PHILIP T. FLIERS

Essays on Financing and Performance

The role of firms, banks and boards

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Artikelen in bedrijfsfinanciering en prestatie
De rol van ondernemingen, banken en bestuur

Thesis

to obtain the degree of Doctor from the
Erasmus University Rotterdam
by command of the
rector magnificus

Prof.dr. H.A.P. Pols

and in accordance with the decision of the Doctorate Board.

The public defence shall be held on

Friday the 17th of June 2016, at 09.30 hrs

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http://www.erim.eur.nl

ERIM Electronic Series Portal: http://repub.eur.nl/pub

ERIM PhD Series in Research in Management, number ERIM reference number: EPS-2016-388-F&A
ISBN 978-90-5892-447-6

Design: B&T Ontwerp en advies www.b-en-t.nl

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We shall not grow wiser before we learn

that much that we have done was very foolish

- *Friedrich August von Hayek (1972)*
'The Road to Serfdom'

Preface

To me, the writing of this dissertation has been a journey of many faces. More than once I felt overcome with joy, but perhaps just as often I felt frustrated and helpless. It was in those moments, many people have stood by me and pushed me through. I am grateful for their support and unwavering confidence in me. Over the past five years I have been a Lecturer at the Finance department at RSM, I am grateful that they provided me with the opportunity to write my dissertation and have given me the flexibility to travel and funded my research. First and foremost, I want to thank my supervisor Abe de Jong. He has been an excellent mentor. I can honestly say that he is probably the only one who could have gotten me through it all. Abe has taught me how to balance research and teaching, thought me the 'true academic process' and choose wisely when to let me figure things out for myself. Not only did he supervise my dissertation, we also worked closely on constructing a database of financial information for Dutch firms over the twentieth century. Something that will probably provide us with research material until the day we retire. All those years ago, it was Abe who gave me the chance of a lifetime and apparently he saw something promising in me. Abe, I hope I have delivered on that promise and I will be forever grateful.

Likewise, I would like to express my deepest gratitude to Chris Colvin, my friend and colleague. Chris has supported my work on Dutch economic history and during the writing of our first paper we soon knew that our skills were very much complementary. I am grateful for his willingness to correct my drafts and his never ending supply of patience. Over the years Chris and I became friends and I truly hope that our shared interest in economic history (among other things) will fuel our friendship for many years to come.

I would like to thank Peter Roosenboom for the support he gave me. Peter has provided invaluable comments on my research, especially on chapter four. As our department chair he gave me the flexibility in my courses and thesis supervision. Peter, I want to thank you for your confidence in me.

There are two scholars I would like to thank in particular. Gerarda Westerhuis: the work in this dissertation has greatly benefited from her knowledge of the Dutch economy and corporate networks . I admire her work ethic and hope to share many future projects with her. Then I am grateful to have met Joost Jonker who has provided feedback and suggestions to my work on multiple occasions. I have come to admire his knowledge, his way of inspiring others and his dedication to accurately describing the history of the Dutch economy.

Then I would like to express my gratitude to Henry van Beusichem. I have come to appreciate Henry for his enthusiasm in research and the precision in his work. He is an example of a truly dedicated academic, without his efforts in collecting data this dissertation would not have been finished this early.

Also I would like to thank John Turner, who on many occasions provided feedback on my work. Over the years his knowledge and insights have become an inspiration for my work and my ambition for an academic career.

Obviously there are many more academics to whom I am very grateful for their support. Among others I would specifically like to thank Pooyan Ghazizadeh, Stefan van Kampen, Yigitcan Karabulut, Arjen Mulder, Peter Neuteboom, Buhui Qui, Miguel Rosellon, Ben Tims, Dirk Schoenmaker, Wolf Wagner. Then there are two people from the RSM Finance department that I wish to thank separately. Flora Pos and Myra Lissenberg-van der Pennen, they took care of much of the administrative issues, both in my research and teaching. Additionally I would like to thank

all the student assistants who helped me to collect the data for the various chapters in this dissertation. In particular I would like to thank Michael Rothuizen, Roland Staats, Dirk-Jan Sanderink and Kasper Sanderink.

Finally, I want to thank my parents Marjolein Fliers-Vos and Roy Fliers for their continued support, love and confidence in me. I want to thank them for the 'kitchen table' discussions of my work, global and national politics and our personal developments. First and foremost, my mother, whom I admire for her independence and her ability to navigate the situations my father and me sometimes create, words cannot express my gratitude to her. I want to thank my father for his advice on my work, his continued suggestions and his efforts to share his knowledge with me. I am grateful for his unparalleled wisdom and I hope he will continue to share his views with me, for many more years to come. From a young age my parents have given me the tools to excel (no pun intended), whether I have made the most of this remains unanswered. Mom, dad, your efforts and support are second to none, without you I would not have become the man I am today.

Philip T. Fliers

Rotterdam, January 2016

Table of content

Chapter 1 Introduction

1.1 Overview

This section provides an overview of the chapters in this dissertation. The chapters are essays on financing and performance. The chapters focus on issues currently debated in both the academic literature and the practice of financiers and management. Also the chapters focus on issues in corporate finance and different types of performance. The second chapter is concerned with the causes and consequences of financial crisis for banks and their performance (survival) during times of economic turmoil. The third chapter investigates the influence directors may have on firm policies and the firms' performance (return on equity, return on assets and market valuation). The fourth chapter focuses on the importance of firm financial flexibility for the dividend decision and the firms' ability to keep dividends stable.

In the second chapter of this dissertation we investigate the determinants of this bank distress in the Netherlands during the 1920s. During this period the Dutch economy suffered an unequalled financial crisis. We use discrete choice models to 'predict the past'. Bank-level financial accounting, product market competition and board data included in contemporary investor manuals are used to assess how policy decisions influenced banks' fate. In particular, we ask how banks' choices made before the debt-deflationary downturn affected their subsequent performance in the banking crisis. This chapter complements De Vries (1989) and Jonker and Van Zanden (1995) by systematically distinguishing the characteristics of distressed and non-distressed banks. This chapter adds a new and more nuanced understanding of this period in Dutch economic history. Though we agree that the crisis of the 1920s was caused by extensive deflationary pressures, our methodology shows that its consequences for the country's financial service

providers stem from bank-specific risk factors, including the characteristics of their relationships with other banks and non-financial firms.

The main goal of this chapter is to shed new light on an unresolved historical question as to what were the key factors causing the 1920s banking crisis. Finding an answer to the role of pre-crisis conditions for crisis-period performance is interesting for three further reasons: (1) it facilitates the economic identification of the roots of bank distress because this crisis forms a quasi-natural experiment of history in that its causes were largely exogenous, but its effects on the banking sector were partly determined endogenously; (2) because of the absence of prudential supervision in the Netherlands at the time of the crisis, this historical episode illustrates how banks may behave when there is little expectation of state intervention; and (3) it provides a better understanding of product market competitive choice and the workings of relationship banking in times of crisis.

The third chapter of this dissertation investigates the relation between individual Dutch directors and the outcome of corporate policies such as dividends, investments and capital structures. The goals of this paper are as follows; (1) describe the evolution of big linkers (i.e. board members holding three or more board positions); (2) measure the correlation between big linkers firm policies and performance; (3) to assess which prominent business men were the most important during the twentieth century and describe their profiles. We focus on big linkers since the literature has left many questions unanswered regarding the role and power of these directors. Are they important because of exceptional skills? Are they too busy to do a good job? Are they only well-connected but do they have no effects?

Building on previous research, such as Bertrand and Schoar (2003), Richardson et al. (2004) and Cronqvist and Fahlenbrach (2009) we use director fixed effects models to assess the

systematic relevance of individual big linkers during the twentieth century. An additional product of this research is that we demonstrate that large scale quantitative research can be combined with in-depth case research, by providing substantial background information on our big linkers. We describe the presence of big linkers over time, estimate the systematic relevance of big linkers on firm policies and performance, and explain the director effects. The focus on big linkers also has a more pragmatic explanation. That is, by examining the similarities of corporate policies across firms by looking at big linkers, we solve the difficulty to separate firm and directors effects on corporate policies because they are always observed simultaneously.

The fourth chapter investigates the impact of corporate financial flexibility on dividend smoothing practices using recent data for US firms. The literature has focused on three areas of market friction to explain the existence and cross-sectional variation of dividend stabilizing policies. Information asymmetry between shareholders and managers generates dividend smoothing, since managers use their private information to provide information about current and future cash flows (Kumar, 1988; Kumar and Lee, 2001; Guttman et al., 2010). Dividend smoothing can also arise as a means to limit the agency costs of free cash flow (Jensen, 1986; Easterbrook, 1984; Allen et al., 2000). Alternatively the existence of external finance costs is suggested as a driver of dividend smoothing (Miller and Scholes, 1978; Almeida et al., 2004; Aivazian et al., 2006). We argue that financial flexibility is the missing link in an explanation that consistently these integrates market frictions. Following De Jong et al. (2012) and Gamba and Triantis (2008) we define financial flexibility as the ability of a firm to fund investments and restructure its financing. Recent work by Lambrecht and Myers (2012) provides new insights into the theoretical underpinnings of dividend smoothing practices. They show that the smoothing of dividends is accomplished through borrowing. In their model payouts can only in part absorb the negative

shocks to net income; the remainder must be absorbed by changes in borrowing since investments are fixed due to contractual obligations and a finite set of investment opportunities. If debt is to act as a shock absorber, the hypothesis is that the firms' dividend smoothing depends on its financial flexibility and prior capital structure decisions.

The main ideas tested in this paper are then as follows. Do firms smooth their dividends in the current period in order to preserve low risk debt capacity in order to fund future positive NPV projects?. Do firms, conditional on their financial flexibility, attempt to limit external financing costs and mitigate agency costs by smoothing their dividends? The contribution of this chapter is then threefold. First, this paper provides evidence that financial flexibility is one of the key determinants of dividend smoothing. Second, since Lintner (1956) provides little theoretical justification for the existence of dividend smoothing, introducing financial flexibility helps to formulate an explanation for cross-sectional variation in dividend smoothing using a combination of documented market frictions. Third, this paper tests if the firms' capital structure is indeed a shock absorber that enables dividend smoothing.

Finally, the fifth chapter provides concluding remarks, the limitations of my studies, and my views on the relationship between research in economic history and research in finance.

1.2 Declaration of Contribution

In this section I declare my contribution to the three studies of this dissertation and acknowledge the contribution of other parties where relevant.

Chapter 2 is joint work with Chris Colvin and Abe de Jong. We developed the approach of this study together. Joint with student-assistants Kasper Sanderink and Dirk-Jan Sanderink I have collected the data for the study. I have executed the analysis. The writing of the paper was a joint effort. We jointly discussed the results and robustness of our findings.

Chapter 3 is joint work with Gerarda Westerhuis and Abe de Jong. We developed the approach of this study together. With the data we had already collected for the BINT-project, sponsored by two NWO grants (360-52-082 and 360-52-080), I have executed the analysis, participated in the writing of the methodology and results. Gerarda Westerhuis and Abe de Jong focused on the theoretical framework and historical setting.

Chapter 4 is single-authored work.

Chapter 2

'Predicting the Past': Understanding the causes of bank distress in the Netherlands in the 1920s[1]

2.1 Introduction

The Dutch economy suffered a sharp recession in the early 1920s after it had experienced a period of exceptional performance in the 1910s. Following Fisher's (1933) debt-deflation theory of great depressions, Jonker and Van Zanden (1995) argue that this recession's principal cause was over-indebtedness combined with price deflation. Dutch businesses had benefited greatly from the First World War, a conflict in which the Netherlands remained neutral (De Jong, 2005); a short post-war boom prolonged their prosperity (Van Zanden, 1997a). The large and sustained declines in aggregate demand and prices that followed were the consequence of falling export demand and monetary policy due to the gold standard. Debt-deflation put pressure both on Dutch businesses and on the banking sector that they had come to rely on. Instability for banks has since been widely classified as constituting a financial crisis (e.g. Bernanke and James, 1991; Reinhart and Rogoff, 2009). Jonker and Van Zanden (1995) estimate that 35 banks suffered financial distress in this crisis; De Vries (1989) puts the number closer to 70. Of the 142 banks considered in this article, which together constitute 83% of the nominal equity value of the Dutch financial services sector, we document 33 that suffered distress at some stage in the crisis. This article quantitatively

[1] This chapter is based on a published paper co-authored by Chris Colvin and Abe de Jong. Earlier versions of this chapter were presented at the Economic History Society Annual Conference (April 2012), the European University Institute (June 2012), Queen's University Belfast (June 2012), the University of Cologne (July 2012), Erasmus University Rotterdam (September 2012), the Netherlands Institute for Advanced Study in the Humanities and Social Sciences (June 2013), the University of Cambridge (June 2013) and the European Business History Association Annual Congress (September 2013). We thank the organisers and audiences of these gatherings for listening to our ideas. We especially thank Fabio Braggion, Carsten Burhop, Joost Jonker, Nathan Marcus, Lars Norden and John Turner for their comments and suggestions on the drafts of this chapter, including on a working paper distributed by the European Historical Economics Society (EHES Working Papers in Economic History, No. 35, January 2013). Finally, we thank Joachim Voth and two anonymous referees for helping us to improve this chapter. Full reference: Colvin, C. L., De Jong, A., & Fliers, P. T. (2015). Predicting the past: Understanding the causes of bank distress in the Netherlands in the 1920s. *Explorations in Economic History*, *55*, 97-121.

investigates the determinants of this unequalled bank distress in the Netherlands by using discrete choice models to "predict the past". Bank-level financial accounting, product market competition and board composition data included in popular contemporary investor manuals are used to assess how policy decisions influenced banks' fate. In particular, we ask how banks' choices made before the debt-deflationary downturn affected their subsequent performance in the banking crisis. This article complements De Vries (1989) and Jonker and Van Zanden (1995) by systematically distinguishing between the characteristics of distressed and non-distressed banks. As such, this article adds a new and more nuanced understanding of this period in Dutch economic history. Though we agree that the crisis of the 1920s was caused by extensive deflationary pressures, our methodology shows that its consequences for the country's financial service providers stem from bank- specific risk factors, including the characteristics of their relationships with other banks and non-financial firms.

While our main goal is to shed new light on an unresolved historical question, finding an answer to the role of pre-crisis conditions for crisis-period performance is interesting for three further reasons: (1) it facilitates the economic identification of the roots of bank distress because its causes were largely exogenous, but its effects on the banking sector were partly determined endogenously; (2) because of the absence of prudential supervision in the Netherlands at the time of the crisis, this historical episode illustrates how banks may behave when there is little expectation of state intervention; and (3) it provides a better understanding of product market competitive choice and the workings of relationship banking in times of crisis.

The methodology that we employ follows work which uses discrete choice models to determine why banks fail (Kolari et al., 2002; Ravi Kumar and Ravi, 2007). Following Meyer and Pifer (1970), Martin (1977), and Pettway and Sinkey (1980), we use bank- level accounting data

to measure capital adequacy, asset quality, earnings and liquidity. Our data on the determinants of failure are taken from 1917, while the failures start in 1920. This implies that all decisions were taken in 1917 or earlier, but the crisis was caused by the troubles the banks' clients and business connections faced in 1920 and later. All banks in our sample - failing or not - were confronted with the same economic conditions, but not all banks failed. Our empirical strategy explores the possibility that failing banks made bad lending and financing decisions up to 1917 and suffered their consequences in the 1920s. In other words, we document bad policy decisions, conditional on changing economic circumstances. Although the precise developments after 1917 were not foreseeable for the bankers, those making good decisions anticipated a worsening of conditions.

In this article we take a broad view of bank distress. We include many of the standard balance sheet-based and control variables found in the literature on banking crises. The Dutch financial sector was highly fragmented at the time of the crisis and the banks in our sample exhibit wide variation in their product market choices and positioning. We incorporate variables which describe market structure and the presence of international activities in order to measure these effects. Descriptions of the Dutch financial services sector in this period suggest that bank directors were positioned strategically on the boards of related financial and non-financial corporations with the explicit task of safeguarding their employers' interests (e.g. De Graaf, 2012). We use information from the banks' boards, and in particular their networks of interlocking directorates, to explore the impact of a form of relationship banking that emerged in the Netherlands in the 1910s.

Our results are as follows. We find that the balance sheet composition of banks before the crisis period had a significant impact on their probability of suffering distress in the 1920s. In particular, banks with higher leverage and more deposits were at greater risk of suffering distress.

Much in line with the established view of this crisis, we attribute this to the combined exposure to debt-deflation - which rendered long-term loans riskier - and the post-war boom that came immediately before it - which caused a short-lived banking bubble. We find that younger and exchange-listed banks were more vulnerable in times of crisis.

The effects of banks' product market strategies and competition are mixed. On the one hand, we find that banks with branches and international activities were more likely to suffer distress. We take this to be evidence of the risk of doing business further away from banks' headquarters, a strategy which is associated with higher monitoring costs. On the other hand, we find no discernible effect of competition, measured as the relative market representation over the regions where a bank is active in the domestic market.

In exploring how interlocking directorates influence banks' performance, we find that banks with smaller boards had a higher probability of suffering distress. When we control for the effects of board size and the attributes of interlocking directorates, we find evidence for the interdependency of the Netherlands' banks. In particular, banks which positioned their managerial connections in other financial firms that were smaller and more profitable immediately prior to the crisis were most at risk. We find that interlocks with non-financial firms had a weak impact on the probability of suffering distress; we find only that banks which concentrated such interlocks were better able to safeguard their interests during the crisis.

The findings of this article relate to a wider literature on universal or relationship banking in the early twentieth century, in particular to Fohlin (1999) for the case of Germany and to Van Overfelt et al. (2009) for the case of Belgium. More specifically, we re-examine the problems associated with mixed banking in the crises of the interwar period, much as White (1986) and Kroszner and Rajan (1994) do for the case of the US.

Our results relate to an already existing body of work on the Dutch crisis of the 1920s. De Vries (1989) gives a detailed historical narrative of its unfolding from the perspective of De Nederlandsche Bank (DNB), the Netherlands' bank of issue. Jonker (1989, 1991) argues that close ties between bankers and their corporate borrowers via interlocking directorates soon extended the crisis from the non-financial to the financial sector. Colvin (2014) describes how conflicts of interest arising from one such interlock resulted in the near failure of the country's second-largest bank. We find that the crisis was mainly caused by the internal choices made by banks in terms of financial structure (leverage and deposits) and product market strategy (branching and internationalization), as well as by the relations between banks.

This article is closely related to various other works in banking and finance. Most importantly, it relates to work on the causes and consequences of financial crises - a theme which, given recent bank failures, has lately been revived (for a review, see Acharyaetal., 2009; Lo, 2013). Of specific relevance in this literature are two studies which, like ours, attempt to "predict the past": Jordan et al. (2010), who, on the basis of data pertaining to banks one year prior to the 2007 crisis, predict recent bank failures with 88% accuracy; and Fahlenbrach et al. (2012), who find that there is a general persistence in banks' risk-taking culture between 1998 and the present which renders their performance very sensitive to crises.

The article proceeds as follows. First, the historical and institutional context necessary to understand our arguments is introduced in Section 2. Our bank-level accounting and corporate governance data and the empirical strategy used in the analysis are discussed in Section 3. Section 4 defines the variables constructed for our regression exercises and presents their descriptive statistics, and Section 5 discusses the results of our regression models for bank failure. Section 6

concludes by assessing the importance of a bank's policy decisions, in terms of balance sheet composition and interlocking directorates, for its performance during a deflationary recession.

2.2 Historical and institutional context

At the turn of last century, the Netherlands' banks played second fiddle to the country's capital markets. Commercial banks were nothing like those in neighbouring Germany (Fohlin, 2007). Indeed, the Netherlands went in very little for banking: 64% of the kingdom's money supply on the eve of the First World War was in the form of paper money, versus 37% in Germany, 29% in Belgium and just 4% in Britain (Van Zanden, 1997b). Jonker (2002) argues that the Netherlands had not produced banks because its sophisticated financial inheritance could do without them. Amsterdam's merchants had developed a flexible credit source called *prolongatie,* a short-term credit instrument which demanded financial securities - primarily exchange-listed shares - as collateral. This highly liquid on-call money market, which operated in a similar way to modern repurchase agreements (repos), was unique to the Netherlands and outcompeted banks on cost. It enabled firms to meet both short-term and long-term credit requirements, since the instrument could be easily rolled over.

From about 1911, and in particular during the First World War, the country started to look more like a bank-based economy. A wave of bank mergers had built sophisticated multi-branch networks with a wide portfolio of clients (Jonker, 1995). The *prolongatie* market gave way to bank finance when Amsterdam's stock exchange closed in 1914 due to the outbreak of war (De Vries, 1976).[2] The war itself and the subsequent short post-war economic boom hastened the move by banks to widen their services; they now took a direct part in industrial ventures, not merely

[2] Although the *prolongatie* market continued to be used after the war (Euwe, 2010), it never fully recovered.

bringing them to market. The regulatory regime at the time remained *laissez faire:* the absence of corporate laws specifically governing banking corporations enabled them to engage in a variety of different business activities, including investment banking, without being inhibited by minimum bank capitalisation requirements, or constrained by specific shareholder liability rules. Moreover, the country lacked a modern central bank; while DNB as the bank of issue monopolised the printing of paper money, it remained a private business answerable to private shareholders, had no formal duty of regulatory oversight and neither a de facto nor a de jure function as a lender of last resort in crises (Jonker, 1996).[3]

By tradition, Dutch firms employed a dual board structure similar to the German model, with a management board made up of *directeuren* (executive directors) and a supervisory board of *commissarissen* (nonexecutive directors).[4] Jonker (1989, 1991) uses the number of interlocks between banks and industry to measure financial development, or banking scope. He argues that an increase in interlocks suggests a move towards universal service provision, where banks simultaneously do business as both commercial and investment banks, since banks install directors in the firms which they finance. He argues that bankers sitting on the boards of multiple firms positioned themselves as "bearers of capitalism", able to control the trajectory of the country's economic development.[5] He finds that in the early 1920s interlocks more than doubled, from 200 in 1920 to 431 in 1923. Many of these were due to changes at the Netherlands' second-largest

[3] However, DNB did supervise the banking sector in three informal ways: (1) its governors were sent news of changes in the board composition of all Dutch financial institutions; (2) like other shareholder- owned banks, it actively participated in the corporate policy formation of other firms by parachuting its directors onto the boards of corporate clients; and (3) it could choose the financial terms for its short-term debt instrument, access to its bill rediscounting facility. The last was especially controversial at the time; some private banks complained that it was abusing its position as the Dutch state's bank of issue by allegedly offering loans at terms that no other bank could match (Communication between the director of the Bond Geld- en Effectenhandel and the Minister of Finance, December 1917, Archief van de Bond voor de Geld- en Effectenhandel te 's-Gravenhage, Access No. 2.19.042.14, Nationaal Archief, The Hague).

[4] Members of both boards were normally appointed at shareholders' meetings on the advice of sitting *directeuren* (De Jong and Roell, 2005); as a rule, their appointment could be assumed.

[5] Jonker revisits earlier notions of the relevance of interlocking directorates put forward by Wibaut (1913), who argues that the Netherlands' largest banks were gradually starting to dominate the economy by buying equity stakes in industry and increasing credit supply. Wibaut saw this as a conscious strategy by the bankers to strive for hegemony, which led to a prominent role for them in the decision making process of industrial firms.

bank, the Rotterdamsche Bankvereeniging (Robaver): from 20 interlocks in 1910 to 127 in 1923.[6] But the trend included others: De Jong and Roell (2005) find that in 1923 the proportion of non-financial exchange-listed firms with no bank interlocks was 40%, while 22% had one interlock, 12% had two, 8% had three and 18% more than three.[7]

The structure of Dutch banking had changed quite significantly at the beginning of the twentieth century: an increasing trend towards concentration, the market entry of new banks and the adoption of a universal banking business model by various incumbents changed the banking landscape. However, the scale and scope of the Netherlands' banks remained highly diverse. Although the size of the five largest banks increased in relation to the rest, they by no means dominated[8]; a host of smaller, often specialised, banks co-existed. These included smaller algemene banken (general commercial banks),[9] which, like Robaver, operated as full-service financial firms, but to more limited geographical markets. Other players included private banking houses, such as Hope & Co.; unit-independent provincial banks offering a narrower range of services, such as bill discounting; and scores of specialist mortgage banks. Cooperative rural banks (boerenleenbanken) and banks for small-scale urban enterprises (middenstandsbanken) were emerging with the turn of the century.[10] In addition a handful of overseas banks operated as free-standing companies servicing firms in the Dutch colonies and elsewhere. Branching was a

[6] This was described on the eve ofthe crisis by the son ofRobaver's president as part of an expansionary strategy to emulate Germany's universal banks (Westerman, 1920).

[7] Most interlocks were between the supervisory boards of banks and non-financial firms (47%), but a substantial portion involved a directeur of a bank sitting as a commissaris of a non-financial firm (29%).

[8] The Netherlands' Big Five comprised: Amsterdamsche Bank, Incasso-Bank, Nederlandsche Handel-Maatschappij, Robaver and Twentsche Bank. All five eventually merged into what is now ABN AMRO (De Nederlandsche Bank, 2000).

[9] Such as the Rotterdam-based Marx & Co.'s Bank, and the Amsterdam- based Bank-Associatie and Algemeene Spaar- en Depositobank.

[10] A separate analysis of cooperative banks can be found in Colvin (2011) and Colvin and McLaughlin (2014).

relatively new strategy for Dutch banks; about 70% of the banks in our sample were unit-independent on the eve of the 1920s' crisis.

Between 1920 and 1924, De Vries (1989) counts the (near-) failure of at least four algemene banken (including Robaver), 26 provincial banks and two overseas ones. He estimates that at least 200 million guilders was lost between 1920 and 1922, a figure largely confirmed by our research.[11] The history of Marx & Co. and Robaver is particularly enlightening: the former for DNB's (lack of) involvement when it failed in 1922; the latter for the poisonous relationship between the bank and the non-financial firms which it had helped to finance (Colvin, 2014). Jonker (1991, 1995) argues that many banks performed badly because they lacked the knowledge and experience to finance industries; he finds that close ties between bankers and their borrowers worsened the crisis. Jonker and Van Zanden (1995) argue that the 1920s taught bankers that management ties carry risks; in the late 1920s, many banks abandoned the very ties that they had earlier established to control their financial interests. The sector as a whole was largely able to avoid banking failures in the Great Depression of the 1930s, due in no small part to crisis-induced consolidation, corporate restructuring and policy changes.

A major source of the economic decline which acted as the backdrop to the Netherlands' 1920s crisis was reduced international demand following a global postwar slump. Consumption statistics suggest that domestic demand remained quite stable, or even increased (Barro and Ursua, 2008), and so much of the blame can be put on consumers located in Germany and the UK, the Netherlands' principal export markets. The reason for the Netherlands' post-war problems was therefore largely exogenous. Why was the drop in foreign demand felt so sharply by banks in particular? The Netherlands' interest rate structure (Van der Bie and Smits, 2001) had encouraged

[11] This is likely an underestimate of the true damage done: just the 18 banks in our sample which failed outright were valued at 208 million guilders immediately prior to the crisis, approximately 1.2 billion euros in today's money.

firms to finance their rapid war-time demand-led expansion using short-term rather than long-term debt instruments, as the former became relatively cheap (Fig. 1). The type of project that had traditionally found long-term financing was now being paid for with riskier short-term debt, which then had to be rolled over. When, in the early 1920s, these loans were called in en masse, they simply could not be repaid.

The Netherlands' 1920s debt-deflationary crisis is best understood in a British mirror, where the blame for deflation has been put squarely at the door of monetary policy (Solomou, 1996). The UK's large trade deficit and low gold reserves resulted in the formal abandonment of gold in March 1919. However, the expectation persisted that policymakers would restore pre-war parity as soon as feasible. Although sterling was only officially re-linked to gold in 1925, the damage had already been done in the preparation for this return; expectations did all the work (Solomou, 1996). The Dutch case differs from Britain's in that the country had accrued large balance of payments surpluses during the war, which had led to a significant increase in gold reserves (Boeschoten, 1992) and the overall money supply (De Nederlandsche Bank, 2000) (Fig. 2). Guilder's return to gold was coordinated with that of sterling, and the guilder-sterling exchange rate was fixed throughout the first three decades of the twentieth century. Economic policies had to be coordinated with the hegemon; the decision-making process which led to the deflation was determined on Horse Guards Road and Threadneedle Street, not the Kneuterdijk and the Oude Turfmarkt. Dutch monetary policy, and thus by extension the decision to embrace a deflationary path, was exogenous.[12]

[12] The Dutch commitment to gold was not unusual and must be seen in the context of Eichengreen's (1992) argument that the interwar gold exchange standard was an exercise of blind faith, yearning for the era of pre-war prosperity, or Bordo and Rockoff's (1996) argument of the gold standard as a "good housekeeping seal of approval", with the Netherlands aligning itself with the region's geopolitical power for economic reasons.

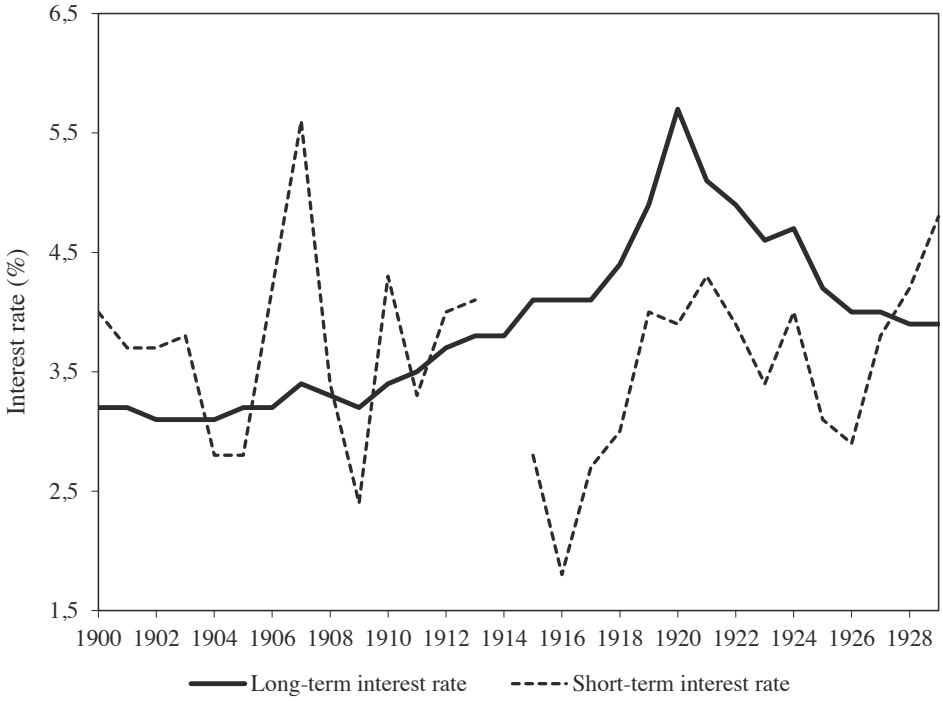

Figure 1: Long and short interest rates, 1900 to 1929.

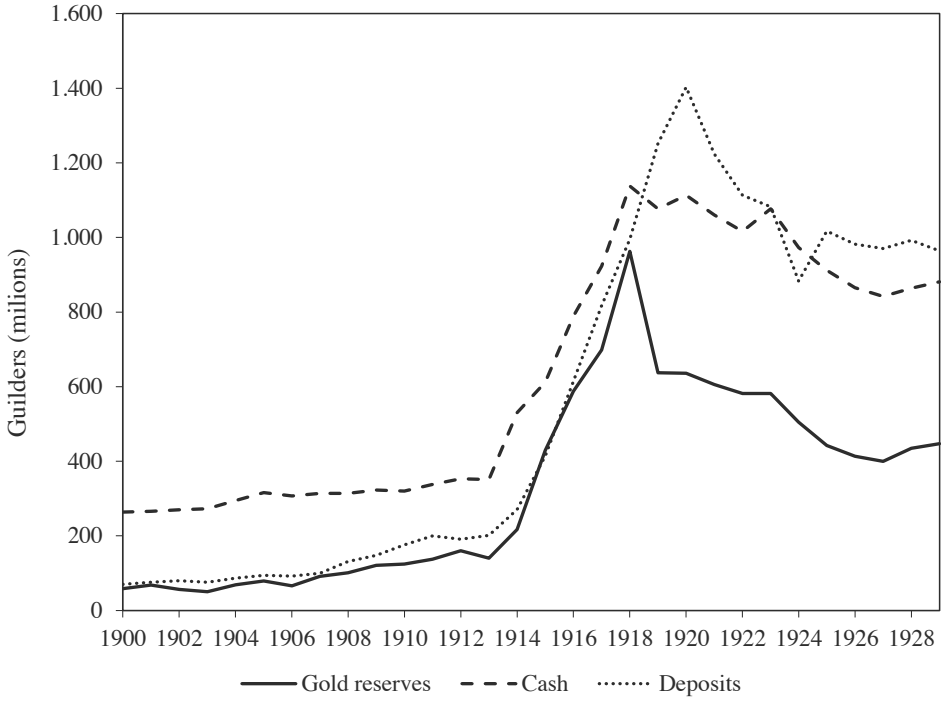

Figure 2: Dutch monetary developments, 1900 to 1929.

2.3 Data and empirical strategy

The macroeconomic cause of the Dutch crisis is relatively well understood, and so we explore the contribution of decisions made at the level of individual banks. We use discrete choice models to estimate whether pre-crisis bank-level characteristics can predict crisis performance. Formula 1 depicts the discrete choice (logistic) model used:[13]

$$Log_e = \frac{\pi_i(Distress)}{1-\pi_i(Distress)} = \alpha + \beta_1 F_i + \beta_2 MS_i + \beta_3 I_i + \varepsilon_i \quad (1)$$

[13] We also estimate linear probability models in order to determine whether imposing assumptions of linearity and normality changes our results. We find that they do not.

Distress is defined as a binominal variable that takes the value of one if a bank has experienced distress during the period 1920 to 1927 and zero otherwise.[14] Subsequently F_i is a vector of bank-specific financial characteristics, MS_i is a vector of bank-specific market structure variables and I_i is a vector of bank-specific management and interlock characteristics. Moreover, ε_i is the bank-specific prediction error stemming from the choice of regression model and is clustered by region and bank type.[15] Subsequent regressions report mar- ginal effects at the median.[16]

We use four sources in the construction of the dependent variable, i.e. the measure of distress resolved through liquidation, merger or reorganisation. These sources are: (1) Kramer (1928), a PhD dissertation on firm reorganisations during the crisis period; (2) De Vries (1989), an official history of DNB in the crisis period, written using the archives of this bank; (3) De Nederlandsche Bank (2000), a list of all banks operating in the Netherlands throughout the nineteenth and twentieth centuries; and (4) news and commentary from the financial press which we compile using an online newspaper database.[17] While we find a significant overlap between these four sources, we find source (4) to be particularly useful; unlike the others, it enables us to systematically search for evidence of distress for all 142 banks in our sample, and it allows us to identify those banks that needed to be reorganised financially, but did not exit the market altogether

[14] We define three mutually exclusive types of distress: liquidation (including bankruptcy), distressed merger and financial reorganisation. We treat these categories as one because we are interested in predicting the incidence of distress rather than the manner in which the distress is resolved.

[15] While the variables chosen in our analysis are generally applicable, there are regional and bank-type differences which may render measurement error particular to specific regions or bank types. To facilitate the identification process we therefore limit the correlation of measurement errors to the specific region and bank type for which they are relevant using a one-way clustering methodology. This results in the use of twelve potential separate clusters, consisting of four region types (Noord-Holland, Zuid-Holland, Groningen, elsewhere in the Netherlands) and three bank types (general, mortgage, shipping banks). As there are no shipping banks located outside of Noord-Holland, Zuid-Holland or Groningen, we use 11 clusters. Overall, our clustering methodology leads to conservative estimates of standard errors.

[16] We report marginal effects at the median rather than at the mean to ensure our results are less affected by outliers (e.g. very large banks)

[17] We use the searchable historical newspaper collection of the Koninklijke Bibliotheek (http://kranten.delpher.nl).

through liquidation or merger. Overall we identify 33 banks that suffered distress. Fig. 3 depicts the timing of the various distress events, categorised by their method of resolution.

The data used in the construction of our independent variables contains information on a sample of banks pertaining to the fiscal year 1917, extracted from the 1920 and 1921 editions of the Van Oss' Effectenboek, an investor manual published annually. We choose 1917 because it is the last stable year preceding the crisis. We aim to predict distress from data pertaining to a time when shareholders did not yet foresee it, and banks had not yet anticipated it. Fig. 4 shows the weighted stock price index of distressed and non-distressed banks,[18] along with the Consumer Price Index (CPI),[19] illustrating the depth of the deflationary crisis. The figure helps to justify the selection of 1917 as our point of reference on the grounds that it offers a middle road between setting the date too late and thus already incorporating crisis effects, and setting it too early, running the risk that the data are unrepresentative of pre-crisis conditions. In 1917, stock prices are still at levels comparable to previous years; the major changes to stock prices set in only after 1920 and the CPI do not show signs of deflation before 1919.

The exact dating of crisis periods is often controversial, and the Dutch crisis is no exception. Bernanke and James (1991) and Van Zanden (1997b) date it to 1921 and 1922 only; Reinhart and Rogoff (2009) follow their example, while Colvin (2011) considers the crisis to run from 1920 to 1927. This much longer period is preferable, because signs of bank distress were observed long after the Dutch economy had stabilised; some problems caused by the crisis took many years to fully manifest or be disclosed to the public; distress events were revealed only after the distress was resolved through liquidation, merger or reorganisation. The longer period

[18] Stock prices (including dividends) are weighted to reflect a hypothetical portfolio which includes all the listed financial firms weighted by the book value of their equity on 31 December 1917. Our index therefore reflects what a possible investor who composed his portfolio in 1918, and kept this portfolio fixed, would observe when looking back at his investments.

[19] CPI is taken from the Statline database of the Centraal Bureau voor de Statistiek (http://statline.cbs.nl/).

encompasses the earliest signs of bank distress before the major failure of Marx & Co.'s Bank in 1922, extends the period beyond the Robaver debacle in 1924, and finally includes the government- backed reorganisation of the middenstandsbanken in 1927 which forever changed expectations about the role of the state in crisis resolution in the Netherlands (Colvin, 2011). Fig. 4 suggests that the recovery of the banking sector began in 1926 for banks that experienced distress, and 1924 for those that did not.

The Van Oss investor manuals bring together balance sheets, profit-and-loss accounts and detailed corporate governance information. Moreover, they include the location of banks' headquarters, their year of foundation, corporate statement, stock listing and stock prices. Table 1 summarises the relative importance of various balance sheet items in our sample, which constitutes all the financial institutions for which sufficient data were available in Van Oss, and includes the vast majority of banks that were listed on Amsterdam's stock exchange during the period. Our database comprises 142 unique banks, where we distinguish between general (commercial) banks, specialised mortgage banks and shipping banks that specialised in financing international trade.[20] These 142 banks amount to 89% of the banks in the Netherlands counted by Van Oss, which equates to 83% of the sector's nominal equity value.

Our financial information is based on the annual reports published by banks and firms themselves, which were used by the compilers of Van Oss in the production of their manuals. In order to facilitate comparative financial ratio analysis, we standardised and converted the accounting information to categories used in modern balance sheets and profit-and-loss accounts, adopting a procedure outlined in Appendix A to this article.[21] In the 1910s, Dutch financial

[20] We exclude DNB and Javasche Bank from our sample, since they acted as banks of issue for the Netherlands and the Dutch East Indies.

[21] Appendix A Table A1 shows the balance sheet of Marx & Co. as an example of the sector, including both original (Panel A) and standardised (Panel B) balance sheets.

accounting practices differed from modern standards. Camffermann and Van den Brand (2010) provide a critical assessment of the usefulness of annual reports for empirical analyses and argue that prudence and conservatism induced an undervaluation of assets and, as a consequence, of equity.[22] Many firms and banks had so-called silent or secret reserves. The creation of these reserves was accompanied by an underrepresentation of the profits, which were partially channelled into these reserves. We argue that financial ratios based on the accounting information can be useful in a comparative setting because results will be influenced only by the accounting practices in cases of systematic mis-valuation for particular firms. Camfferman and Van den Brand (2010, pp. 99-110) do not document such systematic effects. Furthermore, we agree with Camfferman and Van den Brand (2010, p. 115) that annual report information is a useful source because it describes the way in which directors present their firms to outsiders.

In addition to reporting financial accounting data, Van Oss supplies comprehensive lists of all banks' directors (directeuren and commissarissen). We digitised and cross-referenced these lists with all other banks and non-financial firms for the same fiscal year to map any interlocking directorates. We use the Financieel Adresboek (1917), a financial gazetteer, to identify 2579 locations (headquarters or branches) of financial institutions active in the Netherlands.[23] For the 142 banks in our sample we identify 350 branch locations. These data are used to map the market structure of the Dutch financial services sector and banks' product market choices in the 11 provinces that constituted the Netherlands at the time.[24]

[22] See Zeff et al. (1992) for a detailed description of the development of financial reporting practices and rules in the Netherlands.

[23] We count 1,073 unique bank locations; many financial institutions held more than one branch in one particular location in the Netherlands.

[24] We measure competition on the basis that: (1) general banks compete only with other general banks; (2) mortgage banks compete with mortgage banks and general banks; and (3) shipping banks compete only with shipping banks. We found that our results were not sensitive to alternative market definitions.

Ideally, we would prefer to use information about banks' asset portfolios, including their loans and equity participations, but this information is not available to us. Interlocking directorates instead help us to proxy for these portfolio characteristics. Therefore, we collect information from Van Oss about 232 non-financial firms quoted on Amsterdam's stock exchange, in addition to the 142 banks in our sample.[25] The board information of the 374 banks and non-financials is used to map the relationships among banks and between banks and other firms based on interlocking directorates. Consequently we can quantify the effect of interlocks hypothesised by Jonker (1991) by using these firm and bank characteristics (size, leverage and profitability) in conjunction with the interlocks held by banks.

The data described above are used to construct a range of variables which capture different aspects of balance sheet composition and corporate governance characteristics, described in the next section. We pitch these models against one another in a series of binomial regressions in order to arrive at a specification which does the best job of "predicting the past". As standard goodness-of-fit measures do not perform well with binomial regression models (Hosmer and Lemershow, 2000), we adopt an approach popular in the medical literature; we calculate the so-called area under the receiver operating characteristic curve (abbreviated to AUC).[26] This method is used in Taylor (2012) as a means of assessing the predictive ability of his models of global financial crises. Additionally, we use Shapely variance decomposition to explore how much power each variable category (bank characteristics, management structure and interlock characteristics) has in each

[25] The 232 non-financial corporations are representative of the stock- listed population of non-financial corporations. Our results are therefore particular to banks that interlock with publicly-listed firms.

[26] We calculate the proportion of banks which we predicted to fail and actually did fail, or the proportion of true positives that our models classify as being positive (called the "sensitivity" of the model), and compare this with the proportion of banks which we predicted to survive and did survive, or the proportion of true negatives classified as being negative (called its "specificity"). We plot the sensitivity against the false positive fraction (1 - specificity) for all models in our analysis. The curve in such a graph is called the receiver operating characteristic (ROC). Any model that traces an ROC curve above the 45-degree line has a better predictive ability than a random assignment of observations. The larger the area under the ROC curve (abbreviated to AUC), the better is the predictive ability of the model. Metz (1978) describes the method used here in the context of medical statistics.

model specification. We follow a procedure similar to Gromping (2007) and Shorrocks (2012) in this respect.

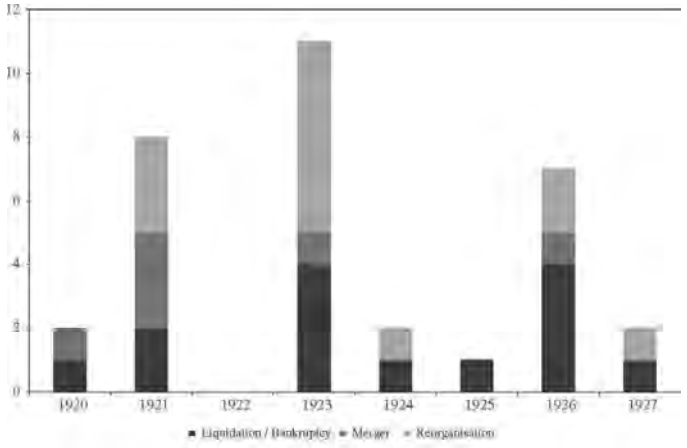

Figure 3: Timeline depicting the number of failures per year by method of resolution, 1920 to 1927.

2.4 Variables and hypotheses

As our core dependent variable indicating distress, we define a dummy variable which equals one if and only if a bank experiences and discloses distress in the period 1920 to 1927. We define three mutually exclusive types of distress resolution: liquidation (including bankruptcy), distressed merger and financial reorganisation.[27] Notice that the crisis came in two phases (Fig. 3): 1920 to 1922 as the first phase of bank distress, when a high proportion of failures was resolved through merger; and 1923 to 1927 as the second, when by far the most crisis-stricken banks looked to reorganisation.[28] Table 2 reports by category concise definitions of all the variables used in the

[27] We define reorganisations as one or any combination of asset restructuring and debt restructuring.

[28] We used alternative specifications of these phases in order to explore the possibility that distress events which became public in 1923 might merely have remained hidden for longer. We find that banks which were seen to be affected by the crisis in 1923 were more likely to: (1) have no interlocking directorates with DNB; and (2) be interlocked with more profitable and bigger non-financials. We conclude that banks which experienced distress in 1923 had more in common with banks which experienced distress after 1923.

analysis that follows.

Financial variables

For asset quality, we use the variable size (natural logarithm of total assets) to proxy for the possibility that large banks are less likely to fail because of a broader portfolio of investments, and age (natural logarithm of the difference between the year of foundation and 1917) to proxy for banks' asset selection experience (following Thornhill and Amit, 2003). For loan book quality, we use the ratio of long-term loans outstanding to total assets (following Martin, 1977; Thomson, 1991). For earnings sufficiency, we use return on assets and a measure of interest rate dependency (following Kolari et al., 2002). For liquidity and solvency, we capture the liquidity of banks' assets by constructing a measure of how well banks manage to match the maturity of their assets with the maturity of their financing instruments, a measure of stability popular among contemporaries (Verrijn Stuart, 1921; Klijnveld, 1922; Sternheim, 1924). Additionally, we posit that banks whose stock was regularly quoted on Amsterdam's official listing were more liquid since investors could sell their stake more easily in times of high volatility (following Kalev et al., 2003). To capture the effects of differences in capital structure we use total leverage (debt to total assets) and deposits to total assets (following Zmijewski, 1984).

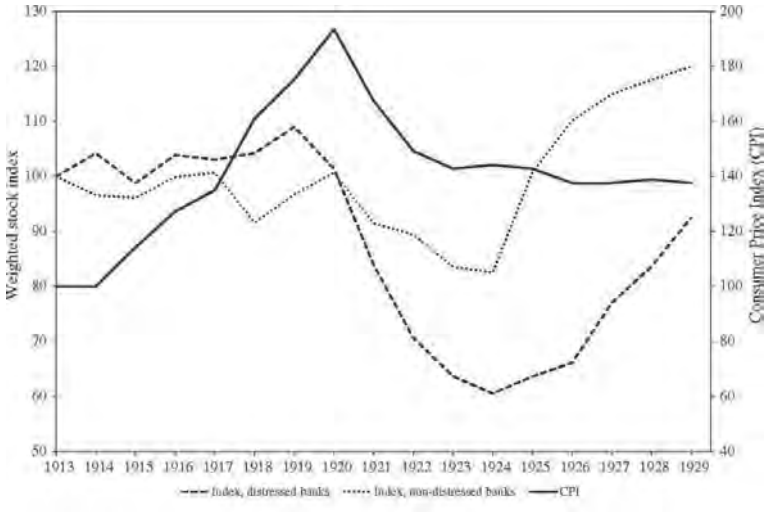

Figure 4: Indices of stock prices of distressed and non-distressed banks, and Consumer Price Index (CPI), 1913 to 1929 (1913 = 100).

Market structure variables

The nature of the relationship between market structure, competition and bank stability is controversial. A dynamic model of asymmetric information of the type proposed in Keeley (1990), and used more recently in Allen and Gale (2004), suggests that there is a trade-off between competition and risk. But models which explore the possibility that bankers have little influence over the riskiness of their customers, such as that of Boyd and De Nicolo (2005), find the opposite result. Empirical applications to US Depression-era banking markets abound (Calomiris and Mason, 2003; Carlson, 2004; Carlson and Mitchener, 2009). We construct three measures that map the degree of competition in the Dutch banking sector. We first define a dummy variable that equals one only if a bank had branches in the Netherlands. Consistent with Calomiris and Mason (2003) and Carlson (2004), we expect branching to increase the probability of suffering distress due to increased monitoring costs since the branches are farther removed from their headquarters. Second we identify banks that had international activities and posit that they will be more exposed

to the macroeconomic shock of the early 1920s and hence face a higher probability of distress. To determine the structure of the banks' product market, we define 11 geographic markets, being the provinces constituting the Netherlands. Then for each bank with presence in a province, we calculate the ratio of the number of locations (headquarters and branches) of that bank and the number of locations of all banks in our extended sample. For each bank we use the average of these ratios over all the regions where a bank is branched. We call this variable relative representation.[29] As the literature has no firm conclusion on the competition- stability relationship, we remain agnostic about the influence of this variable.

Management structure and characteristics of interlocks

We introduce managerial influences by looking at the management structure and interlocking directorates of banks and the connectedness of banks and non-financial firms.[30] We define management structure as the board size and the number of interlocking directorates. We expect that management structure variables negatively affect the risk of failure, in line with Darrat et al. (2010). In much the same way as Dittmann et al. (2010), we posit that bankers on the boards of other corporations are capital market experts and provide know-how and better access to funds (Byrd and Mizruchi, 2005), act as monitors (Morck and Nakamura, 1999), and promote their own business (Booth and Deli, 1999). Interlocking directorates measure the relative independence of a bank or firm's board, sinc banks with more interlocks are potentially more powerful in terms of

[29] This metric takes into account the number of branches that each bank holds in different provinces and the importance of each of the provinces for each bank. For example, Robaver has 13 branches plus one headquarter, in total 14 locations spread over two provinces. In Noord-Holland the bank has two branches; in Zuid-Holland the bank has 12. There are 253 other banks and branches active in Noord- Holland. As the branches of a bank do not compete with one another, the bank faces competition from 251 rather than 253 other bank- branch locations. The relative representation of the bank in Noord- Holland is therefore 0.79% (2/251). For Zuid-Holland the bank has a relative representation of 4.25% (12/300). We weigh these relative representation measures by the number of branches the bank has in each of the two provinces, which yields 1.5% (0.79*2) and 51% (4.25*12) for Noord-Holland and Zuid-Holland. We sum these two and normalize by the number of banks, which generates our final indicator of relative representativeness, which yields a value of 3.8% ((1.5% + 51%)/14).

[30] In the ensuing analysis of interlocking directorates, we treat connections involving either *directeuren* or *commissarissen* as identical; we found that separately measuring interlocks involving each tier of banks' management boards did not affect our results and yielded no additional insight.

financial and industrial dominance, but may have a higher chance of suffering from possible conflicts of interest for bankers on the board (Kroszner and Strahan, 2001).

In addition to the governance roles of interlocks, we use the information as a proxy for banking relations. The economic effects of relationship banking is somewhat ambiguous, in that bank ties allow for information sharing, while they may also create hold-up problems (Braggion and Ongena, 2013). Indeed, some have gone so far as to argue that relationship banking has no measurable impact on firm financing or stability (Elyasiani and Goldberg, 2004). As an approximation of a bank's portfolio we measure the average across interlocks of asset size, leverage and profitability of all banks and all the non-financials that a bank is related to.[31] We calculate a Herfindahl-Hirschman index (HHI) to measure the level of the concentration of investments within banks' portfolios. In particular, we measure asset size concentration and industry concentration.[32][33]

Additionally we incorporate the external financing demand of industries averaged across interlocks to correct for the financial dependence of industries on the Dutch financial sector (after Rajan and Zingales, 1998). Quantifying the costs and benefits associated with bank relationships is done by looking at the number and type of interlocks held by each bank.

[31] We use balance sheet characteristics of banks or non-financial firms (size, leverage and ROA) and construct a value-weighted average using total assets at the beginning of 1918 for each. The bank characteristics are presented in Table 3. The median non-financial firm in our sample has three million guilders in assets, financed by 34% of debt, generating a profit of 5% in 1917. The largest non-financial sectors are industrial firms (20%) and agricultural firms (24%).

[32] With respect to asset size concentration, we calculate an HHI as the sum of squared portions of each interlock's total assets relative to the sum of total assets of all interlocked banks or non-financials. For example, assume that bank A has interlock-relations with B and C, both with a size of 500 thousand guilders in assets. The total size of the related banks is therefore 1000 thousand guilders. The index will then be 0.5, or $(500/1000)^2 + (500/1000)^2$. Obviously, the concentration index increases when bank A becomes interlocked with additional banks and when the size of bank B or C increases.

[33] Similarly, we measure industry concentration using an HHI based on share of banks' interlocks in each of the 11 industries listed in *Van Oss* (industrial; agriculture; mining; oil; rubber; shipping; tobacco; tea; railways; tram transport; and other).

Understanding bank distress

Table 3 summarises the mean values for all variables as specified across the full sample of 142 banks and sub-samples organised by bank type. We find that general commercial banks make up the largest portion in terms of asset size, while mortgage banks dominate in terms of number. Mortgage banks were highly specialised in long-term funds, while general banks held approximately equal totals of short- and long-term loans. We find that general banks were better able than mortgage and shipping banks to match the maturity of their assets with their liabilities and held significantly higher amounts in deposits. Furthermore, general banks that were interlocked more with non-financial corporations held significantly more directorates than more specialised banks.

A univariate analysis of bank distress, timing and resolution

Table 4 reports the mean and median values of all variables as specified across the full sample of 142 banks, categorised by distress experience during the 1920s. We find that banks which experienced distress during this period were younger, more likely to have a stock listing and held more deposits. Additionally we find that banks suffered more when they had more branches, were active internationally and had a larger market share. When we separate early (1920 to 1922) from late (1923 to 1927) distress events, we find that: (1) bigger and older banks failed during the second rather than the first part of the 1920s, which corroborates the claim made by one contemporary observer (Verrijn Stuart, 1921) that larger banks are likely able to weather a crisis for longer; (2) banks which better matched the maturity of their (short-term) assets with that of their (short-term) liabilities were more prone to debt-deflationary shock and subsequently suffered distress earlier; (3) banks which had fewer interlocking directorates experienced distress earlier; (4) banks which

had interlocking directorates with large banks were more likely to experience distress during the latter part of the crisis; and (5) banks which had large and concentrated interlocking directorates with nonfinancial firms failed later in the crisis.

A baseline model of distress

A series of four regressions is reported in Table 5. We examine the effect of five categories of variable independently and then together. In model (1) we find that bank age has a significant negative effect, which shows that younger banks were more likely to fail. We also find that exchange-listed banks were about 25% more likely to experience distress. This may be driven by the liquidity of the stock and the resulting volatility, consistent with Kalev et al. (2003); it may, however, reflect the possibility that unlisted banks were better able to hide their distress.

We find a strong effect for profitability. Profits in 1917 are in our view an indication of the riskiness of the banks' activities, which in good times bring higher earnings, but lead to a backlash under worsened conditions, much in line with Fahlenbrach et al.'s finding (2012) for US banks

in the modern era. We find that banks which failed were also more highly valued before the crisis than those that did not; from 1916 to 1919, the stock prices of banks which would go on to experience distress increased by about 10%, versus 0.6% for non-distressed banks (see Fig. 4). This suggests that banks which did best out of the Netherlands' neutrality during the First World War and the short post-war economic boom had most to lose in any ensuing economic reversal. For each percentage increase in leverage, we find that the probability of banks' distress increases by about 50%, showing that lower equity buffers make banks vulnerable to shocks. This is consistent with the argument in Jonker and Van Zanden (1995) that this crisis was debt-deflationary. We control for bank size and long-term loans, but find no significant effects.

In model (2) we add four variables describing earning sufficiency, liquidity and solvency, and capital structure. We find that deposits have a significant positive effect, where each additional percentage of deposits relative to assets increases the probability of failure by about 45%. As is common to many financial crises, banks which relied more heavily on callable deposits rather than other types of financing stood a greater chance of failure. The other three variables show no effects that are statistically significant.

Model (3) introduces our three product market variables. We find that branching has a significantly positive effect, which indicates that banks with branch networks faced significant monitoring problems and increased risk exposure as the branches became more removed from their headquarters. This finding is consistent with Calomiris and Mason (2003) and Carlson (2004), where bank branching induces higher failure rates. We find that banks with international activities were about 20% more likely to experience distress because they were more exposed to pressures exogenous to the Dutch economy. We find no effect of banks' relative representation, our domestic market structure variable. This is a very interesting finding; it suggests that bank distress was driven by the joint effect of the economic shock and strategic choices within banks, rather than any competitive pressures from one another. In model (4) we retain all variables with an absolute t-value above unity and rerun our model.[34] This specification suggests that, after controlling for the product market choices of banks, long-term loans also significantly affect distress probability. The reported AUC values demonstrate that our model specifications in Table 5 perform ("predict the past") significantly better than random assignments. We find that measures of asset quality, earnings sufficiency, stock listing and bank capital structure have the largest explanatory power.

[34] This model includes only statistically relevant variables and can therefore be said to be the most parsimonious specification. The statistical power of this model remains unaffected by this choice in terms of pseudo R-squared or AUC.

The effects of interlocking directorates

Panel A of Table 6 shows the results of logistic regressions with respect to our hypotheses, where: model specification (5) encapsulates the effect of banks' management structure on the probability of experiencing distress during the 1920s; model (6) focuses on the characteristics of interlocked banks; model (7) introduces three additional characteristics of interlocked non-banks; and model (8) combines all these effects. Again we omit each variable with a t-value below one or with an obvious correlation with subsequently introduced variables.

Management structure

We find that a bank with a large board stood significantly less chance of experiencing distress; a 1% increase in board size results in a reduction of distress probability in the range of 12 to 26%.[35] This is somewhat contrary to Simpson and Gleason (1999), who find that, for publicly listed banks, the size of a bank's board negatively affects costs and efficiency and increases the probability of distress. We suggest that a larger board signifies more "in-house experience" to cope with crisis management.

Characteristics of interlocked banks

We find that interlocks with large banks reduce the failure risk (by about 6%), while the profitability of these banks has an adverse effect. Our results imply that banks with ties to smaller and more profitable banks were engaging in relations with riskier peers, which negatively affect their survival chances. Together, these results suggest that the mere presence of an interlock does not in itself result in a conflict of interest. Intrinsically, then, interlocking directorates have risk-

[35] The results remain robust after controlling for potential non-linear properties.

reducing properties; however these risk properties depend on the corporate characteristics of the interlocks.[36]

Characteristics of interlocked non-banks

We find that banks that concentrated their interlocks with non-financials were significantly less at risk during the crisis than those banks that held well diversified portfolios. The effect is relatively large as we find that a 1% increase in concentration leads to an increased failure probability of 17%. This result suggests that banks with concentrated interlocks were better able to monitor their interests through their networks.

Using variance decomposition in Panel B of Table 6 we find that banks' financial characteristics explain over 70% of the variation in the probability of their distress. Additionally we find that the characteristics of interlocks explain approximately 21% of the variation. This is driven by interlocks with banks rather than non-financials. We show that the quality of our model improves by about 7% - comparing the AUCs of models (4) and (8) - because we add interlocking characteristics (see Fig. 5).[37] In summary, we find evidence that Jonker (1989, 1991) was correct but incomplete in believing that interlocks added to the riskiness for banks. We show that Jonker's ideas can be expressed more precisely in terms of the characteristics of interlocked banks and non-financial firms, such as firm size, leverage, profitability and concentration.

Robustness

Tables 7 and 8 report a number of additional results intended to determine whether our findings are robust to alternative model specifications and sample selection biases. Together they suggest

[36] We find that the effect of return on assets disappears when we take the profitability of interlocked banks into account. This may be due to either: (1) the presence of a competitive advantage which other banks want to benefit from by interlocking with these more profitable banks; or (2) these more profitable banks have superior asset selection and monitoring abilities in terms of selecting firms that are able to meet their bank obligations; or (3) both of these. This being the case, the profitability of a bank is associated with the profitability of its interlocks.

[37] For the AUC, a common rule-of-thumb is that values between 0.9 and 1 should be considered outstanding; between 0.8 and 0.9 excellent; and between 0.7 and 0.8 acceptable (Hosmer and Lemeshow, 2000, pp. 156-164).

that our main results on banks' balance sheet characteristics, management structure and interlocking directorates are not sensitive to the inclusion of additional variables or the use of restricted samples.

Model (9) is for the sub-sample of banks for which sufficient historical data were available to calculate asset growth. We find that asset growth has a non-significant positive effect, while the goodness-of-fit increases and all bank characteristics keep their sign and significance. We find that asset growth shows significant correlation (21%) with the size of interlocked banks, which subsequently becomes (though only marginally) insignificant.[38] The results of model (10) are consistent with the idea that sharing a director with a large and influential private bank has risk-reducing properties: one such interlock reduces failure risk by approximately 11% from the median - though this is not statistically significant at standard levels. Model (11) includes a dummy variable that equals one only if some portion of a bank's equity capital remains unpaid. It is included to test the hypothesis that uncalled capital can act as an equity buffer in times of crisis (Turner et al., 2005). Its inclusion has no discernible impact on our results.

[38] Accordingly we argue that prior asset growth was industry wide, hence the correlation.

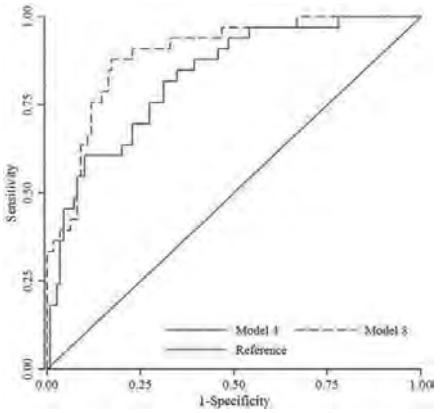

Figure 5: Receiver operating characteristics (ROC).

The discrete choice model in our analyses does not take into account the timing of distress. Potentially, the weakest banks are the first to enter distress, while stronger banks fail at a later stage of the crisis. In order to test for the relevance of the timing of distress we present a Cox proportional hazards model in Table 8, specifications (12) through (15).[39] We find that our earlier results (in Table 6) are consistent with those of the hazards models; the signs and significance of the variables remain stable. Additionally the variance decomposition shows a similar distribution of explanatory power across the variable categories; the majority of the variance is still explained by bank characteristics, followed by the characteristics of interlocked banks. Two expected changes occur when using the hazards models: (1) the size of interlocked banks becomes (marginally) non-significant, which is consistent with our findings, presented in Table 4, that banks interlocked with large banks are better able to longer withstand the crisis; and (2) our long-term

[39] The estimation equation of the Cox proportional hazards model is given by $h(t,X) = h_0(t)\exp(\sum_{i=1}^{p}\beta_i X_i)$, where $h_0(t)$ is the baseline hazard and X_i a vector of firm-specific variables concerning bank characteristics, management structure and characteristics of interlocked banks and non-banks. We report marginal effects at the median to keep the findings comparable to earlier results.

loans variable has become (marginally) non-significant, which is consistent with our findings presented in Table 4 that banks that fail later in the crisis hold more long-term loans.

2.5 Conclusion

This article adds to the historiography of the 1920s by systematically measuring the differences between the banks that suffered financial distress in the Netherlands' biggest twentieth century financial crisis and those that did not. While the root debt deflationary macroeconomic cause of the 1920s crisis was largely exogenous to the Netherlands, this article shows how factors endogenous to the Dutch financial services sector were crucial in explaining banks' differing fates. Our analysis explains why some banks failed in the 1920s while others survived unscathed, something Jonker and Van Zanden (1995) omit to specify precisely in their analysis. We suggest that debt-deflation's impact depended on banks' balance sheet characteristics and management structure. Decisions made before the deflationary shock were indicative of banks' ensuing probability of survival; their exposure to distress was partly attributable to past policies. We find that younger banks, banks that were stock listed, banks that had high leverage ratios, banks that engaged in branching and international activities, and banks with large quantities of deposits were more at risk during the 1920s.

In particular we find that the characteristics of the financial firms with which a bank shares managerial ties have a high predictive power. Jonker (1989, 1991) uses the number of interlocking directorates as an indicator of the developmental path of the Dutch banking system. He implies that the Dutch banking sector's retreat from universal banking in the late 1920s is proof that this corporate governance mechanism did not operate well in times of crisis. Our article contributes to Jonker's analysis by exploring the mechanism through which managerial interconnectedness had

an impact on banking stability. We provide evidence that it was the characteristics - size and profitability - of the banks rather than the non-financial firms at the other end of interlocks that drove Jonker's hypothesised relationship. As such, we argue that conflicts of interest found in case studies of the crisis (in particular, Colvin, 2014) are best understood as a function of the corporate characteristics of those interlocks.

Data appendix

This appendix describes with the aid of an example how the accounting and governance data collected from *Van Oss* were standardised and converted to consistent categories across all firms: we use Marx & Co.'s Bank, probably the most high-profile casualty in the early part of the 1920s crisis.

Table 1, Panel A shows the 1918 balance sheet of Marx & Co.'s Bank, as published at the time. The bank's assets are noted in the left-hand panel and are divided into: *Aand. in portef.* (unplaced equity); *Kassa* (cash held in the firm); *Wiss., coupons en spec* (short-term loans); *Bankiers* (cash held at banks); *Effecten* (investments in financial assets); *Fondsen af te leveren* (deliverable funds); *Voorschot. in rek.-crt. tegen effecten en beleeningen op effecten* (advances against financial assets and/or accounts payable); *Voorschot. tegen goed., hyp of borgst.* (advances against goods, mortgages or bail); *Saldo's rek.-crt* (net accounts receivable); *Gebouwen en safes* (building and safes); and *Meubilair* (furniture). The bank's liability structure is listed in the right-hand panel and is divided into: *Kapitaal* (nominal equity capital); *Reserve* (equity reserves); *Personeelfonds* (funds available for employees); *Bankiers* (cash stored by other banks); *Effecten in beleening gegeven* (invested funds under management from third parties); *Saldo's r.crt. en dep.* (net accounts payable and deposits); *Id. v. rek. v. derden* (net payable accounts from third parties); *Accepten en traites* (accepted short term loans); *Dividend* (dividends); and *Onverdeeld* (retained profits).

Table 1, Panel B shows the same balance sheet converted to standardised categories which are consistent across all the sampled banks. Assets are divided into: fixed assets, financial assets and current assets; and the equity and liability structure consists of equity capital, provisions and long- and short-term liabilities. Short-term liabilities consist of accounts payable and short-term

loans. The difference between equity reserves and provisions is the nature of the reservation. Cases in which the purpose of a reserve was clearly stated have been classified as provisions. In some cases, the item *aandeelhouders* (shareholders) was found on the left-hand side of the balance sheet. This signalled that there is unpaid equity capital, which the bank could call upon in times of need. This item was subtracted from the balance sheet and the nominal equity capital was lowered accordingly. The same procedure was followed for all 143 banks in our sample and the 234 non-financial firms that were used in the calculation of the interlock characteristics.

For the governance data, we compiled a list of all directors and supervisors on the boards of all banks and non-financial corporations at the start of 1918. This yielded 1,269 individuals sitting on the boards of 143 banks and 1,625 individuals sitting on the boards of 234 non-financial corporations. Subsequently, we cross-referenced each individual and found that each bank had on average seven interlocks with other banks and non-financial corporations. We count multiple interlocks with one bank (or non-financial firm) as one interlock only.

Tables

Table 1: Relative importance of balance sheet items for full 142-bank sample, 1 January 1918.

Balance sheet item	Full sample	Distressed banks	Non-distressed banks
Assets			
Fixed assets	1%	1%	1%
Long-term debt	32%	24%	35%
Equity investment	7%	4%	8%
Short-term debt	43%	54%	40%
Receivables	10%	13%	9%
Cash	5%	5%	6%
Other non-cash	2%	0%	2%
Liabilities			
Equity capital	15%	17%	15%
Reserves	4%	4%	4%
Provisions	2%	0%	2%
Bonds and mortgages	27%	20%	29%
Deposits	15%	14%	16%
Other long-term liabilities	1%	2%	0%
Short-term credits	30%	32%	29%
Payables	2%	3%	2%
Other short-term liabilities	4%	8%	3%
Combined size of balance sheets			
In millions of guilders (1918 prices)	3,277	806	2,471
In millions of euros (approx., 2014 prices)	24,500	6,000	18,500

Table 2: Definitions of all variables used in analysis.

Variable	Unit	Definition
Asset quality		
Bank size	Guilders	Balance sheet size, in millions of guilders
Bank age	Years	Bank age
Loan book quality		
Long-term loans	Ratio	Sum of all outstanding (long-term) loans to equity and cash
Short-term loans	Ratio	Sum of all outstanding (short-term) loans to equity and cash
Earnings sufficiency		
Interest dependency	Ratio	Receivable interest minus payable interest to total equity
Return on assets	Ratio	Profits to total assets
Liquidity and solvency		
Maturity matching	Ratio	Current liabilities to financial assets
Stock listing	Dummy	Dummy equals one if bank has stock listing in Amsterdam
Capital structure		
Leverage	Ratio	Total debt to total assets
Deposits	Ratio	Total deposits to total assets
Market structure		
Branches	Dummy	Dummy equals one if bank has branch network
International activities	Dummy	Dummy equals one if bank has activities abroad
Relative representation	Ratio	Average number of provincial branches relative to the number of branches in a province held by other banks, weighted by the number of branches in a particular province
Management structure		
Board size	Number	Total number of members of the board of directors
Interlock with DNB	Dummy	Dummy equals one if interlock with DNB
Total interlocks with banks	Number	Total number of bank-bank interlocks
Total interlocks with non-banks	Number	Total number of bank-firm interlocks
Characteristics of interlocked banks		
Size of interlocked banks	Guilders	Average total assets of interlocked banks, in millions of guilders

Table 2 (continued)

Size of interlocked banks (log)	Guilders	Average log of total assets of interlocked banks
Profitability of interlocked banks	Ratio	Average profitability of interlocked banks
Leverage of interlocked banks	Ratio	Average leverage of interlocked banks
Concentration of interlocked banks	Ratio	Herfindahl-index in terms of firm size
Characteristics of interlocked non-banks		
Size of interlocked non-banks	Guilders	Average total assets of interlocked non-financials, in millions of guilders
Size of interlocked non-banks (log)	Guilders	Average log of total assets of interlocked non-financials
Profitability of interlocked non-banks	Ratio	Average profitability of interlocked non-financials
Leverage of interlocked non-banks	Ratio	Average leverage of interlocked non-financials
Concentration of interlocked non-banks	Ratio	Herfindahl-index in terms of firm size
Industry concentration of interlocked non-banks	Ratio	Herfindahl-index measuring concentration of a bank's interlocks to non-financials in any one industry
External financing demand	Ratio	Average amount of capital expenditure minus net profits, scaled by capital expenditures
Additional variables		
Asset growth	Ratio	Change in total assets over the financial year 1916-1917
Interlock with influential private bank	Dummy	Dummy equals one if bank is interlocked with influential private bank*
Liability regime choice	Dummy	Dummy equals one if bank has unpaid capital

Note: * = Influential private banks defined here are Mees & Zoonen, Ooyens & Co, Hope & Co, Eeghen & Co, Ogtrop & Co, Heldring & Co, and Pierson & Co.

Table 3: Mean values of all variables, for full sample and by bank type.

Variable	Full sample (N=142)	General banks (N=63)	Mortgage banks (N=71)	Shipping banks (N=8)
Asset quality				
Bank size	22.309	36.768	10.781	10.757
Bank age	20.528	22.111	19.845	14.125
Loan book quality				
Long-term loans	0.621	0.216	0.945	0.932
Short-term loans	0.146	0.314	0.011	0.013
Capital adequacy				
Working capital	0.094	-0.044	0.198	0.260
Equity reserves	0.038	0.056	0.023	0.031
Earnings sufficiency				
Interest dependency	-0.024	-0.084	0.044	-0.146
Return on assets	0.022	0.019	0.024	0.029
Liquidity and solvency				
Asset liquidity	0.903	0.881	0.922	0.916
Maturity matching	0.167	0.340	0.029	0.033
Stock listing	0.289	0.508	0.127	0.000
Capital structure				
Leverage	0.834	0.738	0.908	0.929
Deposits	0.061	0.137	0.002	0.000
Market structure				
Branches	0.352	0.508	0.239	0.125
International activities	0.296	0.286	0.324	0.125
Relative representation	0.007	0.011	0.002	0.025
Management structure				
Board size	10.993	10.175	11.549	12.500
Interlock with DNB	0.197	0.238	0.155	0.250
Total interlocks with banks	6.634	6.905	6.239	8.000
Total interlocks with non-banks	4.873	6.191	3.662	5.250

Table 3 (continued)

Characteristics of interlocked banks				
Size of interlocked banks	48.382	56.170	40.030	61.184
Size of interlocked banks (log)	2.260	2.198	2.230	3.017
Profitability of interlocked banks	0.022	0.020	0.023	0.025
Leverage of interlocked banks	0.797	0.769	0.816	0.847
Concentration of interlocked banks	0.237	0.229	0.235	0.314
Characteristics of interlocked non-banks				
Size of interlocked non-banks	12.030	12.259	10.785	21.264
Size of interlocked non-banks (log)	1.139	1.198	0.982	2.062
Profitability of interlocked non-banks	0.053	0.053	0.050	0.068
Leverage of interlocked non-banks	0.277	0.281	0.266	0.331
Concentration of interlocked non-banks	0.137	0.126	0.141	0.183
Industry concentration of interlocked non-banks	0.375	0.331	0.391	0.575
External financing demand	0.061	0.074	0.047	0.075
*Additional variables**				
Asset growth	0.085	0.166	0.025	0.029
Interlock with influential private bank	0.183	0.175	0.197	0.125
Liability regime choice	0.676	0.397	0.887	1.000

*Additional variables pertain to smaller sub-samples, as defined in the table.

Table 4: Univariate statistics for distressed and non-distressed banks, with discrimination between early and late resolution timing.

	Full sample by distress event					*Distressed bank sub-sample by distress timing †*				
	Distressed banks (N=33)		Non-distressed banks (N=109)		Equality of means	Early distress (N=10)		Late distress (N=23)		Equality of means
Variable	*(mean)*	*(median)*	*(mean)*	*(median)*	*(t-value)*	*(mean)*	*(median)*	*(mean)*	*(median)*	*(t-value)*
Asset quality										
Bank size	23.667	6.572	21.898	6.893	-0.805	6.938	5.381	30.941	8.041	1.998*
Bank age	13.394	12.000	22.688	19.000	2.884***	10.700	9.500	14.565	12.000	0.715
Loan book quality										
Long-term loans	0.551	0.887	0.642	0.915	1.064	0.498	0.543	0.574	0.894	0.452
Short-term loans	0.176	0.013	0.136	0.001	-0.746	0.164	0.123	0.182	0.002	0.179
Capital adequacy										
Working capital	0.032	0.164	0.113	0.101	1.147	-0.124	-0.150	0.100	0.171	1.674
Equity reserves	0.032	0.027	0.040	0.025	0.714	0.032	0.014	0.031	0.030	-0.083
Earnings sufficiency										
Interest dependency	-0.021	-0.001	-0.024	-0.004	-0.032	-0.017	0.000	-0.022	-0.016	-0.036
Return on assets	0.033	0.035	0.019	0.016	-1.207	0.029	0.023	0.034	0.039	0.79
Liquidity and solvency										
Asset liquidity	0.876	0.883	0.912	0.951	1.602	0.878	0.890	0.876	0.869	-0.061
Maturity matching	0.224	0.040	0.150	0.030	-1.295	0.387	0.331	0.153	0.031	-1.861*
Stock listing	0.455	0.000	0.239	0.000	-2.224**	0.500	0.500	0.435	0.000	-0.336
Capital structure										
Leverage	0.837	0.895	0.833	0.910	-0.112	0.819	0.841	0.846	0.915	0.552
Deposits	0.104	0.000	0.048	0.000	-1.861*	0.075	0.030	0.117	0.000	0.851
Market structure										
Branches	0.515	1.000	0.303	0.000	-2.15**	0.500	0.500	0.522	1.000	0.111
International activities	0.485	0.000	0.239	0.000	-2.529**	0.200	0.000	0.609	1.000	2.416**
Relative representation	0.012	0.000	0.006	0.000	-1.410	0.012	0.005	0.012	0.000	-0.033
Management structure										
Board size	10.424	11.000	11.165	11.000	0.900	9.500	10.500	10.826	11.000	0.963
Interlock with DNB	0.242	0.000	0.183	0.000	-0.742	0.300	0.000	0.217	0.000	-0.495
Total interlocks with banks	6.758	5.000	6.596	6.000	0.129	3.500	2.000	8.174	6.000	2.751***
Total interlocks with non-banks	4.546	2.000	4.973	2.000	-0.026	1.200	1.000	6.000	3.000	2.913***
Characteristics of interlocked banks										
Size of interlocked banks	38.426	17.380	51.397	16.293	0.926	33.964	5.849	40.366	17.903	0.324
Size of interlocked banks (log)	2.246	2.469	2.265	2.272	0.088	1.808	1.756	2.436	2.494	1.736*
Profitability of interlocked banks	0.028	0.029	0.020	0.025	-1.389	0.030	0.028	0.028	0.030	-0.274
Leverage of interlocked banks	0.813	0.864	0.792	0.862	-0.484	0.752	0.801	0.839	0.876	1.032
Concentration of interlocked banks	0.254	0.271	0.231	0.207	-0.471	0.092	0.000	0.325	0.355	2.905***
Characteristics of interlocked non-banks										
Size of interlocked non-banks	9.144	3.785	12.903	4.299	1.307	3.340	0.854	11.668	4.894	2.414**
Size of interlocked non-banks (log)	0.980	1.040	1.187	1.244	1.047	0.569	0.049	1.159	1.236	1.607
Profitability of interlocked non-banks	0.056	0.050	0.051	0.048	-0.431	0.045	0.014	0.061	0.057	0.766
Leverage of interlocked non-banks	0.265	0.310	0.280	0.322	0.388	0.201	0.098	0.292	0.335	1.204
Concentration of interlocked non-banks	0.132	0.000	0.138	0.000	0.153	0.000	0.000	0.189	0.000	3.364***
Industry concentration of interlocked non-banks	0.408	0.375	0.364	0.278	-0.641	0.456	0.500	0.387	0.333	-0.451
External financing demand	0.061	0.000	0.061	0.000	-0.005	0.063	0.000	0.060	0.012	-0.070
Additional variables ††										
Asset growth	0.145	0.059	0.065	0.040	-1.379	0.196	0.109	0.122	0.041	-0.503
Interlock with influential private bank	0.152	0.000	0.193	0.000	0.532	0.000	0.000	0.217	0.000	2.472**
Liability regime choice	0.576	1.000	0.706	1.000	1.337	0.500	0.500	0.609	1.000	0.566

† Banks defined as early distress did so between 1920 and 1922; banks defined as late distress did so between 1923 and 1927. †† Additional variables pertain to smaller sub-samples. T-statistics for bank size, bank age, board size and total interlocks are calculated using logaritmic transformations of the variables. Significance levels are indicated as follows for a two-tailed t-test: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Logistic regressions of bank distress using balance sheet characteristics.

Variable	(1)	(2)	(3)	(4)
Bank size (log)	-0.005	-0.009	-0.051	-0.051
	(-0.129)	(-0.258)	(-1.096)	(-1.140)
Bank age (log)	-0.095***	-0.090***	-0.053**	-0.052***
	(-4.605)	(-4.688)	(-2.409)	(-2.701)
Long-term loans	0.091	0.122	0.190*	0.188*
	(0.810)	(1.258)	(1.701)	(1.851)
Stock listing	0.246***	0.211***	0.135***	0.136**
	(3.596)	(3.618)	(3.061)	(2.286)
Return on assets	2.842***	2.618***	2.075	1.944**
	(4.102)	(2.678)	(1.464)	(2.308)
Leverage	0.307***	0.294***	0.506***	0.497***
	(3.419)	(3.080)	(3.615)	(3.705)
Interest dependency		0.025	0.015	
		(0.661)	(0.221)	
Asset liquidity		-0.259	0.043	
		(-0.514)	(0.076)	
Maturity matching		-0.059	0.186	0.168***
		(-0.377)	(1.073)	(2.689)
Deposits		0.446***	0.622***	0.615***
		(4.344)	(7.733)	(5.394)
Branches			0.104*	0.098*
			(1.892)	(1.909)
International activities			0.206**	0.206***
			(2.522)	(3.233)
Relative representation			-0.410	
			(-0.274)	
Observations	142	142	142	142
No. of distressed banks	33	33	33	33
Headquarter region indicators	YES	YES	YES	YES
Bank type indicators	YES	YES	YES	YES
Pseudo R-squared	0.189	0.208	0.257	0.256
AUC	0.797	0.812	0.827	0.828

The dependent variable is a binominal variable that equals one if and only if a bank has gone into distress during the period 1920-1927. Measures of size and bank age are logaritmic transformations. Marginal effects are calculated at the median. All specifications include bank type and headquarter region indicators. Robust z-statistics are reported in parentheses. Standard-errors are clustered using eleven groups comprised of relevant bank type and headquarter region combinations. Significance levels are indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Influence of management and interlock characteristics on the probability of bank dis

Panel A: Marginal effects				
Variable	(5)	(6)	(7)	(8)
Management structure				
Board size (log)	-0.122*	-0.214***	-0.252***	-0.257***
	(-1.722)	(-2.612)	(-3.597)	(-3.321)
Interlock with DNB	-0.002			
	(-0.017)			
Total interlocks with banks (log)	-0.037			
	(-0.386)			
Total interlocks with non-banks (log)	-0.052			
	(-1.042)			
Characteristics of interlocked banks				
Size of interlocked banks (log)		-0.042	-0.055**	-0.058**
		(-1.237)	(-1.968)	(-2.198)
Profitability of interlocked banks		8.678***	10.231***	10.137***
		(4.421)	(4.251)	(4.394)
Leverage of interlocked banks		0.018		
		(0.117)		
Concentration of interlocked banks			0.211	0.212
			(1.149)	(1.223)
Characteristics of interlocked non-banks				
Size of interlocked non-banks (log)		-0.048		
		(-0.531)		
Profitability of interlocked non-banks		0.449		
		(0.644)		
Leverage of interlocked non-banks		0.025		
		(0.065)		
Concentration of interlocked non-banks			-0.151	-0.173**
			(-1.600)	(-2.225)
Industry concentration of interlocked non-banks			0.032	
			(0.261)	
External financing demand			-0.104	
			(-0.313)	
Bank characteristics				
Bank size (log)	0.000	-0.019	-0.025	-0.024
	(0.008)	(-0.722)	(-0.639)	(-0.649)
Bank age (log)	-0.075**	-0.079***	-0.087***	-0.088***
	(-2.135)	(-3.731)	(-3.912)	(-4.483)
Long-term loans	0.128	0.219***	0.228**	0.229**
	(1.621)	(3.719)	(2.416)	(2.201)
Stock listing	0.145***	0.165***	0.166***	0.153***
	(3.095)	(3.053)	(2.980)	(4.191)
Return on assets	1.357	0.407	0.788	0.800
	(1.232)	(0.385)	(0.844)	(0.847)
Leverage	0.368**	0.554***	0.623***	0.616***
	(2.301)	(3.148)	(4.811)	(4.708)
Maturity matching	0.059	0.187*	0.212*	0.212**
	(0.507)	(1.925)	(1.908)	(2.141)
Deposits	0.562***	0.784***	0.805***	0.823***
	(2.749)	(3.877)	(3.310)	(3.565)
Branches	0.075	0.069	0.089**	0.090***
	(1.269)	(1.459)	(2.141)	(3.970)
International activities	0.231***	0.265***	0.275***	0.278***
	(2.620)	(4.612)	(4.006)	(4.840)
Observations	142	142	142	142
No. of distressed banks	33	33	33	33
Headquarter region indicators	YES	YES	YES	YES
Bank type indicators	YES	YES	YES	YES
Pseudo R-squared	0.295	0.389	0.403	0.402
AUC	0.862	0.894	0.893	0.893

Table 6 (continued)

Panel B: Shapely decomposition of explained variance				
Management structure	11%	5%	7%	7%
Characteristics of interlocked banks		17%	20%	20%
Characteristics of interlocked non-banks		4%	1%	1%
Bank characteristics	89%	73%	72%	72%

The dependent variable is a binominal variable that equals one if and only if a bank has gone into distress during the period 1920-1927. Measures of size and bank age are logaritmic transformations. Marginal effects are calculated at the median. All specifications include headquarter region and bank type indicators. Robust z-statistics are reported in parentheses. Standard-errors are clustered using eleven groups comprised of relevant bank type and headquarter region combinations. Significance levels are indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Additional logistic regressions of bank distress, marginal effects.

Variable	(9)	(10)	(11)
Additional variables			
Asset growth	0.134		
	(1.270)		
Interlock with influential private bank		-0.082	
		(-1.244)	
Liability regime choice			0.078
			(0.808)
Variables from previous analysis			
Bank size (log)	-0.028	-0.023	-0.022
	(-0.564)	(-0.633)	(-0.572)
Bank age (log)	-0.143***	-0.082***	-0.093***
	(-2.675)	(-3.936)	(-4.136)
Long-term loans	0.312***	0.206**	0.244***
	(2.947)	(2.041)	(2.576)
Stock listing	0.152***	0.184***	0.206**
	(3.248)	(4.445)	(2.555)
Return on assets	0.209	0.880	0.788
	(0.317)	(0.948)	(0.850)
Leverage	0.529***	0.587***	0.536**
	(3.394)	(4.816)	(2.541)
Maturity matching	0.173	0.181**	0.235**
	(1.440)	(2.290)	(2.380)
Deposits	0.738***	0.749***	0.821***
	(2.954)	(3.717)	(3.326)
Branches	0.091***	0.086***	0.083***
	(4.179)	(3.658)	(5.522)
International activities	0.256***	0.281***	0.278***
	(3.276)	(4.849)	(4.750)
Board size (log)	-0.278***	-0.267***	-0.273***
	(-3.637)	(-3.432)	(-3.411)
Size of interlocked banks (log)	-0.044	-0.052**	-0.057**
	(-1.163)	(-1.969)	(-2.129)
Profitability of interlocked banks	10.644***	10.087***	10.657***
	(3.110)	(4.460)	(4.109)
Concentration of interlocked banks	0.255	0.212	0.231
	(1.232)	(1.233)	(1.299)
Concentration of interlocked non-banks	-0.180**	-0.130	-0.179**
	(-2.060)	(-1.189)	(-2.355)
Observations	133	142	142
No. of distressed banks	33	33	33
Headquarter region indicators	YES	YES	YES
Bank type indicators	YES	YES	YES
Pseudo R-squared	0.419	0.406	0.405
AUC	0.904	0.898	0.894

The dependent variable is a binominal variable that equals one if and only if a bank has gone into distress during the period 1920-1927. Measures of size and bank age are logaritmic transformations. Marginal effects are calculated at the median. All specifications include headquarter region and bank type indicators. Robust z-statistics are reported in parentheses. Standard-errors are clustered using eleven groups comprised of relevant bank type and headquarter region combinations. Significance levels are indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Influence of management and interlock characteristics, Cox proportional hazards models.

Panel A: Marginal effects				
Variable	(12)	(13)	(14)	(15)
Management structure				
Board size (log)	-1.185	-1.613**	-1.801***	-1.755***
	(-1.478)	(-1.994)	(-2.832)	(-2.817)
Interlock with DNB	-0.029			
	(-0.041)			
Total interlocks with banks (log)	-0.097			
	(-0.164)			
Total interlocks with non-banks (log)	-0.320			
	(-0.982)			
Characteristics of interlocked banks				
Size of interlocked banks (log)		-0.176	-0.224	-0.278
		(-0.707)	(-1.316)	(-1.611)
Profitability of interlocked banks		48.563***	65.317***	63.198***
		(4.438)	(4.337)	(4.546)
Leverage of interlocked banks		-0.293		
		(-0.209)		
Concentration of interlocked banks			0.948	1.134
			(0.911)	(1.040)
Characteristics of interlocked non-banks				
Size of interlocked non-banks (log)		-0.579		
		(-1.051)		
Profitability of interlocked non-banks		5.530		
		(1.241)		
Leverage of interlocked non-banks		0.546		
		(0.230)		
Concentration of interlocked non-banks			-1.527*	-1.683**
			(-1.745)	(-2.300)
Industry concentration of interlocked non-banks			0.622	
			(0.891)	
External financing demand			0.022	
			(0.008)	
Bank characteristics				
Bank size (log)	-0.130	-0.228	-0.350	-0.379
	(-0.383)	(-1.374)	(-1.053)	(-1.242)
Bank age (log)	-0.412***	-0.557***	-0.553***	-0.549***
	(-3.741)	(-5.668)	(-5.665)	(-6.319)
Long-term loans	1.198	1.942	2.000*	1.902
	(1.261)	(1.482)	(1.647)	(1.616)
Stock listing	1.251**	1.623**	1.675**	1.564***
	(2.357)	(2.414)	(2.324)	(3.055)
Return on assets	10.231	1.135	7.181	6.839
	(1.112)	(0.225)	(0.988)	(0.998)
Leverage	2.357*	3.783	4.946***	4.590***
	(1.671)	(1.445)	(3.148)	(3.105)
Maturity matching	1.110*	1.750***	2.135**	2.350***
	(1.862)	(3.751)	(2.308)	(2.662)
Deposits	2.869*	4.283**	4.694**	4.774***
	(1.845)	(2.327)	(2.478)	(2.648)
Branches	0.598**	0.742**	1.098**	1.057***
	(2.070)	(2.023)	(2.551)	(3.041)
International activities	1.246	1.259***	1.453***	1.433**
	(1.542)	(2.580)	(2.906)	(2.447)
Observations	142	142	142	142
No. of distressed banks	33	33	33	33
Headquarter region indicators	YES	YES	YES	YES
Bank type indicators	YES	YES	YES	YES
Pseudo R-squared	0.142	0.192	0.197	0.194
Chi-squared	101	173	6553	183

Table 8 (continued)

Panel B: Shapely decomposition of explained variance				
Management structure	13%	5%	6%	7%
Characteristics of interlocked banks		9%	11%	11%
Characteristics of interlocked non-banks		9%	2%	0%
Bank characteristics	87%	76%	81%	82%

The dependent variable is a binominal variable that equals one if and only if a bank has gone into distress during the period 1920-1927. Measures of size and bank age are logaritmic transformations. Marginal effects are calculated at the median. All specifications include headquarter region and bank type indicators. Robust z-statistics are reported in parentheses. Standard-errors are clustered using eleven groups comprised of relevant bank type and headquarter region combinations. Significance levels are indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.

Table A1: Balance sheet of Marx & Co.'s Bank, 1 January 1918.

Panel A: Contemporary categories

	Assets	Liabilities	
Aand. in portef.	4,000,000	12,000,000	Kapitaal
Kassa	756,252	1,700,000	Reserve
Wiss., coupons en spec.	12,220,201	99,743	Personeelfonds
Bankiers	4,442,787	8,412,586	Bankiers
Effecten	1,437,820	1,979,900	Effect in beleening gegeven
Fonds af te leveren	557,910	19,007,074	Saldo's r.ct en dep.
Voorschott. in rek-crt. tegen effecten en beleeningen op effecten	12,367,254	-	Id. v. rek. v. derden
Id. tegen goed., hyp. of borgst.	6,107,550	2,651,034	Accepten en traites
Saldo's rek.-crt.	4,178,309	660,000	Dividend
Gebouw en safes	450,000	7,747	Onverdeeld
Meubilair	1		
	46,518,085	46,518,085	Total liabilities

Panel B: Converted standardized categories

	Assets	Liabilities	
Fixed assets	450,001	8,000,000	Equity capital
Long-term debt	-	1,707,747	Reserves
Equity investment	1,437,820	99,743	Provisions
Short-term debt	34,873,315	-	Bonds and mortgages
Receivables	-	27,419,661	Deposits
Cash	5,199,039	-	Other long-term liabilities
Other non-cash	557,910	2,651,034	Short-term credits
		660,000	Payables
		1,979,900	Other short-term liabilities
Total assets*	42,518,085	42,518,085	Total liabilities*

* Total assets and liabilities quoted in coverted standardized balance sheets do not necessarily equal those in contemporary balance sheets. This is because they have been adjusted to reflect shareholder capital that has either not been placed, or not yet been called.

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Chapter 3

Big linkers and corporate policies and performance: Dutch evidence from the 20th century [40]

3.1 Introduction

Dutch business in the previous century was characterized by both family businesses and large multinationals. Westerhuis and De Jong (2015) describe that Dutch directors were the relatively important, vis-à-vis corporate owners, in setting corporate policies during the twentieth century. With assigned legal and statutory powers, directors had the responsibility to design and execute a firms' strategy. David and Westerhuis (2014) show that this power was concentrated in the hands of a select group of individuals with seats on multiple boards, so-called big linkers. This concentration may be because of a scarcity of good directors or caused by the value of relations between firms via directors with multiple seats. In this chapter we investigate the impact of big linkers in Dutch firms over the course of the twentieth century.

Prior research has shown that a substantial variation in corporate policies can be explained by individual board members (Bertrand and Schoar, 2003; Richardson et al., 2014). Their findings fits with common views on the role of board members. Their primary duties are providing advice (Lorsch and MacIver, 1989; Westphal, 1999), monitoring (Fama, 1980; Bainbridge, 1993; Johnson, et al., 1996) and strategizing (Lorsch and MacIver, 1989; Kesner and Johnson, 1990). Studies such as Carpenter and Westphal (2001) find that directors with multiple appointments can provide relevant strategic knowledge and show that the directors' social network is an important part of corporate policies. Carpenter et al. (2012) describes the

[40] This chapter has greatly benefited from comments by Joost Jonker, Oscar Gelderblom, Chris Colvin and John Turner. We thank seminar participants of the Economic History Seminar, Queen's University Belfast; European Group for Organizational Studies, Rotterdam; Business History Group, Erasmus University Rotterdam; Financial History Group, Radboud University Nijmegen, and King's College, Cambridge University.

various dimensions along which these well-connected directors can have an impact on corporate performance. Directors are able to wield power thanks to their social capital (e.g. Bourdieu and Wacquant, 1992), actively use their networks to advance corporate interests (e.g. Bian, 1997) or close structural gaps in corporate networks using their experience and social capital (e.g. Burt, 2001).

However, studies into the effect of board members with multiple directorships on corporate performance show mixed evidence (see Ferris et al (2003), Harris and Shimizu (2004), Fich and Shivdasani (2006) or Andress et al. (2013)). In this chapter, we take a broader view in understanding the impact of individual directors. We investigate impact of directors on corporate policies and how their personal traits and network characteristics can explain this impact. We argue that the measurement of impact and the understanding of the effects requires a mixed-method approach (Small, 2011). We distinguish two complementary methods, i.e. statistical analysis and prosopographical research. We measure the effects of big linkers using statistical regression modelling and subsequently we use archival and bibliographical research to describe the backgrounds of those big linkers that are found to have a significant contribution, as in prosopographical research.

Using a unique dataset with information on board ties between exchange listed corporations in the Netherlands over the period 1903-2003 (5,217 firm-year observations and in total 37,582 board seats). From this data we then identify 266 big linkers, i.e. individuals with three or more board seats in any given year. We then match our big linkers to a dataset containing financial statements and governance information. Our mixed-method approach consists of three steps. First, by using binominal choice models we describe which firms choose to employ a big linker. Second, using OLS-regressions with director fixed effects we describe the evolution of big linkers in explaining cross-sectional variation in corporate policies and financial performance over the period. From these results we are able to assess the individual

contribution of the 266 big linkers in our sample. Third, we provide a historical context to our findings by providing biographical details in combination with descriptions on the various dimensions as defined by Carpenter et al. (2012).

By employing a mixed method research design we are able to combine quantitative research (statistical modelling) with qualitative research (biographical descriptions) using secondary sources. The advantages of this approach are threefold: (1) we are able to provide a historical context to the empirical findings, taking advantage of the strengths and mitigating the weaknesses of either methodology (Tashakkori and Teddlie, 2003); (2) it allows us to infer some degree of causality from detailed historical context, examine different narratives allowing us to connect the dots (Morck and Yeung, 2011); (3) it allows us to be inclusive of local and broader individual, societal and institutional realities (Johnson et al., 2007).

We contribute to the Dutch historiography by describing the importance of big linkers and their evolution over the twentieth century. In addition, by using director fixed effects, we are able to assess the extent to which history has adequately attributed power and influence to prominent Dutch individuals such as K.P van der Mandele (banker and chairman of the Chamber of Commerce) or E. Heldring (banker and president of the Nederlandsche Handels Maatschappij). Additionally we contribute to a large body of literature. First, we extend the literature on corporate governance. Studies such as Helmers et al. (1975), Granovetter, (1985), Davis (1991), Haunschild (1993) and Heemskerk (2009) usually measure the impact of board members as averages across individuals, we assess their impact on an individual level. Second, we complement the literature on corporate networks, as much of the research on corporate networks is descriptive and our mixed method research design allows us to incorporate historical context with empirical analysis. Third, we contribute to the literature on fixed effects models. By examining the similarities of corporate policies across firms by looking at big linkers, we solve the difficulty to separate firm and director's effects on corporate policies

because they are almost always observed together. We do so by employing fixed effects models, similar to Bertrand and Schoar (2003), Richardson et al. (2004) and Cronqvist and Fahlenbrach (2009).

Section 2 briefly describes the various steps in our research. Section 3 describes the research setting and data collection, including the descriptive statistics. In Section 4 we estimate big linkers effects and provide an assessment of the explanatory power of these effects. In Section 5 we discuss the results and Section 6 concludes.

3.2 Methodology

In this section we highlight the different components to our research design. Using data on board members of Dutch exchange listed corporations over the period 1903-2003 (including the fifty largest financial institutions), we identify the big linkers in our sample. In the literature it is common to define big linkers as directors that have three or more board positions (David and Westerhuis, 2014). Given our objective to assess if big linkers have a systematic contribution to corporate policies we extend the aforementioned definition. We define a big linker as an individual who has more than two board positions in any given year and nine or more positions in his entire career.[41] Based on this definition we identify 266 big linkers. Table 1 shows the top fifteen board members that fit this definition, of which the total number of positions ranges from 51 (W. Westerman) to 126 (K.P. van der Mandele).

We then estimate what type of firm is more likely to have a big linker on board. We use a binominal choice model to assess the determinants of firms having a big linker on their board. We execute this analysis in order to understand why firms hire well-connected directors. We argue that only stronger firms (i.e. larger firms) are able to attract the most powerful board members. However this implies that there is an endogenous selection observed in the effect

[41] Our analysis shows that there are no female big linkers in de Dutch corporate network during the twentieth century.

individual big linkers may have on corporate policies and performance. Formula 1 represents our estimation, where Y is the binominal indicator of having a big linker on the board at time t, $F_{i,t-1}$ is a vector of lagged firm characteristics (firm size, dividend payment, current ratio, leverage, tangibility, growth, profitability, board size), ω_t is a vector of year fixed effects to control for unobserved macroeconomic shocks, $\theta_{i,t}$ is a vector of industry fixed effects to control for unobserved industry specific characteristics. These estimations use robust standard errors.

$$Log_e \frac{\pi_{i,t}(Y)}{1 - \pi_{i,t}(Y)} = \alpha + \beta_1 F_{i,t-1} + \beta_2 \omega_t + \beta_3 \theta_{i,t} + \varepsilon_{i,t} \quad (1)$$

Third, we assess the explanatory power of the big linker effects, based on a sequence of regressions. We investigate how much of the variability in firm's policies and performance (the outcome) is explained by big linker fixed effects, after controlling for other variables explaining these outcomes, where we include firm characteristics, year fixed effects and industry fixed effects.

Formula 2 through 4 highlight our OLS-estimations, where $Policy_{i,t}$ are firm specific policy and performance variables, $F_{i,t-1}$ is a vector of firm characteristics (firm size, dividend payment, current ratio, leverage, tangibility, growth, profitability, board size), ω_t is a vector of year fixed effects to control for unobserved macroeconomic shocks, $\theta_{i,t}$ is a vector of industry fixed effects to control for unobserved industry specific characteristics. We subsequently add a vector $B_{i,t}$ capturing firm specific board characteristics and finally we add vector $M_{i,t}$ capturing board member (big linker) fixed effects. To allow for time variation in the firm and industry determinants we interact these vectors with τ_t which is a vector of period five period fixed effects.[42] All estimations include robust standard errors.

[42] The five periods are, 1908-1923, 1928-1942, 1948-1963, 1968-1983 and 1988-2003.

$$Policy_{i,t} = \alpha + \beta_1 F_{i,t}\tau_t + \beta_2 \omega_t + \beta_3 \theta_{i,t}\tau_t + \varepsilon_{i,t} \quad (2)$$

$$Policy_{i,t} = \alpha + \beta_1 F_{i,t}\tau_t + \beta_2 \omega_t + \beta_3 \theta_{i,t}\tau_t + \beta_4 B_{i,t}\tau_t + \varepsilon_{i,t} \quad (3)$$

$$Policy_{i,t} = \alpha + \beta_1 F_{i,t}\tau_t + \beta_2 \omega_t + \beta_3 \theta_{i,t}\tau_t + \beta_4 B_{i,t}\tau_t + \beta_4 M_{i,t} + \varepsilon_{i,t} \quad (4)$$

We use base-line OLS regressions for 12 firm policies and performance variables and for 20 bench mark years. We calculate the coefficient of determination (R-squared) per cross section, which measures the explained variance relative to total variance. The larger the increase of the R-squared in a cross section when big linker fixed effects are added, the larger the importance of these fixed effects. Although we estimate our model as a single panel, we calculate the R-squared for each of the twenty cross sections. This is particularly relevant, because it allows us to show the importance of big linkers over the century.[43] [44]

Fourth, using formula 4 (vector $M_{i,t}$) we rank individual directors using the t-statistics pertaining to the individual big linker coefficients. The advantage of ranking based on t-statistics the effects are then standardized and made comparable. We subsequently provide short biographical descriptions of the big linkers found most relevant for the different policies and corporate performance. In order to explain the systematic relevance of our big linkers we highlight individual traits, attributes, corporate commitments and describe the characteristics of the corporations these individuals.

[43] Two assumptions are made. Big linker effects are constant over all firm-year-positions (robustness for positions), and effects are measured with other boards as benchmark, that's the zero's for the big linkers not active in a firm and for directors that are not big linkers. The effects are sophisticated correlations that are constant for directors over all seats they occupy. Thus an effect might be called a "style" a director has (see also Bertrand and Schoar, 2003).

[44] Also important to bear in mind is that our estimates in step three are correlations because all inputs are measured contemporaneously. The correlation can be driven by selection (matching directors with the goals of a firm) or by influence (directors indeed influence outcomes) (Cronqvist and Fahlenbrach, 2009).

3.3 The research setting and data

Our research is based on big linkers in Dutch listed firms during the 20th century. Dutch business can be characterized by a long tradition of entrepreneurship and large multinationals. Over the century, periods of stability were followed by disruption. Crises, world wars, and globalization are examples of exogenous factors that challenged Dutch business. Following the Varieties of Capitalism literature (Hall and Soskice, 2003), one could say that the Netherlands swung from a liberal market economy in the beginning of the 20th century, towards a coordinated market economy after the Second World War, and reverted back again to a more liberal one since the 1980s (for more details on Dutch capitalism see Sluyterman (2015)). Dutch directors are described to have considerable influence relative to firms' owners, only to decline somewhat since the 1990s and especially in the early 21th century (Westerhuis and De Jong, 2015).

The Dutch corporate network emerged at the end of 19th century when industrialization began to take hold and the economy grew rapidly. Firms were created and many of them were listed on the Amsterdam Stock Exchange. A temporarily decline of the network in the 1930s was followed by a period of consolidation in the 1950s to 1970s. Since the 1980s the network gradually declined, and more significantly at the turn of the century, when the number of board positions held by directors declined substantially (Westerhuis, 2014). This general trend from emergence, to consolidation, and then to decline of the network is very similar to other national networks, such as in the US, Germany, and Switzerland although the pace of the decline and the explaining factors differed across countries (David and Westerhuis, 2014).

Dutch firms have a two-tier system, consisting of an Executive Board and a Supervisory Board. During the 20th century all listed firms included both boards, although a supervisory board became mandatory only in 1971 (structured regime), and only for large firms. For the set of non-financial firms we collected the names of the directors of both boards between 1908 and

2003 with five-year intervals. And we did the same for another set of 50 largest financial firms, both listed and non-listed. Next, we collected annual report information of all Dutch listed non-financial firms between 1903 and 2003 with five-year intervals. We excluded the financial firms due to differences in accounting principles. With this dataset we calculated firm size, performance (return on assets and return on equity) and 10 different firm policies (see for the definitions Appendix).

Based on the data sets described above we created three samples. One sample with all Dutch listed non-financial firms for which we collected complete annual report data between 1908 and 2003 with five-year intervals (of 3,564 firm-year observations). A second sample with all Dutch listed non-financial and the 50 largest financial firms for which we collected complete board data between 1903 and 2003 with five-year intervals (5,217 firm-year observations with 37,582 board seats). And, a third sample consists of 266 big linkers including personal background information such as age, belonging to elite families, education, bank involvement and network statistics. The descriptive statistics of 266 big linkers are shown in Table 2. On average the 266 big linkers have 25 board positions, 68% is a banker, 14% belong to an elite family, 12% is or has been political active and 21% has a university degree.

Based on the second sample, we calculate the number of board positions taken by the big linkers. As can be seen in Figure 6, the number of board seats taken by big linkers followed a similar pattern as the overall network: increase (until 1928), temporarily decline (in the 1930s), and consolidation (1950s-1960s), and decline (since 1970s). The different development between number of big linkers (declining already since the 1970s) and number of big linkers per firm (declining only since the late 1990s) can be explained by the diminishing number of firms in our sample. The relative late decline of big linkers per firm is consistent with the literature, in which it is shown that the Dutch network only declined significantly at turn of the century (Westerhuis 2014).

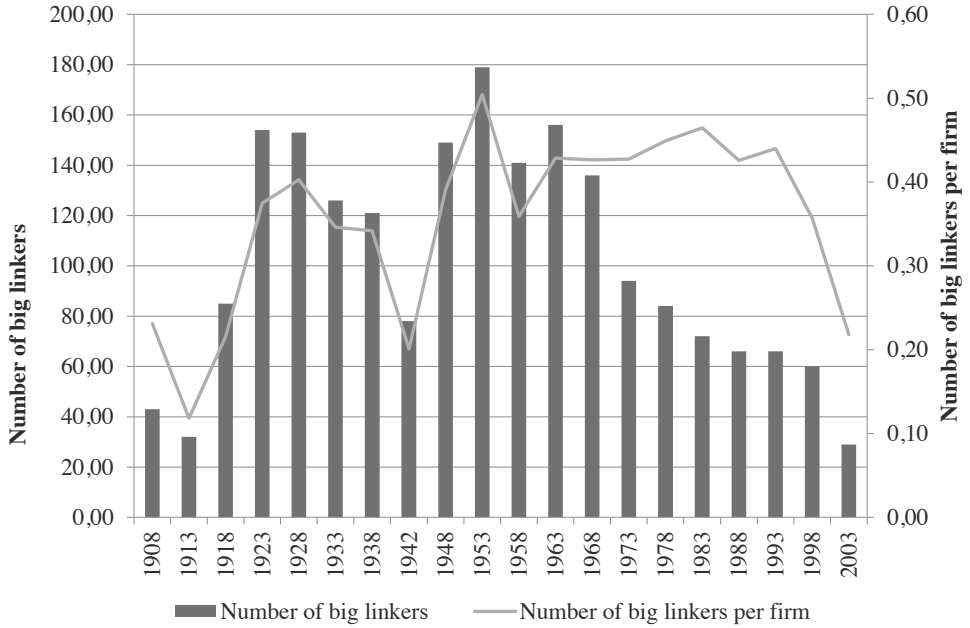

Figure 4: Number of board seat of big linkers over the period 1908-2003

Table 3A shows descriptive statistics of consisting of 3,564 firm-year observations. Over the whole century, on average 57% of the firms has a big linker on board, with an average board size of 7.3 directors. A big linker has on average 8.3 interlocks of which 0.9 with non-financial firms. The second part of the table shows the firm policies. Table 3B shows averages for five different periods. It shows that after the second world war the percentage big linkers increased slightly to around 61%, and then since the late 1980s started to decline to 48%. Board size increases from around 7 until 1963 to around 8 in the last two periods, whereas the total board interlocks decreases from 10.1 in the period 1903-1923 to 5.7 in the period 1988-2003. The average firm size increases a little until 1942, and considerably as of the 1960s, which is consistent with the extant literature (see e.g. Westerhuis and De Jong, 2015).

Next, we estimate what type of firms – characterized by size, performance, growth, leverage and board size –, are more likely to have a big linker on board. As Table 4 shows in each period during the 20th century larger firms are more likely to have a big linker. Also board

size has a positive relation with big linkers in the periods 1928-1942; 1948-1963; and 1968-1983. This finding is consistent Ferris et al (2003), who stated that directors who serve larger firms and sit on larger board are more likely to attract board positions. Combined with the aforementioned finding on firm size it supports the idea individuals sitting in the board of larger corporations, with larger boards add to their reputation.

Additionally our analysis highlights two interesting facts. First, we find that that in the period 1928-1942, asset tangibility has a significantly negative predictive ability for the presence of big linkers. We argue that, during this period, there was a substitution effect between the skills of particular big linkers and the functions of asset tangibility. A possible explanation could be the recuperation of Dutch economy from the 1920s financial crisis. Chapter two of this dissertation and Jonker (1996) attribute the severity of this crisis to the intertwinedness of corporations and the banking sector. Here we argue that our result highlights a change in dominant logic, where the function of collateral shifted from director and banker reputation to more material corporate assets. Second, we find that during the period 1913-1928 corporate profitability positively predicts the presence of a big linker. This finding is consistent with the idea that at the turn of the twentieth century Dutch business men (especially bankers) collectively aimed to increase their power (Wibaut, 1913; Jonker, 1989). As such big linkers were primarily positioned at large and profitable corporations. We also find that profitability is an important determinant in the last two periods. In the period 1968-1983, we find that less profitable firms had at least one big linker on their board. The period, characterised by oil crises and severe turmoil on the Dutch housing market, had a negative impact on especially the largest corporations such as Koninklijke Olie Shell. As such the economic cycle fits as an explanation for the observed negative effect. In the last period, 1988-2003, the Dutch economy reverted back to a more liberal market economy, changing the market for corporate control. We argue that a shift in dominant logic again changed the hiring policy of Dutch firms. At this point in

time only the best performing companies are able to attract those board members that are (assumed) to be the best. This finding is consistent with Sluyterman (2015) and Westerhuis and De Jong (2015).

3.4 Measuring big linker effects

We estimate big linker effects by separating the firm effects from the individual effects. We investigate how much of the variability in firm's policies (*outcome*) is explained by director fixed effects after controlling for variables explaining these outcomes, where we include firm characteristics (*determinant*) and industry fixed effects (*industry*) (See formulas 2 to 4 in Section 3). Because of the panel nature of our data, we need to deal with the time dimension. We do so by estimating a single model for the full 20 cross-sections, and (i) including 20 year-fixed effects to capture variation in the outcome variables, which is caused by time effects and (ii) interacting the Determinant, Industry and Board-characteristic variables with five period indicators for 1903-1923, 1928-1943, 1948-1963, 1968-1983 and 1988-2003. We do not allow the director fixed effects to vary over time, because the length of the presence of a director in the sample is limited, such that director fixed effects are estimated over a maximum number of cross-sections.

The results of the estimations are a set of regression coefficients measuring the correlations between outcome variables and director characteristics, controlling for firm, industry and year characteristics. We calculate the coefficient of determination (R-squared) per cross section for models (2) to (4). This coefficient measures the explained variance relative to the total variance. The larger the increase of the R-squared in a cross section when director characteristics and director fixed effects are added, the larger the importance of these characteristics. The results are shown in Table 6 and Figure 2. Table 6 shows the explanatory

power of the big linker effect, which is the difference between formula 4 and 3 and reflects the dotted line in figure 7.[45]

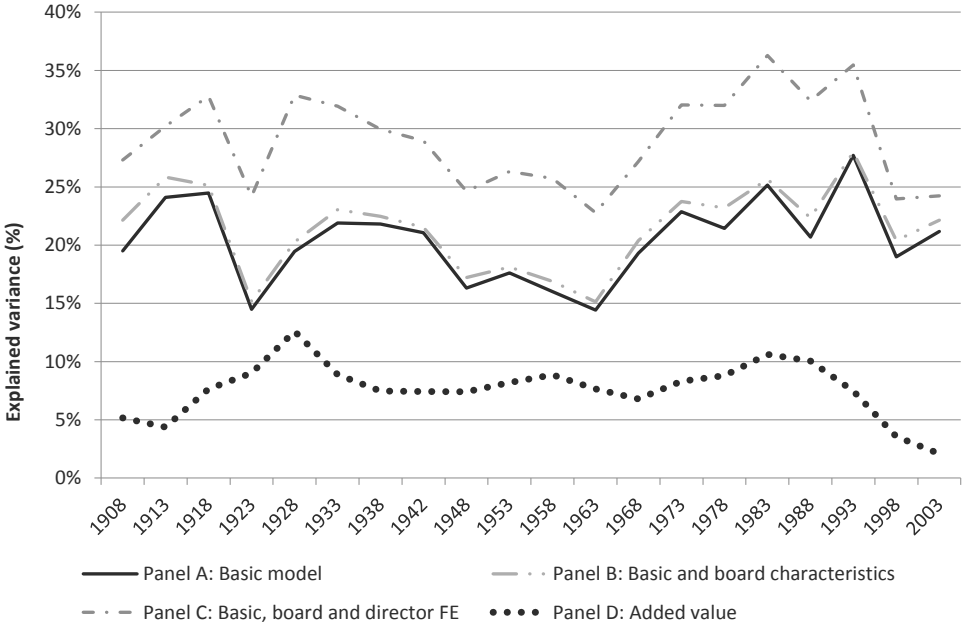

Figure 5: The effect of big linkers (per year) for corporate policies as measured by the outcome variables (mean)

Overall it shows that board characteristics do not improve the model substantially, whereas the big linkers fixed effect do improve the model fit. The average percentage fluctuates around 8-9% and is lower at the beginning and in the end of the 20th century whereas in 1928 and in the 1980s it is at its highest. In particular the relatively high explanatory power in the 1980s is interesting, because by then big linkers occupied far less positions (see Figure 6). We find that big linker fixed effect does improve the model that explains variances in corporate policies and performance, we zoom in into the big linkers fixed effects.

[45] Our estimates are correlations as all inputs are measured contemporaneously.

3.5 Understanding big linker effects

Our estimations are correlations, which means that the effects can be driven by either selection (i.e. matching) or influence. Thus big linker fixed effects might indeed reflect influence on policy and performance variables. It would mean that a big linker influences policies in the same way across different firms where he has a board position. He beliefs that this will enhance firm value. However, big linker fixed effect can also reflect that firms that want to reach certain goals actively select directors to do the job. In other words, the firm is already heading in a certain direction and matches the best director available to help out. The first might lead to inefficient policies imposed by influential directors; the latter to optimal or at least intended policies with the right director at the right job (Cronqvist and Fahlenbrach 2009).

An example of big linker fixed effects is shown in Table 5. We included 5 big linkers, each with different characteristics, and regressed them on leverage (one of the 12 policies). C.J.K. van Aalst (in our sample in 1908-1918) was active in the oil industry, trade and shipping industry. K.P. van de Mandele (1918-1963) had many board positions in the light industry (cigars, packing and wood) and important multinationals such as Unilever and Stork. C.J.P. van Westreenen (1973-1993) had board positions at ABN AMRO bank, Bijenkorf, Aalberts and Super de Boer. S.P. van Eeghen (1903-1933). Van Eeghen had a prominent position in Amsterdam, where together with his brother in law, he pulled the strings in the financial and business world (F.J.E. van Lennep in *Late regenten* (Haarlem, 1962)). Westreenen shows a significant positive correlation whereas the other three big linkers show only limited impact on leverage. We interpret these findings as follows. Firms where Van Westreenen was in the board had approximately 11% more leverage when compared to firms where he was not a board member. We may attribute this finding to Van Westreenen's ability to secure capital through his bank connections or his role as a monitor for banks in highly indebted banks.

Table 7 presents three panels. Panel A shows the absolute values of the effects of our biggest linkers from Table 1. We find that relatively few exhibit systematic effects. Only two of the biggest linkers have an absolute effect which is statistically significantly difference from zero with a ninety percent confidence interval: E. Heldring (t-value of 1.64) and J.F. de Beaufort (t-value of 1.58). The general finding that the biggest linkers exhibit little systematic effects is consistent with the literature on busy directors, which highlights that the directors with the most commitments are not by definition the once that have the highest contribution to corporate policies and performance. A precautionary note is in order here as it might be possible for the most powerful big linkers to adapt to corporate needs. This implies that these particular individuals do not have a certain management style, rather they are well-equipped to meet targets set for their appointment.

Panel B of Table 7 shows the top 15 big linkers with the highest absolute fixed effects from our regressions. Our most influential big linkers exhibit an absolute correlation with corporate policies and performance t-values ranging from 1.6 to 1.9. To understand these effects we follow Carpenter et al. (2012) and define four categories along which we explain our findings. First, we distinguish big linkers with high or low social capital. We make a systematic division between personal and corporate social capital. Big linkers have a high personal social capital when they are connected to other important directors (e.g. E. Heldring), are from elite families (e.g. J. A. van Veen Kretschmar) or they are prominent business owners (e.g. L. Stokvis). Big linkers have high corporate social capital when they have board positions at large and influential multinational corporations. For example A. H. J. Kruising had board positions at Akzo (predecessor of Akzo Nobel) and Koninklijke BAM. Second, we investigate if big linkers have the ability to advance corporate interest. Big linkers with positions at banks can have the ability to increase the access to financing (for example W.R. Esser had board positions at Uni-Bank in the Dutch Indies, providing corporations such as Singkep Tin-

Maatschappij with access to funds). Third, we aim to find in our sources which big linkers have management experience, for example when they have multiple directorships as opposed to supervisory positions over the time span during which they were are classified as big linker. Fourth, we investigate if big linkers that are more centrally located in the Dutch network use their position to wield power and are better able to reap the benefits from their network.

Panel B shows that fact half of the most influential big linkers were active before Second World War: L. Stokvis (1923-1938), W.R. Esser (1908-1928), F. H. Fentener van Vlissingen (1923-1958), J. A. van Veen Kretschmar (1908-1928) and E. Heldring (1908-1948). Less known are P. Leeuwen Boomkamp (1913-1942) and P.E. Tegelberg (1908-1953). When we combine our findings, with the classification from Carpenter et al. (2012) we find the following. Prior to the Second World War the most influential big linkers were characterized by high personal social capital as opposed to corporate social capital, high experience. After the Second World War experience became less important for big linkers, however their network (and especially their centrality) became more important.

The big linker with the highest overall contribution, L. Stokvis, was well known for his ownership of multiple shipping companies, exhibits a striking management style. We find that companies where Stokvis was a board member had systematically lower leverage (t-statistic: -1.5), invested less in fixed assets (-6.9) and were more liquid (1.6). It was Stokvis' entrepreneurial spirit that made him risk averse, as he was personally liable for adverse shocks to his corporations. Stokvis quickly gained substantial social capital as his shipping companies became more successful. It was through his experience of managing his companies in turbulent times (1920s and 1930s) that he was able to build his empire. However we find that the companies where he was a director provided (on average) a very low return on equity (approximately 2.8% less than other companies).

In second place we find C.J.P. van Westreenen, although he is one of the big linkers with the least board positions, his contributions are highly significant. Van Westreenen was very able to advance the corporate interests of the retail companies where he was a board member. His positions at Amro (legal predecessor of ABN Amro) enabled him a secure funds for the various corporations in his portfolio. We find that his companies had on average 8.6% more leverage, invested significantly more in their fixed assets and operated approximately 11% more efficiently. His experience and the corporate social capital allowed Van Westrenen to contribute significantly to the equity return of the firms in his portfolio. We find that companies where he was a board member generated a return on equity which was approximately 10% higher than that of other firms.

Third, P. E. van Leeuwen Boomkamp. Although he is relatively unknown in the Dutch historiography, he held a multitude of positions at shipping and rubber companies both in the Netherlands and in the Dutch Indies. As many of his contemporaries, Leeuwen Boomkamp went to the Openbare Handelsschool in Amsterdam after which he got experience and knowledge by internships at various firms between 1889-1892. In 1892 he started at his father's firm Leeuwen Boomkamp & Co, at which he became a partner in 1898. He created many cultuuurondernemingen, among them Rubber Cultuur Maatschappij Amsterdam. His overseas positions at these companies limited his domestic exposure, limiting his corporate social capital. However his multitude of positions with shipping companies and trade corporations gave him the capital to found various overseas rubber, tobacco and coffee producing firms. In contrast to entrepreneurs such as Stokvis, Van Leeuwen Boomkamp was more risk seeking, his companies were significantly more levered and invested less in their assets. We find that his management experience and eventually his central location in the network of did not contribute to the performance (return on equity or return on assets) of the companies in his portfolio.

Of the big linkers with the highest overall contribution we discuss two other individuals. Frederik Hendrik Fentener van Vlissingen (1882-1962) was an entrepreneur and was married to Sophie Schout Velthuys (1882–1976), who came from a wealthy banking family (Bank Vlaer & Kol, later it became part of AMRO Bank). He received his education at the Polytechnical School in Delft in 1900 but had to quit when he his father died in 1904. Soon after he got a position in the family firm, *Steenkolen Handels Vereeniging* (SHV). He moved the firms' headquarters from Rotterdam to Utrecht in front of its biggest customer Nederlandse Spoorwegen (NS). In 1911 he became director of the family business. Already in he was one of the creators of N.V. Hollandsche Kunstzijde-Industrie which was one of the predecessors of AKZO. Later he collected capital to finance the start-up of the Koninklijke Luchtvaart Maatschappij in 1919. From 1918 till 1933 Fentener van Vlissing was among the advisors of the Ministry of Economic Affairs. Having taken part in trade negatiations for the Ministry of Foreign Affairs during the 1920s, he quickly gained a reputation as an economic expert and talented diplomat. Den Tex (2013) describes Fentener van Vlissingen as highly analytical and pragmatic. Coming from a large merchant family Van Vlissingen quickly increased his influence throughout the Netherlands. Driven by ambition and his entrepreneurial spirit he always recognised good business opportunities, with his corporate and social status he was able to maximize on these opportunities. Although we do not find that he significantly contributed to the return of the companies in his portfolio, we find that his firms were very efficient in their production (net working capital t-statistic: -3.2) and his firms operated with relatively low amounts of fixed assets (t-statistic: -3.8). Overall we classify Fentener van Vlissingen as a highly skilled big linker with no particular management style, as a is much more driven by case by case opportunities and the experience of a man from a family of reputable merchants.

B. Th. (Barthold Theodoor Willem) van Hasselt (1896-1960) was son of doctor dr. Sjoerd Folkert Willem van Hasselt (1868-1934). He studied law at Leiden University and

obtained his PhD for a dissertation entitled "*De literatuur over het wetsontwerp op de Naamlooze Vennootschappen, critisch samengevat*" in Leiden in 1919, after which he got a position at NV Koninklijke Nederlandsche Maatschappij tot exploitatie van Petroleumbronnen in Nederlands-Indië. In the Dutch-Indies he also got a position at the Bataafse Petroleum Maatschappij, and he became banker at Javasche Bank. In 1934 he was elected in the Volkraad Nederlands-Indie and as such member of the Economic Group. By then Van Hasselt was known as an industrialist and soon became director at Koninklijke Olie in 1944 and in 1948 director-general. In 1951 he resigned after which he occupied many supervisory positions at for example AKZO and Hoogovens. Wynaendts van Resandt (1933) describes the roots of the Van Hasselt family. Dating back to at least the thirteenth century, the Van Hasselt family can be classified as a nobel family holding important governmental posts in Keulen (Germany). As such it is no surprise that B. Th. van Hasselt is found to be one of the highest contributing big linkers. We find that Van Hasselt exhibits a particular management style, characterized by a focus on profitability (return on assets t-statistic: 2.3), efficiency (net working capital t-statistic: -3.4) and risk aversion (leverage t-statistic: -2.3). Although non-significant, we find that firms in his portfolio invested approximately 8% more and grew at a rate 23% higher than firms where he was not a board member. We argue that the combination of his network centrality, and social capital allowed him to maximize rents across the firms in his portfolio.

Panel B demonstrates the 15 most influential big linkers with an absolute correlation with corporate policies and performance ranging from 1.62 to 1.92. When we compare panel A, B and C we can conclude that the most central directors are not the most influential ones. Only Ernst Heldring appears in both tables, meaning that he is one of the 15 biggest linkers and that he has an absolute effect on corporate policies and performance. Heldring (1871-1954) was a very active entrepreneur and ship owner before the Second World War. Heldring's eductation (Public Trade School Amsterdam), his travels abroad and internships at various

trade offices in both London and Amsterdam quickly shaped his career path. He established the Java-China-Java line, was director at Koninklijkse Nederlandse Stoomboot-Maatschappij from 1899 to 1937, and president of the Nederlandsche Handel-Maatschappij between 1939 and 1948. He was the frontrunner of the Chamber of Commerce in Amsterdam in the 1930s, and between 1938 and 1946 member of the First Chamber. Heldring was known for his sense of responsibility and integrity. Moreover he was revered for his broad interest in the arts and sciences and respected for his confidence and restraint in the face of hardship (De Vries, 1970). Heldring's experience, and centrality in the Dutch network of board members makes him in all likelihood one of the most influential individuals of the century. Not only was we a board member of many large multinational corporations his management style is also very explicit. We find that although Heldring's firms paid out a significantly lower proportion of their profits, his firms were more financially flexible (current ratio t-statistic: 1.8) and also more highly levered (leverage t-statistic: 1.8). Firms in Heldring's portfolio yielded a return on assets approximately 3% above that of firms where Heldring was not a board member. We argue that Heldring used his social capital, experience and utilized his network to take advantage of opportunities, which required financial flexibility, effectively balancing investments and payouts (for which we find no significant effects).

From Panel C we observe that those big linkers with the highest contribution to corporate performance where primarily directors of non-financial corporations and held supervisory positions at various banks. We find that their network centrality is not very different than that of the top fifteen big linkers with the overall highest contribution (panel B). However both the number of bank positions and director positions are substantially higher than the big linkers from panel B. This can be interpreted as evidence that big linkers that have also focus their efforts on generating returns for shareholders, conditional on the power of their network.

Another interesting observation is that the two big linkers with the highest effect on corporate policies and performance are from different time periods. Thus, L. Stokvis (1.9) was active in the interwar years, whereas C.J.P. Westreenen (1.8) in the period 1973-1993. Both were not very centrally located in the network (20 and 31% respectively). This finding highlights that, although the majority of big linkers are concentrated in the era prior to the Second World War, our analysis does not constrain us from finding important effects in periods during which corporate networks declined. Additionally Table 8 highlights the following: (1) big linkers with the highest overall contribution, are characterized by high personal social capital and extensive management experience; (2) corporate social capital became much more important following the Second World War; (3) after the Second World War the importance of the big linkers centrality in the Dutch network increased.

Our finding shows interesting patterns. We show that the directors with the highest systematic relevance for corporate policies are not by definition those who are central in the Dutch network. Nor are they the ones with the most connections, rather we argue that they are well-connected and have substantial management experience. We show that the individuals with systematic relevance are not descendants from nobility, rather they come from merchant families. We find that the relevance of big linkers and their contribution in explaining corporate policies and performance is larger after periods of economic turmoil. Additionally we find that throughout the twentieth century bankers have played an important role in shaping corporate policies. In addition to these patterns we find many effects specific to firms and individual directors, which underlines the importance of our mixed-method approach.

3.6 Conclusions

This paper investigates the effects of individual directors on corporate policies and firm performance. For directors with many executive and supervisory roles in multiple firms' so-called big linkers we estimate whether the presence of these individuals is systematically related with corporate policies and performance.

We show that Dutch corporate networks changed over time consistent with David and Westerhuis (2014). Generally it is assumed that firms or directors that are most centrally located in the network have potential to wield power (e.g. Helmers et al 1975; Granovetter 1985, Heemskerk 2009). We show that the 266 Dutch big linkers had on average 25 board positions, 68% is a banker, 14% belong to an elite family, 12% is or has been political active and 21% has a university degree.

Following Bertrand and Schoar (2003), we use director fixed effect to estimate the effect or 'style' of the big linkers in our sample and to assess their importance during the period. We find that over the course of the 20th century for Dutch exchange-listed firms, big linkers matter and explain a substantial part of the variation in firm corporate policies and performance. We estimate that the contribution in explaining corporate policy throughout the twentieth century is between 4% and 11%.

Using archival sources and biographical details we provide an overview of the big linkers that were found to have a significant effect on corporate policies over the twentieth century. We find that the directors with the highest systematic relevance for corporate policies are not by definition those who are central in the Dutch network. Nor are they the ones with the most connections, rather we argue that they are well-connected and have substantial management experience. Additionally our analysis inspired by Carpenter et al. (2012) shows that big linkers with the highest overall contribution, are characterized by high personal social capital and extensive management experience. We find that corporate social capital became

much more important following the Second World War. After the Second World War the importance of the big linkers centrality in the Dutch network increased. This line of research opens new avenues for research that combines historical or archival sources in combination with empirical analysis.

Appendix: Definitions of variables

Variable name	Unit	Definition
Big linker (dummy)	**Dummy**	**Equals 1 if and only if the firm has a board member who has more than 2 board positions in any given year and 9 or more positions in his entire career**
Payout ratio	Continuous	Total dividends paid to net income
Liquid assets	Continuous	Current assets minus inventory to total assets
Leverage	Continuous	Debt to total assets
Investments	Continuous	Change in fixed assets
Asset growth	Continuous	Change in total assets
Return on equity	Continuous	Net income to total equity
Return on assets	Continuous	Net income to total assets
Market-to-book	Continuous	Market value of equity to nominal equity value
Retained profits	Continuous	Equity reserves and retained earnings to total assets
Interest coverage	Continuous	Gross profits to interest paid
Firm size (milions and inflation corrected, 2003 base year)	Continuous	Total assets (ln)
Tangibility	Continuous	Fixed assets to total assets
Conservatism	Dummy	Equals 1 if and only if the firm rapidly writes down its asset to a value below 10 guilders
Net working capital	Continuous	Current assets minus short-term debt to total assets
Quick ratio	Continuous	Current assets minus inventory to short-term debt
Current ratio	Continuous	Current assets to short-term debt
Boardsize	Continuous	Number of board members
Total interlocks	Continuous	Total number of interlocking directorates
Total firm interlocks	Continuous	Total number of interlocking directorates with non-financials
Total bank interlocks	Continuous	Total number of interlocking directorates with financials
Network centrality	Continuous	Degree centality (Newman, 2010)

Appendix: Description of other influential big linkers

Jacob Adriaan Kretschmar van Veen (1857-1931) was an engineer and as jonker part of the Dutch nobility. He was active particularly in the railroad industry. He became director of the Nederlandsche Zuid-Afrikaanse Spoorweg Maatschappij (NZASM) in 1899, which was created by Paul Kruger and Rudolf van den Wall Bake at the end of the 19th century. Because of the war with England, Kretschmar Van Veen came back to the Netherlands in 1901, and in 1909 the NZASM was liquidated. He became directeur-generaal of the Nederlandsche Spoorwegen between 1917 and 1921 and president-supervisor between 1921-1927. He was also director at Deli Spoorweg Maatschappij. His dealings with the "Vryheidsoorloë" (wars between decendants of Dutch kolonists and the British in South-Africa) and his ability to manage crisis situations at the Nederlandsche Spoorwegen, quickly gave him a reputation of an expert diplomat (Veenendaal, 2001)

The other half of the big linkers were mostly active after Second World War: Westreenen (1973-1993), J.M. Haga (1948-1963), H.J. Buttinger (1953-1978), L.A. van Ittersum (1958-1968), D.F.W. Langelaan (1963-1978) B. Th. van Hasselt (1948-1958), L. Speelman (1948-1963), A. H. J. Kruising (1968-1988), of whom only the first and last (Westreenen and Kruising) were active in the more recent period. Thus 6 of them were active in the period directly after Second World War, when the Dutch economy was recovering, Dutch business were growing and Dutch management was gaining power at the expense of shareholders. We describe three of these prominent individuals.

J.M. Haga (Sneek 1891-Amsterdam 1984) was director at Amsterdamsche Bank between 1940 and 1956, after which he occupied a position in the Supervisory board of this bank until 1963. He was also a director at the Incasso Bank in 1948 and 1949, and had supervisory board positions in many cultuurondernemingen.

D.F.W. Langelaan was director at Participatie Maatschappij, at Rubber Cultuur Maatschappij Amsterdam between 1952-1964, and supervisor at Bank Mees and Hope among others. When Rubber Cultuur Maatschappij Amstedam came into financial trouble around 1973 and 1974, the majority at the extrodinary shareholder meeting decided to fire both directors and Langelaan was appointed director at the firm, which most important bank relation was with Bank Mees and Hope (Reformatorisch Dagblad: 17 March 1975; 16 June 1975). His father was professor in Medicines and as such did not belong to the Dutch business elite. However Langelaan married into the Lucassen family which had become wealthy in the sugar industry in Nederlands-Indie. Following in his father's footsteps, Langelaan on the board of the Vereeniging Nederlandsch Kankerinstituut. Here he was as treasurer active in daily management until 1963, and was assisted by a financial committee of three advisors, among them banker J.M. Haga. And in 1960 Haga became second treasurer, which he remained until 1968 (annual report various years). Later, Langelaan married with a member of the important banker family Van Eeghen. These findings highlight the intertwinedness, not only of Dutch corporations, but also of the Dutch elite families (a finding consistent with Heemskerk (2009)).

Lastly, table 7C shows the top 15 big linkers with highest correlation with performance, measured by return on assets and return on equity, ranging from 1.68 to 3.57. Here we see some familiar names. C.J.P. van Westreenen and E. Heldring also appear as most influential on total policies. M.C Koning has the highest effect of 3.57 on performance. Since 1920 he was member and between 1937 and 1948 chairman of the executive board of Koninklijke Paketvaart-Maatschappij (*Uitlaat*, Magazine KPM; 1 February 1950). Before that, since 1912 he was director and since 1916 president-director of the firm in Batavia (Jakarta). Like Van Hasselt he was appointed in the Volksraad Nederlands-Indie around 1918.

Tables

Table 1: Biggest linkers (top 15)

Name	First	Last	Total number of board positions	Total number of board positions (at sample firms)
K. P. van der Mandele	1918	1963	126	73
C. J. K. van Aalst	1908	1938	76	45
S. P. van Eeghen	1908	1933	71	23
E. Heldring	1908	1948	67	30
J. F. de Beaufort	1918	1953	64	18
H. Cremer	1918	1948	62	27
H. W. A. van de Wall Bake	1953	1978	60	38
P. J. van Ommeren	1918	1973	59	43
J. P. van Tienhoven	1918	1948	58	26
H. F. van Leeuwen	1938	1968	56	44
B. E. Ruys	1908	1948	56	34
F. S. van Nierop	1908	1923	54	29
A. H. Ingen Housz	1928	1968	53	44
R. J. H. Patijn	1918	1953	51	27
W. Westerman	1913	1933	51	30

Table 2: Descriptive statistics of all big linkers (N=266)

	mean	p50	min	max
Total number of board positions	25.18	22.00	9.00	126.00
Total number of board positions (at sample firms)	17.14	15.00	9.00	73.00
Banker (dummy)	0.68	1.00	0.00	1.00
Number of bank seats to total seats	0.11	0.10	0.00	0.45
Number of bank management seats to total number of seats	0.03	0.00	0.00	0.27
Number of management seats to total seats	0.15	0.13	0.00	1.00
Biggest big linkers (more than median number of positions)	0.39	0.00	0.00	1.00
Elite family	0.14	0.00	0.00	1.00
University degree	0.21	0.00	0.00	1.00
Educated in Rotterdam	0.01	0.00	0.00	1.00
Educated in Amsterdam	0.06	0.00	0.00	1.00
Educated in Leiden	0.05	0.00	0.00	1.00
Educated in Delft	0.05	0.00	0.00	1.00
Educated in Utrecht	0.02	0.00	0.00	1.00
Politically active	0.12	0.00	0.00	1.00
Active as lawyer	0.05	0.00	0.00	1.00
Network centrality	37.94	34.42	10.50	88.86

Table 3A: Descriptive statistics (firm level)

	N	mean	p25	p50	p75	sd
Big linker	3564	0.568	0.000	1.000	1.000	0.495
Payout ratio	3564	0.414	0.000	0.396	0.726	0.361
Liquid assets	3564	0.300	0.151	0.282	0.425	0.186
Leverage	3564	0.423	0.267	0.431	0.583	0.207
Investment	3564	0.380	0.044	0.879	1.000	0.790
Growth	3564	0.297	0.035	0.466	1.000	0.763
Return on Equity	3564	0.074	0.023	0.073	0.127	0.117
Return on Assets	3564	0.072	0.031	0.062	0.101	0.073
Market-to-book	2916	1.605	0.708	1.218	1.880	1.835
Retained profits	3564	0.220	0.014	0.187	0.487	0.484
Interest coverage	3564	7.402	3.933	10.000	10.000	3.608
Firm size	3564	509.042	29.595	74.226	282.585	1812.272
Tangibility	3564	0.332	0.125	0.286	0.493	0.256
Net working capital	3564	0.215	0.046	0.203	0.367	0.214
Quick ratio	3564	1.512	0.631	1.018	1.612	1.767
Current ratio	3564	2.369	1.177	1.686	2.598	2.118
Board size	3564	7.313	5.000	7.000	9.000	2.816
Total interlocks	3564	8.290	2.000	5.000	12.000	8.639
Total firm interlocks	3564	7.308	1.500	5.000	11.000	7.789
Total bank interlocks	3564	0.984	0.000	1.000	2.000	1.289
Conservatism	3564	0.312	0.000	0.000	1.000	0.463

Table 3B: Descriptive statistics per period (firm level)

	1908-1923 (N=568)	1928-1942 (N=876)	1948-1963 (N=1019)	1968-1983 (N=636)	1988-2003 (N=465)
	mean	mean	mean	mean	mean
Big linker	0.553	0.546	0.613	0.607	0.475
Payout ratio	0.455	0.341	0.487	0.403	0.354
Liquid assets	0.200	0.237	0.333	0.364	0.377
Leverage	0.380	0.320	0.414	0.526	0.545
Investment	0.493	-0.108	0.605	0.501	0.503
Growth	0.475	-0.239	0.527	0.428	0.407
Return on Equity	0.057	0.040	0.096	0.069	0.117
Return on Assets	0.059	0.051	0.094	0.078	0.068
Market-to-book	1.074	1.174	1.880	1.231	2.683
Retained profits	0.032	0.040	0.254	0.540	0.278
Interest coverage	7.262	7.739	8.437	5.103	7.813
Firm size	104.604	106.369	155.794	737.166	2223.741
Tangibility	0.423	0.360	0.255	0.330	0.336
Net working capital	0.151	0.231	0.267	0.211	0.156
Quick ratio	1.889	2.003	1.439	1.014	0.967
Current ratio	2.786	3.158	2.309	1.678	1.449
Board size	7.218	6.792	7.008	8.143	7.942
Total interlocks	10.076	8.094	8.610	8.329	5.725
Total firm interlocks	8.968	7.193	7.754	7.052	4.869
Total bank interlocks	1.127	0.898	0.845	1.263	0.897
Conservatism	0.280	0.441	0.418	0.222	0.000

Table 4: Which firms have big linkers in their boards? (Logit regression, marginal effects at the median)

	(1)	(2)	(3)	(4)	(5)
Variables (lagged 5 years)	1913-1923	1928-1942	1948-1963	1968-1983	1988-2003
Firm size	0.151***	0.159***	0.146***	0.091***	0.116***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Payout	0.010	0.003	0.030	0.057	-0.120
	(0.892)	(0.945)	(0.540)	(0.425)	(0.337)
Current ratio	0.007	-0.012	-0.005	0.019	-0.079
	(0.513)	(0.154)	(0.666)	(0.614)	(0.332)
Leverage	0.012	-0.084	-0.271**	0.055	0.074
	(0.953)	(0.441)	(0.038)	(0.781)	(0.804)
Tangibility	-0.020	-0.196***	-0.140	-0.012	-0.113
	(0.835)	(0.006)	(0.173)	(0.936)	(0.558)
Growth	-0.054	-0.037*	-0.003	-0.020	-0.041
	(0.259)	(0.070)	(0.925)	(0.551)	(0.407)
Return on equity	0.907*	-0.250	0.012	-0.643**	0.540***
	(0.056)	(0.144)	(0.956)	(0.040)	(0.001)
Board size	0.122	0.214**	0.274***	0.285***	-0.060
	(0.338)	(0.012)	(0.003)	(0.005)	(0.612)
Year effects	YES	YES	YES	YES	YES
Industry effects	YES	YES	YES	YES	YES
Observations	295	764	701	560	345
Pseudo R-squared	23%	25%	26%	21%	23%

Note: Standard errors are clustered at the industry level.

Table 5: Example big linker fixed effect regression (dependent variable leverage)

Control variables	
	Coefficient
Variable	(t-statistic)
Firm size (ln)	
1908-1923	0.077***
	(5.809)
1928-1942	0.045***
	(4.423)
1948-1963	0.066***
	(7.569)
1968-1983	0.041***
	(4.537)
1988-2003	0.025***
	(3.059)
Board characteristics	
	Coefficient
Variable	(t-statistic)
Board size	
1908-1923	0.038
	(0.936)
1928-1942	-0.042
	(-1.043)
1948-1963	-0.055*
	(-1.658)
1968-1983	-0.069**
	(-2.138)
1988-2003	-0.059
	(-1.279)
Big linker fixed effects	
	Coefficient
Variable	(t-statistic)
C.J.K. van Aalst	0.056
	(1.149)
K.P. van der Mandele	0.035
	(0.996)
C.J.P. van Westreenen	0.109***
	(2.825)
S.P. van Eeghen	-0.053
	(-0.957)
Other control variables	YES
Other board characteristics	YES
Year dummies	YES
Industry dummies	YES
Observations	3,564
R-squared	0.441

Table 6: Explanatory power of director fixed effects for twelve policy metrics during the twentieth century

Year	Return on Equity	Return on assets	Payout	Leverage	Interest coverage	Investment	Growth	Liquid assets
1908	0.03	0.06	-0.02	-0.01	-0.01	0.02	0.05	0.08
1913	0.08	0.05	-0.01	0.01	0.04	0.06	0.08	-0.01
1918	0.08	0.12	0.09	0.10	0.03	0.08	0.02	0.12
1923	0.08	0.08	0.11	0.17	0.10	0.01	0.06	0.09
1928	0.09	0.13	0.11	0.17	0.11	0.12	0.14	0.11
1933	0.07	0.11	0.08	0.12	0.08	0.05	0.07	0.12
1938	0.08	0.08	0.07	0.13	0.00	0.06	0.08	0.10
1942	0.03	0.06	0.05	0.19	0.03	0.09	0.03	0.15
1948	0.10	0.04	0.09	0.13	0.02	0.11	0.08	0.15
1953	0.10	0.04	0.07	0.16	0.06	0.02	0.10	0.09
1958	0.08	0.02	0.10	0.18	0.02	0.13	0.13	0.10
1963	0.05	0.13	0.06	0.13	0.09	0.03	0.11	0.08
1968	0.02	0.14	0.11	0.11	0.13	0.07	0.09	0.06
1973	0.00	0.22	0.07	0.11	0.12	0.06	0.09	0.11
1978	0.09	0.00	0.06	0.20	0.13	0.18	0.07	0.05
1983	0.07	0.08	0.04	0.18	0.19	0.05	0.10	0.18
1988	0.09	0.05	0.06	0.12	0.10	0.05	0.12	0.12
1993	0.04	0.06	0.01	0.03	0.03	0.12	0.10	0.15
1998	0.03	0.02	-0.01	0.07	0.04	-0.01	0.00	0.08
2003	0.02	0.01	0.06	0.01	0.04	0.02	0.03	0.02

Year	Working capital (net)	Quick ratio	Current ratio	Tangibility	Market to book	Average (overall)	Median (overall)
1908	0.10	0.10	0.09	0.12	0.03	0.05	0.05
1913	0.07	0.03	0.03	0.11	0.15	0.04	0.04
1918	0.08	0.05	0.04	0.10	0.07	0.08	0.10
1923	0.10	0.08	0.11	0.10	0.18	0.09	0.09
1928	0.14	0.11	0.15	0.14	0.19	0.13	0.10
1933	0.10	0.10	0.10	0.07	0.14	0.09	0.10
1938	0.09	0.04	0.05	0.13	0.16	0.07	0.08
1942	0.09	0.05	0.07	0.04	0.09	0.07	0.12
1948	0.10	-0.02	0.01	0.08	0.14	0.07	0.09
1953	0.09	0.09	0.08	0.09	0.09	0.08	0.09
1958	0.06	0.06	0.07	0.11	0.09	0.09	0.11
1963	0.10	0.02	0.04	0.08	0.20	0.08	0.10
1968	0.08	-0.04	0.02	0.01	0.14	0.07	0.08
1973	0.10	0.03	-0.03	0.13	-0.02	0.08	0.13
1978	0.09	0.00	0.03	0.15	0.02	0.09	0.14
1983	0.10	0.01	0.03	0.24	-0.02	0.11	0.18
1988	0.15	0.11	0.09	0.15	0.06	0.10	0.09
1993	0.09	0.07	0.07	0.13	0.04	0.07	0.05
1998	0.07	0.05	0.05	0.03	0.10	0.04	0.03
2003	0.00	0.00	0.00	0.03	0.01	0.02	0.03

Table 7: Top 15 big linkers. Biggest, highest contribution and perfromance

Panel A: Biggest linkers (top 15)

Name	First	Last	Total number of board positions	Total number of board positions (at sample firms)	Absolute effect	Elite family	Centrality in the network	Number of bank seats to total seats	Number of bank management to total seats	Number of management to total seats
K. P. van der Mandele	1918	1963	126	73	0.96	1	88.8	13%	6%	10%
C. J. K. van Aalst	1908	1938	76	45	0.76	0	88.9	22%	8%	11%
S. P. van Eeghen	1908	1933	71	23	0.93	0	63.9	37%	4%	4%
E. Heldring	1908	1948	67	30	1.64	0	36.5	9%	0%	19%
J. F. de Beaufort	1918	1953	64	18	1.58	0	43.5	13%	5%	13%
H. Cremer	1918	1948	62	27	0.81	0	72.9	16%	2%	11%
H. W. A. van de Wall Bake	1953	1978	60	38	0.95	0	58.3	8%	3%	10%
P. J. van Ommeren	1918	1973	59	43	0.65	0	25.1	3%	3%	7%
J. P. van Tienhoven	1918	1948	58	26	1.07	0	58.0	38%	17%	24%
H. F. van Leeuwen	1938	1968	56	44	0.98	0	55.9	14%	7%	7%
B. E. Ruys	1908	1948	56	34	0.76	0	60.6	13%	2%	9%
F. S. van Nierop	1908	1923	54	29	0.81	1	76.3	17%	7%	13%
A. H. Ingen Housz	1928	1968	53	44	1.00	1	50.0	2%	0%	8%
R. J. H. Patijn	1918	1953	51	27	0.99	1	54.1	24%	0%	4%
W. Westerman	1913	1933	51	30	0.66	1	70.7	20%	16%	24%

Panel B: Big linkers with the highest absolute influence

Name	First	Last	Total number of board positions	Total number of board positions (at sample firms)	Absolute effect*	Elite family	Centrality in the network	Number of bank seats to total seats	Number of bank management to total seats	Number of management to total seats
L. Stokvis	1923	1938	19	17	1.92	0	20.00	0%	0%	11%
C. J. P. van Westreenen	1973	1993	13	10	1.80	0	31.20	23%	23%	23%
P. Leeuwen Boomkamp	1913	1942	44	17	1.79	0	39.57	2%	0%	25%
W.R. Esser	1908	1928	22	13	1.75	0	29.40	14%	14%	14%
F. H. Fentener van Vlissingen	1923	1958	23	15	1.74	0	34.63	22%	0%	4%
J. M. Haga	1948	1963	25	10	1.73	1	59.40	24%	8%	8%
H. J. Buttinger	1953	1978	19	18	1.71	0	28.83	0%	0%	16%
P.E. Tegelberg	1908	1953	48	23	1.68	0	45.44	13%	0%	15%
L. A. van Ittersum	1958	1968	14	12	1.66	1	26.25	0%	0%	0%
D. F. W. Langelaan	1963	1978	25	14	1.65	0	51.00	20%	0%	8%
J. A. van Veen Kretschmar	1908	1928	20	13	1.64	1	28.20	0%	0%	40%
E. Heldring	1908	1948	67	30	1.64	0	36.54	9%	0%	19%
B. Th. van Hasselt	1948	1958	16	12	1.64	0	48.00	0%	0%	6%
L. Speelman	1948	1963	16	12	1.63	0	39.00	0%	0%	25%
A. H. J. Kruising	1968	1988	17	15	1.62	0	43.40	12%	0%	18%

*mean of the absolute influence of each of the 13 metrics

Panel C: Big linkers with the highest effect on performance

Name	First	Last	Number of positions during his career	Number of positions in firm level sample	Effect on performance**	Elite family	Centrality in the network	Number of bank seats to total seats	Number of bank management to total seats	Number of management to total seats
M. C. Koning	1918	1963	50	38	3.57	0	49.90	8%	0%	8%
M. W. Dekker	1988	2003	12	10	2.70	0	21.75	17%	0%	0%
F. H. Fentener van Vlissingen	1923	1958	23	15	2.67	0	34.63	22%	0%	4%
I. Ijsel de Schepper	1918	1923	10	9	2.38	1	43.50	0%	0%	30%
A. Waller	1918	1948	24	19	2.32	0	19.25	0%	0%	75%
J. M. Hessels	1988	2003	14	10	2.29	0	29.50	14%	0%	7%
J. M. Fentener van Vlissingen	1948	1978	32	22	2.10	0	33.38	19%	0%	0%
A. D. de Marez Oyens	1908	1923	46	14	2.10	0	60.25	26%	2%	2%
W. H. J. Oderwald	1913	1928	14	9	2.08	0	32.25	14%	0%	29%
Th. F. A. Delprat	1908	1928	17	14	2.03	0	18.40	0%	0%	35%
A. H. Ingen Housz	1928	1968	53	44	1.84	1	50.00	2%	0%	8%
C. J. P. van Westreenen	1973	1993	13	10	1.75	0	31.20	23%	23%	23%
J. E. F. de Kok	1923	1938	16	13	1.72	0	23.50	0%	0%	31%
P. Goedkoop dzn	1938	1968	36	30	1.69	0	44.57	8%	0%	22%
E. Heldring	1908	1948	67	30	1.68	0	36.54	9%	0%	19%

**Performance as measured by ROA and ROE and Market-to-Book

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Chapter 4

Dividend Smoothing, Financial Flexibility and Capital Structure[46]

4.1 Introduction

This paper investigates the role of financial flexibility in corporate dividend smoothing practices. We argue that financial flexibility is a key determinant of cross-sectional variations in dividend smoothing policies. Contrary to, for example Fama and French (2001), we argue that dividends and the stability of cash dividends are still a very important part of financial decision making. Figure 6 shows that large and mature firms, with a history of dividend payments, pay on average 2.3 times more divdends than the average firm in Compustat.[47] Figure 7 shows the relative volatility of dividends and earnings as calculated by Leary and Michaely (2011), illustrating that the large and mature firms provide more stable dividends. Lambrecht and Myers (2012) predict that this dividend stability is only feasible if corporate capital structures can be easily adjusted.

The main question answered in this paper is whether, financially flexible firms smooth their dividends more. Follwing Gamba and Triantis (2008) and De Jong et al. (2012), we define financial flexibility as the ability of a firm to fund investments and restructure its financing. Although studies such as those of Jagannathan (2000), Aivazian et al. (2006) and DeAngelo and DeAngelo (2007) have hinted at a strong interaction between corporate capital structure and dividend policy, there is no clear evidence of a relationship with dividend smoothing policies.

[46] This chapter has greatly benefited from comments by Abe de Jong, Peter Roosenboom, Chris Colvin, John Turner, Pooyan Ghazizadeh and members of the finance department of Queen's Management School, Queen's Belfast University.

[47]These 517 firms constitute approximately 35 percent of all on-balance sheet assets and approximately forty-five percent of all dividends paid totalling over 1,6 trillion US dollars in the period 1987 till 2008 (on average 73 billion per annum). We exclude financials and utilities in all subsequent analyses.

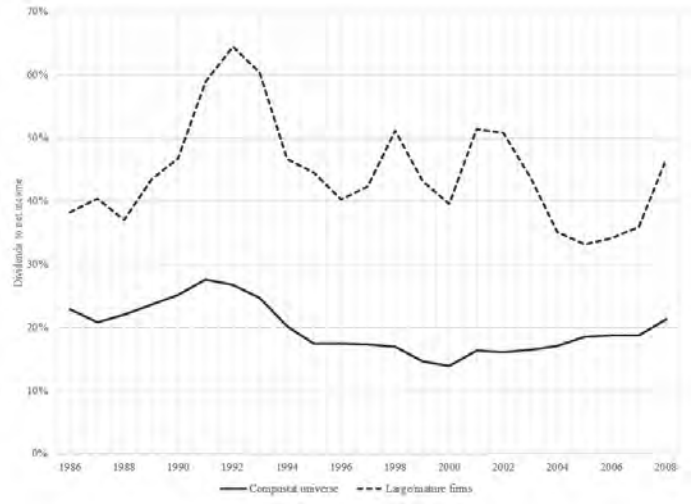

Figure 6. Dividend to net income ratio

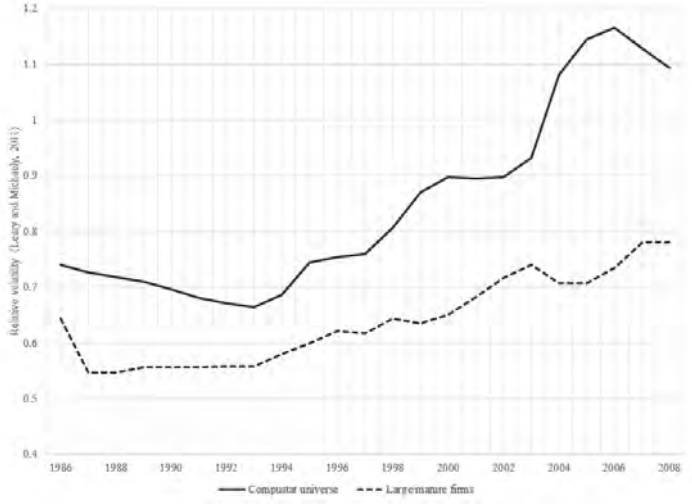

Figure 7. Dividend/net income volatility

Until now the literature has primarily focused on three areas of market frictions to explain the prevalent dividend stabilizing policies. First, information asymmetry between shareholders and managers induces dividend smoothing (Kumar, 1988; Kumar and Lee, 2001; Guttman et al.,

2010). Second, dividend smoothing can also arise as a means to limit the agency costs of free cash flow (Jensen, 1986; Easterbrook, 1984; Allen et al., 2000). Third, the existence of external financing costs is suggested as a driver of dividend smoothing (Miller and Scholes, 1978; Almeida et al., 2004; Aivazian et al., 2006). In this paper we introduce financial flexibility as a new explanation for cross-sectional differences in dividend smoothing.

As in the case of Lambrecht and Myers (2012) and Leary and Michaely (2011), our analysis focuses on large and mature firms with publically traded debt. We use data of all the firms in both the CRSP and Compustat databases covering the period 1986-2008. We exclude financial firms and utilities. Like Leary and Michaely (2011), we limit the sample to those firms that pay a dividend in at least 10 of the years in the period investigated. Additionally we reject firms that stop paying dividends more than three times in those ten years, to ensure that we identify firms with a reputable history of dividend payments. After applying all requirements, we have 517 unique firms from which we derive 5,159 firm-year observations. Dividend smoothing behaviour is calculated by estimating rolling window regressions, using Lintner's (1956) model. We explain the variation in smoothing behaviour, using Feasible Least Squares models with correction for auto-correlation and heteroscedasticity. We use firm specific and time-varying metrics such as unused debt capacity (De Jong et al., 2012) and capital structure adjustment speeds (Flannery and Rangan, 2006) to measure a firm's financial flexibility. Additionally we use a WW-index to capture differences in agency costs (Whited and Wu, 2006). We mitigate endogeneity concerns by correcting our estimates for the conditional probability that firms will self-select into groups of high leverage or high unused debt capacity. For this correction we use a novel instrument that captures shocks to the firms' financial flexibility and which is unrelated their dividend policy; We use US Government Shutdowns, and show that firms that are large, mature and have a history of dividend payments

respond differently to such exogenous shocks, that is they outperform other firms by 127 basis points within five days of a shutdown.

The contribution of this paper is then threefold. First, this paper provides evidence that financial flexibility is one of the key determinants of dividend smoothing, which is critical given the economic importance of large, mature firms with a history of paying dividends. Second, following Lambrecht and Myers (2012), this paper tests whether firms' capital structure is indeed a shock absorber that enables dividend smoothing, which is important to broaden our understanding of how dividend policies and capital structure choices interact. Third, the exogenous shock used to correct our models for endogeneity has, to our knowledge, not yet been used in the literature.

As predicted, we find that firms that are more financially flexible smooth their dividends more. First, we find that the relation between firms' dividend policy and unused debt capacity is non-linear. At low levels of unused debt capacity we find that firms have limited incentive to smooth their dividends. At sufficiently high levels of unused debt capacity firms smooth their dividends significantly more. Second, we find that dividend smoothing increases by two percent for each standard deviation increase in the firms' ability to quickly change its capital structure. With respect to Lambrecht and Myers (2012), we find that firms' capital structure absorbs shocks to net income and enables dividend smoothing. Additionally, our results indicate that firms that have more unused debt capacity, or are able to adjust their capital structure more quickly, are better able to smooth their dividends in case of a shock to net income. Third, we show that firms smooth their dividends more when agency costs associated with underinvestment are higher.

The remainder of this paper is structured in the following manner. Section II elaborates on the theoretical framework. Section III discusses the sample description and methodology. Section

IV provides the main results. Section V provides details on the robustness of our findings and section VI concludes.

4.2 Theoretical framework and hypothesis development

Lambrecht and Myers (2012) formulate a budget constraint where the *net total payouts* are determined by net income minus their capital expenditures, plus the change in debt. Net total payouts are defined as dividends plus share buybacks and minus equity issues. If this constraint is to hold in every period, payouts can only partly absorb the negative shocks to net income; the remainder must be absorbed by changes in borrowing, since investments are fixed due to contractual obligations and a finite set of investment opportunities.

The change in debt must then (1) absorb most of the transitory noise in net income and (2) accommodate the delayed adjustment of payout changes in permanent income. The corrollary here is that financially more flexible firms, that is firms that can lend more, will be better at offsetting any disruptions and smooth dividends more. Following Gamba and Triantis (2008) and De Jong et al. (2012), we define financial flexibility as the ability of a firm to fund investments and restructure its financing.

H. 1: *Financially flexible firms smooth their dividends more.*

Heinkel and Zechner (1990) have shown that existing debt makes new investments less attractive, in particular when internal funds have been depleted.[48] Firms that are financially more flexible have the incentive to separate themselves from competitors. Managers use dividends to

[48] Though the issue of new debt or the use of existing debt (deployment of cash) reduces the over-investment problem, the cost of debt still increases with the issuance of new debt (Myers, 1977).

signal expectations of current and future earnings; dividends then also contain information on the firm's opportunity set and financial flexibility.[49]

Lie (2005) argues that firms with excess financial flexibility (i.e. sufficient debt capacity and high levels of permanent earnings) increase dividend payments. Firms that are financially constrained pay less in dividends and are less able to smooth their dividend payments (Almeida et al., 2004). Jagannathan (2000) shows that dividends are paid by firms with high permanent operating cash flows and that any changes in dividends have to do with non-transitory changes in income. Financial constraints thus determine how well firms are able to cope with transitory changes in income, when capital expenditures are fixed.

As such, firms can be financially constrained due to limited profitability, high leverage or limited growth opportunities (e.g. Kaplan and Zingales, 1997; Whited and Wu, 2006). This form of constraint induces agency costs for the firm, since positive NPV projects are more likely to be forgone due to the manager's risk aversion and habit formation, consistent with Lambrecht and Myers (2012). This type of underinvestment prompts firms to smooth their dividends.

H. 2: *Firms that face high agency costs smooth their dividends more.*

If the budget constraint from Lambrecht and Myers (2012) is to hold, then firms' capital structure works as a shock absorber to net income, which allows managers to keep payouts stable. Lambrecht and Myers (2012) show that risk aversion and habit formation induce dividend smoothing, as managers seek to secure future rents. Managers thus have an incentive to smooth dividends as payouts and managerial rents move in lock-step (Lambrecht and Myers, 2014).

[49] Information asymmetry can also be expressed in terms of principal agent models. For example, Fudenberg and Tirole (1995) and DeMarzo and Sannikov (2008) show that shareholders have to acquire information on the true profitability of the firms and that smoothing increases as the costs of acquiring this information increase (i.e. smoothing increases for more opaque firms). Moreover information asymmetry also occurs between investors, where firms with more individual investors will smooth more (e.g. Brennan and Thakor, 1990).

Consistent with Lintner (1956), who argues that managers realize the transitory nature of their earnings, shocks to net income are then persitently absorbed by firms' capital structure.

H. 3: *Financially flexible firms with a shock to net income are better able to smooth dividends*.

4.3 Data and methodology

Sample selection

We use data for all firms in both the CRSP and Compustat databases over the period 1986- 2008. We exclude financial firms (SIC codes 6000-6999) and utilities (4000-4999). For the analysis of corporate smoothing behaviour we require firms to have sufficient data to calculate smoothing metrics. Like Leary and Michaely (2011), we limit the sample to those firms that pay a dividend in at least ten of the years during our sample. Additionally, we reject firms that did not pay a dividend in at least three out of ten years. We do this to ensure that we select only firms with a history of reliable dividend payouts. We subsequently require firms to have information on the control variables used (discussed below). After applying all requirements, we have 517 firms from which we derive 5,159 firm-year observations (an average of approximately ten years of data per firm).

Measuring dividend smoothing

We use Linter's (1956) model to calculate firm specific speed of adjustments (formula 3). By using rolling window regressions we are able to calculate speed of adjustments that change over time. The partial adjustment hypothesis, as introduced by Lintner (1956), holds that managers recognise the transitory nature of current earnings. Moreover Lintner shows that firms need a dividend discipline in which the changes in dividends are determined by prior dividend levels and current earnings. The firm's desired level of dividends (Div_t^*) is given by:

$$Div_t^* = rE_t \quad (1)$$

where E_t are the firm's current earnings and r is the firm's target payout ratio and can be expressed as a function of the firm's investment and borrowing opportunities (Ang, 1975).[50] Additionally, Lintner (1956) argues that when earnings increase, a firm will not adjust its dividends completely if there is uncertainty about the firms' ability to keep the dividends at the higher level. Moreover, the partial adjustment hypothesis shows that firms are reluctant to cut the amount of dividends, whereby the changes in dividends will be only gradual. In light of this, Lintner's proposed partial adjustment process of the firm's dividends is given by:

$$\Delta Div_t = \alpha + \beta_1 E_t + \beta_2 Div_{t-1} + \varepsilon_t \; ; \; \forall \; firms \; at \; time \; t \quad (2)$$

Where the target payout ratio (TPR) is then given by $\frac{\beta_1}{\beta_2}$ and the speed with which firms adjust their dividends (SOA) is given by $-\beta_2$.[51] Table I provides the definitions of the variables used in the subsequent analysis.

Explaining cross-sectional variations in dividend smoothing

To test our hypotheses we explain cross-sectional variations in dividend smoothing for large and mature firms with a history of dividend payments using proxies for the firms' financial flexibility and agency costs. Our first variable of interest is the firms unused debt capacity, as estimated by De Jong et al. (2011). The firms' unused debt capacity captures the firms relative ability to increase the amount of on-balance sheet debt, without losing its investment grade rating. The second variable

[50] Moreover, Ang (1975) lists investors' preferences, marginal tax rates and transaction costs as potential determinants of the target payout ratio. This is, however, beyond the scope of our argument.

[51] Note that $SOA_{i,t}$ is an inverse metric; put differently, firms with stable dividends have *low adjustment speeds*. Since $SOA_{i,t}$ is estimated for each firm separately we require each firm to have at least ten consecutive observations to allow for a robust rolling window estimation of the dividend adjustment speed at time *t*. The mid-points of these estimations are then matched with control variables and variables of interest at that point in time.

of interest is the firms' capital structure adjustment speed, as estimated by Fama and French (2002) and Flannery and Rangan (2006). The firms' capital structure adjustment includes the relative costs against which firms can quickly adjust their capital structure. Third we calculate the WW-index, as estimated by Whited and Wu (2006), to capture agency costs induced by underinvestment. Fourth, we calculate the extent to which firms experience a shock to net income (scaled by total assets). We define a shock as change of the firms' net income that is economically relevant to the firms' dividend payment. Since the firms in our sample pay out approximately 2% of their asset value each period, we define a shock to net income of more than 2% to be economically relevant to the firms' dividend policy.

To explain corporate smoothing behaviour we then estimate the following base equation:

$$SOA_{i,t} = \alpha + \beta_1 C_{i,t} + \beta_2 I_{i,t} + \varepsilon_{i,t} \quad (3)$$

$SOA_{i,t}$ is the speed of a firm's dividend adjustment obtained from *Equation 2*. $C_{i,t}$ is a vector of the firm specific control variables, which include leverage, m/b, firm size, profitability, tangibility, cash and earnings volatility. $I_{i,t}$ are the variables of interest, including unused debt capacity and capital structure adjustment speed and the WW-index (appendix A and B on the specifications). We specify our models as Feasible Least Squares estimations, with an identity link function ($X\beta = \mu$). We correct for a heteroskedastic error structure with no cross-sectional correlation. Because our dependent variable is estimated using a rolling window regression, we employ a panel-specific AR1 autocorrelation structure (similar to Byoun (2008)), where the autocorrelation parameter is specified by the Durbin-Watson statistic ($d = \frac{\left(\sum_{t=2}^{T}(\varepsilon_t - \varepsilon_{t-1})\right)^2}{\sum_{t=2}^{T} {\varepsilon_t}^2}$).[52] Since SOA is an estimated variable we weigh the dependent variable by the inverse of its estimation

[52] This requires each firm in our sample to have at least two consecutive observations in our final sample.

error, which allows us to put more weight on more accurately measured speed of adjustments. All models include time, industry and age decile fixed effect to ensure our findings are not driven by an omitted variable.[53]

4.4 Endogeneity: US Government Shutdowns

To alleviate concerns about the endogeneity of our estimations, we correct for two potential endogenous selection biases. The first bias arises from the firms' ex ante choice in leverage. Consistent with Lambrecht and Myers (2012) and Lambrecht and Myers (2014) the firms leverage is persistent over time. As such, we estimate the conditional probability that a firm ex ante chooses to have high leverage (above industry year median) and include this in our models as the inverse Mills ratio of the appropriate binary response model.

The second bias results from the firms ex ante choice in debt capacity. That is firm have an incentive based on their firm characteristics such as profitability, firm size or tangibility to preserve or impair their unused debt capacity. This self-selection bias is consistent with De Jong et al. (2012). They show that firms with high unused debt capacity invest more in future years and should thus smooth their dividends accordingly to maintain low-risk debt capacity. As such we correct our estimations for the conditional probability that firms ex ante choose to maintain high levels of unused debt capacity and include this in our model as the inverse mills ratio of the appropriate binary response model.

As with Heckman (1979) our first-step binary response model requires an instrument unrelated to the firms' dividend smoothing policy and related to the firms' financial flexibility. In

[53] We refrain from using firm fixed effects as the aim in this paper is not to examine within firm variation, but rather between-firm variation. As the firms dividend smoothing $SOA_{i,t}$ is estimated per firm in our sample, firm fixed effects would absorb most of the between-firm variation.

this paper we use US Government Shutdowns as an instrumental variable. We define a government shutdown as point in time when US Congress chooses not to pass legislation funding government operations and agencies. Following this failure a funding gap is created, whereby programs and businesses that receive funding through operations are curtailed and possibly halted alltogether. We argue that large and mature firms, which are more likely to have government contracts (Forbes has estimated that only 22.5% of all contracts are awarded to small firms), are able to mitigate the shocks induced by the curtailment of government funding due to their financial flexibility.

During our sample period we observe five of these shocks as shown in table II. We find, that over the different event windows the median cumulative abnormal returns were negative for firms listed in Compustat and CRSP. However the large and mature firms with a history of dividend payment substantially outperformed other firms by approximately 6 basis points upon announcement and 127 basis points in the five days following the shutdown. This finding is consistent with the idea that firms that financially more flexible firms are expected, to better cope with the consequences of a government shutdown. As such we define our instrumental variable as an indicator that equals 1 if at time t or at $t-1$ the US government experienced a shutdown and include it in the probit model (Equation 4), where the choice variable ($Y_{i,t}$) is either above year industry median leverage or unused debt capacity and standard controls are included. We subsequently derive the inverse mills ratio, capturing the conditional probability of the self-selection (see table III).

$$\Pr\left(Y_{i,t} = 1 \,\middle|\, X_{i,t}\right) = \alpha + \varphi(X'_{i,t}\beta_1) + \varphi(IV'_{i,t}\beta_2) + \varepsilon_{i,t} \tag{4}$$

4.5 Results

Univariate results

Tables IV provide descriptive statistics for all variables of the firms in our sample. The median firm in our sample has a balance sheet size of almost 3 billion dollars, is overvalued, has a dividend yield of approximately 2.1%, can be considered liquid and has been included in CRSP for thirtyeight years. This illustrates how closely these firms resemble the firms described in Lambrecht and Myers (2012); large, mature firms with a reasonable number of growth options and free cash flow available for dividend payment.

In unreported descriptive analysis we find, that firms that adjust their dividends quickly, are the larger, less profitable and more constrained firms. We find that firms with the largest unused debt capacity are the most overvalued firms. Consistently we find that the firms the most stable dividends also have higher market valuations. Additionally we show that firms with low levels of outstanding debt have significantly more cash holdings, consistent with the finding of Lambrecht and Pawlina (2013), where they state that debt and cash are in fact substitutes. Consistent with the aforementioned, we observe that firms that face more agency costs (i.e. high WW-index), smooth their dividends more, have less unused debt capacity, are more likely to operate above their target leverage and have a relatively high demand for external financing. The firms with the highest agency costs are less overvalued and have lower cash holdings, consistent with Almeida et al. (2004).

Multivariate results

Table V shows the multivariate explanation of dividend smoothing behaviour. Model 1 incorporates only our control variables. We find that firms that have more leverage tend to smooth their dividends more. Consistent with diminished capital market access at high leverage levels, we find

that corporate debt ratios reflect cumulative requirements for external funds and dividend smoothing will increase as the firm's debt ratio rises. We find that one standard deviation increase in the leverage prompts firms to smooth between 2-4% more.

Firms that are more profitable will also smooth their dividends more, in order to signal stability, sufficient free cash flows and high permanent earnings, consistent with findings from Lie (2005). We find, that firms with more tangible assets and consequently lower levels of information asymmetry indeed smooth their dividends less. Additionally we find that more risky firms are more likely to smooth their dividends. Moreover we show that (inconsistent with the findings of Leary and Michaely (2011) that larger firms smooth their dividends less. We argue that in the presence of relatively small firms we might obtain the same findings as Leary and Michaely (2011), however here we focus only on the largest and most mature firms.

When including the inverse mills ratio for the firms ex ante leverage choice we find that there is no significant selection bias. We then address the impact of the firm's unused debt capacity on dividend smoothing behaviour. We find two things. First there is a significant endogenous selection with respect to the firms unused debt capacity. Consistent with Lambrecht and Myers (2014) we find that firms thus have an ex ante preference to preserve their debt capacity. Secondly we find that there is a non-linear relation between the firm's debt capacity and its dividend smoothing.

Initially firms with relatively low levels of unused debt capacity smooth their dividends less, since debt is a relatively poor shock absorber and firms choose to rapidly pay out their dividends (in case of positive shocks to net income) or cut dividends (in case of negative shocks to net income). However beyond a threshold (udc $\approx$ 0.45), firms smooth their dividends more as they aim to preserve their financial flexibility and easy access to capital markets to fund future

investments (note that the firms with a high smoothing incentive have substantial growth opportunities and low current external financing demand).[54] Put differently, firms that avoid smoothing at low unused debt capacity have an incentive to pay out their cash flows and signal future earnings and permanent earnings. Firms that have high unused debt capacity will smooth their dividends more in order to mitigate agency costs and keep access to low-cost external financing. As such, financially more flexible firms indeed smooth their dividends more, consistent with our hypothesis.

We then find that firms that adjust their capital structure more quickly have an incentive to smooth their dividends. For these firms transitory shocks in income can easily be mitigated by changing the firms' capital structure. Since debt is a better shock absorber and capital structure adjustment costs are low, firms aim to preserve their financial flexibility and limit external financing costs and thus have an incentive to signal. This effect has economic significance as a one standard deviation increase in capital structure adjustment speeds prompts a firm to smooth its dividends 2.3% more. As such we are unable to reject our first hypothesis as we find that more financially flexible firms, both in terms of debt capacity and capital structure adjustment speed, smooth their dividends more.

Subsequently we find that agency costs (as measured by the WW-index) are negatively associated with dividend smoothing. We find that one standard deviation increase in agency costs, is associated with approximately 4% more dividend smoothing, consistent with Lambrecht and Myers (2012) and our second hypothesis.

Table VI shows the results for our third hypothesis. We find that in itself shocks to net income have no direct effect on dividend smoothing policies. However we find that as firms are

[54] The infliction point of 0.45 is less than one standard deviation from the median, illustrating that including a squared term provides additional information.

more financially flexible they are able to smooth their dividends more in the presence of a shock. This finding holds for both of our proxies. As such we conclude that the firms' capital structure indeed works as a shock absorber that enables dividend smoothing, in line with the predictions from Lambrecht and Myers (2012). An additional finding is that firms that face high agency costs also have an incentive to smooth their dividends more in the presence of an income shock, which is consistent with the signaling hypothesis.

In this section we show that our results are not driven by variables from the main analysis. We include target payout choices, histories of high capital costs, interactions with WW-index, alternative measurement of agency costs, analyst forecasts, executive compensation and governance index.

Table VII shows the inclusion of a dummy variable for high target payouts. We find that firms that promise above median payouts to shareholders smooth their dividends approximately 5% more. This finding is consistent with DeAngelo and DeAngelo (2007) and Leary and Michaely (2011) who show that firms that promise a high dividend smooth dividends to mitigate agency costs. Our primary results remain with the inclusion of the firms' target payout ratio.

Table VIII shows interaction effects with an indicator variable which equals 1 if a firm has a history of high capital costs, the firm has operated above its target leverage and had a $m/b < 1$ in previous periods (Warr et al., 2012). We find that firms with a history of high capital costs smooth their dividends more (approximately 3%) in order to reduce equity mispricing and maintain access to capital markets, consistent with (Warr et al., 2012). Additionally we find that firms with high levels of unused debt capacity smooth their dividends 53% more when they have a history of high capital costs. This finding illustrates that prior capital structure decisions have

severe impact on corporate dividend stability. In line with our previous findings and consistent with the assumption of risk averse managers we find that when firms have experienced high capital costs and agency costs increase (WW-index) managers decide to smooth their dividends more. Again our main results remain robust.

Table IX shows that our results with respect to financial flexibility are not primarily driven by differences in agency costs between firms. Additionally we find that firms that face high agency costs dividend smoothing becomes more prevalent at high levels of unused debt capacity. This is consistent with the idea that firms aim to preserve access to capital markets and their debt capacity, since much of the agency costs are usually attributed to underinvestment problems. Our main results to not change.

In Table X we analyse the sensitivity of our results with respect to our definition of shocks to net income. We find that our main results hold in these tests. Additionally we find that those firms that experience the most severe shocks (between 4% and 9%, either positive or negative), smooth their dividends approximately 16% more. In particular, when agency costs are higher, these firms smooth their dividends even more, in contrast to firms that at low levels of unused debt capacity are less able to smooth their dividends.

Table XI shows additional inclusion of an alternative measure to agency costs, KZ-index (Kaplan and Zingales, 1997). Additionally we include number of analyst forecasts made and the forecast deviations to account for potential differences in information asymmetry between firms. Further- more we include a governance index following Gompers et al. (2003) to ensure that our results are not driven by differences in governance between firms. We find that our main results hold.

4.6 Conclusion

This paper investigates the role of financial flexibility in corporate dividend smoothing practices. We define financial flexibility as the ability of a firm to fund investments and restructure its financing. Lintner (1956) argues that managers *realize the transitory nature of their earnings*. When combined with Lambrecht and Myers (2012) who model dividends as a function as the firms' ability to change its capital structure, we are able to test three hypotheses. We do this for a subset of firms that is of high economic importance (on average firms in our sample represent 31% of all assets and 45% of all dividends paid). These firms are large, mature, and have a history of dividend payments. First we test whether firms that are more financially flexible smooth their dividends more. We find that firms with relatively high levels of unused debt capacity smooth there dividends more, and we find that firms that are able to adjust their capital structure also smooth their dividends more. Second we test whether firms that face more agency costs through underinvestment smooth their dividends more. We find that firms with a higher WW-index indeed smooth their dividends more. Third we test whether the firms' capital structure works as a shock absorber to shocks in net income. We find that firms that have more unused debt capacity, or are able to adjust their capital structure more quickly, are better able to smooth their dividends in case of a shock to net income.

We show that our results are robust to a battery of tests and the inclusion of additional variables. We conclude that dividend smoothing is highly dependent on firms' financial flexibility and prior capital structure decisions. Additionally this paper highlights new avenues for research on dividend smoothing policies, and tests the implications from Lambrecht and Myers (2012). Given the economic importance of large and mature firms with a history of dividend payments, we argue that financial flexibility should be at the centre of both future empirical and theoretical advances in corporate finance.

Appendix A - Measurement of financial flexibility, agency costs and control variables

We use two distinct measures of financial flexibility. First we calculate the firms unused debt capacity and second we calculate firm specific and time-varying capital structure adjustment speeds. Following De Jong et al. (2012), we calculate a firm's debt capacity by predicting the debt level at which a specific firm in a given year has a p percentage chance of losing its investment-grade rating, given the firm's other characteristics. We model a firm's credit rating $y^*_{i,t}$ with an ordered response model, shown in Table B1:

$$y^*_{i,t} = \alpha_1 dr_{i,t} + x'_{i,t}\alpha_2 + \epsilon_{i,t} \quad (5)$$

Where $y^*_{i,t}$ is the latent variable, and $x'_{i,t}$ is a set of firm characteristics based on Altman and Rijken (2004), and $dr_{i,t}$ is the firms debt ratio.9 For the credit ratings we follow Ashbaugh-Skaife et al. (2006), who measure corporate credit ratings based - on S&P credit ratings - on a 7-point scale (ranging from AAA to CCC&D).10 The ordered response model provides boundaries (γ) between different credit ratings. An investment-grade rating corresponds to the point where $y_{i,t} \geq 4$ and $y^*_{i,t} \geq 3$. We estimate the firm's debt capacity by determining the expected value of $y^*_{i,t}$ conditional on the firm's characteristics, current rating, debt ratio and by comparing this with threshold γ_3. We derive the measure for debt capacity by solving

$$\alpha_1 dc_{i,t} + x'_{i,t}\alpha_2 + E\{\epsilon_{i,t} \mid y_{i,t}, x_{i,t}, dr_{i,t}\} = \gamma_3 \quad (5)$$

The probability of having a speculative-grade rating, conditional upon the current rating, is then given by:

$$P\{y^*_{i,t} < \gamma_3\} = P\{\alpha_1 dr_{i,t} + x'_{i,t}\alpha_2 + \lambda_{i,t} + \epsilon_{i,t} < \gamma_3 \quad (7)$$

Where $\lambda_{i,t}$ is the generalized residual for individual firms and is positive for firms with unexpected high credit ratings, these firms have unobservable firm characteristics that make their rating higher than expected. We assume that $\epsilon_{i,t}$ follows an F-distribution with $F^{-1}(.)$ as its inverse. We define the debt capacity (dc) as the value for $dr_{i,t}$ that results in a p probability of receiving a speculative rating. It is then the solution to:

$$P\{\alpha_1 dc_{i,t} + x'_{i,t}\alpha_2 + \lambda_{i,t} + \epsilon_{i,t} < \gamma_3\} = p, \tag{8}$$

Which yields

$$dc_{p,i,t} = \frac{\gamma_3 - x'_{i,t}\alpha_2 + \lambda_{i,t} - F^{-1}(p)}{\alpha_1} \tag{9}$$

To measure the firm's financial flexibility we take the difference between the debt capacity and the debt ratio of the firm in year t. We assume that p = 0.2 - much like De Jong et al. (2012) - since it could be argued that the firm has reached its debt capacity when rating agencies are considering a down grade, rather than assuming a probability above 50%.[55]

As a second proxy for the firms' financial financial flexibility we use capital structure adjustment speeds, where high adjustment speeds represent low adjustment costs (i.e. low external financing costs). To measure target leverage we employ a standard partial adjustment model in which the change in book leverage partially absorbs the difference between target leverage dr^*_{t+1} and lagged leverage dr_t (Fama and French, 2002; Flannery and Rangan, 2006). Using year-by-year cross-section regressions and Fama-McBeth time-sieries standard errors, we estimate:

$$dr_{i,t+1} = \alpha_1 + \alpha_2 x'_{i,t} + \varepsilon_{i,t} \tag{10}$$

[55] By construction the choice of p has no influence on the analysis

We then use the fitted value from Equation 11 as a proxy for dr^*_{t+1} to calculate firm specific capital structure adjustment speeds we estimate for each firm separately:

$$dr_{i,t} - dr_{i,t} = \alpha_1 + \alpha_2[dr^*_{i,t} - dr_{i,t}] + \varepsilon_{i,t} \quad (11)$$

where α_2 is the speed of adjustment for the firms' capital structure. The specification further implies that:

(1) The firm's actual debt ratio eventually converges with its target debt ratio $dr^*_{i,t}$.[56]

(2) All firms have a different adjustment speed (α_2).

(3) α_2 is variable over time.[57]

Other proxies for the firms' financial flexibility are high capital costs, based on whether firms have a history of operating above their target leverage with limited growth opportunities, consistent with Warr et al. (2012), or financing deficits as a measure of the actual financial constraints that a firm faces, introduced in Shyam-Sunder and Myers (1999).

Measuring agency costs

Following the literature on financial constraints we calculate a WW-index (Whited and Wu, 2006) (in the robustness analysis we also include a KZ-index (Kaplan and Zingales, 1997)).14 We argue that measures such as the KZ- and WW-index capture the financial constraints induced by agency costs that increase as the probability of the occurrence of underinvestment increases.

[56] see Flannery and Rangan (2006)

[57] Flannery and Rangan (2006) highlight that they find evidence that firm characteristics affect capital structure adjustment speeds; however these results are left unreported because the firm specific adjustment speeds are very similar to their published estimate. However, here it is possible that cross-sectional differences between firms affect corporate adjustment speeds, in that different firms face different levels of adjustment costs. Since it is our goal to explain dividend smoothing practices using capital structure adjustment speeds, we cannot assume that all firms have similar adjustment speeds.

Control variables

Our analysis includes other proxies for other market frictions, where we distinguish between market frictions arising from asymmetric information and frictions associated with agency costs. Table 1 shows all variables and their definitions. To take into account the corporate characteristics associated with asymmetric information, we use firm size to capture the firm's maturity, because larger firms are usually well known and face lower information asymmetry (Frank and Goyal, 2003; Lemmon and Zender, 2010). To proxy for the firm's assets we use two metrics. We use asset tangibility to proxy for the investor's ease in valuing the firm's assets (Harris and Raviv, 1991). We use the market-to-book ratio to take into account the investor's perception of the firm's future growth opportunities. Moreover we use leverage as a proxy for the firm's financial risk and the historically accumulated external capital. To take into account the corporate characteristics associated with agency costs, we use profitability and market-to-book ratios to discover which firms are able to make relative profitable investments (Jensen, 1986; Fama and French, 2002). We incorporate corporate cash holdings to capture the substitution effect implied by the pecking order theory and the financial slack hypothesis (Jensen, 1986). Finaly we include earnings volatility to capture equity risk factors that increase dividend smoothing (Kumar, 1988; Kumar and Lee, 2001).

Appendix B - Calculation financial constraints

We calculate the relevant indices based on their respective sources, in the following manner:

$$KZ = -1.002 * \frac{CF}{K} + 0.283 * \frac{M}{B} + 3.139 * \frac{Debt}{K} - 39.368 * \frac{Div}{K} - 1.315 * \frac{Cash}{K} \quad (12)$$

$$WW = -0.626 * \frac{CF}{A} + 0.283 * D_{div} + 0.139 * \frac{Debt}{A} - 39.368 * A + 0.049 * Industry + 0.014 * S \quad (13)$$

$$SA = \frac{Size\ decile + Age\ decile}{2} \quad (14)$$

$$Financing\ deficit = \frac{DIV + X + \Delta W + R - C}{TA} \quad (15)$$

Where DIV is the amount of dividends paid in period t, X is the capital expenditures, ΔW is the net increase in working capital, R is the current portion of long-term debt at the start of the period and C is the cash flow from operations. CF is cash flow, $Cash$ is cash holdings. $D_{dividend}$ is a dummy that equals 1 if a firm paid dividend, A is total assets, $Industry$ is a factor capturing industry sales growth, S captures firm specific sales growth.

Table B1: Ordered logit estimation

Panel A: Firm characteristics

	All Firm-Years (N = 36,265)	
	Mean	Median
Total assets	8,545	2,306
Sales	6,701	1,757
Book leverage	0.379	0.337
EBIT ratio	0.072	0.082
Age	25.086	22.000
Retained earnings	0.065	0.125
Working capital	0.103	0.078
Credit rating	3.678	4.000

Panel B: Credit rating

	Credit Rating	
	Coefficient	Standard Errors
Sales ratio	0.532***	(0.173)
Leverage	-6.511***	(0.922)
EBIT ratio	2.428***	(0.559)
Retained earnings	0.603***	(0.199)
workingcapital_orth	-3.492***	(1.165)
Year FE	YES	
Age FE	YES	
N	36,208	
Pseudo R^2	0.203	
Boundaries		
γ_1	0.668	
γ_2	4.048	
γ_3	5.647	
γ_4	7.361	
γ_5	9.327	
γ_6	11.408	

Tables

Table 1: Variable description

Variables name	Definitions
Speed of adjustment	Formula (3)
Relative volatility	Formula (6)
Unused debt capacity	Formula (11)
Capital structure adjustment speed	Formula (13)
Leverage	Debt to total asset
Total debt	Total assets minus book value of equity to total assets
Target debt	Formula (12)
Deviation from target debt	Difference between target debt and total debt
Above target debt (dummy)	Equal to one if total debt larger than target debt zero otherwise
KZ-index	Kaplan and Zingales (1997)
WW-index	Whited and Wu (2006)
SA-index	Hadlock and Pierce (2010)
External financing demand	Rajan and Zingales (1998)
Financing deficit	Shyam-Sunder and Myers (1999)
Financing deficit surplus (dummy)	Equal to one if financing deficits are present and zero otherwise
Sales ratio	Total sales
EBIT ratio	Earnings before interest and taxes to total assets
Profitability	Net income to total assets
Reported losses	Equal to one if losses are reported and zero otherwise
Retained earnings	Retained earnings
Working capital	Working capital to total assets
Dividend yield	Dividend per share divided by year-end stock price
Firm size (milions, adjusted for inflation base year 2013)	Total assets adjusted for inflation (base year 2013)
Market-to-book	Leary and Michaely (2011)
Tangibility	Fixed assets to total assets
Cash	Cash and cash equivalents to total assets
Liquidity	Current assets to total assets
Non-debt tax shield	Depreciation and amortization to total assets
Growth	Yearly change in total assets
Forecast deviation	Deviation of earnings from median analyst forecast
Number of analysts	Number of analysts
Board size	Board size
Total compensation	Total compensation
Total current compensation	Total current compensation
Total bonusses awared	Total bonusses awared
Dollar value of options awarded	Dollar value of options awarded
Bonus to total compensation	Bonus to total compensation
Value of options awarded to total compensation	Value of options awarded to total compensation
Total compensation to net income	Total compensation to net income

Table 2: US government shutdowns

Year	Start date	End date	Length of Shutdown	President	Subject
1986	October 16th	October 18th	1	Reagan	Welfare and selling of government assets
1987	December 18th	December 20th	1	Reagan	"Fairness doctrine"
1990	October 5th	October 9th	5	G. H.W. Bush	Deficit reduction
1995	November 13th	November 19th	5	Clinton	Budgeting
1996	December 15th (1995)	January 6th	21	Clinton	Budgeting
Cumulative abnormal return (median, basis points)					
Year	**Start date**	**End date**	CAR (0,0)	CAR(0,1)	CAR(0,5)
1986	October 16th	October 18th	-12.16	-9.22	-25.58
1987	December 18th	December 20th	-23.85	-10.83	18.27
1990	October 5th	October 9th	0.10	-18.33	-176.81
1995	November 13th	November 19th	-11.62	-26.13	-93.17
1996	December 15th (1995)	January 6th	11.18	-35.48	-137.21
		Number of observations	16060	16060	16060
Cumulative abnormal return large and mature firms with a history of dividend payments (median, basis points)					
Year	**Start date**	**End date**	CAR (0,0)	CAR(0,1)	CAR(0,5)
1986	October 16th	October 18th	24.05	27.56	24.91
1987	December 18th	December 20th	-60.23	-19.78	47.07
1990	October 5th	October 9th	-3.27	-16.89	-31.36
1995	November 13th	November 19th	17.62	67.97	155.47
1996	December 15th (1995)	January 6th	14.89	-35.34	28.29
		Number of observations	755	755	755

Table 3: Estimating inverse mills ratios

Variables	Leverage		Unused Debt Capacity	
Size (ln)	0.007***	0.007***	-0.038***	-0.038***
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.000*	-0.000*	0.000***	0.000***
	(0.079)	(0.079)	(0.000)	(0.000)
Tangibility	-0.223***	-0.223***	0.110***	0.110***
	(0.000)	(0.000)	(0.000)	(0.000)
Liquidity	-0.565***	-0.565***	0.185***	0.185***
	(0.000)	(0.000)	(0.000)	(0.000)
Non-debt tax shields	0.001	0.001	-0.000***	-0.000***
	(0.733)	(0.733)	(0.000)	(0.000)
Age (ln)	0.007**	0.007**	-0.015***	-0.015***
	(0.034)	(0.034)	(0.000)	(0.000)
US Governemnt shutdown		0.059***		-0.093***
		(0.000)		(0.000)
Year FE	YES	YES	YES	YES
Observations	114,977	114,977	114,977	114,977
Pseudo R2	0.040	0.040	0.202	0.202

Table 4: Sample descriptives

Variables	mean	p50	p25	p75	sd	N
Speed of adjustment	0.315	0.283	0.084	0.477	0.265	5159
Relative volatility	1.588	0.633	0.389	1.005	12.049	5159
Unused debt capacity	0.319	0.289	0.085	0.494	0.265	5159
Capital structure adjustment speed	0.447	0.411	0.220	0.655	0.291	5159
Leverage	0.260	0.253	0.178	0.334	0.121	5159
Total debt	0.544	0.540	0.452	0.633	0.140	5159
Target debt	0.584	0.586	0.573	0.597	0.018	5159
Deviation from target debt	0.041	0.045	-0.048	0.131	0.140	5159
Above target debt (dummy)	0.374	0.000	0.000	1.000	0.484	5159
High capital costs	0.193	0.000	0.000	0.000	0.395	5159
KZ-index	-1.940	-0.609	-2.730	0.632	5.840	5159
WW-index	-0.002	0.010	-0.043	0.053	0.085	5159
SA-index	9.210	9.500	9.000	10.000	0.892	5159
External financing demand	-1.277	-0.730	-1.834	-0.070	4.547	5159
Financing deficit	0.036	0.032	-0.029	0.099	0.133	5159
Financing deficit surplus (dummy)	0.358	0.000	0.000	1.000	0.480	5159
Sales ratio	8.497	8.472	7.549	9.380	1.310	5159
EBIT ratio	0.114	0.109	0.073	0.153	0.074	5159
Profitability	0.061	0.059	0.031	0.089	0.059	5159
Reported losses (dummy)	0.026	0.000	0.000	0.000	0.158	5159
Retained earnings	0.344	0.331	0.209	0.465	0.206	5159
Working capital	0.143	0.130	0.042	0.230	0.139	5159
Dividend yield	0.025	0.021	0.012	0.031	0.032	5159
Firm size (milions, adjusted for inflation base year 2013)	9,075	2,941	1,224	8,485	19,154	5159
Market-to-book	1.773	1.485	1.168	2.008	1.003	5159
Tangibility	0.373	0.326	0.220	0.505	0.200	5159
Cash	0.052	0.031	0.013	0.069	0.058	5159
Liquidity	0.399	0.393	0.286	0.510	0.161	5159
Non-debt tax shield	0.049	0.047	0.035	0.058	0.021	5159
Growth	0.099	0.060	-0.002	0.140	0.235	5159
Robustness variables						
Forecast deviation	0.047	0.006	-0.049	0.118	0.725	4140
Board size	6.285	6.000	5.000	7.000	1.238	3153
Total compensation	16536	9836	5319	18802	22789	3153
Total current compensation	5344	4404	3070	6657	3778	3153
Total bonusses awared	2355	1657	590	3196	3140	3153
Dollar value of options awarded	4589	1648	19	5050	10398	3153
Bonus to total compensation	0.193	0.188	0.079	0.286	0.141	3153
Value of options awarded to total compensation	0.345	0.214	0.005	0.453	0.507	3153
Total compensation to net income	72.238	34.066	14.444	73.878	731.730	3153

Table 5: Explaining Dividend Smoothing

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Unused debt capacity			0.196***			0.200***
			(0.000)			(0.000)
Unused debt capacity *(squared)*			-0.228***			-0.226***
			(0.000)			(0.000)
Capital structure adjustment speed				-0.028***		-0.025***
				(0.000)		(0.000)
WW-index					-0.153***	-0.151***
					(0.000)	(0.000)
Leverage	-0.114***	-0.113***	-0.047*	-0.108***	-0.117***	-0.057**
	(0.000)	(0.000)	(0.094)	(0.000)	(0.000)	(0.042)
M/B	0.002	0.002	-0.001	0.000	-0.002	-0.003
	(0.431)	(0.467)	(0.805)	(0.961)	(0.607)	(0.287)
Size *(ln)*	0.030***	0.030***	0.039***	0.043***	0.045***	0.034***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.002	-0.003	0.011	0.049	0.035	-0.024
	(0.952)	(0.931)	(0.749)	(0.116)	(0.242)	(0.465)
Tangibility	0.121***	0.119***	0.120***	0.117***	0.124***	0.109***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.073**	0.073**	0.131***	0.144***	0.126***	0.105***
	(0.033)	(0.033)	(0.000)	(0.000)	(0.001)	(0.004)
Earnings volatility *(ln)*	-0.008*	-0.008*	-0.017***	-0.019***	-0.021***	-0.014***
	(0.086)	(0.084)	(0.002)	(0.000)	(0.000)	(0.008)
Inverse mills ratio (Unused debt capacity)			-0.321***	-0.411***	-0.419***	-0.265***
			(0.000)	(0.000)	(0.000)	(0.002)
Inverse mills ratio (Leverage)		0.001	0.060*	0.039	0.005	0.007
		(0.975)	(0.061)	(0.231)	(0.872)	(0.832)
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Age deciles	YES	YES	YES	YES	YES	YES
Observations	5,159	5,159	5,159	5,159	5,159	5,159
Number of id	517	517	517	517	517	517
Chi-square	4485	4539	4372	4431	5379	4672

Table 6: Explaining dividend smoothing and firms experiencing an income shock.

Variables	(7)	(8)	(9)	(10)
Unused debt capacity x Income shock	0.103***			0.083***
	(0.000)			(0.001)
;ed debt capacity (squared) x Income shock	-0.089***			-0.076**
	(0.005)			(0.015)
structure adjustment speed x Income shock		-0.032***		-0.018**
		(0.000)		(0.035)
WW-index x Income shock			-0.055**	-0.048*
			(0.038)	(0.083)
Income shock	-0.009**	0.020***	0.007***	0.004
	(0.033)	(0.000)	(0.003)	(0.541)
Unused debt capacity	0.160***			0.155***
	(0.000)			(0.000)
Unused debt capacity *(squared)*	-0.192***			-0.181***
	(0.000)			(0.000)
Capital structure adjustment speed		-0.015**		-0.015**
		(0.047)		(0.044)
Size-age index			-0.132***	-0.122***
			(0.000)	(0.000)
Leverage	-0.059**	-0.099***	-0.116***	-0.058**
	(0.035)	(0.000)	(0.000)	(0.035)
M/B	-0.002	-0.001	-0.002	-0.005
	(0.563)	(0.780)	(0.473)	(0.105)
Size *(ln)*	0.041***	0.045***	0.046***	0.035***
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	0.023	0.056*	0.041	-0.017
	(0.427)	(0.074)	(0.147)	(0.599)
Tangibility	0.114***	0.114***	0.122***	0.105***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.061	0.114***	0.131***	0.091**
	(0.120)	(0.004)	(0.001)	(0.020)
Earnings volatility *(ln)*	-0.018***	-0.017***	-0.022***	-0.013**
	(0.001)	(0.001)	(0.000)	(0.014)
Inverse mills ratio (Unused debt capacity)	-0.348***	-0.463***	-0.467***	-0.317***
	(0.000)	(0.000)	(0.000)	(0.000)
Inverse mills ratio (Leverage)	0.062*	0.040	0.005	0.010
	(0.056)	(0.220)	(0.880)	(0.762)
Controls	YES	YES	YES	YES
Inverse mills ratio's	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Age deciles	YES	YES	YES	YES
Observations	5,155	5,155	5,155	5,155
Number of id	517	517	517	517
Chi-square	4220	4170	4957	4364

Table 7: Explaining dividend smoothing and having high target dividends.

Variables	(11)	(12)	(13)	(14)
High target payouts	-0.051***	-0.051***	-0.049***	-0.048***
	(0.000)	(0.000)	(0.000)	(0.000)
Unused debt capacity	0.186***			0.192***
	(0.000)			(0.000)
Unused debt capacity *(squared)*	-0.221***			-0.221***
	(0.000)			(0.000)
Capital structure adjustment speed		-0.025***		-0.025***
		(0.000)		(0.000)
WW-index			-0.137***	-0.144***
			(0.000)	(0.000)
Leverage	-0.050*	-0.103***	-0.112***	-0.057**
	(0.081)	(0.000)	(0.000)	(0.032)
M/B	-0.000	-0.000	-0.001	-0.003
	(0.962)	(0.957)	(0.676)	(0.251)
Size *(ln)*	0.044***	0.048***	0.048***	0.038***
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	0.007	0.064**	0.026	-0.015
	(0.836)	(0.012)	(0.315)	(0.510)
Tangibility	0.113***	0.113***	0.112***	0.108***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.127***	0.152***	0.156***	0.126***
	(0.001)	(0.000)	(0.000)	(0.001)
Earnings volatility *(ln)*	-0.019***	-0.023***	-0.023***	-0.016***
	(0.001)	(0.000)	(0.000)	(0.002)
Inverse mills ratio (Unused debt capacity)	-0.316***	-0.425***	-0.410***	-0.260***
	(0.000)	(0.000)	(0.000)	(0.003)
Inverse mills ratio (Leverage)	0.023	-0.003	-0.028	-0.028
	(0.493)	(0.929)	(0.386)	(0.373)
Controls	YES	YES	YES	YES
Inverse mills ratio's	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Age deciles	YES	YES	YES	YES
Observations	5,159	5,159	5,159	5,159
Number of id	517	517	517	517
Chi-square	4481	4394	5435	5056

Table 8: Explaining dividend smoothing and firms with a history of high capital costs

Variables	(15)	(16)	(17)	(18)
Unused debt capacity x High capital costs	0.486***			0.335***
	(0.000)			(0.000)
Unused debt capacity (squared) x High capital costs	-0.569***			-0.381**
	(0.000)			(0.018)
Capital structure adjustment speed x High capital costs		-0.055***		-0.015
		(0.000)		(0.329)
WW-index x High capital costs			-0.259***	-0.149***
			(0.000)	(0.005)
High capital costs	-0.069***	0.001	-0.008	-0.032**
	(0.000)	(0.964)	(0.398)	(0.028)
Unused debt capacity	0.135***			0.120***
	(0.000)			(0.000)
Unused debt capacity *(squared)*	-0.170***			-0.166***
	(0.000)			(0.000)
Capital structure adjustment speed		-0.013**		-0.014**
		(0.020)		(0.021)
WW-index			-0.090***	-0.096***
			(0.000)	(0.000)
Leverage	-0.035	-0.095***	-0.103***	-0.057**
	(0.222)	(0.000)	(0.000)	(0.040)
M/B	-0.002	-0.003	-0.005	-0.005*
	(0.436)	(0.398)	(0.129)	(0.079)
Size *(ln)*	0.038***	0.046***	0.041***	0.033***
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.005	0.044	0.023	-0.006
	(0.884)	(0.154)	(0.280)	(0.837)
Tangibility	0.120***	0.115***	0.133***	0.112***
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.065*	0.108***	0.135***	0.109***
	(0.087)	(0.005)	(0.000)	(0.004)
Earnings volatility *(ln)*	-0.017***	-0.020***	-0.018***	-0.011**
	(0.001)	(0.000)	(0.000)	(0.037)
Inverse mills ratio (Unused debt capacity)	-0.296***	-0.388***	-0.333***	-0.261***
	(0.001)	(0.000)	(0.000)	(0.003)
Inverse mills ratio (Leverage)	0.038	0.021	-0.011	-0.008
	(0.233)	(0.524)	(0.737)	(0.805)
Controls	YES	YES	YES	YES
Inverse mills ratio's	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Age deciles	YES	YES	YES	YES
Observations	5,159	5,159	5,159	5,159
Number of id	517	517	517	517
Chi-square	4332	4518	5284	4482

Table 9: Explaining dividend smoothing and agency costs.

Variables	(19)	(20)	(21)
Unused debt capacity x WW	0.125***		0.111***
	(0.000)		(0.000)
Unused debt capacity *(squared)* x WW	-0.135***		-0.124***
	(0.001)		(0.001)
Capital structure adjustment speed x WW		-0.012	-0.011
		(0.233)	(0.262)
WW	-0.027***	-0.006	-0.021***
	(0.000)	(0.300)	(0.005)
Unused debt capacity	0.142***		0.141***
	(0.000)		(0.000)
Unused debt capacity *(squared)*	-0.153***		-0.151***
	(0.000)		(0.000)
Capital structure adjustment speed		-0.025***	-0.019**
		(0.002)	(0.016)
Leverage	-0.048*	-0.107***	-0.048*
	(0.093)	(0.000)	(0.093)
M/B	-0.001	-0.001	-0.002
	(0.644)	(0.787)	(0.463)
Size *(ln)*	0.038***	0.044***	0.036***
	(0.000)	(0.000)	(0.000)
Profitability	-0.008	0.044	-0.012
	(0.823)	(0.154)	(0.710)
Tangibility	0.117***	0.116***	0.110***
	(0.000)	(0.000)	(0.000)
Cash	0.083**	0.119***	0.104***
	(0.031)	(0.003)	(0.007)
Earnings volatility *(ln)*	-0.018***	-0.019***	-0.016***
	(0.001)	(0.000)	(0.003)
Inverse mills ratio (Unused debt capacity)	-0.340***	-0.417***	-0.325***
	(0.000)	(0.000)	(0.000)
Inverse mills ratio (Leverage)	0.035	0.024	0.025
	(0.281)	(0.461)	(0.436)
Controls	YES	YES	YES
Inverse mills ratio's	YES	YES	YES
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Age deciles	YES	YES	YES
Observations	5,159	5,159	5,159
Number of id	517	517	517
Chi-square	4427	4624	4167

Table 10: Explaining dividend smoothing and different type of shocks to net income.

Variables	Shock > 2%	Shock > 1.5%	Shock > 2.5%	Group 1	Group 2	Group 3	Group 4
Unused debt capacity x Income shock	0.083***	0.083***	0.065**	-0.006	0.001	-0.013*	0.027***
	(0.001)	(0.001)	(0.013)	(0.428)	(0.866)	(0.062)	(0.000)
;ed debt capacity (squared) x Income shock	-0.076**	-0.074**	-0.054*	-0.071**	-0.039	0.077***	0.012
	(0.015)	(0.012)	(0.079)	(0.024)	(0.160)	(0.006)	(0.738)
structure adjustment speed x Income shock	-0.018**	-0.024***	-0.001	0.104***	0.012	-0.077**	-0.014
	(0.035)	(0.004)	(0.910)	(0.008)	(0.713)	(0.018)	(0.758)
WW-index x Income shock	-0.048*	-0.080***	-0.061**	-0.003	0.030***	0.011	-0.046***
	(0.083)	(0.004)	(0.048)	(0.756)	(0.002)	(0.265)	(0.000)
Income shock	0.004	0.006	-0.005	0.071**	-0.062*	0.159***	-0.166***
	(0.541)	(0.291)	(0.480)	(0.037)	(0.092)	(0.000)	(0.000)
Unused debt capacity	0.155***	0.167***	0.174***	0.223***	0.217***	0.174***	0.196***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unused debt capacity *(squared)*	-0.181***	-0.190***	-0.194***	-0.247***	-0.227***	-0.206***	-0.215***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital structure adjustment speed	-0.015**	-0.014*	-0.020***	-0.021***	-0.027***	-0.026***	-0.013**
	(0.044)	(0.058)	(0.009)	(0.002)	(0.000)	(0.000)	(0.044)
WW-index	-0.122***	-0.110***	-0.115***	-0.174***	-0.143***	-0.196***	-0.097***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.058**	-0.052*	-0.055*	-0.060**	-0.042	-0.070**	-0.048*
	(0.035)	(0.060)	(0.054)	(0.034)	(0.129)	(0.013)	(0.087)
M/B	-0.005	-0.005	-0.004	-0.004	-0.003	-0.004	-0.004
	(0.105)	(0.102)	(0.196)	(0.140)	(0.258)	(0.179)	(0.162)
Size *(ln)*	0.035***	0.036***	0.035***	0.036***	0.033***	0.033***	0.036***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.017	-0.020	-0.022	-0.013	-0.035	-0.012	-0.011
	(0.599)	(0.539)	(0.500)	(0.696)	(0.278)	(0.716)	(0.746)
Tangibility	0.105***	0.109***	0.105***	0.114***	0.105***	0.104***	0.106***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.091**	0.096**	0.097**	0.091**	0.101***	0.099**	0.107***
	(0.020)	(0.013)	(0.013)	(0.019)	(0.009)	(0.012)	(0.006)
Earnings volatility *(ln)*	-0.013**	-0.013**	-0.016***	-0.016***	-0.014***	-0.012**	-0.015***
	(0.014)	(0.014)	(0.003)	(0.002)	(0.009)	(0.020)	(0.005)
Inverse mills ratio (Unused debt capacity)	-0.317***	-0.328***	-0.325***	-0.327***	-0.289***	-0.246***	-0.323***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.005)	(0.000)
Inverse mills ratio (Leverage)	0.010	0.015	0.016	0.008	-0.002	-0.002	0.002
	(0.762)	(0.642)	(0.607)	(0.802)	(0.946)	(0.957)	(0.953)
Controls	YES	YES	YES	YES	YES	YES	YES
Inverse mills ratio's	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Age deciles	YES	YES	YES	YES	YES	YES	YES
Observations	5,155	5,155	5,155	5,155	5,155	5,155	5,155
Number of id	517	517	517	517	517	517	517
Chi-square	4364	4262	4386	4439	4544	6020	4261

Table 11: Explaining dividend smoothing and additional tests

`	KZ-index	Information	Governance Index
KZ-index	-0.001***		
	(0.003)		
Number of analyst forecasts		-0.015	
		(0.119)	
Forecast deviation		0.001	
		(0.520)	
Governance Index			-0.011***
			(0.000)
Unused debt capacity	0.189***	0.107***	0.145***
	(0.000)	(0.002)	(0.000)
Unused debt capacity *(squared)*	-0.222***	-0.167***	-0.180***
	(0.000)	(0.000)	(0.000)
Capital structure adjustment speed	-0.024***	-0.020***	-0.029***
	(0.000)	(0.006)	(0.002)
WW-index		-0.129***	-0.079***
		(0.000)	(0.004)
Leverage	-0.043	-0.070**	-0.085**
	(0.125)	(0.014)	(0.013)
M/B	-0.001	-0.001	-0.001
	(0.696)	(0.659)	(0.835)
Size *(ln)*	0.039***	0.047***	0.001
	(0.000)	(0.000)	(0.883)
Profitability	-0.015	0.022	0.000
	(0.655)	(0.510)	(0.997)
Tangibility	0.129***	0.167***	0.051**
	(0.000)	(0.000)	(0.033)
Cash	0.084**	0.006	0.096*
	(0.033)	(0.878)	(0.066)
Earnings volatility *(ln)*	-0.017***	-0.016***	0.006
	(0.002)	(0.007)	(0.413)
Inverse mills ratio (Unused debt capacity)	-0.288***	-0.355***	-0.066
	(0.001)	(0.000)	(0.553)
Inverse mills ratio (Leverage)	0.051	0.063*	-0.141***
	(0.114)	(0.060)	(0.002)
Controls	YES	YES	YES
Inverse mills ratio's	YES	YES	YES
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
Age deciles	YES	YES	YES
Observations	5,159	4,031	3,365
Number of id	517	426	262
Chi-square	4281	3395	29988

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Chapter 5

Summary and limitations

Each essays on corporate finance presented in this dissertation provide independent conclusions. In this chapter I will provide a summary. I will then discuss the limitations of the different chapters in this dissertation. Additionally I share my views on the relevance of economic history and on the relationship between research in financial history and contemporary finance.

5.1 Summary

In the first essay answers the question why some banks fail in financial crises while others survive. This article answers this question by analysing the effect of the Dutch financial crisis of the 1920s on 142 banks, of which 33 failed. We show that balance sheet composition and product market strategy choices made in the lead-up to the crisis had a significant impact on banks subsequent chances of experiencing distress. We document that high-risk banks those making large profits, operating highly-leveraged portfolios and attracting large quantities of deposits were more likely to fail. Branching and international activities also increased banks default probabilities. We measure the effects of board interlocks, which have been characterized in the extant literature as contributing to the Dutch crisis. We find that boards matter: failing banks had smaller boards, shared directors with smaller and very profitable banks and had a lower concentration of interlocking directorates in non-financial firms.

The second essay investigates the effects of individual directors on corporate policies and firm performance. For directors with many executive and supervisory commitments in the board of multiple firms, so-called big linkers, we estimate whether the presence of these individuals is systematically related with corporate policies and performance. Over the course

of the 20th century for Dutch exchange-listed firms we argue big linkers matter and explain a substantial part of the variation in firm corporate policies and performance. By analysing director fixed effects we estimate that the contribution in explaining corporate policy throughout the 20th century is between 4-11%. Using archival sources and biographical details we provide an overview of the big linkers that were found to have a significant effect on corporate policies over the twentieth century.

The final essay investigates the impact of corporate financial flexibility on dividend smoothing practices. We define financial flexibility as the firm's ability to fund investments and to restructure its financing. We measure the firms' financial flexibility using firm specific and time-varying measures of unused debt capacity and capital structure adjustment speeds. Our findings are threefold. First, we find that firms smooth their dividends more when they are more financially flexible. Second, we find that firms smooth their dividends more when agency costs are high. Third, we show that firms' capital structure absorbs shocks to net income and enables dividend smoothing.

5.2 Limitations and suggestions

This section provides an overview of the limitations and suggestions for further research based on chapters two, three and four. For chapter two we acknowledge that our data is incomplete. The set of banks investigated in this chapter is by no-means a complete set of all banks in the Netherlands during the 1920s. Although we argue that the data covers 83% of the nominal equity at the time, there were many much smaller banks operating in the Netherlands at the time, hence it could be that generalizing behaviour to all banks in the Netherlands is unwarranted.

Chapter two is a first step into an investigation into the long-run evolution of the Dutch financial services sector over the twentieth century. Additionally future research will focus on the survival chances of non-financial firms during the 1920s, where we explore how managers

who were active during both the 1920s and 1930s fared in navigating through crisis periods, systematically describe distress events and methods of distress resolution.

In the third chapter I investigate the cohesion between individual Dutch managers and the outcome of corporate policies such as dividends, investments and capital structures. By looking at the 266 board members with the most board seats during the twentieth century we attempt to understand to understand the influence these managers actually have. However in this paper I am unable to disentangle influence from selection. That is, in our analysis it is empirically difficult to see whether the impact we estimate for an individual big linker is actual influence or systematic corporate policy for which the big linker is selected. We mitigate this concern by providing biographic descriptions of big linkers that we are had influence or were selected for specific reasons. In future versions of this chapter we will also mitigate this problem with additional analysis.

Another limitation of this study is the extent of the data. Both the data of financial statements and governance information has been collected every five years over the period 1903 till 2003. This might result in an underestimation of the number of board members that we identify to be big linkers. We mitigate this problem by using a conservative definition of what constitutes a big linker and future versions of the chapter will test for robustness using different definitions.

This chapter is a first description the evolution of the impact of governance and board members on corporate policies. Subsequent projects will investigate the evolution of Dutch corporate networks from a more quantitative perspective and will study historical episodes in Dutch history and investigate the impact of these events on changes in corporate governance and corporate networks.

In the fourth chapter I investigate the impact of financial flexibility on dividend smoothing policies. First, this chapter excludes share repurchases from the analysis. Grullon

and Michaely (2002) argue that share repurchases work as a substitute for actual dividends. Future versions of this chapter will take this into account. Other limitations of this study are: (1) an endogenous selection bias, I mitigate this problem by correcting the estimations with the firm-year specific probability that a firm chooses to limit its ex-ante financial flexibility; (2) an omitted variable bias, I mitigate this problem by including industry, time and age decile fixed effect.

This chapter is the first part of a research agenda that places financial flexibility at the center of corporate decision making. Subsequent research will focus on the relation between financial flexibility and earnings management, executive compensation and security issuances.

5.3 The relation between economic history and contemporary finance

This dissertation provides answers on prime questions in economic history, corporate governance and corporate finance. The relationship between these subject areas is sometimes overlooked. Here I would like to make a case for research in any area to be inspired by historically sensitive ideas. The argument here is that any type of research in finance (or financial economics) can benefit from history in three distinct ways.

First, history can provide us with relevant cases that puts contemporary events into perspective and can provide policy implications. In chapter 2 I studied the largest financial crisis the Netherlands had seen up until 2007. During the 1920s, the Netherlands lacked a modern central bank and Dutch banks were unfamiliar with state-sponsored rescues. Although the Dutch government occasionally intervened in during the crisis, banks and financial markets did not ex-ante expect bailouts to occur. And when it did intervene, the Dutch government and the Dutch central bank did so mostly in secret, using odd strategies like guaranteeing stock prices. We show that the Dutch government understood the too big to fail doctrine, as it rescued one of the country's largest bank. However, because the banking industry had never before experienced a crisis of this magnitude, the intervention was unforeseen. And there were far

fewer banks that were big enough to warrant such a rescue effort. Overall, intervention proved to be irregular and was perceived by bankers and the public as improbable. The industry had no official lender of last resort to turn to, forcing banks to resolve their distress on their own initiative. In spite of the Dutch institutional setting, banks still failed in the early decades of the twentieth century. However, failing banks did so at low costs to the taxpayer, especially when compared to the costs incurred following the financial crisis of 2007 (Colvin et al., 2014).

Second, historical inquiries can provide us with insights into the evolution of corporate practices and decision making of managers, allowing for alternative ideas in current debates. In chapter 3 I demonstrate the evolution of the importance of board members. Recently there has been a debate on the height and frequency of bonuses paid to managers. Following the evolution these see that the board members in our sample have systematic influence on corporate policy. These board members managed relatively large firms that are highly profitable and their added value is especially needed when the economy is recovering after a crisis. The influence of prominent business men is very much determined by their network, their centrality and their societal status. Put differently, these business men have certain qualities that make them exceptional.

Third, history can inspire. History can provide interesting examples that can help to resolve contemporary puzzles in corporate finance. Chapter 4 highlights the importance of financial flexibility for the dividend smoothing decision managers. This idea stemmed from the fact that for firms the prime directive is to survive. Firms survive by limiting risks in the balance sheet composition and product market strategy (see chapter two). From chapter three we learned that board members actively contributed to corporate policies, consistent the theory of Lambrecht and Myers (2012) as outlined in chapter four. They argue that managers are risk averse and suffer from habit formation and in order to secure their future rents, subsequently these managers choose to smooth the dividends paid. Combined with other project not included

in this dissertation, on the long-term evolution of dividend policies in the Netherlands (De Jong, 2014), these aforementioned chapters very much inspired the topic of chapter four. The main takeaway here is that studying economic history can help us to put current events into perspective. Economic history as a discipline is on the rise, its added value both in terms of research and teaching can be tremendous.

Nederlandse samenvatting, beperkingen en visie (Summary in Dutch)

De drie studies, opgenomen in dit proefschrift, bieden ieder onafhankelijke conclusies. In dit hoofdstuk geef ik een samenvatting. Daarna bespreek ik de beperkingen van de verschillende hoofdstukken en geef ik mijn visie op de relevantie van economische geschiedenis en haar relatie met hedendaags onderzoek in het vakgebied van bedrijfsfinanciering.

Samenvatting

In het tweede hoofdstuk bekijken we waarom sommige banken failliet gaan, terwijl andere een crisis overleven. We beantwoorden deze vraag door te kijken naar de effecten van de financiële crisis ten tijden van de jaren twintig van de vorige eeuw in Nederland. Van 142 banken, waarvan er toentertijd 33 in de problemen kwamen. We laten zien dat de balanssamenstelling en de product-marktstrategie keuzes, voorafgaand aan de crisis, cruciaal waren in het voorspellen van de overlevingskansen van deze banken. We documenteren dat hoog-risico banken, zij die grote winsten maakten, een grote schuldenpositie hadden en veel deposito's aantrokken, meer kans hadden om failliet te gaan. Daarnaast zien we ook dat banken met veel filialen en internationale activiteiten meer kans hadden om ten onder te gaan. Ook meten we de mate van verbondenheid tussen verschillende banken en of deze verbondenheid extra faillissementen risico met zich mee brengt. We vinden dat de kenmerken van de overlappingen van directeuren en commissarissen, tussen de verschillende banken, tezamen met beleidsstructuren erg belangrijk waren: banken die ten onder gingen hadden kleinere directies, deelden veel directeuren met kleine winstgevende banken en hadden een lagere concentratie overlappen met niet-financiële ondernemingen.

In hoofdstuk drie onderzoeken we de invloed die individuele directeuren hebben op ondernemingsbeleid en de daaruit volgende prestaties. In het bijzonder kijken we naar

directeuren die veel uitvoerende en controlerende taken hadden bij verschillende ondernemingen, zogenoemde big-linkers. We analyseren of de aanwezigheid van deze individuen systematisch te koppelen is aan het bedrijfsbeleid en de winstgevendheid van de onderneming. We laten zien dat over de gehele twintigste eeuw deze big-linkers ongeveer 4 tot 11% van de variatie in bedrijfsbeleid en prestatie verklaren. Met behulp van archieven en biografische beschrijvingen geven we een overzicht van welke big-linkers nu werkelijk belangrijk waren in de twintigste eeuw.

In hoofdstuk vier analyseren we de invloed van financiële flexibiliteit op de dividend stabilisatie politiek van de onderneming. We definiëren financiële flexibiliteit als het vermogen van de onderneming om haar investeringen te financieren en haar kapitaal structuur te herzien. We vinden dat de ondernemingen met de grootste flexibiliteit in staat zijn om stabielere dividenden te genereren. Dit kan op drie manieren gebeuren. Ondernemingen die financieel flexibeler zijn, stabiliseren hun dividenden om op deze manier toekomstige projecten beter te kunnen financieren. Ook kunnen ondernemingen er voor kiezen om hun dividenden te stabiliseren om zo in de toekomst lagere financieringskosten te hebben. Als laatste reden voor dividend stabilisatie laten wij zien dat ondernemingen de kosten van interactie met aandeelhouders (klassiek principaal-agent probleem) willen beperken. We concluderen dat dividend stabilisatie politiek grotendeels afhankelijk is van de financiële flexibiliteit van de onderneming en de kapitaal structuur keuzes die gemaakt zijn in het verleden.

Beperkingen

Zoals iedere studie kent ook dit proefschrift in de verschillende hoofdstukken een aantal beperkingen, hieronder volgen de belangrijkste. Hoewel hoofdstuk twee al is gepubliceerd, zijn er twee belangrijke beperkingen die we kunnen aanwijzen. Als eerste het feit dat onze data beperkt zijn. De banken die wij bekijken in dit hoofdstuk zijn niet alle banken die operationeel

waren ten tijde van de financiële crisis in de jaren twintig. Hoewel wij beargumenteren dat de banken waar wij gegevens van hebben ongeveer 83% van de nominale waarde van het eigenvermogen van de volledige bankensector in Nederland beslaat, waren er zeer veel hele kleine banken actief in deze periode. Het is dan ook goed mogelijk dat het trekken van algemene conclusies voor de gehele Nederlandse bankensector problematisch is.

In het derde hoofdstuk onderzoek ik de samenhang tussen beleid van ondernemingen en de rol die managers spelen bij het vaststellen van dividenden, investeringen en schuldfinanciering. Ik kijk naar 266 directeuren en commissarissen die de meeste posities hadden tijdens de twintigste eeuw. Zo beschrijf ik welke bijdrage bestuurders leveren aan bijvoorbeeld de prestaties van de onderneming. Het is echter niet mogelijk om daadwerkelijke invloed of macht te scheiden van een selectie bias. Anders gezegd, een beperking van deze studie is dan ook dat we niet kunnen zien of een bestuurder invloed uitoefent of dat hij door de onderneming is geselecteerd om een specifieke taak uit te voeren. We verminderen dit probleem door individuele bestuurders te beschrijven aan de hand van biografieën en archiefmateriaal.

Een andere beperking van deze studie is de data. Zowel de financiële data als de data met betrekking tot ondernemingsbestuur is verzameld voor iedere vijf jaar in de periode 1903-2003. Deze keuze kan ertoe leiden dat we het aantal big-linkers onderschatten. We verminderen dit probleem door een conservatieve definitie van een big-linker te hanteren en toekomstige versies van dit hoofdstuk zullen robustheidstesten bevatten met verschillende definities.

Het vierde hoofdstuk, zoals hier beschreven, bevat een aantal belangrijke beperkingen. Ten eerste bespreek ik het gebruik van aandelen inkopen door ondernemingen niet. Grullon en Michaely (2002) hebben laten zien dat het inkopen van aandelen door ondernemingen fungeert als een substituut voor contante dividend uitkeringen. Toekomstige versies van dit hoofdstuk zullen hier wel rekening mee houden. Daarnaast zijn er nog twee andere beperkingen; (1) een

endogeen selectie effect, ik beperk dit probleem door de schattingen te corrigeren met ondernemingsjaar specifieke variabelen die de kans meten dat een onderneming ex-ante er voor kiest zijn financiële flexibiliteit te beperken; (2) een weggelaten variabele, ik beperk dit probleem door industrie-, tijd- en leeftijdgroepeffecten mee te nemen in de analyses. Dit hoofdstuk is een eerste onderdeel van een onderzoeksagenda waarin de financiële flexibiliteit van de onderneming centraal wordt geplaatst in het besluitvormingsproces. Toekomstig onderzoek zal zich richten op de relatie tussen financiële flexibiliteit en winststuring, beloningen voor bestuurders en de uitgifte van kapitaal.

Onderzoek in economische geschiedenis en moderne financieringsleer

Dit proefschrift beantwoordt een aantal kernvragen binnen de vakgebieden economische geschiedenis, bedrijfsfinanciering en kenmerken van goed bestuur. De relatie tussen deze onderwerpen wordt soms door onderzoekers over het hoofd gezien. Ik zou dan ook van de gelegenheid gebruik willen maken om uiteen te zetten waarom economisch of bedrijfskundig onderzoek baat kan hebben bij historisch gevoelige concepten. Ik besprek drie manieren waarop dit mogelijk is.

Als eerste zou ik willen noemen dat economische gebeurtenissen uit het verleden ons een nieuw perspectief kunnen geven op hedendaagse ontwikkelingen en nieuwe richtingen kunnen bieden voor beleidsvoering. In hoofdstuk twee bestuderen we de grootste financiële crisis die Nederland voor 2007 heeft getroffen. Tijdens de jaren twintig had Nederland geen moderne centrale bank met een mandaat om de financiële sector te reguleren. Daarnaast waren de Nederlandse banken niet gewend om steun van de overheid te krijgen wanneer ze in de problemen raakten. Hoewel de Nederlandse overheid een aantal keer heeft ingegrepen tijdens de crisis van de jaren twintig, had zij dit nooit eerder gedaan. Toen de overheid ingreep, deed zij dit in het grootste geheim. De Nederlandse overheid begreep dat sommige banken te groot waren om om te vallen. Zij liet dit zien toen ze de grootste bank van Nederland van de

ondergang behoedde. Door de afwezigheid van een zogenoemd 'laatste vangnet' waren banken gedwongen om hun eigen problemen op te lossen. Er gingen echter nog steeds banken failliet, maar de kosten voor de samenleving van de crisis in de jaren twintig waren aanzienlijk lager dan de kosten die we in de meest recente crisis hebben moeten maken om onze banken te redden (Colvin et al., 2014).

Als tweede zou ik willen aangeven, dat het bestuderen van economische geschiedenis ons inzichten kan geven in de evolutie van de besluitvormingsprocessen en de rol van bestuurders bij deze processen. In hoofdstuk drie laten we zien dat er in de twintigste eeuw een verandering te zien is in de importantie van bestuurders voor een onderneming. Recentelijk is er natuurlijk een debat ontstaan over de hoogte en de frequentie waarmee bestuurders bonussen betaald krijgen. Wanneer we naar het onderzoek kijken zien we dat onze bestuurders systematisch invloed hebben op de bedrijfsvoering en dat deze bestuurders vooral actief zijn in grote en zeer winstgevende ondernemingen. Daarnaast zie ik dat hun rol vooral na periodes van economische tegenslagen relatief belangrijk is. Zodoende vind ik dat de rol van prominente bestuurders bepaald wordt door hun netwerk en hoe centraal ze staan in de Nederlandse economie. Anders gezegd prominente bestuurders hebben exceptionele kwaliteiten.

Als laatste wil ik noemen dat onze geschiedenis ons inspiratie kan geven. Historische voorbeelden bieden ons de mogelijkheid om hedendaagse kwesties in de bedrijfsfinancieringsleer op een nieuwe manier te benaderen. Hoofdstuk vier laat zien dat de financiële flexibiliteit van een onderneming belangrijk is voor de beslissing van bestuurders om de betaalde dividenden stabiel te houden. Ik heb dit idee gekregen door het feit dat ondernemingen slechts één doel hebben, dat is overleven. Een onderneming overleeft door risico's op de balans te beperken (beschreven in hoofdstuk 2). In hoofdstuk drie hebben we gezien dat bestuurders actief bijdragen aan beleidsbeslissingen, zoals ook past bij de theorie van Lambrecht en Myers (2012). Zij beargumenteren dat bestuurders risico's willen vermijden

en hun pensioenen en bonussen veilig willen stellen en zodoende de neiging hebben om dividenden te stabiliseren (beschreven in hoofdstuk 4). Wanneer we deze ideeën combineren met een van mijn projecten, niet opgenomen in dit proefschrift, over de lange termijn evolutie van dividendbeslissingen in Nederland, zien we dat alle eerder genoemde zaken de fundering vormen voor hoofdstuk vier.[58]

Het punt dat ik hier wil maken is dat we bewust ons moeten zijn van de geschiedenis om zo het heden en de toekomst te kunnen doorgronden. Economische geschiedenis als vakgebied is aan het opkomen. De waarde van dit vakgebied voor academisch onderzoek en onderwijs kan enorm zijn.

[58] De beschrijving van de lange termijn evolutie van dividendpolitiek in Nederland is een project met Abe de Jong en Henry van Beusichem (De Jong et al, 2014).

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Philip Fliers was born in Addis Abeba (Ethiopia) on December 15th, 1986. He holds a BSc degree in Business and Economics, BA degree in Philosophy and an MSc degree in Financial Economics from the Erasmus University Rotterdam. In 2011 he joined the department of Finance of the Rotterdam School of Management, Erasmus University. As a lecturer he was involved in courses in M&A, valuation, financial analysis and supervised many graduate students.

Portfolio of the author

Courses followed:

- EDEN Seminar on Corporate Finance
    - European Institute for Advanced Studies in Management, 2013
- Integrity in Research
    - Rotterdam School of Management, Erasmus University, 2015

Visiting positions:

- Visiting Scholar, Queen's Management School, Queen's University Belfast (September 2014)

Conferences:

- 6th International Conference of the Financial Engineering and Banking Society – Málaga, 2016
- 13th Corporate Finance Day, Vlerick Business School, 2015
- European Business History Association (Annual Congress), Utrecht University, 2014
- Belgian Financial Research Forum, University of Antwerp (CESAM), 2014
- New Scholar Workshop Belfast, European Association for Banking and Financial History, 2014
- Netherlands Institute for Advanced Study, 2013
- Economic History Society (Annual Conference), University of Oxford, 2012

Teaching:

Undergraduate teaching

- Research training (2011-2015)

Graduate teaching

- Mergers and Acquisitions (2016)
- Financial Analysis & Valuation, (2015)
- M&A and Valuation, (2012-2014)
- Mergers, Acquisitions and Restructuring, (2011)
- Thesis supervision (2011-2015)

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ESSAYS ON FINANCING AND PERFORMANCE

THE ROLE OF FIRMS, BANKS AND BOARDS

How firms, banks and board interact has a significant impact on corporate financing decisions and performance. In three studies, this dissertation combines studies in economic history with contemporary research in corporate finance. The first study investigate the determinants of this bank distress in the Netherlands during the 1920s. During this period the Dutch economy suffered an unequalled financial crisis. This study finds that during this time, banks that acquired too much leverage and attracted large quantities of deposits were more likely to fail. The investigation showed that international activities increased bankruptcy risk and that board characteristics, such as interlocking directorates, were important determinants of failure probabilities. The second study takes a long-run perspective and examines the relation between individual Dutch board members and the outcome of corporate policies such as dividends, investments and capital structures over the entire twentieth century. The study shows that individual Dutch directors have significant impact on corporate policies and performance. Moreover the study identifies individuals with substantial contributions and provides a historical understanding of the effects these individuals have on corporate policies. The results show that the directors with the highest systematic relevance for corporate policies are not by definition those who are most central in the Dutch network. Rather, these directors have substantial social capital and extensive management experience. The third study investigates the impact of corporate financial flexibility on dividend smoothing practices. For large and mature firms dividend payment is still an important determinant of access to capital markets. As investors aim to generate stable returns, these firms have the incentive to smooth dividends. This study thus focuses on the interaction between corporate capital structure choices and dividend smoothing practices. First, the study documents that firms smooth their dividends more when they are more financially flexible. Second, the examination shows that firms smooth their dividends more when agency costs are high and that capital structure choices enable dividend smoothing. The results of these studies address different aspects and interactions between firms, banks, their boards and shareholders.

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Design & layout: B&T Ontwerp en advies (www.b-en-t.nl) Print: Haveka (www.haveka.nl)