twintigste eeuw. In de jaren vijftig en zestig werden er in het Canadese federale parlement en in enkele provinciale parlementen pensioenregelingen geïntroduceerd voor parlementariërs. Enkele decennia later werden deze pen-

sioenregelingen weer aanzienlijk versoberd. Onze onderzoeksvraag in hoofdstuk 5 is in hoeverre deze wijzigingen de keuzes van politici beïnvloedden om langer aan te blijven in het parlement, of om dit op zijn minst te proberen.

Beloningsbeleid in de politiek dient verschillende doelen en is doorgaans een erg beladen onderwerp. Eén van de redenen om parlementsleden een royaal salaris en pensioen te bieden is dat dit ze in staat stelt om voor langere tijd in de politiek te blijven. Dit kan bijdragen aan de continuïteit van de politieke besluitvorming. Dit was één van de beweegredenen voor het Canadese federale parlement om in 1953 een pensioenregeling voor haar leden in het leven te roepen. Dit was een zogeheten *defined benefits* (DB) pensioen: een pensioen waarbij het jaarlijks te ontvangen pensioen van tevoren vastligt en daarmee als relatief genereus kan worden gezien. De jaren daarna volgden veel provinciale parlementen dit voorbeeld door ook DB pensioenregelingen in te stellen. Later, vanaf eind jaren zeventig, werden sommige van deze parlementaire pensioenregelingen omgezet in *defined contributions* (DC) pensioenen. Bij een DC pensioen is het te ontvangen pensioen afhankelijk van de totale inleg en het vermogen daarop; deze pensioenvorm is daarom minder zeker en doorgaans ook aanzienlijk minder lucratief dan een DB pensioen.

We onderzoeken of het invoeren van DB pensioenen heeft geleid tot een grotere “electorale vasthoudendheid”. Dat wil zeggen: of het politici ertoe heeft aangezet om zich vaker herverkiesbaar te stellen. Ook onderzoeken we in hoeverre dit zich ook daadwerkelijk vertaald heeft in een langere gemiddelde termijn in het parlement van individuele politici. Vice versa onderzoeken we of het omzetten van DB- in DC pensioenen geresulteerd heeft in een lagere electorale vasthoudendheid en in kortere gemiddelde termijnen van parlementsleden.

Het feit dat de wijzigingen in beloningsbeleid op verschillende momenten plaatvonden in verschillende parlementen stelt ons in staat om te bepalen wat het effect hiervan geweest is met behulp van een zogeheten *difference-in-differences* methode. Deze methode gaat ervan uit dat zonder beleidswijzigingen de veranderingen van de electorale vasthoudendheid en gemiddelde termijn in dezelfde mate veranderd zou zijn in alle parlementen. Het verschil tussen de parlementen van deze veranderingen over de tijd zijn in dat geval namelijk een weergave van het effect van de invoering of versobering van de

pensioenregeling. De drie provincies die we in onze studies betrekken — Ontario, Manitoba en Saskatchewan — zijn alledrie grote provincies. Daarnaast hebben in het Canadese politieke systeem provinciale parlementen relatief veel zeggenschap. Dit maakt dat provinciale parlementen in Canada uit min of meer dezelfde groep potentiële politici kunnen putten als het federale parlement en dat parlementariërs ook na hun politieke loopbaan vergelijkbare carrièremogelijkheden hebben.⁷ Dit alles vormt de basis voor het gebruik van de verschil-in-verschillen methode.

We verzamelen gegevens over de loopbanen van alle individuele leden van de eerder genoemde vier parlementen. Ook verzamelen we voor elk parlamentslid de oorzaak van zijn of haar uittreden, waarbij het voornaamste onderscheid is tussen parlementariërs die zich niet herverkiesbaar hebben gesteld en zij die bij herverkiezing een electorale nederlaag hebben geleden. De difference-in-differences methode combineren wij vervolgens met een serie zogeheten *survival* modellen. Hiermee modelleren we de kans op al-dan-niet vrijwillige uittreding als een functie van de geldende pensioenregeling, het aantal termijnen dat het lid al in het parlement zit en een scala aan controlevariabelen.

Uit onze studie blijkt dat het invoeren van DB pensioenen in de jaren vijftig en zestig heeft bijgedragen aan een aanzienlijk hogere electorale vasthoudendheid van parlementariërs, met name in hun eerste en tweede termijn. Dit vertaalde zich in een gemiddelde verlenging van de parlementaire loopbaan van 32 tot 40 maanden. Het feit dat dit effect zich concentreert in de eerste en tweede termijn verklaren wij door zogeheten *vesting* regels: dit zijn regels die stipuleren dat iemand pas in aanmerking komt voor een pensioen na een minimum aantal jaar de functie te hebben bekleed. Onze studie vindt geen robuust effect van de verandering van DB- naar DC pensioenen. Weliswaar lijken sommige analyses te wijzen op een negatief effect op zowel de electorale vasthoudendheid als op de gemiddelde termijn, maar deze resultaten houden geen stand wanneer we een placebo-test uitvoeren.

Hoofdstuk 5 toont daarmee aan dat beloningsbeleid kan bijdragen aan de continuïteit van een parlement. Het introduceren van genereuze pensioenregelingen voor politici zorgde in Canada ervoor dat deze langer aanbleven,

⁷Of, zoals wij het noemen, ze betreden na hun politieke loopbaan dezelfde markt voor “gewezen politici”.

of dat ze dat op zijn minst probeerden door zich herverkiesbaar te stellen.