

Burhop, Carsten; Selgert, Felix

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Carsten Burhop* and Felix Selgert

Dividend Policy: An Empirical Analysis for Imperial Germany

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Abstract: In the German Empire, corporations almost always paid a dividend to their shareholders. Dividends have been cut or increased in line with the development of profits. We demonstrate that the target dividend and the average dividend tended to be nearly the same. If the dividend paid deviated from the target, we measure an extraordinarily fast return towards the target. Our analysis of the change in dividends, the payout ratio, and the dynamics of the dividend level provides evidence in favour of the agency theory of dividend policy. Companies with good investment opportunities paid comparatively high dividends. An improvement in shareholder protection weakened this effect. Best practice voting rights at the company level have systematically influenced dividend levels, the relevance of investment opportunities for the dividend policy and the speed of adjustment after a deviation from the target.

Keywords: dividend policy; German empire; financial history

1 Introduction

Since nearly seven decades, the empirical corporate finance literature employs a simple, but often confirmed proposition to explain dividend streams. According to Lintner (1956), firms have a target dividend and if the actual dividend diverges from the target, the gap between target dividend and actual dividend will be reduced over several years, controlling for the profitability of the firm. Thus, in technical terms, dividends are expected to follow a distributed lag model with a fixed speed

***Corresponding author: Carsten Burhop**, Department of Constitutional, Social, and Economic History, University of Bonn, Konviktstrasse 11, 53113 Bonn, Germany, E-mail: burhop@uni-bonn.de. <https://orcid.org/0000-0002-2714-6558>

Felix Selgert, Department of Constitutional, Social, and Economic History, University of Bonn, Konviktstrasse 11, 53113 Bonn, Germany. <https://orcid.org/0000-0002-9660-0099>

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of adjustment. Following the pioneering work of Fama and Blahnik (1968), we use firm-specific data to estimate the Lintner adjustment coefficient. In particular, we contribute to this literature by estimating this coefficient using – for the first time – data from pre-1913 Germany. While modern studies show smoothing parameters between 0.33 (Andres et al. 2015; using German data for 1988–2008) and 0.38 (Aivazian, Booth, and Cleary 2006, 448, using U.S. data for 1981–99), we estimate a smoothing parameter of about 0.75. Such a high parameter is in line with the finding of a secular declining Lintner coefficient. In particular, Leary and Michaely (2011, 3225) show that the speed of adjustment declined continuously in the United States from the 1930s (mean speed of adjustment about 0.5) until the new millennium (mean speed of adjustment about 0.2).

Before we turn to the main question of this paper about the stability of dividend payments, we address two additional questions: Were there factors that systematically influenced the likelihood that a company paid dividends? What factors have systematically influenced the payout ratio of companies? It turns out that nearly all firms in all years paid dividends. Thus, we cannot quantify factors related to the “to pay or not to pay” decision. Furthermore, we test if signaling or agency models explain dividend policy in Imperial Germany. Our evidence supports the agency-view of dividend policy and we thus focus on these types of models. In particular, we test whether the outcome or substitution model of dividend pay-out policy from La Porta et al. (2000) holds for the capital market in Imperial Germany. Empirically, we find support for the latter agency model of dividend policy but not the former. Thus, in the period from 1870 to 1913, stable dividends were primarily a tool that managers used for reputation building in order to enable future raising of capital. In fact, the impact of investment opportunities and shareholders’ voting rights on dividend decisions is much more pronounced in companies that regularly carry out seasoned equity offerings (SEOs) than in companies that never or rarely initiate SEOs. High and stable payout ratios thus go hand in hand with shareholder influence on major capital and investment decisions.

Our paper adds, for the first time, evidence about Germany to a lively debate on the dividend policy of companies in Great Britain (Braggion and Moore 2011; Turner, Ye, and Zhan 2013), Belgium (Moortgat, Annaert, and Deloof 2017, 2023, 2024), the Netherlands (De Jong, Fliers, and van Beusichem 2019) and Russia (Gregg and Nafziger 2019, 2023) before World War I. In particular, these papers examine the reasons for dividend payments, the payout ratio or stock market reactions to announced dividend changes, but they focus not on the dynamics of dividend policy. From a theoretical perspective, it is often tested whether the empirical evidence lends support to the signaling hypothesis or the agency hypothesis, i.e., whether managers use dividends to signal information to shareholders or whether shareholders use dividends to restrict the agency of managers. The payout policy of British

companies is in accordance with the hypotheses of signaling theory, while evidence for the validity of the agency hypothesis is not presented (Braggion and Moore 2011; Turner, Ye, and Zhan 2013). Signaling effects also seem to have played an important role in Russian joint-stock companies before World War I (Gregg and Nafziger 2023). In contrast, the signaling theory cannot be confirmed when using Belgian data, while there is evidence for the validity of the agency hypothesis (Moortgat, Annaert, and Deloof 2023). The findings presented in our paper suggest that dividend policy in Germany has been similar to dividend policy in Belgium, but different from dividend policies in Britain and Russia. Closely related to our paper are results presented by Braggion and Moore (2011: 2951) and Gregg and Nafziger (2023: 152), who analyze dividend policies of British firms during 1895–1905 and Russian firms during 1899–1914, respectively. They demonstrate that the Lintner dividend adjustment coefficient was 0.82 in Britain but only 0.38 in Russia. Our estimate of 0.75 suggest that payout policy of German firms was in this respect similar to the one observed in Britain, whereas dividend adjustments followed a different path in Russia.

The remainder of this paper is organized as follows. In section two, we give an overview on the theory about dividend policy and formulate empirically testable hypothesis. In sections three and four, we describe the institutional background of dividend policy in imperial Germany and our data set. In section five, we report our empirical results. We discuss the findings and conclude in section six.

2 Hypotheses

The theoretical literature has mainly dealt with the question why firms want to pay dividends at all. In case of perfect and complete capital markets operating in a tax-free world, the pay-out policy in the current or any future period will have no effect on firm value (Miller and Modigliani 1961). Therefore, managers who aim to maximize shareholder value cannot increase it by paying dividends. However, we observe dividend payments in the real world. Consequently, starting in the late 1970s, the idea that firms can signal future profitability or mitigate agency problems by paying dividends gained ground. La Porta et al. (2000) and Farre-Mensa, Michaely, and Schmalz (2014) review this literature.

In a world with asymmetric information, when managers know more about their firms than outside shareholders, dividends can be used to signal information about the firms' future. Asymmetric information between insiders/managers and outsiders/shareholders tends to be more pronounced for small and young firms. Therefore, in the context of the signaling theory firm size and firm age should be negatively related to the propensity to pay dividends. One should note that governance variables traditionally do not play an important role in this group of

models since managers want to send a signal. Moreover, signaling models typically make only predictions regarding the probability of dividend payments, whereas such models do not predict certain payout ratios.¹

In contrast, agency models refer to conflicting group interests: managers, large shareholders, small shareholders, and creditors may prefer different payout strategies. If, for example, shareholders fear that managers build empires by implementing investment projects with a negative present value, managerial behaviour should be restricted by high pay-out ratios. Thus, dividends should be more likely and payout ratios larger when investment opportunities are poor. Yet, even when firms are expected to have good investment opportunities – reflected in a high Tobin's q – shareholders could force managers to pay large dividends and to fund new investment by raising additional equity (Easterbrook 1984). Restricting managerial behaviour requires sufficient shareholder rights. Thus, variables reflecting institutional quality should be significant in this class of models. For example, identical cash-flow and voting rights (i.e., one share, one vote rules) limit rent extraction possibilities by dominant shareholders (Gugler and Yurtoglu 2003). Moreover, a high debt ratio or close monitoring by trustworthy shareholders or debtors may play a role. Managers facing debt repayments or monitoring by bankers can be expected to waste less money. Forcing them to pay dividends becomes thus less relevant. More recently, the agency perspective has been combined with a life-cycle argument: According to this view, agency conflicts become more severe in mature companies, when managers have built up a powerful position and the best investments have already been made. Therefore, older and larger firms should have higher pay-out ratios if shareholders can restrict managerial misbehavior. Thus, interaction effects between size (age) and governance should be significantly positive (De Angelo, De Angelo, and Stulz 2006; Denis and Osobov 2008; Fama and French 2001).

Two prominent variants of the agency model are the outcome and substitution models proposed by La Porta et al. (2000). According to the outcome view, corporations pay dividends since minority shareholders hold enough power to enforce payout. Thus, stronger minority shareholder rights should result into higher payout ratios and thus higher dividends, keeping profits and investment opportunities (empirically reflected in Tobin's q) constant. Another result of this model should be noted: better investment opportunities are associated with lower dividend levels. Moreover, the extent to which the payout ratio reacts to changes in investment opportunities depends on the level of investor protection. If shareholders

¹ Our discussion of signaling models is rather short since we find no empirical evidence supporting them.

are well protected, the payout ratio falls very sharply as investment opportunities improve.

According to the La Porta et al. (2000) substitution model, managers want to pay dividends to build-up a good reputation in the capital market. In this model, better investor protection leads to a lower payout ratio. Moreover, the association between investment opportunities and payout ratios is positive in low protection environments since companies with good investment opportunities can only finance them by issuing shares to poorly protected future shareholders. In contrast, payout ratios are independent of investment opportunities if shareholders are already well protected. Lastly, we would like to point out that the substitution model depends on a critical assumption: Managers finance investments through share issues. Empirically, firms that regularly increase their capital should therefore pursue a different dividend policy than firms that tend to finance investments internally.

In this paper, however, we not only want to understand which factors make companies dividend payers and which factors determine the payout ratio, but we primarily want to understand the dynamics of the payout policy. The workhorse model employed to analyze the dynamics of corporate pay-out policy has been deductively developed by John Lintner, who conducted a series of interviews with corporate executives and analyzed time series of aggregate accounting data.² The dominant dividend pattern has been embodied in a simple relationship (Lintner 1956, 107–109):

$$\Delta D_{i,t} = a_i + c_i (D_{i,t}^* - D_{i,t-1}) + u_{i,t} \quad (1)$$

In equation (1), D^* denotes the target dividend of the management, D the actual dividend, and ΔD the change in dividend payments. The target dividend of firm i during period t is defined as $D_{i,t}^* = r_i P_{i,t}$, where r_i is the time invariant target payout ratio of firm i and $P_{i,t}$ the profit of firm i during period t . $\Delta D_{i,t}$, the change in dividend payments, is defined as $\Delta D_{i,t} = D_{i,t} - D_{i,t-1} = a_i + c_i (D_{i,t}^* - D_{i,t-1})$. The key variable in Lintner's model is the coefficient of adjustment, c_i . It indicates what proportion of the difference between the actual dividend payment in period $t-1$ and the target dividend is eliminated within one period. It thus represents the speed of adjustment from the actual dividend to the target dividend. In other words: it indicates the time it takes for changed dividends to prove stable or the time it takes to readjust dividends back to the target level after a (negative) shock.

² Lintner (1956) has received 1,402 citations in the Web of Science (13 March 2025), but only seven in the field History of Social Sciences.

The constant a_i might be zero, but it will most likely be positive, since most managers have a great reluctance to reduce dividends. The term $u_{i,t}$ is a random error, capturing all factors not systematically reflected in the other parameters.

Following Lintner, we define $b_i = c_i r_i$ and $d_i = (1 - c_i)$. Equation (1) can thus readily be transformed into (2):

$$D_{i,t} = a_i + b_i P_{i,t} + d_i D_{i,t-1} + u_{i,t} \quad (2)$$

Therefore, the dividend paid by firm i during period t depends on the dividend paid in the last period and the accounting profits generated during the current period. In contrast to (1), all variables in (2) are observable, whereas (1) includes the unobservable target dividend D^* . Consequently, the fixed effects model represented by equation (2) is the workhorse model used in this paper. Moreover, one should note that estimation results based on equation (2) need to be transformed into the Lintner adjustment parameter by using the definition $c = 1 - d$. Finally, we note that the target pay-out ratio is $r = [b/(1-d)]$. A large target pay-out ratio shows that minority shareholders can force insiders to pay out. Moreover, a large target pay-out ratio implies that major investment projects cannot be financed by using retained earnings.

Whereas the target pay-out ratio $r_{i,t}$ is fixed in the Lintner-model it is the key dependent variable in the influential dividend model proposed by La Porta et al. (2000). In this agency model, the payout ratio r depends on investment opportunities and the quality of corporate governance. If different investment opportunities and/or changing corporate governance disturbs the target payout ratio r , we should also observe a change of Lintner's adjustment coefficient c : When we replace $D^*_{i,t}$ in equation (1) by its definition ($D^*_{i,t} = r_{i,t} P_{i,t}$), simplify by assuming $a_i = 0$ for all i , rearrange it to c_i and calculate the first derivative with respect to r it turns out that

$$\frac{dc}{dr} = - \frac{P_{i,t} \Delta D_{i,t}}{(D^*_{i,t} - D_{i,t-1})^2} \quad (3)$$

The comparative-static nature of the La Porta et al. (2000) model implies an instantaneous jump from an old to the new equilibrium. In contrast, the Lintner model is dynamic and the move from the old to the new equilibrium follows an autoregressive process. During a transition period (e.g., the time period between enactment of a new law strengthening the rights of minority shareholders, its implementation on the firm level, and the subsequent effects on dividend policies) to the new equilibrium, the effect of r on c is reflected in (3). The denominator of equation (3) is always positive. Thus, profit levels and dividend changes determine changes of adjustment speed.

3 Law, Corporate Governance, and Accounting

Analyzing dividend policy requires three kinds of institutional information: How were profits calculated? To what extent was the profit distribution regulated by law? Who decided about dividends – the executive board, the supervisory board or the shareholders? If shareholders had a say on dividends – how were shareholder voting rights organized?

Corporate accounts were dealt with in corporate law. Since 1861, corporations had to publish a balance sheet and since 1884 additionally a profit-and-loss statement. Thus, the scope of information available to shareholders increased. However, the quality of both accounts had been a point of concern in the literature. Moreover, the principles according to which accounts had to be prepared changed fundamentally over time. Between 1861 and 1884, assets (and liabilities) were reported at fair value. Fair value accounting implies that accounting profits do not necessarily imply an inflow of cash into the firm and it could lead to the distribution of unrealized accounting profits in the form of dividends to shareholders and bonuses to managers. This became prevalent during the *Gründerzeit* of the early 1870s, so that many companies experienced liquidity shortages or became insolvent during the depression that began in 1873 (Haaker and Velte 2013: 85, 80–81). As a result, from 1884 onwards, the strict lower of cost or market principle applied, i.e., assets had to be carried at historical cost less depreciation or, if lower, at the current market price. Only realized profits were allowed to be accounted, e.g., profits resulting from the sale of output or assets; the posting of profits due to changes in valuation was prohibited. Thus, the focus of the balance sheet was now on protecting creditors rather than providing information to shareholders. In practice, however, even after 1884 working capital continued to be reported at fair value and only fixed assets at historic costs less periodic depreciation (Hanf 1978: 150–151).

Whether an asset was reported on the balance sheet at all or directly expensed, whether it was allocated to working capital or fixed assets, and what depreciation rates on fixed assets were appropriate were largely left to the companies. Even within one industry, divergent methods were taken (Hanf 1978: 152–154, 156–158; Steinfeld 2021: 193, 202–203). In particular, depreciation of fixed assets was used to reduce profits during a boom period, to increase profits during recession, and ultimately to stabilize dividends. To this end, as can be seen from case studies, several draft balance sheets leading to different dividends were sometimes submitted by the accounting department to the supervisory board (Hanf 1978: 161–168). In addition, it is assumed that companies' financing needs also influenced the information content of balance sheets. For example, SEOs were accompanied by a prospectus containing more detailed balance sheets, and loan-granting banks were regularly informed confidentially about valuation reserves hidden in the balance sheet

(Spoerer 1995: 161). Corporate balance sheets thus provided (potential) shareholders with only limited information about the actual financial situation of a company, so that other sources of information – in our case: dividends – were helpful. Thus, managers could use dividends as a signal. Moreover, while accounting data could be manipulated, dividend distributions required cash, the existence of which could not be manipulated. Permanently high payout ratios and stable dividends were therefore instruments to limit the management's ability to manipulate the accounts.

From 1870 onwards, German corporate law set out rules for the profit distribution of corporations. However, until 1884 the law gave corporations a large degree of freedom to allocate their profits. In particular, no rules existed regarding the hierarchy of profits attributable to shareholders (as dividends), the corporation (as reserves) or the boards (as bonus payments).³ Therefore, the articles of association laid down the rules of profit distribution. This also held true for the question of whether profits should be automatically distributed among the shareholders or whether another regulation should apply (Norddeutscher Bund 1870). So far, a comprehensive overview of the structure of cash-flow rights at company level is only available for banks in 1873 (Burhop 2009: 577). The Gründerkrise of 1873 exposed the deficits of stock corporation law with regard to shareholder protection and triggered a reform debate. This debate resulted in a revision of stock corporation law in 1884 (Deutsches Reich 1884). For the first time, the law intervened in the hierarchy of profit distribution by making it mandatory for all companies to set up a reserve fund. Five percent of the annual profit had to be paid into this fund until it reached a size of ten percent of the share capital.⁴ Thus, a payout ratio of up to 95 percent had been legal in any case. As the reform of the Commercial Code was on the agenda in the 1890s, the legislator used this opportunity to carefully modernize stock corporation law. In the area of profit distribution, the reform introduced some innovations when the law was introduced in 1900 (Deutsches Reich 1897). If the supervisory board was to be granted a share in profits (Tantieme), the shareholders were first to be served with a dividend of at least four percent of the paid-in share capital. In fact, the reserve fund now had to be replenished first and then a dividend of at least four percent had to be paid to the shareholders before the supervisory board could receive a share in profits. Thereafter, an additional dividend could be paid

³ The bonus payment of the supervisory board was tied to the profit published in the balance sheet and information on this board's bonus is thus always available. However, the law did not stipulate any rules for the calculation of the cash bonus for the management. In practice, corporations could agree on various targets. As a result, the management's cash bonus could be booked as costs in the profit and loss account and actually reduced the distributable profit reported in the balance sheet. In order to work with as much information as possible, we combined the two bonus-types whenever this was possible.

⁴ In the following section, we use this regulation to construct our variable "excess reserves".

to the shareholders. For the first time, it was determined how the profit was to be calculated in order to derive bonus payments: The bonus of the supervisory board was to be computed on the profit after deduction of all depreciation, amortization and reserves. Thus, legal rules became more comprehensive over time, but they still scored poorly in a law-and-finance perspective (Franks, Mayer, and Wagner 2006: 546–551). In our econometric analysis, we investigate whether the legal reforms implemented in 1884 and 1900 had a significant impact on dividend policy. In addition, we also use evidence at the level of individual firms, since the implementation of legal norms varied considerably, as the following two examples illustrate:⁵

Example 1. In 1871, Chemische Fabrik Heinrichshall was incorporated with a capital of 260,000 thalers (780,000 marks), which was largely used for the takeover of a chemical factory founded in 1848. The corporate charter stipulated that two percent of accounting profit should go to a reserve fund and five percent should be used for bonus payments. The remaining profit had to be distributed as a dividend. The new corporate charter issued on 5 May 1885 – a reaction to the 1884 corporate law reform – stipulated that five percent of the net profit had to flow into the reserve fund until it reached ten percent of the share capital. However, this limit had already been reached in 1883. We thus observe immediate compliance with new legal rules, but without any material consequences on the firm level. In addition, five percent of the remaining profits were still distributed as a bonus and the remainder in full as a dividend. On 30 December 1899, the statutes were amended – again in response to a change in law. As before, the statutory reserve fund had to be serviced first. What was new was the provision that special reserves could now be formed and that managerial bonuses were unlimited. In addition, a mandatory dividend of four percent of the share capital had to be provided. Of the remaining profit, six percent was paid as a bonus to the supervisory board. Instead of an automatic distribution of the remaining profit to shareholders, the general meeting now had to vote. Since the 1899 amendment to the corporate charter, each share had one vote at the annual general meeting (AGM); previously, there was one vote for every five shares. Thus, from a law-and-finance perspective, the latter reform improved shareholder protection.

Example 2. The Arenberg'sche Gesellschaft für Bergbau, a coal mine, was founded in 1857 with a capital of one million Thaler (3 million Mark). Initially, at least 10 percent of the accounting profit was transferred to the reserve fund until it reached 20 percent of the share capital. Bonuses were paid from the remaining profits and the

⁵ The stock market manual Saling's Börsenpapiere contains these description of governance rules for each firm and each year.

shareholders had a vote on the further profit distribution. At the AGM two shares at 1,500 marks each gave one vote and the number of votes was limited to 20 per shareholder. The 1884 corporate law reform did not lead to any change in the corporate charter, but new rules were laid down on 3 March 1900. After the reserve fund had been filled in the manner described above, a mandatory dividend of four percent of the share capital was paid. The remaining profits were partly used to pay bonuses to the executive and supervisory board. Shareholders had a vote on the further profit distribution. From 1900, the rule of one share, one vote applied here.

The two examples illustrate firm-level variation of governance rules. The following Figures 1 and 2 show systematic evidence regarding the evolution of important firm-level governance variables over time. In Figure 1, the bars show the number of firms in our data set. The two bars in dark grey highlight the years 1884 and 1900 respectively. The line illustrates the share of firms in our sample having a one share, one vote rule in the corporate charter. In 1913, nearly all firms have such best-practice voting rights. In contrast, one share, one vote voting rights were rather uncommon in earlier decades. Shareholder voting rights continuously improved during the 1880s and 1890s and they jumped to best practice in 1900.

Figure 2 shows decision rules about profit distribution. Again, we highlight the years 1884 and 1900 with vertical lines. During the 1870s and early 1880s, we observe some firms where the supervisory board had the final say about profit distribution (we name this variable Board). Comprehensive rules laid down in the corporate charter and resulting into an automatic profit distribution were also common (Auto). Since the early 20th century, a shareholder vote has been the most

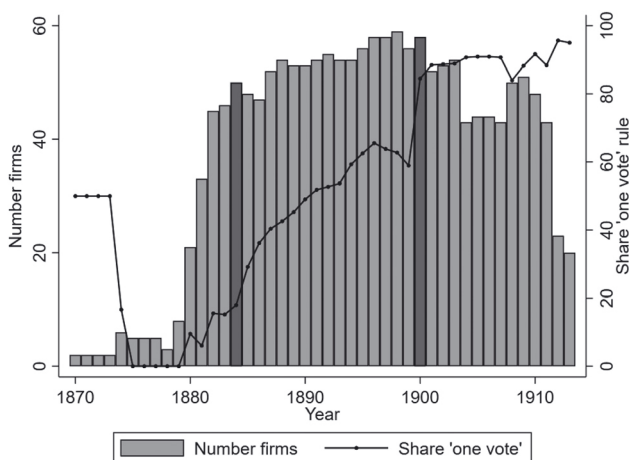


Figure 1: Number of firms and share 'one vote' rule. Note: Dark grey bars highlight the years of corporate governance reform (1884 and 1900).

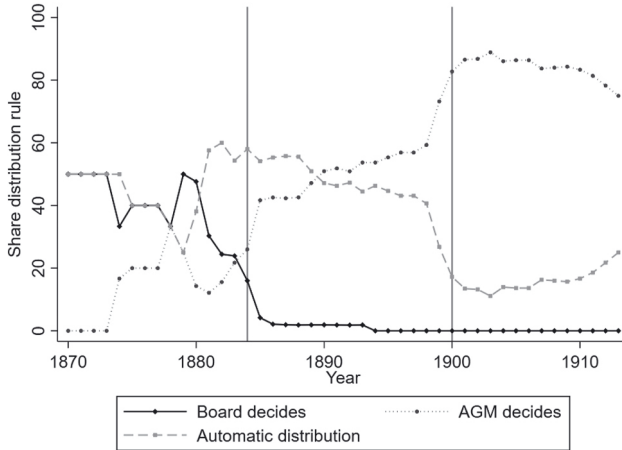


Figure 2: Decisions rules in regard to profit distribution.

frequent decision rule (AGM). Thus, investor protection improved over time but this was not too closely associated to legal reforms.

4 Data Sources and Descriptive Statistics

To test the hypotheses laid out in Section 2, we combined and supplemented a number of balance sheet data sets already used in the literature and collected additional firm-level data. Our starting point is a data set collected by Rettig (1978) to investigate the investment behaviour of 50 listed corporations between 1880 and 1911. The firms were selected to reflect the industry structure of firms listed in 1900 at the Berlin Stock Exchange. Second, we use 20 firms from the dataset compiled by Burhop and Lübbers (2009) to estimate the productive efficiency of coal mining companies between 1880 and 1913. Third, we employ data for nine banks for the period 1871–1910 collected by Bayer and Burhop (2008). This yields a dataset of 79 firms. Where possible and necessary, we have hand-collected data for the years before 1880 and after 1910 from Saling's *Börsenpapiere*, an annual stock market manual for bankers and investors. Furthermore, we use this source to collect data for 12 additional firms. This yields an unbalanced dataset of 91 firms.⁶

We identified a set of potentially relevant variables in Section 2. Dividend payments and accounting profits are the key variables in the classical Lintner model. In addition, we include a set of additional explanatory and control variables into the regression models. In particular, we control for the level of Tobin's q in some

⁶ We list the firms included in the dataset as well as the data source in the Table A1.

regressions. We approximate q by (stock market value of the firm + book value of debt)/total assets. A level of $q > 1$ indicates favourable investment opportunities. Moreover, firm size (log assets in 100,000 Mark) and firm age indicate asymmetric information (signaling models) or the extent of agency problems (life-cycle hypothesis). According to the life-cycle model, degrees of agency conflicts are also reflected in the relative size of accounting reserves (reserves in percent of equity). Yet, from 1884 onwards, dividend policy has been restricted by minimum reserve level regulations. Thus, we use the size of accounting reserves less the legal minimum (excess reserves in percent of share capital) in our regression models. Furthermore, we include the annual bonus (Tantieme) payments to board members. Moreover, the quality of governance is included. We proxy the quality of corporate governance on the firm level by including a dummy variable taking the value 1 if the corporate charter contains a one share, one vote rule. Furthermore, we implement a set of dummy variables indicating decision rules regarding profit distribution (shareholder vote, automatic distribution, or board decision). Additionally, we include two dummy variables “1884 legal reform” (taking the value 1 for all observations from the year 1884 onwards) and “1900 legal reform” (taking the value 1 for all observations from the year 1900 onwards) to account for the fact that shareholders rights were – in principle – enhanced by the corporate law reforms taking effect in those years. In addition, we include a dummy variable taking the value 1 whenever the head of the supervisory board is a banker. This may indicate easier access to bank loans or the stock market and it may provide an additional quality signal to minority shareholders and/or future shareholders buying stock during an SEO. Since the focus of our analysis is on autoregressive processes, we only look at companies for which there are at least four consecutive observations at a given point in time.⁷ This reduces the number of observations from 4,223 to 1,672 and the cross-sectional dimension from 91 to 71 firms (see Table A2 in the Appendix).

Numerical values of the variables are shown in Table 1. All balance sheets items are scaled by the share capital, additionally we report some balance sheet items in relation to equity.⁸ Scaling dividends by the share capital implies that we use dividends in percent of share capital as key dependent variable. This makes sense from a historical perspective, since stock market manuals, newspapers, and corporate charters used this definition, too. On average, firms paid a dividend of 8.7

⁷ Modern data have an adjustment coefficient of 0.3–0.4. If a company halves its dividend, it takes about four years to return to 90 percent of the original level. Our regression results do not change if the limit is set at three, five or six years.

⁸ Since Fama (1974: 306) scaling variables by the number of shares has been the standard in the literature. In our sample, most, but not all, shares of one specific company have a face value of 1,000 Mark. Scaling by share capital instead by number of shares levels different denominations at the firm level out.

Table 1: Descriptive statistics.

| | Mean | SD. | Min | Max | Count |
|---|------|------|-------|-------|-------|
| Dividend, pct. of share capital | 8.7 | 5.0 | 0.0 | 35.0 | 1,672 |
| Dividend (first lag) | 8.6 | 5.1 | 0.0 | 35.0 | 1,662 |
| Δ Dividend | 0.2 | 2.5 | -10.0 | 10.0 | 1,653 |
| Dividend increase | 0.4 | 0.5 | 0.0 | 1.0 | 1,662 |
| Dividend decrease | 0.3 | 0.5 | 0.0 | 1.0 | 1,662 |
| Dividend pay-out ratio | 0.8 | 0.2 | 0.0 | 1.1 | 1,638 |
| Profit, pct. of share capital | 11.7 | 7.4 | -7.3 | 44.2 | 1,672 |
| Profit increase | 0.5 | 0.5 | 0.0 | 1.0 | 1,672 |
| Return on equity, pct. | 9.7 | 5.8 | -7.3 | 37.9 | 1,672 |
| Bonus payments management, pct. of share capital | 1.2 | 1.1 | 0.0 | 6.9 | 1,672 |
| Reserves, pct. of equity | 14.3 | 9.8 | 0.0 | 52.5 | 1,672 |
| Excess reserves (ppt. above/below 10 pct. of share capital) | 8.5 | 16.2 | -10.0 | 100.6 | 1,672 |
| Log assets (in 100,000 mark) | 5.0 | 1.7 | 2.0 | 10.0 | 1,672 |
| Growth assets in pct. | 4.8 | 11.3 | -28.0 | 69.3 | 1,655 |
| Max # capital increase | 4.5 | 3.5 | 0.0 | 16.0 | 1,672 |
| SEO in the last five years | 0.4 | 0.5 | 0.0 | 1.0 | 1,672 |
| SEO in the next five years | 0.4 | 0.5 | 0.0 | 1.0 | 1,672 |
| Tobin's q | 1.2 | 0.4 | 0.2 | 3.0 | 1,672 |
| Debt ratio, in pct. of assets | 38.3 | 17.4 | 2.2 | 81.0 | 1,631 |
| Corporate age | 28.5 | 13.1 | 0.0 | 78.0 | 1,629 |
| One share, one vote | 0.6 | 0.5 | 0.0 | 1.0 | 1,672 |
| Profit distribution: | | | | | |
| Board decides (board) | 0.0 | 0.2 | 0.0 | 1.0 | 1,672 |
| Automatic dist. (auto) | 0.4 | 0.5 | 0.0 | 1.0 | 1,672 |
| General meeting (AGM) | 0.6 | 0.5 | 0.0 | 1.0 | 1,672 |
| Banker | 0.3 | 0.4 | 0.0 | 1.0 | 1,560 |
| Novelle 1884 | 0.9 | 0.3 | 0.0 | 1.0 | 1,672 |
| HGB | 0.3 | 0.5 | 0.0 | 1.0 | 1,672 |

Note: pct. = percent; ppt. = percentage points. For a full list of all included corporations see Table A1.

percent of the share capital and dividends tend to increase over time – indicated by the positive value of Δ Dividend. On average, firms were profitable and investment opportunities were, on average, available – indicated by a Tobin's q of 1.2. Furthermore, about one-tenth of the accounting profit has been paid as bonus to the supervisory and the management board. Finally, voting rights of shareholders were frequently restricted.

Figure 3 shows the total number of firms and the dividend paying firms in our sample as well as the number of firms increasing or decreasing dividends between

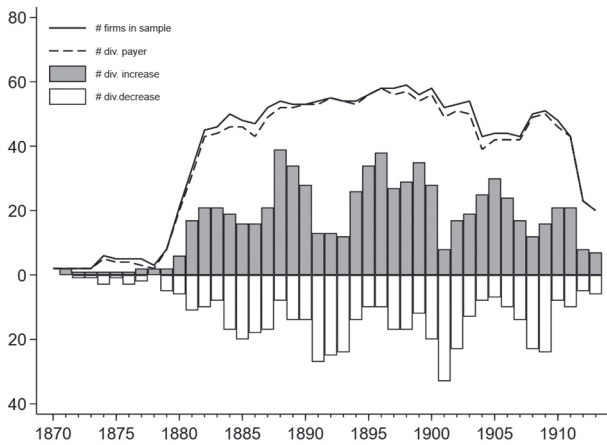


Figure 3: Dividend payment.

1870 and 1913. The number of sample firms is relatively low during the 1870s and soaring in 1880. Subsequently, the number of firms stays relatively constant until after 1910. Eyeballing the bars yields the impression that firms decreased dividends during recessions (e.g., during the early 1890s and after the turn of the century) and increased them during boom periods. Overall, the share of dividend payers, reported in the dashed line, was 94 percent. Thus, the question of whether corporations have paid a dividend at all therefore does not arise. If a corporation was profitable, it usually paid a dividend. The average profit of a dividend-paying corporation was 12 percent, whereas non-payers only reported an average profit of 0.9 percent.

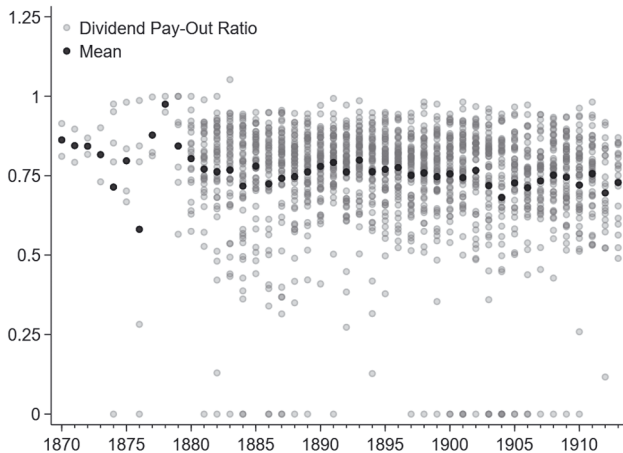


Figure 4: Dividend pay-out ratio.

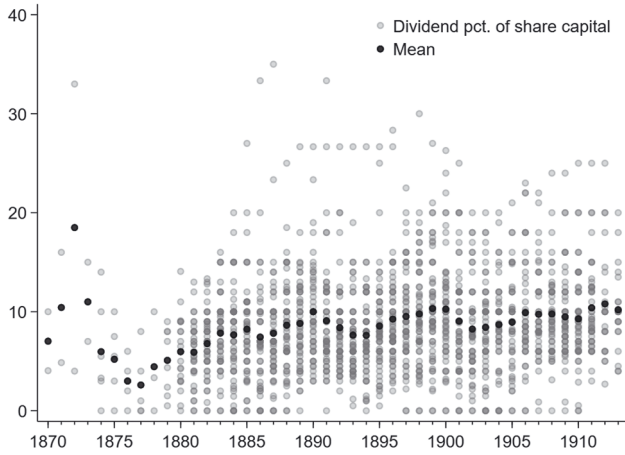


Figure 5: Dividend in percent of share capital.

Figure 4 shows the payout ratio (i.e., dividends divided by accounting profit) for the universe of our firms between 1870 and 1913. From 1870 until the late 1880s, the mean payout ratio fluctuated considerably. Subsequently, it stabilized at around 75 to 80 percent of the accounting profit. Moreover, payout ratios vary substantially within each year among firms.

Figure 5 shows dividends in percent of share capital – the key dependent variable in our regression models. This variable fluctuates substantially during the first two decades. Thereafter, dividends stabilized at nearly ten percent on average. Yet, we still observe a substantial variation of dividends in the cross-section of firms.

5 Dividend Policy

Dividend policy consists of three parts: The decision to pay a dividend; the payout ratio; and the adjustment of dividends towards a target dividend. The focus of our paper is on the third aspect. Nevertheless, in Tables 2 and 3 we present results of standard logit and tobit regressions in order to also consider the first two aspects of dividend policy.

Why do firms pay dividends? Looking at Figure 3 illustrates that nearly all firms paid dividends every year. Thus, an econometric investigation of the to pay or not to pay decision does not make much sense. Nevertheless, we investigate if certain factors are associated with rising or declining dividends. The results in Table 2 show that profitability (reflected in return on equity) is the most important factor. Positive returns on equity are associated with rising dividends, negative returns with declining dividends. Beyond profitability, factors associated with rising and declining

Table 2: Determinants of dividend changes.

| | Dividend increase | | Dividend decrease | |
|------------------------------|---------------------|---------------------|----------------------|----------------------|
| | (1) Logit | (2) Logit | (3) Logit | (4) Logit |
| Return on equity | 0.017*** (0.003) | 0.024*** (0.004) | -0.017*** (0.003) | -0.029*** (0.005) |
| Log assets (in 100,000 mark) | | 0.018 (0.011) | | 0.023** (0.010) |
| Excess reserves | | -0.003 (0.002) | | 0.001 (0.001) |
| Growth assets | | 0.005*** (0.001) | | -0.001 (0.001) |
| Tobin's q | | 0.025 (0.044) | | 0.052 (0.047) |
| Debt ratio | | -0.001 (0.001) | | -0.002** (0.001) |
| Bonus payments management | | -0.036 (0.023) | | 0.059** (0.021) |
| One vote | | -0.010 (0.030) | | 0.008 (0.026) |
| Corporate age | | -0.001 (0.001) | | 0.000 (0.001) |
| Obs. | 1,662 | 1,566 | 1,662 | 1,566 |
| Pseudo R^2 | 0.03 | 0.05 | 0.03 | 0.05 |

Note: The table reports the average marginal effects of the estimated coefficients. Cluster robust standard errors in parentheses (clusterlevel = firm). ***, and ** indicate significance at the 1 %, and 5 % level.

dividends vary. Growing firms are more likely to increase dividends. Once firms are large and firms paying high bonuses to board members are more likely to reduce dividends. In contrast, a high debt ratio make dividend decreases less likely. Corporate age, an important indicator of asymmetric information in signaling models, is insignificant in all specifications. Firm size is only significant in one regression. In addition, excess reserves, indicating the life-cycle of a firm, is insignificant in both regressions.

Regression results evaluating the payout ratio are reported in Table 3. Five variables have a statistically significant impact on payout ratios. Larger firms and firms with good investment opportunities tend to have higher payout ratios. The debt ratio and bonus payments to board members are associated with lower payout ratios. Larger bonus payments to the board implies lower payout ratios since money can only be spend once. More debt may indicate better monitoring by debt

Table 3: Determinants of dividend payout ratio.

| | (1) Tobit | (2) Tobit |
|------------------------------|---------------------|----------------------|
| Return on equity | −0.002 (0.003) | 0.000 (0.004) |
| Log assets (in 100,000 mark) | | 0.038*** (0.009) |
| Excess reserves | | 0.000 (0.001) |
| Growth assets | | 0.000 (0.000) |
| Tobin's q | | 0.095*** (0.027) |
| Debt ratio | | −0.002*** (0.001) |
| Bonus management | | −0.029*** (0.010) |
| One vote | | −0.041** (0.020) |
| Corporate age | | −0.001 (0.001) |
| Banker | | −0.013 (0.016) |
| Constant | 0.768*** (0.035) | 0.608*** (0.055) |
| var(e.DPAR) | 0.030*** (0.006) | 0.026*** (0.005) |
| Obs. | 1,638 | 1,439 |
| Pseudo loglikelihood | 460 | 498 |

Note: Cluster robust standard errors in parentheses (clusterlevel = firm). ***, and ** indicate significance at the 1 %, and 5 % level.

holders (banks) and less need to restrict managerial misbehavior using dividends. Within the class of agency models, the positive correlation between investment opportunities and payout ratios is compatible with the substitution model in an environment with low shareholder protection and contrary to the outcome model of La Porta et al. (2000). The one vote-one share rule tends to reduce the payout ratio. If we take this design of the voting rule as an indicator of good shareholder protection, this finding is compatible with the substitution model but not with the outcome model. Thus, it seems that firms with good investment opportunities do not fund investments using retained earnings. Instead, they build-up reputation in the capital market using dividends and fund investment by issuing new shares.

Shareholders can first vote on the authorization of a capital increase and then decide with their feet whether to subscribe to new shares.

We now turn to the dynamics of dividend policy and estimate Lintner adjustment coefficients. Here, we follow established practice in empirical corporate finance and use various dynamic panel data models in our econometric implementation of equation (2). Our preferred method is a fixed-effects OLS panel estimator. We check, if a least square dummy variable correction (LSDVC) model or the Blundell and Bond (1998) estimator yield different results. In general, the OLS estimator tends to yield upward biased estimates of the coefficient of the lagged dependent variable. In contrast, the within group estimator, obtained by subtracting the firm specific mean from all observations, yields a downward biased estimate. However, the downward-bias of the lagged dependent variable is inversely correlated with panel length and most severe in short panels (Flannery and Hankins 2013). In longer panels ($T > 30$) the bias is less severe, but can be still problematic. Since panel length varies in our empirical investigation, we also report the results of the LSDVC model and of the Blundell and Bond (1998) estimator. According to Flannery and Hankins (2013), who compare the model quality of different dynamic panel models outlined above, LSDVC and fixed effects models produce the most accurate results in imbalanced panels with missing values. Thereby the LSDVC estimator is most accurate for the lagged variable, while the fixed effects estimator is most accurate for the other variables. The lagged variable, on the other hand, is most accurately estimated with the Blundell-Bond estimator for panels with censored data. Yet, the fixed effects estimator is most accurate for the other explaining variables. Since our data set is an imbalanced panel with missing values for some firms and the dependent variable might be censored at zero, we report all three models in the beginning.

Columns (1)–(3) of Table 4 estimate a Lintner model (see equation (2)) with dividends in percent of share capital as dependent variable and lagged dividends and accounting profits in percent of share capital as explanatory variable. We remind readers that the estimation results based on Lintner's equation need to be transformed by using the definition $c = 1 - d$. In all model specifications, we control for autocorrelation of the lagged dependent variable using the Portmanteau test and Arellano-Bond test. Additionally, we also report the correlation of the lagged residuals as an alternative indicator for autocorrelation.⁹

All three model specifications result in a similarly strong, statistically significant adjustment factor – the coefficient of the lagged variable – between 0.21 (Blundell-Bond) and 0.26 (LSDVC). This results into a Lintner adjustment factor (calculated as $1 - \text{regression coefficient}$) between 0.74 (LSDVC) and 0.79 (Blundell-Bond).

⁹ All models are estimated with a constant that is not reported. This also applies to the subsequent model specifications.

Table 4: Baseline estimates.

| | (1) Fixed effects | (2) LSDVC | (3) Blundell-Bond |
|---------------------------------|----------------------|--------------------|----------------------|
| L.dividend | 0.25*** (0.032) | 0.26*** (0.009) | 0.21*** (0.035) |
| Profit | 0.48*** (0.033) | 0.48*** (0.015) | 0.50*** (0.036) |
| Obs. | 1,662 | 1,662 | 1,662 |
| Groups | 71 | 71 | 71 |
| Average panel length | 23.4 | 20.3 | 23.4 |
| Adj. R^2 | 0.82 | | |
| Autocorrelation | NO | NO | YES |
| Correlation of lagged residuals | 0.27 | 0.26 | 0.48 |

Note: HAC standard errors in parentheses (clusterlevel = firm). *** indicate significance at the 1 % level. Autocorrelation: panel models (col. (1) and (2) use the Portmanteau test for panel serial correlation; Blundell-Bond (col. 3) uses the Arellano-Bond test for serial correlation in the first-differenced residuals.

Thus, about three quarters of the difference between the actual dividend and the target dividend is adjusted within one period. Moreover, the three specifications yield nearly identical estimates of the target payout ratio: it varies between 0.633 (Blundell-Bond) and 0.649 (LSDVC). The magnitude of the target payout ratio is very close to our baseline estimate of the actual payout ratio (reflected by the constant of regression 2 in Table 3). The magnitude of our adjustment factor is only slightly smaller than the Lintner coefficient of 0.82 calculated by Braggion and Moore (2011) on the basis of British data from 1895 to 1905. On the other hand, it is substantially higher compared to estimates based on Russian data: Gregg and Nafziger (2023: 152) calculate an adjustment coefficient of 0.38. Based on German data for the period 1988–2008, Andres et al. (2015) estimate a Lintner coefficient of 0.33.¹⁰ Thus, if a typical firm cuts its dividend by 50 percent (nearly) returning to the pre-cut level takes two or three years in pre-1913 Germany, but at least six years in modern Germany. At the one hand, dividend adjustment paths are thus much smoother in modern Germany. At the other hand, investors could expect stable dividends in imperial Germany. This might be an important feature in a rentier society with large share denominations – managing incomes by selling shares is difficult when the market price of one share is higher than average annual labor income. On average,

¹⁰ Based on data from 424 companies and for the period 1988 to 2008, Andres et al. (2015: 64) estimate an adjustment speed of 0.32 (Blundell-Bond) and 0.33 (Fixed effects) and target payout ratios of 0.48 (Blundell-Bond) and 0.23 (Fixed effects).

dividends were only cut in exceptional circumstances in imperial Germany and investors could expect a fast return to established dividend levels. Moreover, the relatively high target payout ratio in Imperial Germany implies a low relevance of internal funding of investment. Major investment projects need to be funded by debt or by issuing additional equity.

From a technical point of view, the consistency of the coefficients across the model specifications is worth emphasizing. This is particularly evident in the comparison between the fixed effects model and the LSDVC approach. Since the average panel length in the fixed effects model is around 23 years, the downward bias on the lagged dependent variable is indeed very small, e.g., 0.25 in the fixed effects model versus 0.26 in the LSDVC model. In the Blundell Bond model, the coefficient is somewhat smaller, but in this model an autocorrelation distorting the coefficient of the lagged dependent variable cannot be ruled out. Taking these considerations into account, we employ the most commonly used Lintner fixed-effects model for the remaining hypotheses tests.

In a next step, we investigate the impact of improved investor protection by corporate law (Table 5) or firm-level governance rules (Table 6). Table 5 includes three modifications of the regression model: first, we plug Tobin's q as an indicator of investment opportunities into the regression since La Porta et al. (2000) model the impact of institutional reforms on pay-out policy at given investment opportunities. Second, we introduce a dummy variable separating the pre-1884 and post-1884 periods to assess the potential impact of the major corporate law reform taking place in 1884. To reduce the impact of potentially intervening factors and taking-up the idea of a transition period (or implementation lag) towards a new equilibrium, we restrict the sample period to the years 1880–83 versus 1885–88. The 1884 legal reform influenced accounting methods, strengthened shareholders' monitoring rights, improved the information policy of corporations, and increased the threat of punishment in case of managerial misbehavior. Moreover, the 1884 law introduced minimum accounting reserves (ten percent of share capital) and we use this rule to calculate excess reserves (= accounting reserves less legal minimum accounting reserves). Nevertheless, our results suggest no effect of the corporate law reform on the dividend policy of corporations. The reform did neither affect the level nor the adjustment speed – the dummy for the legal reform in 1884 (Novelle 1884) as well as the interaction effect of reform dummy and lagged dividend is insignificant. In addition, interaction effects of the 1884 legal reform with profits and the level of excess reserves are insignificant. Third, we assess the potential impact of the new *Handelsgesetzbuch* (commercial law) enacted in 1900. This reform strengthened shareholder protection further and we thus expect an impact on dividend policy. Yet, using data spanning the pre-reform (1896–99) and post-reform (1901–04) period, we do not find any significant impact of the 1900 legal

Table 5: Dividend adjustment and corporate law.

| | Aktienrechtsnovelle 1884 (1) | HGB 1900 (2) |
|---------------------------------|---|-------------------------------|
| L.dividend | 0.12** (0.055) | 0.26** (0.121) |
| Profit | 0.40*** (0.057) | 0.48*** (0.069) |
| Excess reserves | 0.01 (0.016) | -0.03 (0.028) |
| Tobin's q | 3.22*** (0.769) | 0.11 (0.580) |
| Novelle 1884 | -0.03 (0.529) | |
| Novelle 1884 # L.dividend | 0.00 (0.068) | |
| Novelle 1884 # profit | 0.09 (0.062) | |
| Novelle 1884 # excess reserves | 0.00 (0.015) | |
| Novelle 1884 # Tobin's q | -1.03* (0.593) | |
| HGB | | 0.33 (0.527) |
| HGB # L.dividend | | -0.21 (0.171) |
| HGB # profit | | 0.11 (0.122) |
| HGB # excess reserves | | 0.01 (0.013) |
| HGB # Tobin's q | | -0.25 (0.509) |
| Obs. | 442 | 541 |
| Groups | 70 | 75 |
| Average panel length | 6.3 | 7.2 |
| Adj. R^2 | 0.82 | 0.79 |
| Autocorrelation | NO | NO |
| Correlation of lagged residuals | 0.04 | 0.22 |

Note: HAC standard errors in parentheses (clusterlevel = firm). ***, **, * indicate significance at the 1 %, 5 %, 10 % level. Autocorrelation: panel models use the Portmanteau test for panel serial correlation.

Table 6: Dividend adjustment and corporate governance.

| | Lintner (fixed effects) | | | |
|----------------------------|-------------------------|-------------------------------|-------------------------------|-----------------------|
| | (1) Full sample | (2) SEO last five years | (3) SEO next five years | (4) Number SEOs |
| L.dividend | 0.07* (0.044) | 0.13** (0.063) | 0.00 (0.075) | 0.08* (0.044) |
| Profit | 0.51*** (0.062) | 0.49*** (0.033) | 0.60*** (0.076) | 0.51*** (0.062) |
| Excess reserves | 0.00 (0.017) | 0.00 (0.024) | 0.04** (0.016) | 0.00 (0.017) |
| Tobin's q | 2.56*** (0.543) | 3.50*** (0.466) | 2.44*** (0.892) | 2.55*** (0.545) |
| One vote | 1.32*** (0.472) | 1.94** (0.767) | 1.89*** (0.677) | 1.28*** (0.470) |
| Board | 1.17 (1.058) | 1.98 (1.420) | 0.41 (1.008) | 1.17 (1.059) |
| AGM | -0.54 (0.455) | 1.32* (0.748) | -0.60 (0.798) | -0.57 (0.463) |
| Banker | -0.13 (0.304) | 0.07 (0.366) | 0.00 (0.335) | -0.12 (0.313) |
| One vote # L.dividend | 0.11** (0.053) | 0.04 (0.070) | 0.22*** (0.071) | 0.11** (0.054) |
| One vote # profit | 0.01 (0.045) | 0.07 (0.059) | -0.07 (0.069) | 0.01 (0.045) |
| One vote # excess reserves | 0.00 (0.017) | 0.00 (0.018) | -0.03 (0.017) | -0.00 (0.017) |
| One vote # Tobin's q | -1.98*** (0.501) | -2.41*** (0.649) | -2.15*** (0.664) | -1.97*** (0.498) |
| Board # L.dividend | 0.27*** (0.068) | 0.10 (0.095) | 0.08 (0.092) | 0.27*** (0.066) |
| AGM # L.dividend | 0.04 (0.054) | -0.01 (0.049) | 0.10 (0.074) | 0.05 (0.057) |
| Board # profit | -0.11 (0.098) | -0.07 (0.101) | 0.10 (0.082) | -0.11 (0.098) |
| AGM # profit | -0.07 (0.066) | -0.06 (0.044) | -0.11 (0.071) | -0.07 (0.067) |
| Board # excess reserves | -0.03 (0.027) | -0.02 (0.033) | -0.04** (0.018) | -0.03 (0.028) |
| AGM # excess reserves | 0.01 (0.012) | -0.01 (0.011) | 0.00 (0.011) | 0.01 (0.012) |
| Board # Tobin's q | -2.14* (1.162) | -1.94 (1.351) | -1.59 (0.961) | -2.11* (1.159) |
| AGM # Tobin's q | 0.49 (0.373) | -0.59 (0.575) | 0.89 (0.731) | 0.48 (0.376) |

Table 6: (continued)

| | Lintner (fixed effects) | | | |
|---------------------------------|-------------------------|-------------------------------|-------------------------------|-----------------------|
| | (1) Full sample | (2) SEO last five years | (3) SEO next five years | (4) Number SEOs |
| Banker # L.dividend | 0.01 (0.043) | 0.02 (0.054) | 0.05 (0.044) | 0.01 (0.043) |
| Banker # excess reserves | 0.02 (0.016) | -0.02 (0.023) | -0.05* (0.027) | 0.02 (0.017) |
| Number SEOs | | | | 0.06 (0.065) |
| Number SEOs # L.dividend | | | | -0.00 (0.006) |
| Obs. | 1,551 | 634 | 660 | 1,551 |
| Groups | 71 | 57 | 58 | 71 |
| Average panel length | 21.8 | 11.1 | 11.4 | 21.8 |
| Adj. R^2 | 0.84 | 0.83 | 0.84 | 0.84 |
| Autocorrelation | NO | NO | NO | NO |
| Correlation of lagged residuals | 0.31 | 0.25 | 0.16 | 0.31 |

Note: HAC standard errors in parentheses (clusterlevel = firm). ***, **, * indicate significance at the 1 %, 5 %, 10 % level. Autocorrelation: the panel models use the Portmanteau test for panel serial correlation. Base category decision rule: automatic distribution via Articles of Association. Regular capital increase = firm raises capital more than two times over observed life cycle. Occasional capital increase = firm raises capital between zero and two times over observed life cycle.

reform on payout policy. Thus, we find no evidence supporting the outcome model of dividend policy put forward by La Porta et al. (2000). However, the significantly positive coefficient of Tobin's q in the 1880s is compatible with the substitution model of La Porta et al. (2000) if the 1880s were a period of weak investor protection. At the turn of the century, the coefficient of Tobin's q is insignificant. This is compatible with the substitution model, if the economy offers now a high protection to minority shareholders. Given the development of corporate law and the quality of governance at the firm level (Section 3), this is a very plausible assumption. The negative coefficient of the interaction term "post 1884 \times Tobin's q " also supports this argument. After the increase of investor protection in 1884, the association between dividends and investment became weaker.¹¹

¹¹ The transition from an environment of weak investor protection to high investor protection somewhat after 1884 is also supported by the results in Table 3.

Furthermore, between the 1880s and the turn of the century, the adjustment speed declined from 0.88 to 0.74 and the target payout ratio increased from 0.45 to 0.65. A higher target payout ratio demonstrates that shareholders could force insiders to pay out decent dividends – also an indicator of better investor protection in the early 20th century compared to the 1880s. Moreover, a growing target payout ratio suggests a growing relevance of external – i.e., debt and equity – funding of major investment projects and a declining relevance of internal funds. In a next step, we evaluate to what extent firm-level governance variables explain dividend policy since we were unable to demonstrate any systematic impact of national legal reforms.

Figures 1 and 2 in Section 3 illustrate the slow adjustment of the articles of association of individual firms towards new legal standards. In Table 6, we use this firm-level variation to assess the impact of voting rules (does a firm apply a one share, one vote rule?) and profit distribution rules (who has the final say about distribution of profits – the board or the general meeting – or is the distribution of accounting profits fully prescribed in the corporate charter?). Again, we control for investment opportunities (Tobin's q), profits, and excess reserves. Furthermore, we assess whether monitoring or signaling by electing a banker to head the supervisory board affects dividend policy.

In regression 1, the Lintner coefficient is (weakly) significant and very high at 0.93 (1–0.07). Moreover, better investment opportunities are correlated with higher dividend levels. This is incompatible with the La Porta et al. (2000) outcome model, but compatible with the substitution model in the weak investor protection scenario. The significantly negative interaction effect of one vote and Tobin's q is additional evidence in favor of the substitution model. In addition, the interaction effect of board and lagged dividend is significant and positive (0.27). When the board has the final say about the profit distribution, the Lintner coefficient is relatively low at 0.66 (1 – 0.07 – 0.27). This again supports the substitution model of dividend policy. The election of a banker to head the supervisory board has no significant influence on the dividend policy.

A fundamental assumption of the substitution model is that firms pay dividends to build up reputation at the capital market. Thus, firms frequently raising additional capital via SEOs should stand out in their dividend policy. Only firms that have carried out a SEO in the previous five years are included in equation (2). In equation (3), we restrict observations to firms that will carry out an SEO in the coming five years. In equation (3), we include the number of SEOs of a firm over its life-cycle. Comparing the regressions lends support to the reputation-building-hypothesis. The association of investment opportunities and dividend levels is, controlling for profits, stronger for firms who raised additional share capital during the last five years. Moreover, this effect is weaker for firms offering higher investor

protection (reflected in the interaction effect of Tobin's Q and one vote). We thus find support for the substitution model.

Furthermore, we evaluate three alternative explanations – the impact of corporate capital structure, corporate life-cycle, and profit changes. We augment the baseline model (Table 6, column (1)) and present the results in Table 7. We do not report the baseline variables since signs, magnitudes, and significance levels are

Table 7: Alternative explanations.

| | Lintner (fixed effects) | | |
|---------------------------------|--------------------------|---------------------|------------------------|
| | (1) Capital structure | (2) Life-cycle | (3) Profit increase |
| Debt ratio | 0.01 (0.009) | | |
| Banker # debt ratio | 0.00 (0.010) | | |
| Corporate age | | -0.04*** (0.014) | |
| Corporate age # L.dividend | | 0.00 (0.001) | |
| Log assets | | 0.14 (0.152) | |
| Log assets # L.dividend | | 0.03** (0.012) | |
| Profit increase | | | 0.28 (0.244) |
| Profit increase # L.dividend | | | 0.05** (0.023) |
| Obs. | 1,512 | 1,511 | 1,551 |
| Groups | 70 | 69 | 71 |
| Average panel length | 21.6 | 21.9 | 21.8 |
| Adj. R^2 | 0.84 | 0.85 | 0.85 |
| Autocorrelation | NO | NO | NO |
| Correlation of lagged residuals | 0.31 | 0.30 | 0.25 |
| Baseline variables | Yes | Yes | Yes |

Note: This table combines the regression of Table 6, col (1) (=baseline) with further control variables. The coefficients that are included in the baseline model are not reported here. However, they do not vary much from the results reported in Table 6. The coefficients of all variables are reported in the Table A3. HAC standard errors in parentheses (clusterlevel = firm). ***, and ** indicate significance at the 1%, and 5% level. Autocorrelation: the panel models use the Portmanteau test for panel serial correlation.

robust to including additional variables.¹² Corporate capital structure (reflected in the debt ratio) and monitoring or signaling by bankers via the supervisory board did not affect dividend policy (Table 7, col. 1). Mature firms at later stages of their life cycle are older, larger, and command relatively large reserves. Firm size does not affect payout levels, but has a small impact on dividend smoothing (reflected in the interaction effect). After a shock, larger firms take slightly more time to return to the established dividend level. This supports life cycle models of dividend policy. In addition, older firms display slightly lower dividend levels. This also lends support to a life-cycle model of dividend policy. Column 3 provides no evidence of a positive association of dividend levels and profitability, but there is some support for the assumption that dividend smoothing works slightly differently in cases where the profitability of firms increased.

6 Discussion of Findings and Conclusion

In the German Empire, joint-stock corporations almost always paid a dividend to their shareholders. Dividends have been cut or increased in line with the development of profits, but they have almost never failed to pay at least a small dividend. In the first decades of the Empire, the payout ratio fluctuated significantly, but from the late 1880s onwards, companies paid out 75–80 percent of their reported net profit as dividends. This stands in marked contrast to modern Germany, where target payout ratios vary between 25 and 50 percent of profits. With the help of regression models, we can demonstrate, among other things, that the target dividend and the average dividend actually paid tended to be nearly the same. Moreover, if the dividend paid deviated from the target dividend, it returned quickly to the target. For example, a negative shock that led to a halving of the dividend was offset in the German Empire within two to three years. At present, German corporations take at least six years to do so.

Over time, the decision-making process on dividend payments was increasingly placed in the hands of the shareholders and the voting rights of the shareholders were approaching best practice, i.e., a one share, one vote rule. Until the end of the 1880s, the distribution of dividends was often fully specified in the corporate charter, i.e., the founders of the corporations had determined the rules for the distribution of profits. From 1890 onwards, a vote by the general meeting was the most common mechanism for deciding on the distribution of profits. After the turn of the century, 80–90 percent of companies used a shareholder vote. At the time, most companies practiced the “one share, one vote” rule. In the mid-1880s,

¹² We provide the full table in the Appendix.

however, shareholders' voting rights were still restricted in around 80 percent of companies. Over the following 15 years, the best practice voting norm slowly but steadily became more widespread. Shortly before the turn of the century, 60 percent of companies followed this rule. This was followed by a jump upwards – presumably an effect of the amendment to the corporate law passed in 1897 and coming into force in 1900. The other major corporate law reform – which came into force in 1884 – did not lead to an observable break in corporate governance.

Our analysis of the change in dividends, the payout ratio, and the dynamics of the dividend provides evidence for the agency theory of dividend policy, but no evidence for the signaling theory. It was not the managers of companies who wanted to signal the quality of their company with the help of the dividend, but the shareholders who reduced agency problems by profit distribution. Within the class of agency models, we find evidence for the validity of the substitution theory proposed by La Porta et al. (2000). Managers who wanted to finance future major investments through capital increases acquired a high reputation on the capital market through steady dividend payments. This gain in reputation is particularly important in the model if the protective rights for shareholders are weak. Accordingly, we find in the German Empire that companies with good investment opportunities paid comparatively high dividends. An improvement in shareholder protection weakened this effect. We have included the quality of shareholder protection in the analysis both at the national level and at the level of individual companies. The two major reforms of stock corporation law in 1884 and 1900 had no statistically significant influence on dividend policy. But best practice voting rights at the company level have systematically influenced the level of the dividend, the relevance of investment opportunities for the dividend policy and the speed of adjustment after a deviation from the target.

Our paper also contributes to established lines of argument in economic and business history. First, the investment cash-flow relationship and the association between cash-flow and cash incentives have been investigated. Fohlin (1998) and Becht and Ramirez (2003) evaluate if investment behavior of bank-connected firms were less cash-constrained than investment of firms without a bank connection; they reach different conclusions. Bayer and Burhop (2009) provide evidence that the change of cash-bonuses depends on the change of profits and that this association is stronger in firms having a high debt ratio. Thus, parameters of corporate financial policies are interrelated: access to debt finance might have an impact on the extent of investment and actual debt finance has an impact on the size of cash bonuses. Yet, dividend payments and the potential impact of dividend policy on capital structure of firms have not been considered so far. We show that steady dividend payments potentially paved the way towards more frequent SEOs.

Second, the interaction of banks and stock exchanges for the financing of large German companies in the late 19th and early 20th century has already been evaluated a long time ago. According to Richard Tilly especially established companies from growing industries generated funds by issuing shares (Tilly 1984: 270–271, 275, 279). Based on balance sheet data of a sample of listed companies, Tilly (1978) found that the internal and external expansion of industrial companies was financed in the short term by the reduction of cash holdings and the increase in debt, but in the long term it was refinanced by the issue of securities. For two samples of, first, iron and steel companies from the Ruhr area and, second, mechanical engineering firms, Feldenkirchen (1979, 1982) confirms this result on the basis of published balance sheets as well as internal accounting documents and minutes of board meetings. In the iron and steel industry of the Ruhr Area, for example, investments were pre-financed by substantial bank loans and then refinanced from the proceeds of share issues when the capital market situation was favourable. Moreover, banks granted the loans because credits offered the prospect of an underwriting business. According to Feldenkirchen, the same argument holds in the case of mechanical engineering firms (Feldenkirchen 1979: 43, 53–54, 1982: 49). We add a new twist to this line of argument by reflecting on the relevance of dividend policy as a substitute for relatively weak corporate governance.

The “naïve explanation of dividends” put forward by Easterbrook (1984: 652) fits our story quite well: “Dividends exists *because* they influence the firms’ financing policies, *because* they dissipate cash and induce firms to float new securities.”

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Data availability: The data and methods underlying this article will be made available and linked via a DOI in <https://emporion.gswg.info/> after acceptance of the paper. Data and replication files have been submitted to the journal.

Appendix

See Tables A2 and A3

Table A1: Sample firms and data source.

| Name | Source |
|---|---------------------------|
| Actien Bauverein Passage | Rettig (1978) |
| AG für Anilinfabrikation | Rettig (1978) |
| AG für Fabrikation von Eisenbahmaterial Görlitz | Rettig (1978) |
| AG für Flachsgarn Maschinenspinnerei und -weberei | New |
| AG für Glasindustrie, vorm. Siemens | New |
| AG Zeche Dannenbaum | Burhop and Lübbers (2009) |
| Allgemeine Berliner Omnibus AG | Rettig (1978) |
| Allgemeine Electricitäts-Gesellschaft | Rettig (1978) |
| Allgemeine Gas AG zu Magdeburg | Rettig (1978) |
| Aplerbecker Actienverein für Bergbau | Burhop and Lübbers (2009) |
| Arenberg'sche AG für Bergbau und Hüttenbetrieb | Burhop and Lübbers (2009) |
| Bank für Handel und Industrie | Bayer and Burhop (2008) |
| Bergbau AG Pluto | Burhop and Lübbers (2009) |
| Bergwerks AG Consodilation | Burhop and Lübbers (2009) |
| Bergwerks AG Courl | Burhop and Lübbers (2009) |
| Bergwerksgesellschaft Bonifacius | Burhop and Lübbers (2009) |
| Bergwerksgesellschaft Hibernia | Burhop and Lübbers (2009) |
| Berlin-Anhaltische Maschinenbau AG | New |
| Berliner Handelsgesellschaft | Bayer and Burhop (2008) |
| Bochumer Bergwerks AG | Burhop and Lübbers (2009) |
| Bochumer Verein für Bergbau und Gußstahl | Rettig (1978) |
| Böhmisches Brauhaus KGaA | Rettig (1978) |
| Braunschweigische AG für Jute und Flachs | Rettig (1978) |
| Chemische Fabrik vorm. Schering | Rettig (1978) |
| Chemische Fabrik zu Heinrichshall | Rettig (1978) |
| Commerz- und Discontobank | Bayer and Burhop (2008) |
| Concordia Bergbau AG | Burhop and Lübbers (2009) |
| Cröllwitzer Aktienpapierfabrik | Rettig (1978) |
| Deutsche Bank | Bayer and Burhop (2008) |
| Deutsche Contiental Gas-Gesellschaft | Rettig (1978) |
| Deutsche Spiegelglas AG | Rettig (1978) |
| Disconto Gesellschaft | Bayer and Burhop (2008) |
| Dortmunder Aktienbrauerei | Rettig (1978) |
| Dortmunder Bergbau-Gesellschaft | Burhop and Lübbers (2009) |
| Dortmunder Steinkohlenbergwerk Louise Tiefbau | Burhop and Lübbers (2009) |
| Dortmunder Union für Bergbau, Eisen und Stahl | Burhop and Lübbers (2009) |
| Dresdner Bank | Bayer and Burhop (2008) |
| Dresdner Bau Gesellschaft | Rettig (1978) |
| Düsseldorfer Eisen- und Drahtindustrie | New |
| Eilenburger Kattunmanufaktur | New |
| Eisenhüttenwerke Marienhütte bei Kotzenau | Rettig (1978) |
| Eschweiler Bergwerksverein | Rettig (1978) |
| Essener Bergwerksverein König Wilhelm | Burhop and Lübbers (2009) |
| Essener Steinkohlenbergwerk/Rhein. Anthracit | Burhop and Lübbers (2009) |

Table A1: (continued)

| Name | Source |
|---|---------------------------|
| Frister & Rossmann Nähmaschinenfabrik | Rettig (1978) |
| Gelsenkirchener Bergwerks AG | Burhop and Lübbers (2009) |
| Georgs-Marien Bergwerks- und Hüttenverein | Rettig (1978) |
| Grosse Berliner Straßenbahn | Rettig (1978) |
| Hallesche Maschinenfabrik und Eisengießerei | New |
| Hannoversche Baugesellschaft | Rettig (1978) |
| Harpener Bergbau AG | Rettig (1978) |
| Hugo | Burhop and Lübbers (2009) |
| Kattowitzer AG für Bergbau und Eisenhüttenbetrieb | New |
| Kölner Bergwerksverein | Burhop and Lübbers (2009) |
| Ludwig Loewe | Rettig (1978) |
| Magdeburger Bergwerks AG | Rettig (1978) |
| Magdeburger Straßen-Eisenbahngesellschaft | Rettig (1978) |
| Maschinenbau AG vorm. Schwarzkopff | Rettig (1978) |
| Maschinenfabrik Kappel | New |
| Massener Gesellschaft für Kohlenbergbau | Burhop and Lübbers (2009) |
| Mitteldeutsche Creditbank | Bayer and Burhop (2008) |
| Nationalbank für Deutschland | Bayer and Burhop (2008) |
| Nienburger Eisengießerei und Maschinenfabrik | Rettig (1978) |
| Norddeutsche Eiswerke | Rettig (1978) |
| Norddeutsche Gummi- und Guttaperchawarenfabrik | Rettig (1978) |
| Norddeutsche Jute Spinnerei und Weberei | New |
| Norddeutscher Lloyd | Rettig (1978) |
| Oberschlesische Portland Cementfabrik | New |
| Posener Sprit AG | Rettig (1978) |
| Ravensberger Spinnerei | Rettig (1978) |
| Rheinische StahlwerkeDuisburg Meiderich | Rettig (1978) |
| Sächsische Gußstahlfabrik | Rettig (1978) |
| Sächsische Kammgarnspinnerei Hartau | Rettig (1978) |
| Sächsische Maschinenfabrik, vorm. Hartmann | Rettig (1978) |
| Sächsisch-Thüringische AG für Braunkohlen | Rettig (1978) |
| Schaaffhausen'scher Bankverein | Bayer and Burhop (2008) |
| Schalker Gruben- und Hüttenverein | New |
| Schlesische AG für Bergbau und Zinkhüttenbetrieb | Rettig (1978) |
| Schlesische AG für Portland-Cement | Rettig (1978) |
| Schlesische Electricitäts und Gas AG | Rettig (1978) |
| Schlesische Leinen-Industrie Kamstra | Rettig (1978) |
| Schultheiß Brauerei | Rettig (1978) |
| Stärke Zuckerfabrik | Rettig (1978) |
| Steinkohlenbergwerk Nordstern | Burhop and Lübbers (2009) |
| Stettiner Chamottfabrik, vorm. Didier | New |
| Stettiner Maschinenbau AG Vulcan | Rettig (1978) |
| Süddeutsche Immobiliengesellschaft | Rettig (1978) |
| Vereinigte Stralsunder Spielkarten Fabriken | Rettig (1978) |

Table A1: (continued)

| Name | Source |
|---|---------------|
| Westfälische Drahtindustrie | Rettig (1978) |
| Wilhelmshütte AG für Maschinenbau und Eisengießerei | Rettig (1978) |
| Zucker Fabrik Glauzig | Rettig (1978) |

Table A2: Composition of full sample versus reduced sample.

| | Full sample Freq. | Pct. | Reduced sample ($T \geq 4$) Freq. | Pct. |
|-----------------|----------------------|-------|--|-------|
| Financial firms | 396 | 9.4 | 262 | 15.7 |
| Mines | 1,276 | 30.2 | 333 | 19.9 |
| Industry | 2,287 | 54.2 | 936 | 56.0 |
| Utilities | 264 | 6.3 | 141 | 8.4 |
| Total | 4,223 | 100.0 | 1,672 | 100.0 |

Note: The reduced sample ($T \geq 4$) only contains corporations for which there are at least four consecutive observations at a given point in time.

Table A3: Alternative explanations – full table.

| | Lintner (fixed effects) | | |
|-----------------|--------------------------|--------------------|------------------------|
| | (1) Capital structure | (2) Life-cycle | (3) Profit increase |
| L.dividend | 0.08* (0.044) | -0.10 (0.065) | 0.12** (0.054) |
| Profit | 0.50*** (0.061) | 0.51*** (0.060) | 0.46*** (0.059) |
| Excess reserves | -0.00 (0.018) | 0.01 (0.015) | 0.01 (0.016) |
| Tobin's q | 2.74*** (0.552) | 2.84*** (0.565) | 2.28*** (0.535) |
| One vote | 1.26** (0.517) | 1.23*** (0.438) | 1.17** (0.443) |
| Board | 1.55 (1.246) | 0.78 (1.001) | 1.22 (1.055) |
| AGM | -0.51 (0.555) | 0.11 (0.461) | -0.56 (0.417) |

Table A3: (continued)

| | Lintner (fixed effects) | | |
|----------------------------|--------------------------|---------------------|------------------------|
| | (1) Capital structure | (2) Life-cycle | (3) Profit increase |
| Banker | 0.03 (0.525) | 0.01 (0.294) | -0.06 (0.273) |
| One vote # L.dividend | 0.11** (0.055) | 0.08* (0.051) | 0.11** (0.055) |
| One vote # profit | 0.00 (0.043) | 0.03 (0.044) | 0.01 (0.045) |
| One vote # excess reserves | 0.00 (0.016) | -0.00 (0.015) | -0.01 (0.015) |
| One vote # Tobin's q | -1.87*** (0.555) | -1.83*** (0.494) | -1.76*** (0.483) |
| Board # L.dividend | 0.30*** (0.079) | 0.31*** (0.058) | 0.25*** (0.063) |
| AGM # L.dividend | 0.05 (0.056) | 0.05 (0.048) | 0.06 (0.055) |
| Board # profit | -0.11 (0.101) | -0.11 (0.095) | -0.11 (0.096) |
| AGM # profit | -0.07 (0.062) | -0.09 (0.064) | -0.07 (0.064) |
| Board # excess reserves | -0.03 (0.032) | -0.01 (0.027) | -0.02 (0.026) |
| AGM # excess reserves | 0.01 (0.012) | 0.00 (0.012) | 0.01 (0.011) |
| Board # Tobin's q | -2.68* (1.448) | -2.12* (1.093) | -2.01 (1.221) |
| AGM # Tobin's q | 0.41 (0.448) | 0.23 (0.368) | 0.42 (0.348) |
| Banker # L.dividend | -0.01 (0.045) | 0.00 (0.041) | 0.01 (0.039) |
| Banker # excess reserves | 0.02 (0.016) | 0.01 (0.016) | 0.01 (0.015) |
| Debt ratio | 0.01 (0.009) | | |
| Banker # debt ratio | -0.00 (0.010) | | |
| Corporate age | | -0.04*** (0.014) | |
| Corporate age # L.dividend | | 0.00 (0.001) | |
| Log assets | | 0.14 | |

Table A3: (continued)

| | Lintner (fixed effects) | | |
|---------------------------------|--------------------------|------------------------------|------------------------|
| | (1) Capital structure | (2) Life-cycle | (3) Profit increase |
| Log assets # L.dividend | | (0.152) 0.03** (0.012) | |
| Profit increase | | | 0.28 (0.224) |
| Profit increase # L.dividend | | | 0.05** (0.023) |
| Obs. | 1,512 | 1,511 | 1,551 |
| Groups | 70 | 69 | 71 |
| Average panel length | 21.6 | 21.9 | 21.8 |
| Adj. R^2 | 0.84 | 0.85 | 0.85 |
| Autocorrelation | NO | NO | NO |
| Correlation of lagged residuals | 0.31 | 0.30 | 0.25 |

Note: HAC standard errors in parentheses (clustervariable = firm). ***, **, * indicate significance at the 1 %, 5 %, 10 % level. Autocorrelation: the panel models use the Portmanteau test for panel serial correlation.

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