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Corporate Payout Policy Developments

An examination of payout policy and firm characteristics across different payout groups

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ABSTRACT

Corporate payout policy has changed substantially throughout the period 1980 – 2015. This research considers several approaches to examine the developments in dividends, share repurchases, total payouts and firm characteristics of different payout groups. Firms that both pay dividends and repurchase shares still contribute the bulk of aggregate payouts. However, the group of firms that only pay dividends remains sizeable in terms of percent share of aggregate payout and relative number of firms, despite the increasing popularity of share repurchases. Overall, but especially surrounding the subprime-crisis, share repurchases show more pro-cyclical behavior than dividends. This is consistent with dividend smoothing, managerial reluctance to cut dividends and the flexibility component of share repurchases. It is also in line with the suggestion that share repurchases are used to reflect transitory earnings, while dividends are used to reflect permanent earnings. This research also shows that surrounding the subprime-crisis, payout firms have significantly less investments than non-paying firms, providing some justification for the concerns of listed firms returning too much wealth to shareholders and investing too little in productive capabilities. Furthermore, aggregate payouts and median payout ratios reach historically high levels in 2015.

Keywords: Share Repurchases; Dividends; Payout Policy

JEL Classification: G32; G35

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CHAPTER 1 Introduction

Corporate payout policy has been subject to substantial change since the 1980's. Fama and French (2001) find that the proportion of industrial firms who pay dividends declines from 66.5 percent in 1978 to 20.8 percent in 1999. Strikingly, DeAngelo, DeAngelo, and Skinner (2004) find that aggregate dividends increased both in nominal terms (224.6 percent) and in real terms (22.7 percent) over 1978 – 2000. Thus, while the number of dividend paying firms decreased, the aggregate dividends increased. Additionally, share repurchases have become increasingly popular as a tool to distribute wealth to shareholders since the 1980's: "Share repurchase expenditures grew at an average annual rate of 26.1 percent over the period 1980 – 2000, dividends only grew at an average annual rate of 6.8 percent." (Grullon & Michaely, 2002) Moreover, in 1999, industrial firms' aggregate share repurchases exceeded aggregate dividends for the first time. Skinner (2008) states that share repurchases are now the dominant form of payout. However, the surge in share repurchases has resulted in growing concerns about the level of share repurchases and dividends. For instance, Lazonick (2014) mentions that throughout the period of 2003 to 2012; The 449 listed companies out of the S&P 500 used 54 percent of their earnings for share repurchases and 37 percent for dividends.[1] Evidently, very little of their earnings were used to invest in productive capabilities or improvements for employees. Additionally, Lazonick (2014) quotes Laurence Fink, the CEO of BlackRock which is the world's largest asset manager: "It concerns us that, in the wake of the financial crisis, many companies have shied away from investing in the future growth of their companies." Lazonick mentions the link between share repurchases and executive compensation: "In 2012 the 500 highest-paid executives named in the proxy statements of the U.S. public companies received, on average, $30.3 million each; 42 percent of their compensation came from stock options and 41 percent from stock awards" (Lazonick, 2014) Share repurchase programs put upward price pressure on the stock price, a consequence of which executives are likely to benefit since their compensation package mostly depends on the stock price. Furthermore, the income of the richest 0.1 percent households in the U.S. reached a record of 12.3 percent of total income over 2007, documented by Thomas Piketty and Emmanuel Saez. Compensation by means of stock based payments is the largest part of income of the richest 0.1 percent households in the U.S. This highlights the importance of tracking the developments of share repurchases, since increases in share repurchases can contribute to income inequality.

Although the growth of share repurchases has been impressive, firms aggressively cut share repurchases during the subprime crisis of 2007 – 2008. Floyd, Li, and Skinner (2015) show that

[1] The article of Lazonick "Profits without prosperity: Stock buyback manipulate the market and leave most Americans worse off", won the HBR McKinsey Award for outstanding article.

aggregate share repurchases were cut by 71 percent over 2007 – 2009. After this decrease, share repurchases rebounded, however not to the pre-crisis levels of 2006 and 2007 (up to 2012). This shows the highly pro-cyclical nature of share repurchases (Dittmar & Dittmar, 2008; Skinner, 2008; Floyd, Li, & Skinner, 2015). Meanwhile, aggregate dividends only experienced a small decrease of 5.4 percent over 2007 – 2009. This is consistent with managerial reluctance to cut dividends and the common practice of dividend smoothing. From 2009 – 2012, aggregate dividends increased again to levels above the pre-crisis years.

Clearly, the subprime crisis had a significant impact on corporate payout policy. DeAngelo, DeAngelo, and Skinner (2008) mention that the subprime-crisis revealed an important shortcoming of share repurchases. Many firms repurchased shares at relatively high prices in the years building up to the subprime crisis. This was in the benefit of selling stockholders and at the expense of loyal, non-selling stockholders. They also state that it will be interesting to see how this well-published disadvantage of share repurchases will affect the future development of share repurchases. I add to the large body of corporate payout literature by considering data up to and including 2015. I combine the methodology of Fama and French (2001), Skinner (2008) and Floyd, Li, and Skinner (2015) to show the development of share repurchases, dividends and total payout surrounding the financial crisis. More specifically, I use a sample of US industrial NYSE, AMEX and NASDAQ firms over 1980 – 2015 to show corporate payout developments both descriptively and empirically. First, dividends, share repurchases and total payout are presented in a descriptive way. Tables and figures of yearly aggregate dividends, share repurchases and total payouts are constructed. Additionally, by sorting on dividend-only firms, repurchase-only firms and firms who both pay dividends and repurchase shares, payout policy can be analyzed across payout groups. The percent share of aggregate payout for each payout group can be analyzed, as well as payout ratios for each payout group. This is followed by Lintner-model regressions to examine the relation between earnings and payouts.

Next, logistic regressions are estimated to highlight differences in key firm characteristics across different payout groups. Combining these approaches will help to answer the following research question: *How do dividends, share repurchase, total payouts and firm characteristics for non-paying firms, dividend-only firms, repurchase-only firms and firms who both pay dividends and repurchase shares develop surrounding the subprime-crisis?* Although the sample period is 1980 – 2015, the focus of this research will be in the period surrounding the subprime-crisis of 2007 – 2008.

The rest of the paper is organized as follows. Section 2 covers a wide range of theories relating to share repurchases, dividends, total payouts and firm characteristics. Section 3 describes the dataset and applied methodology. The results are presented in Section 4. Section 5 concludes by summarizing the main results and implications. Additionally, shortcomings of this research and further research possibilities are listed.

CHAPTER 2 Literate overview

Firstly, in Sections 2.1 and 2.2, I will discuss share repurchases and dividend policy separately. This includes the most accepted theories throughout decades of literature, as well as developments over time of the two payout forms. In Section 2.3, insights from the latter Sections and literature regarding both dividends and share repurchases will be combined to highlight the most important differences between share repurchases and dividends. Next, the most important differences and characteristics of dividends and share repurchases can be used to arrive at an overview of corporate payout policy. Section 2.4 links payout policy and firm characteristics, and lists hypotheses.

2.1 Share repurchases

First, as stated by Van der Sar: "A universally accepted theory about share repurchases does not exist" (Van der Sar, 2011). A good place to start the theoretical overview of share repurchases is with Modigliani and Miller (1961), using the assumption often referred to as 'perfect capital markets'. This assumption entails that (I) investors and firms can trade the same set of securities at competitive market prices equal to the present value of their future cash flows, (II) there are no taxes, transaction costs, or issuance costs associated with security trading and (III) firm's financing decisions do not change the cash flows generated by its investments, nor do they reveal new information about them (Berk & DeMarzo, 2014). Under these conditions, Modigliani and Miller (1961) show that a firm's choice of dividend policy is irrelevant and does not affect the initial share price, when holding fixed the investment policy. Extending this line of thought, again using the assumption of perfect capital markets, Berk and DeMarzo (2014) show that investors are indifferent between the firm distributing funds via dividends or share repurchases. Investors can simply replicate either payout method on their own by reinvesting dividends or selling shares, often referred to as 'homemade dividend'. Of course, capital markets are not perfect in practice. Consequently, market imperfections such as taxes, agency costs, information asymmetry and transaction costs often shape a firm's payout policy.

Berk and DeMarzo (2014) also discuss the common misconception that when a firm repurchases shares, the price will rise due to the decrease in the total number of shares outstanding. This effect is offset by a reduction in value of the assets, since the firm uses cash to repurchase shares. The two effects offset each other, thereby leaving the share price unchanged. In practice, however, the share price is often influenced by (the announcement of) share repurchase programs. This is where other research regarding share repurchases can offer explanations. Extensive research has resulted in several motivations for share repurchases. Ikenberry, Lakonishok, and Vermaelen (1995) address possible motivations for share repurchases: "Capital structure adjustment, takeover defense, signaling, excess cash distribution, substitution for cash dividends and wealth expropriation from bondholders".

However, they highlight that signaling can be considered as the most plausible reason for share repurchases. The signaling hypothesis builds on the fact that there is asymmetrical information between investors and the managers of a firm (Miller & Rock, 1985; Vermaelen, 1984). The management has access to both public and private information, whereas investors only have access to public information. When management believes that the current share price does not properly reflect the future profitability of the firm, they could decide on repurchasing these undervalued shares. In this case, the share buyback serves as a favorable and credible signal about future profitability and earnings towards uninformed investors. Examining the announcements effect of open market share repurchases over 1980 to 1990, Ikenberry et al. (1995) find an average return of 3.5 percent. In addition, the announcement effect appears to be bigger for small firms and larger share repurchases. These findings are consistent with the information signaling hypothesis, since small firms have more information asymmetry and large buybacks serve as a stronger signal. Although their results offer some validation for the signaling hypothesis, the findings of more recent studies seem to disagree. For instance, Grullon and Michaely (2004) specifically examine the information content of share repurchases and find little evidence for cash flow signaling motives. Their results show that future profitability (using different measures) of the sample firms do not significantly increase relative to their peer firms. Additionally, the survey of Brav, Graham, Harvey, and Michaely (2005) does not find evidence in favor of the cash flow signaling hypothesis.[2] Overall, cash flow signaling motives seem to have low priority in share repurchase decisions.

Note that managers rarely provide a motivation for the share repurchase at the announcement. As Ikenberry et al. state: “They frequently claim that they are repurchasing shares because prevailing market prices ‘undervalue’ the stock and that it is a ‘good investment’” (Ikenberry, Lakonishok, & Vermaelen, 1995). This is consistent with managers trying to ‘time the market’, as in Baker and Wurgler (2002). Managers who try to time the market tend to repurchase shares when undervaluation is present and issue equity when overvaluation is present. The market timing ability of managers has been subject to a discussion in the academic literature. Schultz (2003) challenges the market timing ability in the case of equity issues in a fundamental way, posing the theory of ‘pseudo-market timing’. Pseudo-market timing entails that the more managers can receive for their equity, the more likely they are to issue equity, even if the market is efficient and managers have no timing ability. However, Chan, Ikenberry, and Lee (2007) find that the pseudo-market timing theory does not hold in the context of share repurchases. Consequently, they conclude that managers indeed poses market timing ability.

[2] The survey of Brav, Graham, Harvey and Michaely (2005) includes 384 financial executives and 23 in-depth interviews. The main goal of the survey is to determine the factors that drive corporate payout decisions.

DeAngelo, DeAngelo, and Skinner (2008) offer the undervaluation explanation as an important determinant of share repurchases.[3] To elaborate on the undervaluation hypothesis, managers try to correct stock market undervaluation or exploit outside investors with share repurchases. Asymmetric information plays an important role in this process. The management is perceived to have a better understanding of the intrinsic value compared to the market value. This way, managers try to time the market and act when they believe stock market undervaluation is present. On the same line, managers could exploit stock market overvaluation by issuing additional shares. Thus, the market timing ability of managers is a component of the undervaluation hypothesis. Note that undervaluation explanations are very similar to cash flow signaling explanations. However, the undervaluation hypothesis does not limit itself to future profitability as an explanation of undervaluation, but simply focuses on the management's disagreement with the current share price from a broad perspective. For example, inside information regarding industry developments or new technologies are considered as well. To test the undervaluation hypothesis, Ikenberry et al. (1995) examine stock market returns following an open market repurchase. They find four-year positive abnormal buy-and-hold returns of 12.1 percent since the announcement, examining all announcements of open market share repurchases between 1980 and 1990. These results are in line with the undervaluation hypothesis, since these firms appear to be undervalued at the time of the repurchase. Additionally, they find a substantial difference between 'value' (low market to book ratio) and 'glamour' (high market to book ratio) stocks. Value stocks have a four-year buy-and-hold average abnormal return of 45.3 percent, whereas they do not find a significant positive drift for glamour stocks. It can be concluded that value stock companies are more likely to repurchase share because of undervaluation, whereas this is not a likely motivation for glamour stock companies. This finding is in line with undervaluation explanations, since value stock companies have a bigger incentive to correct market undervaluation than glamour stock companies. A recent study of Peyer and Vermaelen (2009) confirms that these results are still as large and significant as reported in Ikenberry et al. (1995). Interestingly, the results of Ikenberry et al. (1995) also indicate another phenomenon, namely underreaction to the signal of undervaluation. If the price continues to drift in the same direction as the initial movement, underreaction is present. In this case, prices would become predictable to some extent, consequently allowing arbitrage opportunities. Their results clearly confirm that underreaction is present. They argue that investors treat share repurchase announcements with skepticism, thereby allowing for a market reaction that could extend over several years.

[3] DeAngelo, DeAngelo and Skinner (2008) provide an extensive overview of dividends, share repurchases and corporate payout policy as a whole over the last few decades. This paper is used in high regard, as it does an excellent job of considering every perspective and every relevant piece of literature with respect to corporate payout policy.

Nonetheless, Dittmar and Dittmar (2008) are critical about the undervaluation hypothesis as a plausible motivation for share repurchases. They pose that the post-repurchase returns do not necessarily mean that the repurchases were transacted below intrinsic value. They find that share repurchases and equity issues are 90 percent correlated over the period 1981 – 2004. This contradicts a component of the undervaluation hypothesis, namely that managers try to time the market. If managers were timing the market, share repurchases should occur at periods of undervaluation and equity issues at periods of overvaluation. Thus, market timing predicts a negative correlation between share repurchases and equity issues, whereas the correlation is positive. Dittmar and Dittmar do provide an alternative explanation, namely that both share repurchases and equity issues are highly pro-cyclical. More specifically, during economic expansion (contraction) both share repurchases and equity issues increase (decrease). Additionally, equity issue growth occurs at earlier stages of economic expansion than share repurchase growth. These business cycle variations are very intuitively. In early stages of the business cycle, firms generally have low cash flows and ample investment opportunities. Consequently, firms try to raise capital by raising debt and issuing equity. In later stages of the business cycle, firms generate high cash flows but experience a decrease in investment opportunities. Therefore, firms tend to repurchase shares in later stages of the business cycle.

From the aforementioned reasons for a share repurchase, the excess cash distribution can be viewed as another plausible motivation. This motivation is based on the agency cost of free cash flow theory, which includes the overinvestment problem (Jensen, 1986). 'Free Cash Flows' (also 'FCFs') refers to the amount of excess cash that is available after financing all projects with a positive net present value (also 'NPV') discounted at the relevant cost of capital. As with any agency theory, it is built upon a conflict of interest, in this case between the managers and the shareholders. The agency cost of free cash flow relates to the situation where management utilizes the free cash flow inefficiently. More specifically, when managers use excess cash to invest it below the cost of capital or waste it on organization inefficiencies. This can happen when the manager focuses on company size and growth rather than shareholder value and profitability, thereby putting his own interests ahead of the shareholders' interest. The tendency of managers to use excess cash for suboptimal investment projects is also known as the overinvestment problem. Firms with large amounts of excess cash are more vulnerable to experience the overinvestment problem.

The agency cost of free cash flow theory suggests that excess cash should be limited so that managers will not invest the free cash flow in suboptimal projects. Outside investors, or more general, the capital markets should monitor and/or discipline the managers to minimize the agency costs associated with free cash flows. Jensen (1986) discusses the benefits of debt and takeovers to limit the free cash flow available to managers, thereby minimizing the potential agency costs. Share repurchases can be viewed as another tool to minimize excess cash, thereby minimizing the agency

cost of free cash flow (Grullon & Michaely, 2004). Although theoretically a plausible argument, Brav et al. (2005) show that most financial executives do not view share repurchases as an important tool to discipline management. More specifically, almost 80 percent of the sample CFOs believe that the discipline imposed by share repurchases is not important. Note that Brav et al. admit that these findings should be interpreted carefully, since managers might not admit the need for monitoring/disciplining. Fenn and Liang (2001) examine this matter and find that managerial stock incentives are only useful in the case of firms experiencing serious excess cash flow problems. Firms with serious excess cash problems are characterized by low management stock ownership, few investment opportunities and high free cash flows.

The described theoretical framework surrounding share repurchases helps to explain the behavior of share repurchases over time. A positive announcement effect of open market share repurchases is widely found throughout different sample periods (Vermaelen, 1981; Ikenberry, Lakonishok, & Vermaelen, 1995). As an example, Grullon and Michaely (2004) find a positive return around the announcement date of share repurchases of 2.71 percent over the period 1980 to 1997 including 4,443 announcements. They find that earnings and profitability do not increase in the years after the share repurchase announcements, in fact, some measure even show a decrease in earnings and profitability. As mentioned, this evidence is not in line with the cash flow signaling hypothesis. Rather, they argue that a positive market reaction to the share repurchase announcements is due to a perceived reduction in the likelihood of the overinvestment problem, as in Jensen's (1986) agency costs of free cash flow hypothesis. Indeed, they find a significant increase in capital expenditures and R&D, as well as a significant reduction in cash reserves relative to peer firms, thereby supporting the free cash flow hypothesis. In addition, repurchasing firms experience a statistically and economically significant decline in risk and cost of capital relative to their peer firms, indicating that these firms are moving towards a more mature state. This mature state is accompanied by a decrease in investment opportunities.

In addition, more practical explanations for share repurchases offer justification as well. Brav et al. (2005) discuss several factors affecting payout decisions, but in the context of share repurchases two explanations yield strong results in their survey. Firstly, share repurchases are a way to boost Earnings Per Share (also 'EPS'). Indeed, 76.1 percent of the sample CFOs think that this is an important or very important factor. However, empirical evidence is mixed and finds some support that managers repurchase shares to mechanically improve EPS through reported accounting performance (DeAngelo, DeAngelo, & Skinner, 2008) Secondly, the survey of Brav et al. (2005) shows that 67.6 percent of the sample CFOs think that offsetting the dilutionary effect of stock option plans or other stock programs is an important or very important factor. Indeed, DeAngelo, DeAngelo, and Skinner (2008) partly

attribute the surge in share repurchases since the 1990's to help offset the dilutionary effect of stock options.

Overall, when treating share repurchases as an isolated event, the relevance of the cash flow signaling hypothesis is limited. Rather, empirical evidence is more in line with the undervaluation hypothesis and the agency cost of free cash flow theory. In addition, business cycle variations impact share repurchases decisions. Life-cycle patterns, firms adjusting from a high growth stage to a low growth stage, help to explain share repurchase decisions as well.

2.2 Dividend policy

A good place to start the literature overview of dividend policy is with Lintner (1956) and Modigliani and Miller (1961), who are often viewed as the pioneers of dividend policy. As mentioned in the previous section, in perfect capital markets, a firm's choice of dividend policy is irrelevant and does not affect the initial share price, when holding fixed the investment policy (Modigliani & Miller, 1961). Consequently, a firm's dividend policy is often shaped by market imperfections (Berk & DeMarzo, 2014). Lintner (1956) conducted field interviews and concluded that managers target a long-term payout ratio in their dividend policy. He also finds that mainly mature companies pay dividends, dividends are 'sticky' (reluctant to change), dividends are 'smoothed' (highly stable) over the years and linked to long-term sustainable earnings. Lintner (1956) also presents the traditional Lintner-dividend model, which tests the relation between dividend changes and earnings. This model is more formally tested by Fama and Babiak (1968), who consider different specifications of the model. In general, most dividend policy theories relate to either or both Modigliani and Miller (1961) and Lintner (1956).

Why firms pay dividends is a question that has concerned many financial researchers over the last decades. Several theories have been proposed to provide more clarity on this matter. For instance, the signaling hypothesis builds on the fact that most firms apply the practice of dividend smoothing, creating a stable dividend policy. So, when firms do decide to change dividends, these changes reflect the managers' view about the firm's future earnings prospects (Berk & DeMarzo, 2014). More specifically, a dividend increase (decrease) sends a favorable (unfavorable) signal about the firm's future earnings prospects. This line of thought was already offered by Modigliani and Miller (1961), who discuss the 'information content of dividends'. They argue that dividend changes impact stock returns because they convey new information about the firm's future profitability. It is well-documented that an increase (decrease) in dividend leads to a positive (negative) reaction on the stock market, on average. For instance, during 1967 – 1993, firms that increased (decreased) their dividend by more than 10% experienced an increase (decrease) in their stock price of 1.34 percent (-3.71 percent) after the announcement (Grullon, Michaely, & Swaminathan, 2002). Although Grullon, Michaely, and Swaminathan (2002) indeed confirm this well-documented market reaction to dividend

changes announcements, they examine a different information content of dividend changes. More specifically, they find that the observed stock market reaction surrounding dividend changes is because of a change in systematic risk, rather than a signal about future profitability. Using a sample of 7,642 dividend changes announcements over 1967 – 1993, they find that dividend increasing (decreasing) firms experience a decline (increase) in systematic risk of 1 percent (2 percent) a year. The rationale behind their results is that dividend changes relate to a change in a firm's life-cycle. In this case, a dividend increase conveys information about a firm becoming more mature. As firms become more mature, they experience a transition from a high growth phase to a low growth phase, associated with a decline in their investment opportunity set (therefore a decline in reinvestment rate), declining return on investment and growth rates and declining risk. Their evidence is consistent with the so-called 'life-cycle theory', or 'maturity hypothesis'. Note that this hypothesis somewhat contradicts the information/signaling theory, since the two theories offer different explanations for the observed stock market reaction due to dividend change announcements. DeAngelo, DeAngelo, and Skinner (2004) address this issue. The signaling hypothesis would predict that signaling through dividend policy should occur the most at relatively small firms with the most information asymmetry. However, as mentioned before, the aggregate dividend supply is mostly determined by a small number of large firms. More specifically, 92% of the dividends are paid by the top 200 industrial firms in 2000. In addition, several other papers provide evidence consistent with life-cycle theories and cast doubt on the signaling hypothesis (Benartzi, Michaely, & Thaler, 1997; Denis & Osobov, 2008).

In a similar way to the analysis on dividend change announcements of Grullon, Michaely, and Swaminathan (2002), Van Eaton (1999) examine dividend initiations, increases, decreases and omissions. Using a sample of NYSE/AMEX US firms over 1971 – 1999, he finds that the average price adjustment is 3.3 percent and 1.9 percent for dividend initiations and increases, respectively. Additionally, the stock market reaction for dividend decreases and omissions show -6 percent and -6.5 percent, respectively. Note that the stock market reaction to dividend decreases has a much higher impact than for dividend increases. This well-known pattern relates to the managerial reluctance to cut dividends, addressed by DeAngelo, DeAngelo, and Skinner (2008), among others. The survey of Lintner (1956) already showed this phenomenon, and "after 50 years this reluctance remains one of the most firmly supported empirical regularities in corporate finance" (DeAngelo, DeAngelo, & Skinner, 2008). They also address the survey of Brav et al. (2005), who find that 94 percent of the sample CFOs strongly or very strongly agree that they try to avoid dividend decreases. DeAngelo, DeAngelo, and Skinner (2008) offer two (non-mutually exclusive) possible explanations behind the reluctance of managers to cut dividends. The first explanation is that dividend decreases might act as a signal of financial distress. This is being enforced by the fact that managers rarely cut dividends, and, firms that do decrease dividends are almost always financially distressed. Indeed, Boudoukh, Michaely,

Richardson, and Roberts (2007) find that private UK firms cut dividends significantly more often compared to public UK firms. This is in line with the signaling hypothesis, since private firms experience less information asymmetry and agency problems than public firms. Secondly, investors might view dividend cuts as a violation of the implicit contract between investors and the firm. The implicit contract refers to the investors that supplied capital with the understanding that they would be rewarded with payouts when the firm starts to generate FCFs. Violating this implicit contract might have negative impact on the stock price and lead to intervention and punishment of shareholders. Additionally, DeAngelo, DeAngelo, and Skinner (2008) mention that managers go to great lengths to avoid dividend cuts, even avoiding positive NPV projects in the process. Brav et al. (2005) also find the strong reluctance to cut dividends in in-depth interviews. The managers believe that the market perceives dividend cuts as a signal of long-lasting and severe liquidity problems.

In Section 2.1, I elaborated on the agency cost of free cash flow theory by Jensen (1986) in the context of share repurchases. Rather than share repurchases, Jensen puts more emphasis on dividend policy as a tool to minimize the agency costs associated with free cash flow. Investors can pressure management to commit to a dividend policy, thereby (partly) denying managers the opportunity to invest in suboptimal projects. The agency theory of free cash flow is closely linked to the life-cycle theory. Since, in general, young firms tend to have ample investment opportunities and very low payouts. In contrast, mature firms generally experience a decrease in investment opportunities and increasing amounts of excess cash. Thus, mature firms are more likely to experience the agency costs associated with free cash flows. Therefore, mature firms are also more likely to utilize tools such as dividends to minimize the agency costs. Empirical evidence for a combination of the two, often referred to as 'agency cost-based life-cycle theories', is strong (Grullon & Michaely, 2004; Denis & Osobov, 2008; DeAngelo, DeAngelo, & Skinner, 2008).

Over the last several decades, there have been noticeable swings in dividend policy. Fama and French (2001) consider a sample of non-financial non-utility firms (also 'industrials' or 'industrial firms') over 1926 – 1999. During the Great Depression, the proportion of NYSE industrial firms paying dividends falls from 66.9 percent to 33.6 percent. This is followed by a major increase in dividend paying firms in the upcoming years. In 1951 and 1952, a peak is reached with more than 90 percent of NYSE firms paying dividend. The percent of dividend paying firms then experiences some swings with the addition of the AMEX in 1963 and the NASDAQ in 1973, and declines sharply after 1978, falling to 30.3 percent in 1987. The decline in dividend paying firms continues: "In 1999, only 20.8 percent of firms pay dividends" (Fama & French, Disappearing dividends: changing firm characteristics or lower propensity to pay?, 2001). Note that this percentage refers to the sample of NYSE-AMEX-NASDAQ industrial firms. Fama and French (2001) find that this decline in dividend paying firms is due to a change in nature of listed firms, which is in term related to the change in characteristics of newly listed

firms. Most newly listed firms are small firms with strong investment opportunities and low profitability that never pay dividend. However, they also find that regardless of firm characteristics, listed firms have a lower propensity to pay dividends after 1978. Fama and French conjecture that the perceived benefits of dividends have declined through time. Although Fama and French (2001) carefully state that "The proportion of firms paying cash dividends falls from 66.5 percent in 1978 to 20.8 percent in 1999", DeAngelo, DeAngelo, and Skinner (2004) note that: "Their evidence is commonly interpreted as indicating that *dividends* themselves are disappearing". The paper of DeAngelo, DeAngelo, and Skinner (2004) tries to paint a more accurate picture of the changes in dividend policy over the period 1978 – 2000. Indeed, their results confirm that the number of dividend-paying industrials has declined by over 50 percent. However, they find that dividends paid by industrial firms increased over 1978 – 2000, both in nominal and in real terms. Nominal dividends paid increased by 224.6 percent and real dividends paid increased by 22.7 percent for their sample. Their paper presents a twofold explanation: "(I) the large reduction in payers occurred almost entirely among firms that paid very small dividends, with the loss of these firms' dividends having at best a minor impact on the aggregate supply, and (II) dividends simultaneously increased substantially among the largest payers, reflecting a marked increase in their real earnings" (DeAngelo, DeAngelo, & Skinner, 2004). Thus, during the period 1978-2000, a rather peculiar development occurred: The amount of dividend paying industrial firms significantly decreased, whereas the aggregate dividend paid by industrial firms increased (both in nominal and real terms). DeAngelo, DeAngelo, and Skinner (2004) find that dividends are highly and increasingly concentrated among industrial firms. Thus, a small number of large firms dominate dividend supply, while many smaller firms impact the dividend supply marginally. This so-called "two-tier structure" is highly important to understand the dividend supply of industrial firms over 1978 – 2000. The reduced propensity to pay dividends is indeed confirmed by DeAngelo, DeAngelo, and Skinner (2004), however, the two-tier structure of industrial firms provides a more accurate description of dividend policy developments.

2.3 Payout Policy

Share repurchases and dividends are both methods for a firm to distribute wealth to shareholders. However, several differences between the two forms of payout exist. First, share repurchases are taxed at lower rates than dividends. Note that the tax rates on dividends versus capital gains have changed over time due to governmental regulations. Still, with minor exceptions, it can be stated that the top tax rate on dividends has exceeded the top tax rate on capital gains throughout history when considering the US. A noteworthy regulation is the Growth Tax Relief Reconciliation Act of 2003, which equalized the top tax rate of dividends and long-term capital gains to a rate of 15 percent. Interestingly, DeAngelo, DeAngelo, and Skinner (2008) mention that capital gains are effectively still taxed at lower

rates than dividends. This is because the 15 percent rate only applies to the portion of the capital gains that exceeds the owner's historical cost basis on the shares sold, whereas the 15 percent rate applies to the entire dividend proceeds. Although the difference might seem negligible, it still has an important implication: from a tax perspective, the firm is doing the shareholders a favor when it chooses to pay out share repurchases as opposed to dividends.

Next to tax regulations, the Securities Exchange Committee (SEC) regulations also impact the balance between dividends and repurchases. By far, the most impactful regulation regarding share repurchases is the institution of Rule 10b-18, shielding firms against manipulation charges if certain criteria are met. These criteria refer to the manner, time, price and volume of the share repurchases. [4] The idea behind the rule is that firms were limiting share repurchases in fear of being charged with stock manipulation. Indeed, Grullon and Michaely (2002) find a positive and significant impact of rule 10b-18 on share repurchase activity. These results show that since the institution of rule 10b-18, companies are less deterrent by charges of stock manipulation followed by share repurchases. The impact of rule 10b-18 also indicates that stock repurchases are quite close to stock manipulation and in term insider trading. Of course, market manipulation and insider trading is illegal in almost all countries, yet it remains difficult to provide evidence of stock market manipulation. In fact, Kim, Schremper, and Varaiya (2004) find that the US is among the least stringent in terms of disclosure and execution of share repurchases in a cross-country examination of the 10 largest stock markets in the world. In addition, Lazonick (2014) states: "Trillions of dollars that could have been spent on innovation and job creation in the U.S. economy over the past three decades have instead been used to buy back shares for what is effectively stock-price manipulation" (Lazonick, 2014).

The degree of flexibility between share repurchases and dividends is another important difference. Share repurchases are a more flexible way of paying out shareholders compared to dividends. This is because share repurchases do not have to be paid every period, whereas dividends result in a strict commitment that have be followed-through (Skinner, 2008). The dividend smoothing phenomena also confirms the strict nature of dividends, since firms exhibit a common practice to maintain highly stable dividends (Berk & DeMarzo, 2014). Stephens and Weisbach (1998) analyze the flexible nature of share repurchases. More specifically, they examine 450 repurchase programs over 1981 to 1990 on the extent to which companies follow-through with share repurchases. They find that 74 to 82 percent of the sample firms repurchase the amount stated in the announcement within three years. Additionally, they find that 57 percent of the sample firms exceeds the originally stated amount in the three years followed by the announcement and 10 percent of the managers repurchase less

[4] Note that rule 10b-18 was changed in 2003, thereby requiring firms to present detailed periodic disclosure of all repurchases, among other changes. For a complete overview of rule 10b-18 after the changes in 2003, see: *https://www.sec.gov/rules/final/33-8335.htm*

than 5 percent of the originally stated amount. Clearly, firms are using the flexibility component of share repurchases.

One might be inclined to think that the flexibility component of share repurchases versus dividends plays a role in the agency cost of free cash flow theory by Jensen (1986). Both forms of payout are tools to reduce possible agency costs. In this case, dividends are more likely to be a more effective tool than share repurchases due to the difference in flexibility. Surprisingly, in their extensive survey amongst financial executives, Brav et al. (2005) find that managers see no difference between dividends and share repurchases to discipline management.

On the other hand, dividends offer some advantages over share repurchases as well. Brennan and Thakor (1990) mention that share repurchases distribute cash to a subset of stockholders, and this subset is determined by the amount of effort stockholders spend to assess whether the repurchase price is above or below intrinsic value. Informed investors will have a better idea of the intrinsic share value and, consequently, will have a better understanding if the repurchase offer price is above or below this intrinsic value. Thus: "Share repurchases are likely to be associated with a redistribution of wealth between informed and uninformed shareholders" (Brennan & Thakor, 1990). Note that in a share repurchase, all stockholders have the incentive to dedicate resources to determine whether the repurchase price is above or below intrinsic value. In contrast, dividends distribute cash proportionately to all stockholders, thereby eliminating the need for stockholders to expend resources assessing whether the repurchase price is at fair value. From an investor's perspective, this is a valid argument to prefer dividends over share repurchases.

Another valid argument is proposed by DeAngelo, DeAngelo, and Skinner (2008), who argue that payout policies with both transitory and permanent components have clear advantages over single-component policies. This enables managers to more credibly communicate their payout intentions and offers the opportunity to better deal with swings in earnings and investments. Technically, share repurchases could be used for both transitory and permanent components. However, repurchases exhibit significantly more volatility than dividends, whereas dividend smoothing and the reluctance to cut dividends lead to highly stable dividend patterns. Additionally, Stephens and Weisbach (1998) find that a substantial amount of share repurchases do not get followed through. These factors suggest that share repurchases are better suited to serve as the transitory component, whereas dividends are better suited to serve as the permanent component. Indeed, Jagannathan, Stephens, and Weisbach (2000) find that repurchasing firms tend to have higher 'temporary', non-operating cash flows, while dividend paying firms have higher 'permanent' operating cash flows. Perhaps more important is the fact that when firms would make share repurchases a permanent payout tool (thereby giving up dividends), some distinct advantages of share repurchases would be abandoned, as highlighted by DeAngelo, DeAngelo, and Skinner (2008). For instance, the opportunity

for managers to correct market undervaluation by 'timing the market' using share repurchases would disappear. In addition, firms constantly force investors to incur valuation costs to examine whether the offer price is above or below intrinsic value. Moreover, proportional repurchases are treated the same as dividends by the IRS, thereby abandoning the tax advantage of share repurchases.

The area of behavioral finance provides some motivations in favor of dividends to share repurchases as well. Behavioral finance, in contrast to traditional finance, uses models based on the assumption that agents are not fully rational. When the assumption of rationality is stressed, behavioral finance is often able to explain situations for which standard corporate finance does not offer explanations. Shefrin and Statman (1984) offer several explanations for investors' preference for cash dividend from a behavioral finance perspective. Firstly, they argue that dividends are preferred by investors since they help with self-control problems. Almost every individual has self-control problems in some way and individuals like to impose certain rules to limit the self-control problems. When considering investing activities, an investor is likely to only consume the dividends but leave the capital invested in the portfolio. This way, investors may like dividends because they help with self-control problems. Secondly, dividends help to segregate gains from losses, thereby increasing utility of the investor. This has to do with mental accounting, a part of prospect theory developed by Kahneman and Tversky (1979). In short, prospect theory is a model in which the utility of an outcome is calculated using different values for gains and losses. They find that the value function for gains is concave and the value function for losses is convex, where the value function for losses is steeper (loss aversion). As an example, in the context of dividends and capital gains, a capital gain of $8 combined with a dividend of $2 has a higher perceived utility than a capital gain of $10 (the same reasoning holds for losses). Thus, when firms pay dividends, they make it easier for investors to segregate gains from losses, resulting in higher perceived utility (Barbaris & Thaler, 2003). Lastly, by paying out dividends, the firm potentially helps some investors to avoid regret. The feeling of regret is stronger for commission than for omission. If an investor must sell stock to afford consumption, but afterwards the price of the stock rises, the investor is left with a feeling of regret (commission). However, if the firm had been paying out dividends, the investor could have used the dividend payment to afford consumption. In this case, the investor feels less regret since he only missed the chance to reinvest the dividend in stocks (omission) (Barbaris & Thaler, 2003). Moreover, Breuer, Rieger and Soypak (2014) find that loss aversion, ambiguity aversion and investor impatience are main determinants of dividend policy across countries, using a sample of 43,000 firm/years from 29 countries. This helps to explain the determinants of dividend policy from a behavioral finance perspective.

The area of behavioral finance also entails behavioral biases, which can lead to suboptimal corporate decision making. Every human is subject to behavioral biases to some extent. It is key notice the most important biases and deal with them accordingly. Note that a behavioral bias is different

from the overinvestment problem in the agency costs of free cash flow context. With a behavioral bias, the manager believes that he is maximizing firm value. The unawareness for the problem is a key characteristic for a behavioral bias. Baker and Wurgler (2014) discuss managerial biases, and mention optimism and overconfidence as the most relevant. Optimism and overconfidence are sometimes confused with one another, however the two are distinctly different in the academic literature. Optimism (also referred to as 'over-optimism') results in an overestimation of a mean or outcome, whereas overconfidence results in an underestimation of variance or risk. The findings of optimism and overconfidence are strong and robust, documented in many samples. Optimism and overconfidence impact many aspects of corporate finance, such as investment decisions, capital structure and M&A activity. Later, I will address behavioral biases in the context of corporate payout policy.

Naturally, the differences between share repurchases and dividends extend towards the determinants of both payout forms. The determinants of corporate payout policy is a rather elaborate discussion, including a wide range of theories. I will focus on the most relevant theories that relate to corporate payout policy. Clientele effects is such a theory, suggesting that firms will tailor their payout policy considering the demands of investors regarding their preferences for current payout versus future payouts. Investors can have different preferential payout policies due to, for example, differences in personal tax situations and transaction costs. On the same line, clientele theories argue that tax differentials create stockholder clienteles of institutional versus individual investors. In this case, low-taxed institutional investors would prefer high dividend stocks and high-taxed individual investors would prefer to avoid dividends, instead preferring unrealized capital gains and stock repurchases (DeAngelo, DeAngelo, & Skinner, 2008). If clientele effects would be a key determinant of corporate payout policy, there should also be substantial heterogeneity in payout policies offered by firms, thereby offering alternatives for different investor tax preferences. More specifically, independent of firm size and industry, there should be firms with high current payouts and low current payouts, thereby offering the opportunity for a diversified portfolio for different tax clienteles. In contrast, as mentioned before, both dividends and share repurchases are dominated by a small number of large groups. For example, DeAngelo, DeAngelo, and Skinner (2004) find that across or within industries, the market does not offer a broad spectrum of dividend heterogeneity. Additionally, most of the non-paying firms are clustered in the technology sector. Therefore, it can be inferred that the pressure to satisfy heterogeneous clienteles only has minor impact on dividend policy. In addition, the findings of several other papers cast doubt on clientele theories as a key determinant of corporate payout policies (Brav, Graham, Harvey, & Michaely, 2005; Denis & Osobov, 2008; DeAngelo, DeAngelo, & Skinner, 2008).

I discussed signaling motives in the context of both share repurchases and dividends. To quickly recap, the signaling hypothesis seems to be a second-order determinant at best for share repurchase decisions. Especially recent studies find little evidence for the signaling hypothesis. As for dividends, the signaling hypothesis has more relevance. This is because signaling motives play an important role in the context of managerial reluctance to cut dividends, and managers go to great lengths to avoid dividend cuts.

DeAngelo, DeAngelo, and Skinner (2008) provide an extensive theoretical overview of dividend policy using Modigliani and Miller (1961) and Lintner (1956) as foundation of their framework. They find that a framework based on asymmetric information between managers and outside investors does a good job of explaining the main features of corporate payout policy observed in practice. Asymmetric information between managers and outside investors plays a role in the agency cost of free cash flow framework, but is perhaps more pronounced in security valuation problems as depicted by Myers and Majluf (1984). They present a theoretical model of the situation in which a firm's management has superior information. Additionally, this firm must issue common stock to raise cash for a valuable (positive NPV) investment opportunity. They formally show that, in some cases, the management will not issue new shares and thereby forego on the investment opportunity. The inside information is so favorable that, if management acts in the interest of 'current' or 'old' shareholders, the costs to old shareholders of issuing shares at a low price may outweigh the project's NPV. Consequently, real capital investment is misallocated and firm value is reduced. To avoid being put in this situation, management can arrange financial slack (cash holdings or access to default-risk-free debt). Firms with ample financial slack would never pass up on a positive NPV project. Thus, the model has an important implication, namely that there are significant benefits to financial slack. Additionally, their model suggests a certain 'pecking order' in financing decisions: Firms should finance positive NPV projects by using internally generated cash first, then by issuing debt, and lastly by issuing equity. Considering both the benefits of financial slack and the pecking order framework, Myers and Majluf argue that: "financing matters" (Myers & Majluf, 1984).

To further elaborate, DeAngelo, DeAngelo, and Skinner (2008) propose an asymmetric information framework which embeds agency costs and security valuation problems and emphasizes the need to distribute free cash flows to maximize shareholder value. They find that this framework is in line with current patterns observed in payout policy, referring to the size, timing and to a lesser degree the form of payouts. On the same line, this framework provides a theoretical explanation for the observed 'two-tier structure' in aggregate payouts, as in DeAngelo, DeAngelo, and Skinner (2004). They also urge that agency costs should include managerial biases such as optimism and overconfidence, which I explained earlier. This framework is in line with life-cycle theories, as advocated by many, e.g. (Fama & French, Disappearing dividends: changing firm characteristics or

lower propensity to pay?, 2001; Grullon & Michaely, 2004; Denis & Osobov, 2008). In this framework, firms in early stages of the life-cycle tend to have ample investment opportunities, low cash reserves and negative to low FCFs. These young firms tend to have high cost of capital, high growth rates and high systematic risk. As firms become more mature, thus advancing to later phases in the life-cycle, firms experience a decline in investment opportunities, growth rates, cost of capital and systematic risk. However, their FCFs and thereby cash reserves tend to increase. Key is that the trade-off between the benefits of retention [as in Myers and Majluf (1984)] and the costs of retention [agency costs of free cash flow as in Jensen (1986)] plays an important, time-varying role. In early stages of the life-cycle, being able to invest in every valuable investment opportunity is of high priority, whereas limiting the agency costs of free cash flow is less important. However, in later stages of the life-cycle, this trade-off is the other way around. Therefore, as observed in practice, more mature firms start to increase their payout to limit the agency costs of free cash flow. More specifically, dividends are used to reflect permanent earnings, whereas share repurchases are used to reflect transitory earnings. It can be concluded that dividends and share repurchases should be viewed as complements, rather than substitutes.

2.4 Payout policy and firm characteristics

Firm characteristics and payout policy are inherently connected. For instance, Fama and French (2001) find that dividend payers are larger, have higher book-leverage ratios and have higher profitability than non-payers, on average. Additionally, using different measures, dividend payers have lower investment opportunities compared to non-payers. The fundamentals size, book-leverage and profitability are rather straightforward. Investment opportunities, however, deserves a little more attention. The framework of DeAngelo, DeAngelo, and Skinner (2008) describes the role of investment opportunities and the consequences for payout policy in the context of a life-cycle theory. This framework emphasizes the changing investment opportunity set over the life-cycle of a firm. Young firms tend to have ample investment opportunities, whereas large firms experience a significant decline in investment opportunities. As firms become larger, more profitable and experience a decrease in investment opportunities, they start to return wealth to shareholders by paying dividends or repurchasing shares. Consequently, as observed in practice, the aggregate supply of both dividends and share repurchases is dominated by large firms. Thus, this framework suggests that payout policy is partly determined by investment opportunities. In line with this framework, Gugler (2003) finds that firms with low investment opportunities (no R&D spending) have larger target dividend payout ratios than firms with good growth prospects (positive R&D spending), examining a sample of Austrian firms over 1991 – 1999. In addition, Fama and French (2001) find that R&D expenditures scaled by total assets are 2.76 percent for firms that have never paid dividend, whereas this ratio is 1.61 percent for

dividend paying firms. Additionally, using logistic regressions, they also show that firms with more investment opportunities are less likely to pay dividends. In these regressions, growth rate of assets and market-to-book assets ratio are used as proxies for investment opportunities. Fama and French (2001) also address the notion of using capital expenditures as a proxy for investment opportunities. It is mentioned that capital expenditures relate to the change in long-term assets, however, Fama and French believe that short-term assets should be considered as investments as well. This is the reason why the growth rate of total assets is used. Adam and Goyal (2008) specifically examine several proxy variables for a firm's investment opportunities. They test different proxy variables on their information content and find that the book-to-market assets ratio (simply the inverse of the market-to-book assets ratio) has the highest information content with respect to the investment opportunity set. This reinforces the results of Fama and French (2001) and the use of market-to-book assets ratio as proxy for investment opportunities.

International evidence regarding firm characteristics of dividend paying firms is provided by Denis and Osobov (2008). Their international sample consists of the US, Canada, UK, Germany, France, and Japan. Consistent with the findings of Fama and French (2001), they find that dividend paying firms are large, profitable firms with low investment opportunities. The results of both Denis and Osobov (2008) and Fama and French (2001) fit the theoretical framework of DeAngelo, DeAngelo, and Skinner (2008).

As for share repurchases, Fama and French (2001) find they are largely carried out by dividend paying firms. Evidently, most share repurchasing firms have the same characteristics as dividend paying firms. Although this is indeed the case, Skinner (2008) finds that most young firms who choose to payout shareholders do so in the form of share repurchases. It is suggested that a loss generating firm has more institutional and/or legal difficulties with paying dividends than carrying out share repurchases. Overall, the results of Skinner (2008) suggest that repurchasing-only firms tend to be in earlier stages of the life-cycle compared to firms who both pay dividends and repurchases shares. Thus, *I hypothesize that repurchasing-only firms are smaller, less profitable firms with more investment opportunities compared to dividend-only firms and firms who both pay dividends and make repurchase shares.* Additionally, Skinner (2008) finds that the group of firms who only pay dividends is rather small. It is argued that the primary groups of payers since the 1980's are firms who only repurchase shares and firms who pay dividends and repurchase shares. This makes sense, considering that Fama and French (2001) find a declining propensity to pay dividends, regardless of firm characteristics. *I re-examine whether repurchase-only firms and firms who both pay dividends and repurchase shares are the primary group of payers in terms of aggregate payouts and percent of sample firms.*

Interestingly, the development of aggregate dividends and share repurchases over time is notably different, especially surrounding the subprime crisis. Aggregate share repurchases were cut

aggressively during the subprime crisis, whereas aggregate dividends only experienced a slight decrease (Floyd, Li, & Skinner, 2015). Specifically, aggregate share repurchases declined by 71 percent over 2007 – 2009, whereas aggregate dividends only declined by 5.4 percent over the same period. This is consistent with managerial reluctance to dividend cuts, the common practice of dividend smoothing and the flexibility component of share repurchases. It is also in line with dividends being used to reflect permanent earnings and share repurchases being used to reflect transitory earnings. More importantly, this shows the highly pro-cyclical nature of share repurchases (Dittmar & Dittmar, 2008; Skinner, 2008; Floyd, Li, & Skinner, 2015). Taking this into account, *I hypothesize that the increase in share repurchases will outstrip the increase in dividends in the period after the subprime-crisis.*

Investments is yet another relevant firm characteristic. Investments can be directly measured, as opposed to investment opportunities which is usually measured using a proxy variable such as the market-to-book assets ratio. The article of Lazonick (2014) is part of a growing body of literature which is concerned about the consequences of the increasing share repurchase activity. Lazonick states that listed firms distribute too much wealth to shareholders and invest too little in productive capabilities. In addition, Lazonick believes share repurchases are used to manipulate stock prices, for instance to boost stock based compensation packages. Chan, Ikenberry, Lee, and Wang (2010) consider this matter from an empirical perspective. Using a sample of 7628 open-market share repurchases, they find that managers with poor earnings quality are under greater pressure to boost stock prices. Additionally, these firms appear to have more exercisable stock options, providing yet another incentive to boost stock prices. Moreover, investors are unable to differentiate between firms with poor earnings quality and other firms, as the share repurchase announcements all show an initial positive market reaction of around 2 percent. Consequently, the market does not realize a potential misleading share repurchase announcement. In this case, 'misleading' refers to the implied signal of undervaluation and bright earnings prospects, which is clearly not applicable for these firms. They also show that share repurchase announcements of firms with poor earnings quality are, on average, followed by significant decrease in operating performance compared to the general case. Although the firms with poor earnings quality only represent less than 10 percent of their sample, it shows that firms can successfully send misleading signals using share repurchase announcements. These results provide some justification to the concerns regarding the increasing popularity of share repurchases.

To address the concerns regarding share repurchases and the possible negative impact on a firm's future growth, Koller (2015) examines capital expenditures and R&D in relation to US GDP. He finds that both the inflation-adjusted capital expenditures and R&D average yearly growth outstripped the US GDP average yearly growth over the period 1989 – 2014. More specifically, capital expenditures and R&D grew at an average yearly rate of 2.7 percent and 5.4 percent respectively, whereas the US GDP grew at an average yearly rate of 2.4 percent. Consequently, Koller concludes that the possible

negative effects of share repurchase on future growth are inexistent. Interestingly, Kallapur and Trombley (1999) find that capital expenditure and R&D are suboptimal proxies for future growth compared to the market-to-book assets ratio. This is tested by examining several growth proxies from a certain reference year in relation to realized growth in the subsequent three-year period. Although the capital expenditure variables show the correct correlation with future growth, their t-statistics are considerably smaller (yet still significant). Additionally, R&D variables show weak and inconsistent correlation with future growth. These findings might cast doubt on the suggestion of Koller (2015) that the increase in share repurchases do not impact a firm's future growth negatively. I will add to the results of Koller (2015) and Lazonick (2014) by examining investments across different groups of payout firms and non-paying firms. In line with Lazonick, *I hypothesize that investments across different groups of payout firms are significantly lower than for non-paying firms.* Additionally, it can be expected that firms who both pay dividends and repurchase shares have the lowest investments relative to other payout groups.

To examine the concerns of Lazonick (2014) from a different perspective, I will also examine payout ratios of different groups. The article conveys the impression that payout ratios have increased among listed firms, although the subprime-crisis impacted payout ratios negatively. However, since share repurchases have become an integrated part of payout policy, payout policy has become more pro-cyclical. Therefore, *I hypothesize that payout ratios increase after the subprime-crisis amongst repurchase-only firms, dividend-only firms and firms who both pay dividends and repurchase shares.* Due to the pro-cyclical nature of share repurchases, it can be expected that the increase in payout ratios is of higher magnitude for repurchase-only firms than dividend-only firms. Similar, the share repurchase component is expected to increase faster than the dividend component in terms of payout ratios for firms with both payouts. Note that dividend payout has a smoother path over the business cycle.

Lastly, a distinction is made between high-technology firms and other firms, which I refer to as non-technology firms for simplicity. This distinction will help to explain the variations in payouts. Although technology firms are represented in every payout group, sector specific analysis might yield interesting insights. DeAngelo, DeAngelo, and Skinner (2004) find that some very large technology firms like Microsoft, Oracle, and Cisco Systems have very high earnings, repurchase shares actively but do not pay dividends in 2000. DeAngelo, DeAngelo, and Skinner (2008) also find that firms like Cisco and Dell, who repurchase but do not pay dividends, might indicate that some part of repurchases now serves to reflect permanent earnings. In this paper, I focus on the entire high-technology sector to provide additional insights. I intend to provide information regarding payout policy and firm characteristics of high-technology firms versus non-technology firms.

CHAPTER 3 Data and methodology

The database of Compustat Annual (via WRDS) is used to request data for the period 1980 to 2015. The year 1980 as a starting point is used since share repurchases became increasingly popular during this period. This is mostly due to the SEC rule 10b-18 instituted in 1982, which shields repurchasing firms against share price manipulation charges if certain criteria are met. Note that the focus of this paper is not to highlight the already well-documented changes in payout policy before and after the adoption of rule 10b-18. Rather, this paper focuses on the development of payout policy since 1980. As Skinner (2008) mentions, share repurchases only begin in material amounts in the 1980's. Following DeAngelo, DeAngelo, and Skinner (2008), the sample includes NYSE, AMEX and NASDAQ industrial firms, thus excluding SIC codes 4900-4949 and 6000-6999 (financial and utility firms). A firm is included in the sample if the fiscal year applies to the calendar year period 1980 – 2015. Data is also collected for fiscal years of 1979 to allow lagged variables to have values at the start of the sample period. The following variables must be available (non-missing values) over the full sample period for a firm to be included in the sample (Compustat item number in parentheses): Assets (#6), income before extraordinary items (#18), dividend (#21), stock price (#199), shares outstanding (#25), book value of equity (#216), common treasury stock (#226), purchase of common and preferred stock (#115), sale of common and preferred stock (#108), total liabilities (#181), special items (#17) and capital expenditures (#128). I follow Fama and French (2001) and exclude firms with book equity below $250,000 or assets below $500,000. To construct the measure of net repurchases, which considers both tender and open market share repurchases, I use a common algorithm to remove the effect of shares issued for employee stock options, to fund acquisitions, and other corporate purposes (Fama & French, Disappearing dividends: changing firm characteristics or lower propensity to pay?, 2001; Skinner, 2008; DeAngelo, DeAngelo, & Skinner, 2008; Floyd, Li, & Skinner, 2015).[5] Fama and French (2001) mention that the Compustat of common treasury stock starts in 1982, therefore, the first year for a difference in common treasury stock is 1983. Market value of equity is constructed as the stock price (#199) times the number of shares outstanding (#25). Total payout is given as the sum of dividends (#21) and net repurchases. Also, following Skinner (2008), earnings (#18) are adjusted for the effect of special items (#17).[6]

[5] If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero.

[6] Earnings are measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17), thereby assuming an effective tax rate of 40 percent.

First, the data will be analyzed in a descriptive way to show the trends in dividends, share repurchases and total payout over time, like Floyd, Li and Skinner (2015). In the descriptive approach, I combine elements of Skinner (2008) and Floyd, Li, and Skinner (2015). Tables of yearly aggregate dividends, share repurchases and total payout are constructed. In addition, yearly percentages of payout contributed by different payout groups are reported. In this case, I consider dividend-only firms, repurchase-only firms and firms who both pay dividends and repurchase shares. Next, yearly fractions of different payout groups of the total sample firms are reported. Additionally, I report yearly aggregate figures of income before extraordinary items, special items and earnings adjusted for special items to show the increasing impact of special items over time, as mentioned by Skinner (2008). To visualize the corporate payout developments over time, graphs of aggregate figures and fractions of different payout groups are constructed. Like Floyd, Li, and Skinner (2015), I report firm-level median dividend payout ratios and total payout ratios for different payout groups. They acknowledge that payout ratios can be presented in several ways and choose to report median firm-level payout ratios. Median payout ratios are less sensitive for outliers than average payout ratios. Firm/years with negative earnings are dropped. Payout ratios are constructed by dividing either dividends or total payout by earnings adjusted for special items.

In addition, I repeat several procedures for high-technology firms and non-technology firms to help explain the variations in payouts over time. I follow Kile and Phillips (2009) in their approach to construct a sample of high-technology firms using three-digit SIC codes. A firm/year is identified as high-technology if it matches to one of following three-digit SIC codes (industry name in parenthesis): 283 (Drugs), 357 (Computer and Office Equipment), 366 (Communication Equipment), 367 (Electronic Components and Accessories), 382 (Laboratory, Optic, Measure, Control Instruments), 384 (Surgical, Medical, Dental Instruments), 481 (Telephone Communications), 482 (Miscellaneous Communication Services), 489 (Communication Services, NEC), 737 (Computer Programming, Data Processing, etc), and 873 (Research, Development, Testing Services). If a firm/year does not match any of these three-digit SIC codes, it is classified as non-technology. Of course, some technology is present in these firms, however, for simplicity I refer to this group as non-technology. Also, median firm-level earnings per share are shown graphically for different payout groups, as well as high-technology firms and non-technology firms.

Next, an empirical approach is considered to examine the development of dividends, share repurchases and total payout over time. First, the relation between payouts and earnings is examined. More specifically, following the methodology of Skinner (2008), Lintner-model regressions are estimated. As in Fama and Babiak (1968), the underlying assumption is of the traditional Lintner-model is that for any year *t*, the target dividends (D_{it}^{*}) for firm *i* are related to earnings:

$$D_{it}^{*} = r_i E_{it} \quad (1)$$

D_{it}^{*} = Target dividends

E_{it} = Earnings

r_i = Target payout ratio

Another assumption is that the firm will only partially adjust to the target dividend level in any given year. Thus, the change in dividends from year *t-1* to year *t* is given by:

$$\Delta D_{it} = \alpha_i + c_i(D_{it}^{*} - D_{i,t-1}) + u_{it} \quad (2)$$

D_{it}^{*} = Target dividends

D_{it} = Dividends

c_i = Speed of adjustment coefficient

Substitution of (1) into (2) yields equation (3) that incorporates the target payout ratio and the speed of adjustment coefficient:

$$\Delta D_{it} = \alpha_i + c_i r_i E_{it} - c_i D_{i,t-1} + u_{it} \quad (3)$$

D_{it} = Dividends

E_{it} = Earnings

c_i = Speed of adjustment coefficient

r_i = Target payout ratio

Or:

$$\Delta D_{it} = \alpha_i + \beta_1 E_{it} + \beta_2 D_{i,t-1} + u_{it} \quad (4)$$

D_{it} = Dividends

E_{it} = Earnings

In this case, $\beta_1 = c_i r_i$ and $\beta_2 = -c_i$. Skinner (2008) introduces a variation on the traditional dividend model to test the relation between earnings and total payout instead of dividends, where total payout is the sum of dividends and share repurchases:

$$\Delta Pay_{it} = \alpha_i + \beta_1 E_{it} + \beta_2 Pay_{i,t-1} + u_{it} \quad (5)$$

Pay_{it} = Sum of Dividends and Repurchases

E_{it} = Earnings

Regression (4) will be estimated for all dividend-paying firms, dividend-only firms and firms who both repurchase shares and pay dividends. Regression (5) will be estimated for all repurchase firms,

repurchasing-only firms and firms using both payout methods. Earnings adjusted for special items are used, since this measure yields a higher explanatory power in almost every specification compared to bottom-line earnings (Skinner, 2008). Using regressions (4) and (5), the speed of adjustment coefficient is defined as -β_2 and the target payout ratio as -β_1/β_2. Since literature suggests that repurchases have become increasingly important since the 1980's, it can be expected that regression (5) has more explanatory power than regression (4) in terms of the adjusted R-squared when considering the group of both payout forms. This would indicate that earnings drive total payout instead of dividends. Consequently, this would also indicate that share repurchases are integrated in the payout policy. Additionally, due to the more flexible nature of share repurchases, the speed of adjustment coefficient is expected to be higher for repurchasing-only firms over firms that use both payout methods. Overall, estimating and comparing regressions (4) and (5) for the different groups of payers will help explain the observed trends over time.

In addition, like Fama and French (2001), firm characteristics of different payout groups over different subperiods are tabulated. More specifically, I report mean firm characteristics for repurchase-only firms, dividend-only firms, firms who both pay dividends and repurchase shares, non-paying firms, and all sample firms. For each subperiod and for each payout group, the following mean firm characteristics are reported: Market-to-book assets ratio, capital expenditures scaled by assets, debt ratio, assets, earnings and retained earnings. The market-to-book assets ratio serves as a proxy for investment opportunities and capital expenditures scaled by assets is an investment measure (Fama & French, 2001). The debt ratio measures the total liabilities relative to total assets and indicates the amount of leverage.

Next, following the approach and variable selection of Fama and French (2001) and Skinner (2008), logistic regressions are estimated year-by-year to formally show which firms are more likely to pay dividends, share repurchases, or both. These regressions help to explain the differences in firm characteristics between different payout groups and non-paying firms. Examining the difference in characteristics between payout groups helps to make the connection with payout policy theories. Evidently, since the logit regressions are estimated year-by-year, changes in characteristics over time can be observed as well. The dependent variable will be coded as 1 and 0 for different payout groups, thus each specification includes two types of firms. For example, one specification of the dependent variable will be 1 for firm/years if share repurchases are carried out but no dividends are paid and 0 for firm/years if a firm pays both dividends and share repurchases. Note that the results of Skinner (2008) and Fama and French (2001) indicate that almost all corporate payouts are carried out by two groups, namely repurchasing-only firms and firms that both pay dividends and repurchase shares. I re-examine the case and consider different specifications that include non-paying firms, dividend-only firms, repurchase-only firms and firms who both pay dividends and repurchase shares. Variables

included in the logit regressions are presented in Table 1. All variables are constructed the same way as either Fama and French (2001) or Skinner (2008), except for the investment variable. I choose to define the investment measure as capital expenditures scaled by assets. Fama and French (2001) mention that capital expenditures are roughly the same as the change in long-term assets, as opposed to the change in total assets, which also includes changes in short-term assets. My view is that the change in long-term assets is more applicable in this case, as the investment measure aims to identify relative investments across different payout groups. Ultimately, the goal is to highlight which payout groups invest significantly less in productive capabilities than other payout groups. This will help to explain whether the concerns of Lazonick (2014) are justified or not. Like Skinner (2008), variables are winsorized at the 1 percent and 99 percent level to adjust for outliers. Note that variables are only winsorized for the logistic regressions, whereas unwinsorized variables are used in the remainder of the results. Unwinsorized variables allow procedures such as median payout ratios. In total, five specifications of logistic regressions are estimated, which are presented in the Appendix. Specifications that include payout groups with share repurchases start at 1983, since this is when net share repurchases start. For specifications that include non-paying firms, the life-cycle variable is scaled by assets instead of the book value of equity, since the book value of equity is negative for many non-paying firms.

Table 1
Variable description table for different firm characteristics used for sample industrial firms, 1980 – 2015.

Firm characteristic	Variable	Variable description
Investment opportunities	V_t / A_t	V_t / A_t is the market-to-book assets ratio, where V_t is the market value of assets and A_t is the book value of assets (#6). V_t is measured as ($A_t - BVE_t + MVE_t$), where BVE_t is the book value of equity (#216) and MVE_t is the market value of equity, calculated as the stock price (#199) times the shares outstanding (#25).
Current investment	$CAPEX_t / A_t$	$CAPEX_t$ is capital expenditures (#128), and is scaled by assets (#6).
Leverage	L_t / A_t	L_t is total liabilities (#181) and is scaled by assets (#6).
Size	$Ln(A_t)$	Natural logarithm of assets (#6)
Profitability	E_t / A_t	E_t is earnings, measured as income before extraordinary items (#18) minus 60 percent of special items (#17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. Variable is scaled by assets (#6).
Life-cycle	RE_t / BVE_t	RE_t is retained earnings (#36) and is scaled by the book value of equity BVE_t (#216). Following Skinner (2008), when considering non-payers, retained earnings is scaled by assets (#6) instead of the book value of equity since the book value of equity is negative for a large fraction of non-payers.

CHAPTER 4 Results

4.1 Aggregate earnings and payouts by different payout groups

As part of the descriptive analysis part, it is interesting to look at yearly aggregate figures of dividends, share repurchases, total payout and earnings. Figure 1 displays the development over time of aggregate dividends and repurchases. By construction, the upper line of the graph depicts total payout, since this is defined as the sum of dividends and share repurchases. Complementary to Figure 1 is Table 2, which presents yearly aggregate figures of dividends, share repurchases and total payout, as well as the percent share of total payout for different payout groups.

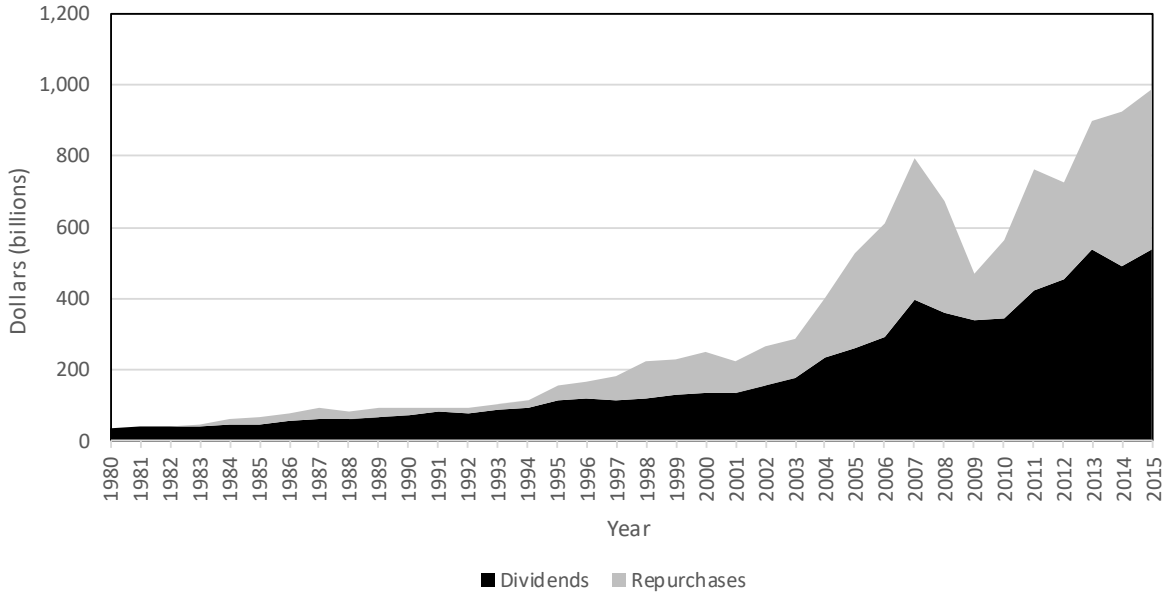

Figure 1
Aggregate dividends and repurchases for sample US industrial firms, 1980 – 2015 (in billions of dollars).

Dividends are measured as dividends to common stockholders (Compustat #21). Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero.

Both Figure 1 and Table 2 show the impact of the subprime-crisis on both payout forms in the years 2007 and 2008. The pre-crisis period shows a rapid increase in both payout forms, followed by a sharp decline in the post-crisis period. Over the period 2007 – 2009, dividends dropped by 13.6 percent whereas share repurchases dropped by 67.4 percent. Both repurchases and dividends start to increase again in 2010, reaching almost a trillion dollars of aggregate total payout in 2015. Over 2009 – 2015, share repurchases grew from $130,715 million to $453,072 (247 percent), whereas dividends grew from $341,031 million to $537,175 million (58 percent). These results confirm the hypothesis that the growth of share repurchases exceeds the growth of dividends in the period after the subprime-crisis.

Table 2
Yearly percent share of aggregate payout and aggregate payout figures for different payout groups of sample US industrial firms, 1980 – 2015.

For every payout group, the percent share of yearly aggregate payout is reported. The distribution is split into firms that only pay dividend, firms that only repurchase shares and firms who both pay dividend and repurchase shares. Additionally, yearly aggregate payout is reported for completeness. Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. Dividends are measured as dividends to common stockholders (Compustat #21). Total payout is defined as the sum of net repurchases and dividends. The average reported at the bottom of the table refers to the period 1983 – 2015.

	Percent share of total payout by payout group			Aggregate payout in millions of dollars		
Year	Dividend-only	Repurchase-only	Firms that pay dividends and repurchase	Dividends	Repurchases	Total payout
1980	100.0%	0.0%	0.0%	37,180	0	37,180
1981	100.0%	0.0%	0.0%	40,016	0	40,016
1982	100.0%	0.0%	0.0%	39,437	0	39,437
1983	70.5%	0.7%	28.8%	40,608	3,924	44,533
1984	45.6%	4.4%	50.0%	45,363	16,182	61,544
1985	46.7%	0.9%	52.4%	47,368	21,323	68,691
1986	38.8%	1.1%	60.1%	54,964	21,611	76,575
1987	34.0%	3.5%	62.5%	61,442	30,024	91,466
1988	38.9%	2.8%	58.2%	59,238	24,351	83,590
1989	43.3%	1.9%	54.8%	67,833	26,325	94,158
1990	43.6%	1.3%	55.1%	73,068	20,501	93,569
1991	60.3%	1.1%	38.6%	80,374	12,245	92,619
1992	54.3%	1.7%	44.0%	75,383	14,860	90,243
1993	53.8%	1.7%	44.5%	85,504	16,362	101,865
1994	52.2%	2.7%	45.1%	92,655	21,050	113,705
1995	43.3%	1.8%	54.9%	113,309	41,145	154,454
1996	41.4%	3.8%	54.8%	120,735	45,485	166,219
1997	33.4%	5.8%	60.8%	112,893	69,022	181,915
1998	23.9%	8.5%	67.6%	120,950	100,643	221,593
1999	30.5%	10.7%	58.9%	126,959	103,486	230,445
2000	25.8%	12.3%	61.9%	135,559	113,100	248,658
2001	29.5%	9.5%	61.1%	134,344	87,040	221,384
2002	29.5%	13.6%	56.9%	153,034	110,644	263,678
2003	27.3%	8.3%	64.4%	176,831	108,458	285,288
2004	25.5%	7.6%	66.9%	231,406	168,935	400,341
2005	19.7%	9.1%	71.2%	261,125	265,142	526,267
2006	18.9%	11.2%	69.9%	290,048	323,025	613,073
2007	19.6%	9.5%	70.9%	394,642	401,239	795,881
2008	25.4%	10.6%	63.9%	361,105	312,620	673,725
2009	38.8%	5.6%	55.6%	341,031	130,715	471,745
2010	31.8%	8.4%	59.9%	345,185	217,205	562,390
2011	26.6%	7.9%	65.5%	420,862	342,400	763,262
2012	31.0%	5.6%	63.4%	454,578	274,020	728,597
2013	29.2%	5.2%	65.7%	537,732	363,257	900,989
2014	20.6%	7.0%	72.5%	490,176	437,023	927,199
2015	23.3%	6.6%	70.0%	537,175	453,072	990,247
Average	35.7%	5.8%	58.5%	-	-	-

Overall, both Figure 1 and Table 2 highlight the pro-cyclical nature of share repurchases versus more stable dividends due to dividend smoothing and the managerial reluctance to dividend cuts. The subprime crisis certainly impacts both payout forms, but the magnitude of the impact is larger on share repurchases compared to dividends. Overall, share repurchases are more volatile than dividends, which can be expected from a theoretical perspective. It is in line with the flexibility component of share repurchases, and supports the suggestion that share repurchases are used to reflect transitory earnings whereas dividends are used to reflect permanent earnings (Jagannathan, Stephens, & Weisbach, 2000).

In line with the results of Floyd, Li, and Skinner (2015), the measure of net repurchases starts to become material from 1983. This is due to the Compustat database common treasury stock measure starting in 1982, and thus, the difference in common treasury stock starting in 1983. To account for this, the average reported at the bottom of the table refers to the period 1983 – 2015 for all payout groups. Additionally, both Figure 1 and Table 1 display that aggregate total payout has surpassed the pre-crisis levels in terms of nominal dollars. More specifically, since 2013, aggregate total payout is exceeding the previous peak of $795,881 million in 2007. Aggregate share repurchases exceed aggregate dividends for the first time in 2005, and again in 2007. This differs from the results of Grullon and Michaely (2002), who find that repurchases outstrip dividends for the first time in 1999. This difference is most likely due to sample selection criteria and a different variable definition of share repurchases. I choose to follow the algorithm of net repurchases, which appears to have become the standard and preferred measurement of share repurchases to remove the effect of shares issued for employee stock options, to fund acquisitions, and other corporate purposes (Fama & French, 2001; DeAngelo, DeAngelo, & Skinner, 2008; Skinner, 2008; Floyd, Li, & Skinner, 2015). Additionally, I require non-missing values for 12 variables, whereas Grullon and Michaely (2002) maintain a threshold of four variables. Also, like Fama and French (2001), firms with book equity below $250,000 or assets below $500,000 are excluded.

As for the different payout groups, it appears that payouts by the dividend-only group have become smaller over time. In contrast, payouts carried out by the group of both payout forms have become larger over time, peaking in 2014 with 72.5 percent of total payouts. This is in line with the increasing popularity of share repurchases since the 1980's. Payouts carried out by the repurchase-only group are relatively small throughout the whole sample period, with a peak of 13.6 percent of total payout in 2002. Note that the payouts by the dividend-only group outstrip the payouts by the repurchase-only group in every sample year. Also, firms that both pay dividends and repurchase shares contribute the largest part of payouts, especially in the second half of the sample period. This is also highlighted by the average of 58.5 percent share of total payout by the group of both payout forms, versus 35.7 percent by the dividend-only group and 5.8 percent by the repurchase-only group. Overall,

Table 3
Fraction of sample US industrial firms in different payout groups, 1980 – 2015.

For every given year, fractions are reported for: firms that only pay dividend, firms that only repurchase shares, firms that both pay dividends and repurchase shares, firms that neither pay dividends nor repurchase shares, all firms that pay dividend, all firms that repurchase shares and the count of total sample firms. Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. Dividends are measured as dividends to common stockholders (Compustat #21). Total payout is defined as the sum of net repurchases and dividends. The average reported at the bottom of the table refers to the period 1983 – 2015.

Year	Dividend -only	Repurchase -only	Both payout forms	Non-payers	All dividend payers	All repurchase firms	Total firms
1980	59.2%	0.0%	0.0%	40.8%	59.2%	0.0%	3,460
1981	51.3%	0.0%	0.0%	48.7%	51.3%	0.0%	3,891
1982	48.9%	0.0%	0.0%	51.1%	48.9%	0.0%	3,794
1983	34.4%	6.3%	8.7%	50.6%	43.1%	15.0%	4,109
1984	28.6%	8.9%	12.1%	50.4%	40.7%	21.0%	4,119
1985	27.8%	9.3%	11.7%	51.1%	39.5%	21.0%	3,969
1986	24.3%	9.8%	11.9%	54.0%	36.2%	21.6%	4,030
1987	19.2%	13.1%	14.6%	53.1%	33.8%	27.7%	4,119
1988	20.5%	13.6%	12.9%	53.0%	33.4%	26.5%	3,920
1989	22.4%	11.6%	12.0%	54.0%	34.4%	23.6%	3,781
1990	20.2%	12.9%	14.0%	52.9%	34.2%	26.9%	3,724
1991	23.5%	10.4%	9.6%	56.5%	33.1%	20.0%	3,799
1992	23.0%	9.3%	8.7%	59.0%	31.7%	18.0%	4,129
1993	21.7%	9.1%	8.3%	61.0%	30.0%	17.4%	4,509
1994	19.3%	10.0%	9.0%	61.7%	28.3%	19.0%	4,829
1995	17.9%	10.3%	9.6%	62.1%	27.5%	19.9%	5,175
1996	16.7%	11.1%	9.8%	62.4%	26.5%	20.9%	5,431
1997	15.2%	13.8%	10.7%	60.2%	25.9%	24.6%	5,307
1998	12.8%	18.7%	12.5%	56.0%	25.3%	31.2%	5,154
1999	12.0%	19.0%	10.8%	58.2%	22.8%	29.8%	5,199
2000	10.7%	17.2%	11.1%	61.1%	21.7%	28.2%	5,111
2001	12.4%	18.9%	9.3%	59.4%	21.7%	28.2%	4,645
2002	13.6%	19.0%	8.5%	59.0%	22.0%	27.4%	4,443
2003	14.9%	16.2%	10.1%	58.7%	25.0%	26.4%	4,298
2004	17.0%	13.1%	10.9%	59.0%	27.9%	24.0%	4,217
2005	17.2%	13.6%	12.9%	56.3%	30.1%	26.5%	4,133
2006	15.3%	15.5%	14.6%	54.7%	29.9%	30.0%	4,098
2007	14.3%	16.7%	15.5%	53.5%	29.7%	32.2%	4,122
2008	14.6%	22.9%	15.2%	47.3%	29.8%	38.1%	3,911
2009	17.7%	17.9%	11.0%	53.4%	28.7%	28.9%	3,690
2010	16.7%	17.6%	13.2%	52.5%	30.0%	30.8%	3,666
2011	16.3%	20.0%	15.8%	47.9%	32.1%	35.8%	3,632
2012	18.8%	17.2%	17.0%	47.0%	35.8%	34.2%	3,585
2013	18.4%	16.8%	17.1%	47.8%	35.5%	33.8%	3,587
2014	17.5%	16.6%	18.2%	47.7%	35.7%	34.8%	3,631
2015	16.8%	17.0%	19.9%	46.3%	36.7%	36.9%	3,505
Average or total	18.5%	14.3%	12.3%	54.8%	30.9%	26.7%	150,722

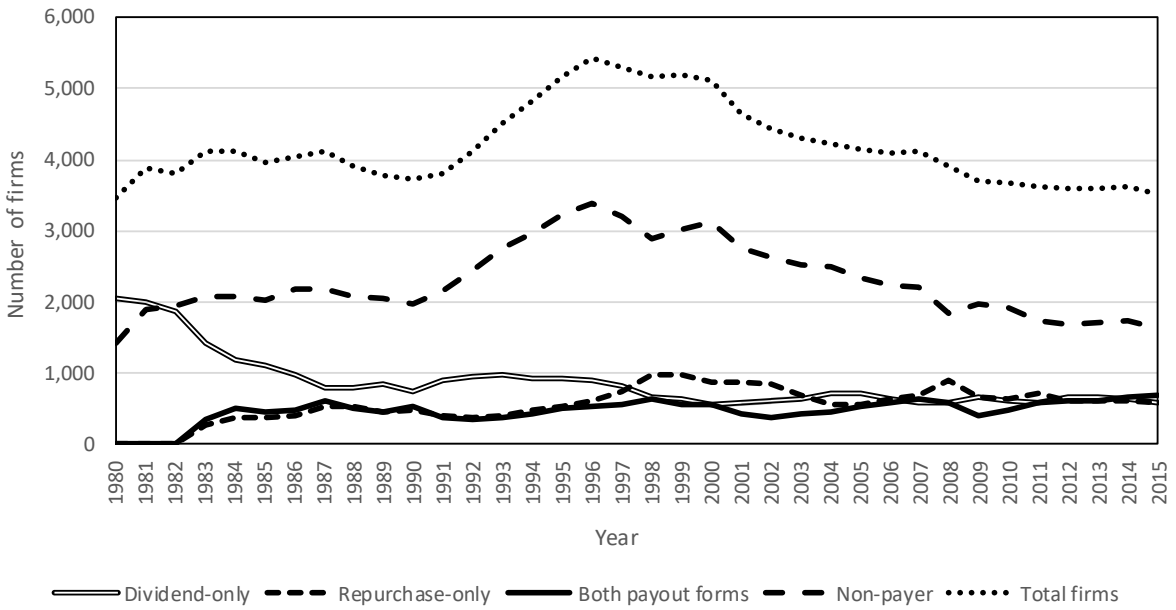

Figure 2
Count of firms in different payout groups of sample US industrial firms, 1980 – 2015.

A firm/year is included in the dividend-only group if dividends are positive and share repurchases are either zero or missing. A firm/year is included in the repurchase-only group if share repurchases are positive and dividends are zero or missing. A firm is included in the group of both payout forms if both dividends and repurchases are positive. A firm/year is included in the non-payer group if both dividends and repurchases are zero or missing. The group of total firms is the total amount of sample firms.

the payout distribution by different payout groups reinforces the suggestion of Fama and French (2001) that share repurchases are mainly carried out by dividend-paying firms. In addition, these results are consistent with the suggestion that the bulk of payouts are now carried out by firms who both pay dividends and repurchase shares (Fama & French, Disappearing dividends: changing firm characteristics or lower propensity to pay?, 2001; Skinner, 2008; DeAngelo, DeAngelo, & Skinner, 2008; Floyd, Li, & Skinner, 2015). Table 3 provides additional information about the distribution of different payout groups in the sample industrial firms. Table 3 reports yearly fractions of each payout group in relation to the total amount of sample firms. In addition, figure 2 provides a graphical overview of the number of firms for different payout groups over time. It is visible that the dividend-only group has declined over time in terms of number of firms. Thus, combining this with Table 2, it can be concluded that the dividend-only group has declined in number of firms and payouts made by this group. However, compared to the other payout groups, the dividend-only group remains relatively large in number of firms and payout contribution. In fact, the dividend-only group has been roughly as large as the repurchase-only group in number of firms over 2005 – 2015, however contributes significantly more in terms of payout. The average percent share of total payout by the dividend-only group over 1983 – 2015 is 35.7 percent, versus 5.8 percent of the repurchase-only group. In fact, the payouts made by the dividend-only group exceed the payouts made by the repurchase-only group in every sample year. This raises doubts to the conclusion of Skinner (2008), who suggests that the main two

payout groups that have emerged since 1980 are repurchase-only firms and firms who both pay dividends and repurchase shares. It can also be concluded that the number of firms in the dividend-only group, repurchase-only group and the group of both payout forms have converged over time, especially in the period 2010 – 2015. The group of firms with no payouts is a relatively large group in the total sample. However, this sample distribution is comparable to the sample of Floyd, Li, and Skinner (2015). Moreover, this sample distribution makes sense, since the literature suggests that most payouts are now carried out by a small group of large, mature firms (DeAngelo, DeAngelo, & Skinner, 2008).

The first step in analyzing firm characteristics of different payout groups is to consider earnings. Table 4 shows income before extraordinary items, special items and adjusted earnings for every sample year. Compustat defines special items as income or expense from unusual or non-recurring items. I follow Skinner (2008) and adjust earnings for the effect of special items. He finds that earnings adjusted for special items does a better job of explaining payouts than bottom-line earnings. Throughout the sample period, special items are almost always negative and become larger over time, consistent with Skinner (2008). The peak of special items is reached during the subprime-crisis with a value of -$388,884 million in 2008. Earnings experience an impressive increase throughout the sample period, surpassing a trillion dollars for the first time in 2007 with aggregate earnings of $1,099,443 million. During the subprime crisis, in the period 2007 – 2009, earnings dropped to $805,148 million dollars, which is a 26.8 percent decrease. In the period 2010 to 2014, earnings exceed the trillion-dollar bound every year. Surprisingly, aggregate earnings at the end of 2015 dropped to $865,232 million from $1,103,936 at the end of 2014, which is a decrease of 21.6 percent. Interestingly, aggregate payouts increased from 2014 to 2015. Figure 3 presents aggregate dividends, share repurchases, total payouts and earnings over 1980 – 2015 to compare these developments over time. Here it becomes visible that aggregate total payout surpasses aggregate earnings in 2015. A possibility might be that this development is explained by an increase in payouts of firms with negative earnings. Although loss-firms indeed increased payouts during 2015, this was only an increase of $33,133 million, and therefore only partly explains this development.[7] As both share repurchases and dividends increased from 2014 to 2015, it becomes clear that firms moved to higher payout ratios, on average. It also indicates that some firms have increased debt to increase payouts, which is plausible due to the low interest rates since the subprime crisis. Figure 3 also depicts the pro-cyclical nature and high correlation between earnings, share repurchases, total payouts, and to a lesser degree dividends.

[7] Aggregate payouts by firms with negative earnings are relatively small throughout the sample and therefore not reported separately. Payouts by firms with negative earnings are $22,773 million and $55,906 million in 2014 and 2015 respectively.

Table 4
Aggregate income before extraordinary items, special items and adjusted earnings for sample US industrial firms, 1980 – 2015 (in millions of dollars).

Yearly figures of aggregate income before extraordinary items (Compustat #18), special items (Compustat #17) and earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent.

Year	Income before extraordinary items	Special items	Adjusted earnings
1980	108,367	1,207	107,642
1981	108,839	2,038	107,617
1982	82,952	-478.1	83,239
1983	96,943	-3,290	98,916
1984	119,252	-3,516	121,362
1985	101,066	-18,067	111,906
1986	96,816	-14,349	105,425
1987	137,325	-7,340	141,730
1988	141,696	-8,870	147,018
1989	156,406	-9,026	161,822
1990	154,908	-13,397	162,946
1991	129,448	-34,665	150,248
1992	135,288	-21,926	148,444
1993	144,130	-46,091	171,785
1994	208,802	-23,367	222,822
1995	253,676	-44,336	280,277
1996	295,804	-42,919	321,556
1997	295,023	-58,108	329,887
1998	271,702	-52,466	303,181
1999	327,595	-26,699	343,614
2000	381,260	-42,083	406,510
2001	39,617	-255,260	192,773
2002	147,707	-284,927	318,663
2003	510,310	-33,356	530,324
2004	657,353	-94,122	713,826
2005	798,786	-107,830	863,484
2006	938,252	-56,772	972,315
2007	1,028,597	-118,077	1,099,443
2008	630,391	-388,884	863,721
2009	803,644	-2,507	805,148
2010	1,063,440	-77,708	1,110,064
2011	1,083,222	-152,594	1,174,778
2012	956,880	-230,173	1,094,983
2013	1,076,133	-100,221	1,136,265
2014	1,015,827	-146,848	1,103,936
2015	761,451	-172,968	865,232

To examine payout ratios for different payout groups more closely, Table 5 reports yearly median dividend payout ratios and median total payout ratios. I follow Floyd, Li, and Skinner (2015) who consider different ways of reporting payout ratios and choose for median firm-level payout ratios. An advantage of median payout ratios is that they are less sensitive for outliers than average payout ratios. Indeed, these results confirm that firms are moving towards higher payout ratios in the pre-crisis period and in the period 2010 – 2015. Every payout group reaches their top median payout ratio in 2015, except for the dividend payout ratio in the group of both payout forms. Almost as soon as the

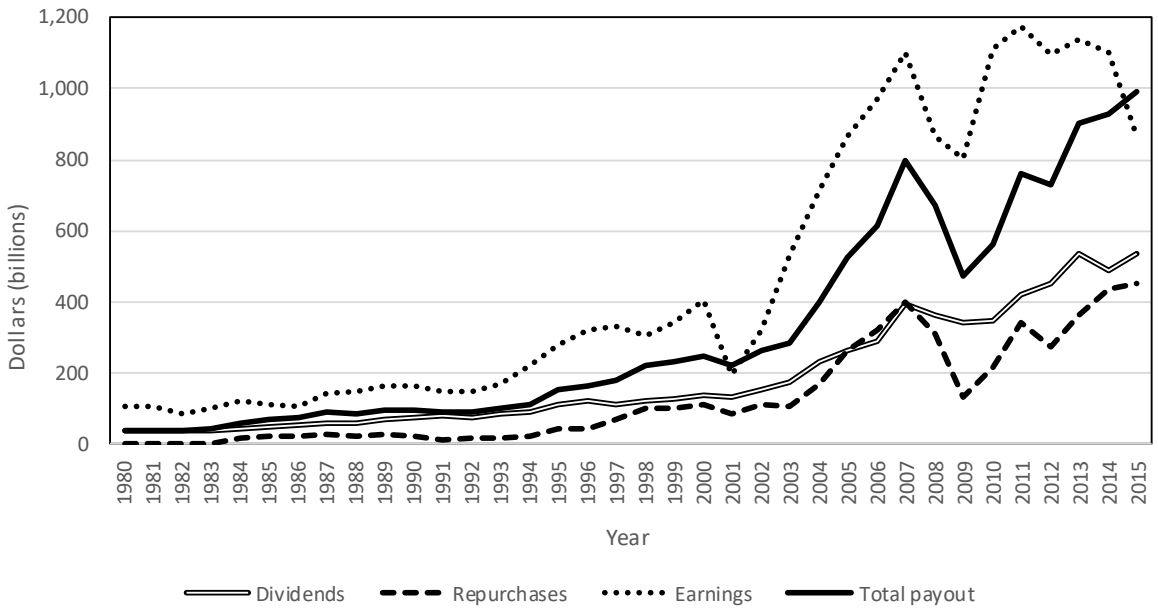

Figure 3
Aggregate dividends, repurchases and earnings adjusted for special items for sample US industrial firms, 1980 – 2015 (in billions of dollars).

Dividends are measured as dividends to common stockholders (Compustat #21). Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. Earnings are measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. Total payout is defined as the sum of dividends and repurchases.

measure of net repurchases starts, the total payout ratio of firms with both payout forms rises above and beyond 50 percent. In every sample year, the group of both payout forms has the highest payout ratio by far, ranging from around 50 percent to almost 90 percent. The dividend-only group and repurchase-only group surpass the 50 percent payout ratio just once, in 2015. Further, the dividend payout ratios are more stable than the total payout ratios. Surrounding the collapse of the dot-com bubble of 1999 – 2001 and the subprime-crisis of 2007 – 2009, total payout ratios show more variability than dividend payout ratios. For instance, the total payout ratio in the repurchase-only group drops from 48.8 percent to 20.0 percent over 2007 – 2009. The most stable payout ratio is the dividend payout ratio of the group with both payout forms, ranging between 24.8 percent and 38.6 percent. Further, when looking at the recovery period after the subprime-crisis, the median payout ratio increases from 0.200 to 0.560 for repurchase-only firms over 2009 – 2015. The median payout ratio for dividend-only firms reaches its bottom from the subprime-crisis a year later with a value of 0.353 in 2010. In the period 2010 – 2015, the median payout ratio of dividend only-firms increases from 0.353 to 0.515. For firms with both payout forms, the dividend component reaches its bottom in 2011 with a median payout ratio of 0.285. This is followed by an increase, to reach a median value of 0.355

Table 5
Median firm-level dividend payout ratios and total payout ratios for different payout groups, 1980 – 2015.

Dividend payout ratio is defined as dividends divided by earnings. Total payout ratio is defined as total payout divided by earnings, where total payout is the sum of net repurchases and dividends. Earnings are measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. Dividends are measured as dividends to common stockholders (Compustat #21). Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. Firms/years with negative earnings are dropped.

Year	Dividend payout ratio		Total payout ratio	
	Dividend-only	Both payout forms	Both payout forms	Repurchase-only
1980	0.282	-	-	-
1981	0.292	-	-	-
1982	0.339	-	-	-
1983	0.309	0.321	0.498	0.113
1984	0.296	0.317	0.538	0.158
1985	0.319	0.325	0.511	0.173
1986	0.323	0.363	0.622	0.187
1987	0.295	0.323	0.622	0.308
1988	0.278	0.300	0.523	0.260
1989	0.306	0.316	0.547	0.219
1990	0.341	0.358	0.610	0.175
1991	0.389	0.386	0.589	0.192
1992	0.356	0.367	0.557	0.199
1993	0.367	0.360	0.585	0.135
1994	0.319	0.313	0.530	0.173
1995	0.289	0.298	0.546	0.197
1996	0.311	0.280	0.566	0.207
1997	0.285	0.275	0.613	0.226
1998	0.303	0.274	0.703	0.370
1999	0.307	0.265	0.722	0.356
2000	0.286	0.258	0.641	0.318
2001	0.370	0.315	0.624	0.203
2002	0.371	0.261	0.536	0.262
2003	0.320	0.275	0.559	0.204
2004	0.297	0.234	0.598	0.291
2005	0.320	0.248	0.717	0.400
2006	0.362	0.260	0.731	0.429
2007	0.364	0.267	0.786	0.488
2008	0.464	0.299	0.788	0.468
2009	0.439	0.327	0.526	0.200
2010	0.353	0.307	0.665	0.231
2011	0.388	0.285	0.679	0.396
2012	0.457	0.323	0.744	0.338
2013	0.448	0.328	0.702	0.323
2014	0.457	0.344	0.829	0.416
2015	0.515	0.355	0.882	0.560

in 2015. However, the share repurchase component experiences a sharp increase, since total payout ratio increases from0.526 in 2009 to 0.882 in 2015. These results confirm the hypothesis that payout ratios increase in the period after the subprime-crisis. Also, the increase is of higher magnitude for repurchase-only firms than for dividend-only firms. Additionally, the share repurchase component exceeds the growth of the dividend component for firms with both payout in the period after the subprime-crisis. Note that the share repurchase component drops heavily over 2008 – 2009, whereas the dividend component decreases a year later for firms with both payouts. For dividend-only firms, the largest decrease in payouts surrounding the crisis is over 2009 – 2010, whereas this is 2008 – 2009 for repurchase-only firms. It appears that share repurchases experience the impact of the subprime-crisis first, followed by dividends. Overall, these results are consistent with the pro-cyclical nature of share repurchases, the flexibility component of share repurchases, managerial reluctance to cut dividends and dividend smoothing. It is also in line with the results of Jagannathan, Stephens, and Weisbach (2000), who find that share repurchases are more flexible and used to reflect transitory earnings, while dividends are used to reflect permanent earnings. The decrease in dividend payout ratios, albeit a somewhat delayed decrease compared with share repurchases, is in line with Hauser (2013), who finds that the probability that a firm pays dividends declined during the subprime-crisis.

To help explain the variations in dividends, repurchases, total payout, and payout ratios, the sample is divided in high-technology and non-technology firms. I follow Kile and Phillips (2009) in their approach to construct a sample of high-technology firms using three-digit SIC codes.[8] Table 6 presents the percent share of total payouts and the fraction of sample firms for high-technology firms and non-technology firms. Table 7 presents median firm-level dividend payout ratios and total payout ratios, also for high-technology and non-technology firms. Table 6 shows the growing relevance of the high-technology industries both in terms of percent share of total payout and number of firms. In 2013, almost 45 percent of the total payouts were made by high-technology firms. Note that 45,343 firm/years classify as high-technology and 105,379 firm/years classify as non-technology. Further, the fraction of high-technology sample firms remains rather close with the percent share of total payout, suggesting that high-technology firms contribute proportionally to the number of firms in terms of total payout. Additionally, Figure 4 shows that aggregate payouts consist of a rather even mix of dividends and share repurchases. Table 7 provides a more detailed insight in the payout policy of high-technology firms versus non-technology firms. It is visible that both the dividend payout ratio and the total payout ratio of high-technology firms are systematically higher than non-technology firms after the dot-com bubble, which collapsed over 1999 – 2001. As the build-up for the subprime-crisis starts,

[8] A firm/year is identified as high-technology if it matches to one of following three-digit SIC codes, and classified as non-technology otherwise: 283, 357, 366, 367, 382, 384, 481, 482, 489, 737, and 873.

Table 6
Percent share of total payouts and fraction of sample firms for high-technology and non-technology firms, 1980 – 2015.

For every payout group, the percent share of yearly aggregate payout is reported. Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. Dividends are measured as dividends to common stockholders (Compustat #21). Total payout is defined as the sum of net repurchases and dividends. Additionally, fractions are reported for high-technology firms and non-technology firms. Firm/years with one of the following three-digit SIC-codes are classified as high-technology, and non-technology otherwise: 283, 357, 366, 367, 382, 384, 481, 482, 489, 737, and 873. Aggregate total payout is reported in millions of dollars.

Year	Percent share of total payout		Fraction of sample firms		Aggregate total payout	Total sample firms
	High-tech.	Non-tech.	High-tech.	Non-tech.		
1980	15.8%	84.2%	16.8%	83.2%	37,180	3,460
1981	14.6%	85.4%	18.4%	81.6%	40,016	3,891
1982	15.5%	84.5%	19.2%	80.8%	39,437	3,794
1983	16.9%	83.1%	22.4%	77.6%	44,533	4,109
1984	22.2%	77.8%	24.0%	76.0%	61,544	4,119
1985	21.0%	79.0%	25.0%	75.0%	68,691	3,969
1986	25.6%	74.4%	26.2%	73.8%	76,575	4,030
1987	26.9%	73.1%	26.3%	73.7%	91,466	4,119
1988	28.5%	71.5%	27.8%	72.2%	83,590	3,920
1989	22.0%	78.0%	28.1%	71.9%	94,158	3,781
1990	26.9%	73.1%	28.3%	71.7%	93,569	3,724
1991	29.8%	70.2%	29.1%	70.9%	92,619	3,799
1992	32.6%	67.4%	30.3%	69.7%	90,243	4,129
1993	31.2%	68.8%	30.1%	69.9%	101,865	4,509
1994	32.9%	67.1%	30.6%	69.4%	113,705	4,829
1995	26.5%	73.5%	31.7%	68.3%	154,454	5,175
1996	35.1%	64.9%	33.3%	66.7%	166,219	5,431
1997	31.6%	68.4%	34.0%	66.0%	181,915	5,307
1998	33.1%	66.9%	34.6%	65.4%	221,593	5,154
1999	35.9%	64.1%	36.8%	63.2%	230,445	5,199
2000	37.1%	62.9%	38.2%	61.8%	248,658	5,111
2001	41.5%	58.5%	39.0%	61.0%	221,384	4,645
2002	38.6%	61.4%	39.0%	61.0%	263,678	4,443
2003	35.9%	64.1%	38.7%	61.3%	285,288	4,298
2004	38.3%	61.7%	39.6%	60.4%	400,341	4,217
2005	34.8%	65.2%	39.3%	60.7%	526,267	4,133
2006	33.7%	66.3%	38.6%	61.4%	613,073	4,098
2007	36.2%	63.8%	38.8%	61.2%	795,881	4,122
2008	38.8%	61.2%	38.0%	62.0%	673,725	3,911
2009	43.2%	56.8%	37.8%	62.2%	471,745	3,690
2010	42.9%	57.1%	38.1%	61.9%	562,390	3,666
2011	40.1%	59.9%	37.2%	62.8%	763,262	3,632
2012	38.7%	61.3%	37.5%	62.5%	728,597	3,585
2013	44.7%	55.3%	38.4%	61.6%	900,989	3,587
2014	38.6%	61.4%	40.0%	60.0%	927,199	3,631
2015	38.2%	61.8%	41.0%	59.0%	990,247	3,505

Table 7
Median firm-level dividend payout ratios and total payout ratios for high-technology and non-technology firms, 1980 – 2015.

Dividend payout ratio is defined as dividends divided by earnings. Total payout ratio is defined as total payout divided by earnings, where total payout is the sum of net repurchases and dividends. Earnings are measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. Dividends are measured as dividends to common stockholders (Compustat #21). Repurchases are measured as net repurchases. Firms/years with negative earnings are dropped. Firm/years with one of the following three-digit SIC-codes are classified as high-technology, and non-technology otherwise: 283, 357, 366, 367, 382, 384, 481, 482, 489, 737, and 873.

Year	Dividend payout ratio		Total payout ratio	
	High-technology	Non-technology	High-technology	Non-technology
1980	0.234	0.289	0.234	0.289
1981	0.238	0.300	0.238	0.300
1982	0.290	0.347	0.290	0.347
1983	0.255	0.317	0.255	0.331
1984	0.233	0.308	0.309	0.335
1985	0.301	0.324	0.352	0.367
1986	0.350	0.341	0.382	0.386
1987	0.306	0.311	0.403	0.410
1988	0.262	0.292	0.375	0.347
1989	0.288	0.313	0.342	0.367
1990	0.317	0.354	0.356	0.421
1991	0.383	0.389	0.399	0.427
1992	0.352	0.364	0.374	0.399
1993	0.349	0.370	0.367	0.391
1994	0.295	0.320	0.274	0.361
1995	0.292	0.293	0.307	0.344
1996	0.305	0.299	0.335	0.368
1997	0.289	0.276	0.327	0.370
1998	0.309	0.283	0.420	0.452
1999	0.268	0.287	0.388	0.434
2000	0.259	0.267	0.355	0.417
2001	0.305	0.346	0.394	0.384
2002	0.302	0.317	0.464	0.380
2003	0.276	0.299	0.371	0.363
2004	0.280	0.265	0.461	0.363
2005	0.326	0.272	0.538	0.411
2006	0.356	0.284	0.583	0.493
2007	0.369	0.288	0.644	0.531
2008	0.433	0.340	0.705	0.563
2009	0.419	0.376	0.453	0.409
2010	0.415	0.312	0.508	0.399
2011	0.386	0.321	0.595	0.473
2012	0.456	0.366	0.633	0.499
2013	0.416	0.362	0.607	0.512
2014	0.404	0.379	0.650	0.581
2015	0.438	0.394	0.730	0.668

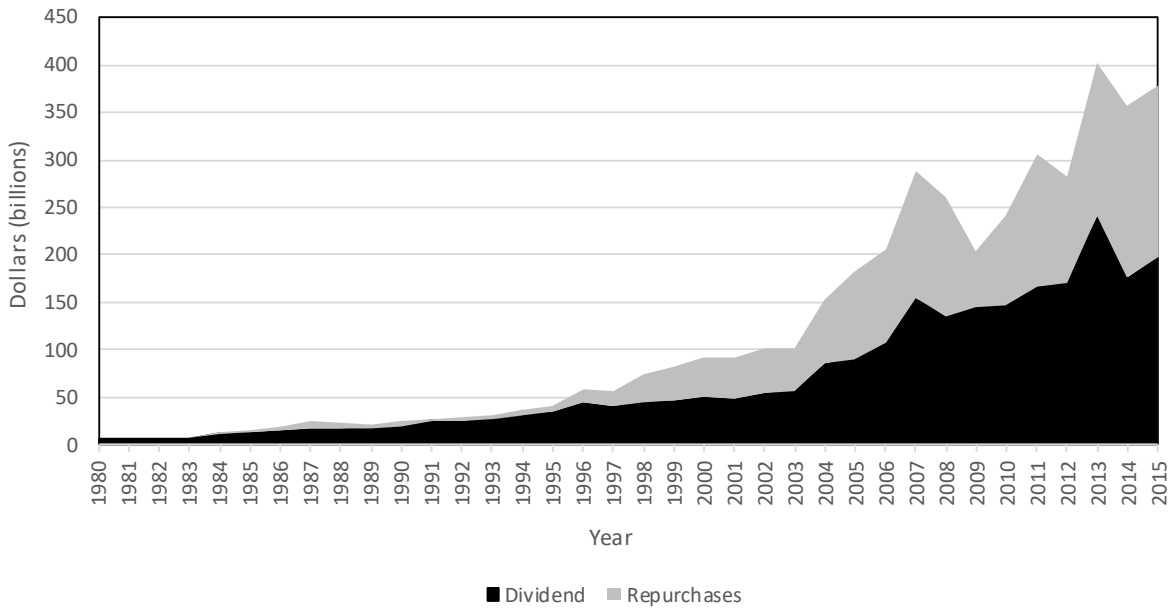

Figure 4
Aggregate dividends and repurchases for high-technology firms, 1980 – 2015 (in billions of dollars).

Dividends are measured as dividends to common stockholders (Compustat #21). Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. Firm/years with one of the following three-digit SIC-codes are classified as high-technology, and non-technology otherwise: 283, 357, 366, 367, 382, 384, 481, 482, 489, 737, and 873.

the gap between payout ratios of high-technology firms versus non-technology firms widens. The systematically higher payout ratios remain up to the end of the sample in 2015. Since the gap is present in both dividend payout ratios and total payout ratios, high-technology firms consistently pay more dividend and repurchase more shares relative to earnings than non-technology surrounding the subprime-crisis. With respect to the dividend payout ratios, this is somewhat surprising. DeAngelo, DeAngelo, and Skinner (2008) mention that technology firms in general rely heavily on investment opportunities. Dividends are a long-term commitment, and dividend cuts are disliked by investors (Eaton, 1999). Alternatively, share repurchases are more flexible and do not necessarily have to be followed through. Thus, maintaining high dividend payout ratios could potentially hinder the firms' capability to invest in every positive NPV investment opportunity. Another possibility is that technology firms have lower earnings compared to non-technology firms, on average. In this case, technology firms might apply a riskier payout policy by committing to higher dividend payout ratios. Likewise, non-technology firms might be more conservative by not committing to such levels of dividend payout ratios, on average.

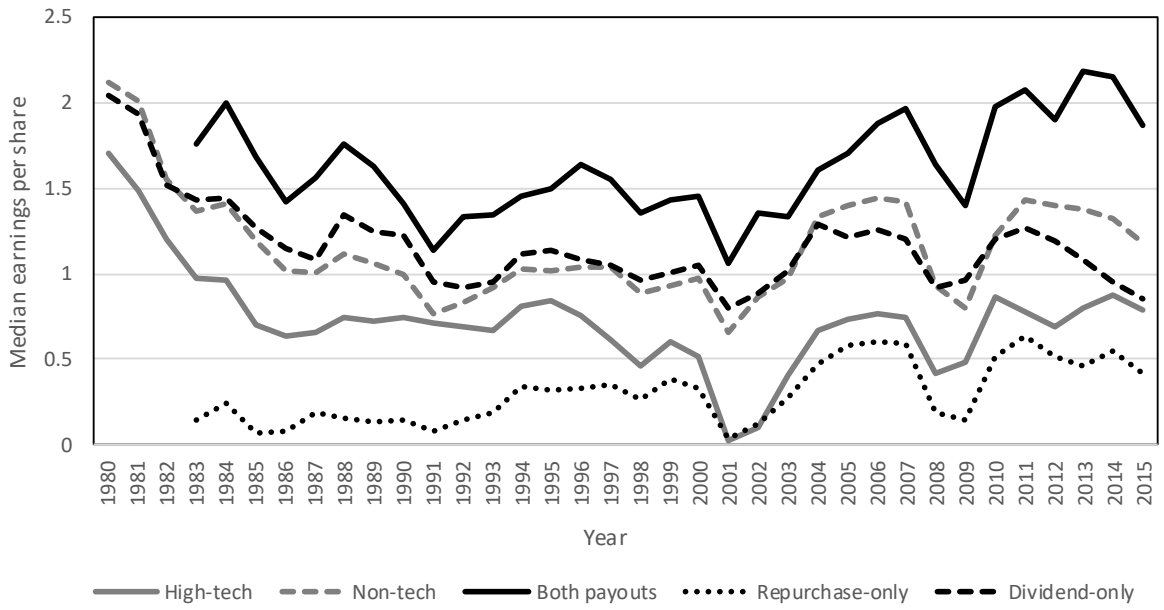

Figure 5
Median earnings per share for different payout groups, high-technology firms and non-technology firms, 1980 – 2015.

Earnings are measured as income before extraordinary items (Compustat #18). The number of shares is defined as common shares outstanding (Compustat #25). Dividends are measured as dividends to common stockholders (Compustat #21). Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. Total payout is defined as the sum of dividends and repurchases. Firm/years with one of the following three-digit SIC-codes are classified as high-technology, and non-technology otherwise: 283, 357, 366, 367, 382, 384, 481, 482, 489, 737, and 873.

Figure 5 shows median firm-level earnings per share for high-technology firms, non-technology firms, firms with both payouts, repurchase-only firms, and dividend-only firms. Earnings per share is a profitability measure. However, this measure can be affected by share repurchases, as it decreases the number of outstanding shares. As Lazonick (2014) mentions, share repurchases enable firms to hit quarterly earnings per share targets. Along the same line, companies could borrow money to repurchase shares and boost earnings per share. Although this effect is cancelled out due to the increased risk of the earnings as a result of leverage, the earnings per share measure is still affected (Berk & DeMarzo, 2014). This way, earnings per share can serve as an indication of a bubble. Indeed, the build-up period of the subprime crisis shows historically high earnings per share in every group of firms. Earnings per share is also extremely high in the 1980's, due to a combination of more profitable firms with high earnings, and low amounts of outstanding shares. As Fama and French (2001) mention, since the 1980's most new lists are young and unprofitable firms, which impacts the earnings per share of this sample. Interestingly, just several years after the subprime-crisis of 2007 – 2008, earnings per share is at higher levels than before the subprime crisis. This effect is slightly more pronounced in firms

with both payouts and high-technology firms. A possibility is that managers have been increasing payouts to reassure investors of the financial position. This might be an indication of a bubble in these groups of firms. However, some solace can be found in the fact that earnings per share have decreased in 2015 for every group. For non-technology firms, dividend-only firms and repurchase-only firms, the decrease in earnings per share started in 2010.

In the next part, an empirical approach is considered to examine payout policy in different payout groups. First, the relation between earnings and payouts is examined by estimating Lintner-model regressions for different payout groups. Table 8 reports the results of pooled cross-sectional time-series regressions with standard errors clustered at the firm-level of two Lintner-model specifications. These regressions are estimated over the full sample period for all dividend firms, dividend-only firms, firm with both payout forms, all repurchase firms, and repurchase-only firms. Consistent with Skinner (2008), earnings coefficients are reliably positive and statistically significant in all regressions. In addition, coefficients on the lagged dividends and lagged payouts are negative and statistically significant, except for the dividend-model in Panel B. The speed of adjustment coefficients and target payout ratios are also reported. Interestingly, the speed of adjustment coefficient in Panel A is relatively high for all dividend firms and dividend-only firms, with values of 0.632 and 0.795 respectively. These findings suggest that these types of payout groups adjust relatively fast towards their target payout ratio. A possible explanation is that these firms, especially in the case of dividend-only firms, strive to maintain a strict target payout ratio to smoothen dividends over time. Since I require that firms pay dividends for at least 20 years in Panel A, these firms are most likely mature firms with a clear and strict target payout ratio. However, the next part of the analysis will provide more information about the firm characteristics of different payout groups. The adjusted R-squared of the two models in Panel A is relatively large, indicating substantial explanatory power of the models. In fact, the adjusted R-squared of 0.426 in the dividend-only group is the largest of all specifications. The magnitude of the earnings coefficient is larger for the dividend only group compared with all dividend firms, suggesting a stronger relation between earnings and dividends in the dividend-only group. Moving towards panel B, I estimate the dividend model and the total payout model for firms who both pay dividends and repurchase shares, which allows comparison of the two models. As for the dividend model, only the earnings coefficient is significant at the 5 percent level. In contrast, both the earnings and the lagged payout coefficient are significant at the 1 percent level in the payout model. Moreover, the dividend model has an adjusted R-squared of only 0.228 compared to 0.420 of the total payout model. These results are consistent with the findings of Skinner (2008), who suggests that earnings now drive total payout instead of dividends. These results confirm that share repurchases have become an integrated part of corporate payout policy. Note that the group of both payout forms

Table 8

Pooled cross-sectional time-series regressions with standard errors clustered at firm-level, 1980 – 2015. Lintner-model regressions:

$\Delta D_t = \alpha_0 + \beta_1 \cdot E_t + \beta_2 \cdot D_{t-1} + u_t$

$\Delta Pay_t = \alpha_0 + \beta_1 \cdot E_t + \beta_2 \cdot Pay_{t-1} + u_t$

D_t is dividends, measured as dividends to common stockholders (Compustat #21). E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. Pay_t is total payout, defined as the sum of dividends and repurchases. Repurchases are measured as net repurchases. If a firm uses the treasury stock method, the amount of share repurchases is the increase in common treasury stock (Compustat #226). However, some firms use the retirement method, which I infer from the fact that treasury stock is zero in the current and previous year. In this case, the amount of repurchases is equal to the difference between stock purchases (Compustat #115) and stock issuances (Compustat #108). Additionally, if either the first measure (change in #226) or the second measure (difference between #115 and #108) is negative, the repurchase amount is set to zero. The t-statistics are based on standard errors clustered at the firm-level. SOA is the speed of adjustment coefficient, defined as $-\beta_2$. TP is the target payout ratio, defined as $-\beta_1 / \beta_2$. Significance levels for the 1 percent, 5 percent, and 10 percent level are denoted by ***, **, and * respectively.

Payout Group	Model	Intercept	E_t	D_{t-1}	Pay_{t-1}	Firm/years	Adj. R-squared	SOA	TP
Panel A: Included firms pay dividends for at least 20 years over 1980 – 2015									
All dividend firms	ΔD_t	13.448*	0.243***	-0.632***		20,521	0.340	0.632	0.384
		(1.661)	(3.081)	(-3.587)					
Dividend-only	ΔD_t	1.949	0.395***	-0.795***		10,890	0.426	0.795	0.497
		(0.159)	(2.861)	(-5.618)					
Panel B: Included firms pay dividends for at least 15 years and repurchase shares for at least 10 years over 1980 – 2015									
Both payout forms	ΔD_t	8.644	0.106**	-0.263		8,399	0.228	0.263	0.403
		(1.354)	(1.983)	(-1.611)					
Both payout forms	ΔPay_t	14.344	0.467***		-0.546***	8,399	0.420	0.546	0.855
		(1.638)	(9.197)		(-9.938)				
Panel C: Included firms repurchase shares for at least 10 years over 1980 – 2015									
All repurchase firms	ΔPay_t	3.464	0.391***		-0.501***	26,952	0.314	0.501	0.780
		(0.840)	(8.576)		(-9.803)				
Repurchase-only	ΔPay_t	14.726***	0.357***		-0.518***	5,388	0.326	0.518	0.689
		(4.520)	(7.841)		(-13.137)				

is the most interesting group by far, in the sense that these firms contribute the bulk of aggregate payouts. When looking at the dividend model in Panel B, a relative low speed of adjustment coefficient, adjusted R-squared and target payout ratio is observed. This is in line with Brav et al. (2005), who find that the traditional Lintner-model becomes less relevant over time, indicating that most firms do not target a specific payout ratio as much as they used to. The total payout model indicates a high payout ratio of 0.855, which is comparable to the median total payout ratios presented in Table 5 for both payout forms. The earnings coefficient of 0.467 has the highest magnitude of all specifications, showing a strong relation between earnings and total payout.

Panel C focuses on the repurchase component of payouts, considering the total payout model for all repurchase firms and repurchase-only firms. Again, the earnings coefficients and lagged payout coefficients are all significant at the 1 percent level. These results also indicate a strong relation between earnings and total payout for these payout groups. However, the adjusted R-squared of the two specifications is notably lower than the payout model for both payout forms in Panel B. This indicates that the results should be interpreted more carefully. For instance, the suggested target payout ratio for the repurchase-only firms of 0.689, which seem rather high compared with the median target payout ratios in Table 5. The speed of adjustment coefficient is relatively low for the specifications in Panel C compared to other specifications. This is unexpected, since the flexibility component of share repurchases and the suggestion that share repurchases are used to reflect transitory earnings should yield high speed of adjustment coefficients.

4.2 Firm characteristics of different payout groups

To examine the firm characteristics of different payout groups, Table 9 contains average values of key variables over the full sample period and four subperiods. Some variables might differ across the total sample period. Indeed, the subperiods show that most listed variables differ substantially across the sample period. With the purpose of interpretation, these variables differ somewhat with the variables presented in Table 1.[9] In general, Table 9 presents a clear idea of the firm life-cycle state of different payout groups. Non-paying firms tend to be the smallest firms with the lowest earnings, retained earnings, and capital expenditures. The debt ratio of non-paying firms is almost the lowest, with an average of 45.01 percent over the full sample period. However, these firms tend to have the most investment opportunities by far, in terms of the market-to-book assets ratio as a proxy for investment opportunities (e.g. Fama & French 2001). The market-to-book assets ratio ranges from 2.20 to 3.12, while the maximum of all other payout groups is 1.97. Moreover, the average market-to-book assets ratio over the full sample period is 2.64, well above other payout groups. When moving along the

[9] The variables in Table 1 match one-on-one with the variables used in the logistic regressions.

Table 9
Average firm characteristics for different payout groups of sample US industrial firms, 1980 – 2015.

For every payout group, this table reports several firm characteristics for the full sample period 1980 – 2015 and the subperiods 1980 – 1989, 1990 – 1999, 2000 – 2007, and 2008 – 2015. V_t / A_t is the market-to-book assets ratio, a proxy for investment opportunities, where V_t is the market value of assets and A_t is the book value of assets (Compustat #6). V_t is measured as (A_t – BVE_t + MVE_t), where BVE_t is the book value of equity (Compustat #216) and MVE_t is the market value of equity, calculated as the stock price (Compustat #199) times the shares outstanding (Compustat #25). $CAPEX_t$ is capital expenditures (Compustat #128), and is scaled by assets to construct an investment measure, in percentages. L_t is total liabilities (Compustat #181) and is scaled by assets to indicate the debt ratio, in percentages. E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. RE_t is retained earnings (Compustat #36). For payout groups associated with repurchases, the average characteristics in the columns 1980 – 2015 and 1980 – 1989 are measured with 1983 as a starting point, since net repurchases start in 1983. A_t, E_t, and RE_t are in millions of dollars.

	1980 - 2015	1980 - 1989	1990 - 1999	2000 - 2007	2008 - 2015
V_t / A_t					
All firms	2.21	1.81	2.30	2.36	2.43
Repurchase-only	1.74	1.52	1.73	1.89	1.79
Dividend-only	1.71	1.44	1.82	1.85	1.77
Both payouts	1.77	1.46	1.76	1.97	1.85
Non-payers	2.64	2.20	2.66	2.70	3.12
High-technology	2.86	2.47	3.17	2.86	2.95
Non-technology	1.89	1.62	1.87	2.04	2.11
$CAPEX_t$ / A_t					
All firms	6.82%	8.92%	7.11%	5.48%	5.17%
Repurchase-only	6.21%	8.05%	7.04%	5.09%	4.68%
Dividend-only	7.09%	8.39%	7.55%	5.96%	6.04%
Both payouts	6.20%	7.48%	6.91%	5.58%	4.83%
Non-payers	6.99%	9.64%	7.02%	5.45%	5.16%
High-technology	5.55%	8.05%	5.93%	4.18%	3.32%
Non-technology	7.49%	9.19%	7.67%	6.31%	6.32%
L_t / A_t					
All firms	46.38%	48.41%	46.26%	44.79%	45.59%
Repurchase-only	45.01%	48.13%	45.07%	42.65%	44.55%
Dividend-only	49.56%	48.64%	49.85%	50.46%	49.45%
Both payouts	49.69%	48.35%	49.02%	50.09%	51.31%
Non-payers	45.03%	48.58%	45.02%	42.91%	42.73%
High-technology	39.30%	41.73%	38.23%	37.25%	39.67%
Non-technology	49.92%	50.51%	50.08%	49.59%	49.32%
A_t					
All firms	2241.91	598.71	1,128.64	2,784.05	5,145.39
Repurchase-only	988.53	132.93	411.95	1,304.30	2,142.12
Dividend-only	5513.65	1,336.16	3,445.66	6,841.11	11,993.06
Both payouts	7026.81	1,667.44	3,163.50	9,901.16	13,671.04
Non-payers	483.60	86.51	237.18	709.80	1,061.81
High-technology	1873.29	450.01	966.85	2360.14	4298.62
Non-technology	2455.37	643.57	1204.20	3055.36	5684.10
E_t					
All firms	117.89	30.33	50.39	149.79	279.80
Repurchase-only	45.08	2.58	15.53	68.22	96.08
Dividend-only	262.51	67.39	146.70	341.49	572.20
Both payouts	489.81	104.07	203.16	701.62	973.84

	1980 - 2015	1980 - 1989	1990 - 1999	2000 - 2007	2008 - 2015
Non-payers	6.13	0.69	3.17	5.50	17.25
High-technology	110.16	28.28	54.02	110.49	282.33
Non-technology	122.67	30.89	48.64	174.92	277.70
RE_t					
All firms	512.68	178.40	262.31	540.53	1,215.63
Repurchase-only	91.78	19.24	50.97	105.52	192.53
Dividend-only	1391.14	404.91	827.68	1,542.06	3,177.34
Both payouts	2229.77	574.05	1,061.30	3,044.32	4,324.55
Non-payers	-32.33	7.39	6.59	-93.09	-69.85
High-technology	305.44	126.17	207.89	250.46	706.44
Non-technology	638.90	194.41	287.50	728.02	1544.64

life-cycle of firms, the next group to encounter is the repurchase-only group. These firms are larger and have more earnings, retained earnings, and capital expenditures than non-paying firms. Leverage of repurchase-only firms (45.01 percent) is slightly lower than non-paying firms (45.03) percent, however this difference is negligible. When looking at assets as a measure of size, repurchase-only firms are almost twice as large as non-paying firms over the full-sample period and across subperiods. Thus, the repurchase-only firms are more mature than non-paying firms, which is also indicated by less investment opportunities. Even more mature are dividend-only firms, with assets of $5,513.65 million while repurchase-only firms have assets of $988.53 million, on average. Thus, over the full sample-period, dividend-only firms are 5.6 times as large as repurchase-only firms in terms of assets, a remarkable difference in size. In addition, dividend-only firms have significantly higher earnings, retained earnings and leverage than the repurchase-only firms. Capital expenditures are slightly higher, while the market-to-book assets ratio is slightly lower. It is somewhat surprising that dividend-only firms are 5.6 times as large as repurchase-only firms in terms of assets, while the decline in investment opportunities in terms of the market-to-book assets ratio is only marginal. The last payout group, firms who both pay dividends and repurchase shares, is the largest group of firms in terms of assets. Over the full sample period, average assets are $7,026.81 million, even reaching $13,671.04 million in the last subperiod. Additionally, firms with both payout forms have the highest average earnings, retained earnings and leverage of all payout groups. Interestingly, firms with both payout forms have the lowest capital expenditures. This is in line with the concerns of Lazonick (2014), warning that most listed firms distribute too much wealth to shareholders and invest too little in productive capabilities. The fact that these firms have slightly higher investment opportunities in terms of market-to-book assets ratio compared with repurchase-only and dividend-only firms makes the concerns of Lazonick even more relevant. Overall, the results presented in Table 9 are consistent with the theoretical framework of DeAngelo, DeAngelo, and Skinner (2008). As firms become more mature, their size increases, they become more profitable, and experience a decrease in investment

opportunities. Additionally, the results of Table 2 and Table 5 suggest that firms distribute more wealth to shareholders as they become more mature.

Lastly, high-technology and non-technology firms are examined as well, showing distinct differences. High-technology firms have systematically higher investment opportunities in terms of market-to-book assets ratio than non-technology firms, which can be expected for the technology industry. High-technology firms also have lower leverage, capital expenditures, earnings and retained earnings than non-technology firms, on average. Additionally, high-technology firms are smaller in terms of assets than non-technology firms. The low debt ratio is most likely linked to the high business risk of the technology sector in general, accompanied by the characteristic of an asset-light industry. Capital expenditures are of less priority for high-technology firms than non-technology firms, but the average capital expenditure of only 3.32 percent of assets is somewhat shocking. Combining this with the high median dividend payout ratios and total payout ratios shown in Table 7, this might be an indication of a bubble in the high-technology sector with high payouts possibly too little investments.

To empirically examine the differences in firm characteristics of different payout groups, annual logistic regressions are estimated with five different specifications. I follow Fama & French (2001) and Skinner (2008) in their approach and variable selection. Like Skinner (2008), variables are winsorized at the 1 percent and 99 percent level to adjust for outliers. Tables 10, 11, 12, 13, and 14 report results of these annual logistic regressions, which are presented in the Appendix. Specifications that include payout groups with share repurchases start at 1983, since this is when net share repurchases start. The variables included in the regressions match one-on-one with the variables reported in Table 1. For specifications that include non-paying firms, the life-cycle variable is scaled by assets instead of the book value of equity, since the book value of equity is negative for many non-paying firms. Each regression contains variables regarding firm life-cycle, profitability, debt ratio (also 'leverage'), investment, size, and investment opportunities. The coefficients should be in line with the results presented in Table 9. Indeed, the logistic regressions serve as a conformation of the relative life-cycle stages of different payout groups and accompanied firm characteristics. On the spectrum of a firm's life-cycle, non-paying firms are indeed more likely to be small firms with low profitability, low leverage and ample investment opportunities. As firms become more mature, they are more likely to be larger, more profitable, have higher debt ratios and experience a decrease in investment opportunities. This is indicated by consistently significant variables of firm life-cycle, profitability, debt ratio, size and investment opportunities at the 1 percent level, in general. Moving along the spectrum of a firm's life-cycle, from young to mature firms, non-paying firms are followed by repurchase-only firms, dividend-only firms and lastly firms who both pay dividends and repurchase shares. These results confirm the hypothesis that repurchase-only firms are smaller, less profitable and have more investment opportunities than dividend-only firms and firms who both pay dividends and repurchase

shares. However, the logistic regressions reveal certain insights which are not directly noticeable in Table 9. For instance, the investment variable, measured as capital expenditures scaled by assets, is insignificant in most cases. Even in the specification of both payouts versus non-paying firms in Table 14, the payout groups with the largest differences, the investment variable statistically significant at the 1 percent level in only 9 out of 33 years. However, when the capital expenditure variable is significant, the sign suggests that every type of payout group tends to almost always have lower investments than non-paying firms when considering all specifications. Overall, this suggests that investments only differ significantly across different payout groups surrounding the subprime-crisis. The magnitude of the Pseudo R-squared between the different specifications signals how big the differences between the included groups are, and is a measure of explanatory power of the model. For instance, Table 14 has the largest Pseudo R-squared values, ranging between 0.386 and 0.587. This makes sense, since this specification includes firm/years with both dividends and share repurchases versus non-paying firm/years. These two groups have the largest differences in firm characteristics, resulting in high values of the Pseudo R-squared and therefore high explanatory power. In contrast, Tables 11 and 12 show low values of the Pseudo R-squared, indicating that the differences between repurchase-only firms versus non-paying firms and dividend-only firms versus firms with both payouts are substantially smaller. It also indicates that although the coefficients might be statistically significant at the 1 percent level in these specifications, results should be interpreted carefully. Additionally, Tables 10 and 13 depict reasonably high Pseudo R-squared values, providing more certainty for interpretation.

The annual logistic regressions highlight several more in-depth differences in firm characteristics between firm types. For instance, Table 11 shows that the debt ratio is insignificant most of the times, indicating that leverage does not differ significantly between repurchase-only firms and non-paying firms. This is also the case for Tables 12 and 13, with specifications of dividend-only firms versus both payout firms and repurchase-only firms versus both payout firms, respectively. Table 11 also highlights that repurchase-only firms and firms with no payouts did not differ significantly in profitability over the period 1983 – 1995, indicated by insignificant values for the earnings divided by assets coefficient. Table 12 reveals that the investment opportunities in terms of market-to-book assets ratio is only significant in 5 out of 33 years, at the 1 percent level. This indicates that investment opportunities do not differ significantly between dividend-only firms and firms who both repurchase shares and pay dividends. In addition, Table 12 indicates that the difference in size between dividend-only firms and firms with both payouts used to be less pronounced. More specifically, the size coefficient is significant at the 1 percent level only once in the period 1983 – 2002. In the period 2003 – 2015, the size coefficient is significant at the 1 percent level in 10 years. This suggests that the size difference in terms of assets has become more noticeable. Alternatively, it also suggests that firms

with both payouts are now more likely to be significantly larger than dividend-only firms, as opposed to before 2003. Also, the life-cycle variable is insignificant in 2001 and several years surrounding the subprime-crisis. This suggests that dividend-only firms and firms with both payouts did not differ significantly in terms of retained earnings after the collapse of the dot-com bubble in 2001 and surrounding the subprime-crisis. Similarly, it can be concluded that dividend-only firms were as likely to have the same level of retained earnings than firms with both payout forms. Table 13 shows that differences in investment opportunities are not as clear-cut as one would expect between repurchase-only firms and firms with both payouts. The market-to-book asset coefficient is significant at the 1 percent level in 12 out of 33 years. However, this is in line with the results in Table 9, with average market-to-book assets ratios of 1.74 and 1.77 over the full sample period for repurchase-only firms and both payout firms, respectively. Table 14 highlights that when the investment variable is statistically significant, this is mostly surrounding the subprime-crisis. To some extent, this is also visible in the other specifications. This suggests that payout firms cut capital expenditures relative to assets aggressively during this period, whereas this was not the case for non-paying firms, resulting in more pronounced differences.

Overall, the results from the logistic regressions are consistent with the theoretical framework of corporate payout policy suggested by DeAngelo, DeAngelo, and Skinner (2008). Firms with no payouts are more likely to be small firms with low profitability, low debt ratios and ample investment opportunities. Repurchase-only firms are more likely to be larger and more profitable, as well as higher debt ratios and fewer investment opportunities. This pattern is even more relevant for dividend-only firms, followed by firms who both pay dividends and repurchase shares. Table 14 serves as the best example to highlight this, testing the specification of firms with both payouts versus non-paying firms. Further, the life-cycle variable is consistently significant at the 1 percent level and suggests the following order from young to mature: non-paying firms, repurchase-only firms, dividend-only firms and firms with both payouts. This is in line with the time-varying benefits and costs of retention, as described by DeAngelo, DeAngelo, and Skinner (2008). In early stages of the life-cycle, it is highly important for a firm to have sufficient cash to carry out every investment opportunity. As firms become more mature, this benefit decreases and the agency costs of free cash flow increases. Therefore, more mature firms have high payouts to limit the agency costs of free cash flow.

As for the investment measure included in the logistic regressions, this coefficient is mostly insignificant. For most of the sample-period, it can be concluded that capital expenditures relative to assets do not differ significantly across different payout groups. However, surrounding the subprime-crisis, the investment coefficient is almost always significant at the 1 percent level in several specifications. This provides some justifications to the concerns expressed by Lazonick (2014). Lazonick claims that most listed companies return too much wealth to shareholders and invest too little in

productive capabilities. Indeed, these results suggest that firms using share repurchases, dividends or both to payout shareholders, are more likely to have significantly lower investments than non-paying firms. These results confirm the hypothesis that payout firms have lower investments than non-paying firms in the period surrounding the subprime-crisis. For the period before the subprime-crisis, the investment variable does not show significant differences across different payout groups and non-paying firms.

Again, these results cast doubt on the suggestion of Skinner (2008) that since the 1980's two groups of payers have emerged, namely repurchase-only firms and firms who both pay dividends and repurchase shares. The logistic regressions show that the dividend-only group differs significantly with other types of firms in terms of life-cycle, size, profitability, debt ratio and investment opportunities. Moreover, the results in Table 2 and 3 reveal that the dividend-only firms are substantial both in terms of percent share of aggregate payout and number of firms. Therefore, I reject the hypothesis that the primary groups of payers are repurchase-only firms and firms who both pay dividends and repurchase shares.

The differences in key firm characteristics between high-technology firms and non-technology firms are also tested using a logistic regression. The results of this specification are presented in Table 15 in the Appendix. Note that the pseudo R-squared is rather low with levels around the 10 percent, indicating marginal explanatory power. Therefore, results should be interpreted carefully and cautiously. The results show that high-technology firms are in earlier stages of the firm life-cycle, have lower debt ratios, lower capital expenditures, and higher investment opportunities than non-technology firms, on average. Differences in profitability are slightly less significant, but show that high-technology firms are less profitable than non-technology firms for most sample years. The differences in size between these types of firms are less pronounced and only significant at the 1 percent level for 5 years. Additionally, the size coefficient is rather small and switches from negative to positive during the 1990's. Due to the low level of statistical significance, it can be concluded that there are no clear size differences between high-technology firms and non-technology firms, on average. These results reinforce the suggestion that high-technology firms have lower investments in terms of capital expenditures than non-technology firms. Note that Table 7 shows that high-technology firms have higher dividend payout ratios and total payout ratios than non-technology firms surrounding the subprime-crisis. In line with Lazonick (2014), this might be an indication of a problem in the high-technology sector where high payouts combined with low investments could be suboptimal for long-term performance.

CHAPTER 5 Conclusion

Corporate payout policy has changed substantially throughout the period 1980 – 2015. Share repurchases have become increasingly popular since the 1980's and are now an integrated part of payout policy. Listed US industrial companies now consider both dividends and share repurchases as viable options to return wealth to shareholders. Consequently, different types of payout firms have emerged, namely firms that only pay dividends, firms that only repurchase shares, and firms that both pay dividends and repurchase shares. I combine elements of the approach of Fama and French (2001), Skinner (2008) and Floyd, Li, and Skinner (2015) to examine corporate payout policy over 1980 – 2015. Several approaches are considered to answer the main research question: *How do dividends, share repurchase, total payouts and firm characteristics for non-paying firms, dividend-only firms, repurchase-only firms and firms who both pay dividends and repurchase shares develop surrounding the subprime-crisis?*

First, I report figures of yearly aggregate dividends, share repurchases and total payout. Share repurchases show more volatility than dividends, especially surrounding the subprime-crisis of 2007 – 2008. These results are consistent with dividend smoothing, managerial reluctance to cut dividends, and the flexibility component of share repurchases (Stephens & Weisbach, 1998; Brav, Graham, Harvey, & Michaely, 2005; Berk & DeMarzo, 2014). Moreover, these results are in line with the suggestion that share repurchases are now used to reflect transitory earnings, whereas dividends are used to reflect permanent earnings (Jagannathan, Stephens, & Weisbach, 2000). Firms that both pay dividends and repurchase shares contribute the bulk of aggregate payouts, which is confirmed in many papers (see e.g. DeAngelo, DeAngelo, & Skinner 2008). This phenomenon has become even more pronounced in the last few years, with a percent share of total payout by firms with both payouts of 72.5 percent and 70.0 percent in 2014 and 2015 respectively. Even more impressive is the fact that the group of firms with both payouts is just slightly larger than dividend-only firms and repurchase-only firms. This is consistent with DeAngelo, DeAngelo, and Skinner (2008), who suggest that corporate payout policy is best described as a two-tier structure, with a small number of large firms contributing the bulk of payouts and many small firms only contributing marginally. Skinner (2008) poses that two types of payout firms have emerged since the 1980's, namely repurchase-only firms and firms who both pay dividends and repurchase shares. However, I find that dividend-only firms are substantial both in terms if percent share of aggregate payout and number of firms relative to other payout groups.

Additionally, median firm-level earnings per share are also presented graphically for different payout groups, high-technology firms and non-technology firms. The main result is that earnings per share are at historically high levels since the subprime-crisis for firms with both payouts and high-

technology firms. Median firm-level dividend payout ratios and total payout ratios are also presented for different payout groups, high-technology firms and non-technology firms. Dividend payout ratios show more stable patterns than total payout ratios, also consistent with dividend smoothing, managerial reluctance to cut dividends and the flexibility component of dividends. Additionally, high-technology firms exhibit systematically higher dividend payout ratios and total payout ratios surrounding the subprime-crisis than non-technology firms. A possibility is that high-technology firms apply a less conservative payout policy than non-technology firms.

I also report figures of aggregate earnings, adjusted for special items, and examine the relation between earnings and payouts formally by using Lintner-model regressions as in Skinner (2008). These results confirm that earnings now drive total payouts instead of dividends, and show that share repurchases are an integrated part of payout policy. Surprisingly, all dividend paying firms and dividend-only firms have high speed of adjustment coefficients, indicating that these firms adjust relatively fast towards their target payout ratio.

In addition, to better examine the differences in payout groups, I report several key firm characteristics over the total sample period and four subperiods. Moreover, following Fama and French (2001) and Skinner (Skinner, 2008) in their methodology and variable selection, annual logistic regressions are estimated for different types of payout groups. Non-paying firms are more likely to be small, accompanied by poor profitability, low leverage and many investment opportunities. On the spectrum of a firm's life-cycle, non-paying firms are followed by repurchase-only firms, who are more likely to be larger, more profitable and have lower investment opportunities. Dividend-only firms are in turn more likely to be larger, more profitable, have higher debt ratios and fewer investment opportunities than repurchase-only firms. Finally, firms who both pay dividends and repurchase shares are the largest and most profitable firms, although differences in leverage and investment opportunities are less pronounced in most cases compared with dividend-only firms. The life-cycle variable is consistently significant at the 1 percent level and suggests the following order of payout groups from young to mature: non-paying firms, repurchase-only firms, dividend-only firms and firms who both pay dividends and repurchase shares. Overall, the logistic regressions confirm life-cycle theories of payout policy, suggesting that as firms become more mature, the become larger, more profitable, and experience a decrease in investment opportunities (Fama & French, 2001; Grullon & Michaely, 2004; Denis & Osobov, 2008). The results are also consistent with the theoretical framework described by DeAngelo, DeAngelo, and Skinner (2008). This framework highlights the time-varying costs and benefits of cash retention. In early life-cycle stages it is highly important to have sufficient cash, allowing a firm to carry out every investment opportunity. However, as firms become more mature, the benefits of retention become less important and the agency costs of free cash flow become more important. Therefore, large and mature firms initiate high payouts to limit the agency

costs of free cash flow problem. In addition, the logistic regression for high-technology versus non-technology firms highlights distinct differences in key firm characteristics. High-technology firms are in earlier firm life-cycle stages, have lower debt ratios, lower capital expenditures, and higher investment opportunities than non-technology firms. High-technology firms are also less profitable than non-technology firms in most of the sample years. Size differences are rather minimal and insignificant most of the times.

The logistic regressions also indicate that surrounding the subprime-crisis, investments (measured as capital expenditures scaled by assets) differ significantly across payout groups. All payout groups have significantly lower investments than non-paying firms. Firms with both payouts have the lowest investments of all payout groups, providing some justifications for the concerns of Lazonick (2014), claiming that most listed companies return too much wealth to shareholders and invest too little in productive capabilities. In addition, aggregate payouts and median payout ratios for all payout groups reach their peak in 2015, making the concerns of Lazonick even more relevant. These results also hold for high-technology firms.

However, this research also has its shortcomings. For instance, the sample selection of this research is slightly stricter than other papers. This might lead to a lower fraction of non-paying firms in the total sample and is a disadvantage in terms of replicability. Additionally, the results of this research could change if another earnings measure is used. Following Skinner (2008), this research defines earnings as income before extraordinary items adjusted for special items. However, Fama and French (2001) choose to use earnings before interest but after taxes, while other papers simply use income before extraordinary items without adjustments (e.g. Grullon & Michaely 2002). Also, the Lintner-model regressions in this research only consider a one year estimation window. Skinner (2008) shows that this is applicable for the dividend-model, since dividends are set and paid annually. However, for the total payout model, a two-year estimation window is more applicable due to share repurchases. In addition, this research is limited in the sense that it only considers one variable for each key firm characteristic. The results if this research might vary when using different variable definitions for firm characteristics, for instance in the case of profitability, investment and investment opportunities (e.g. Tobin's Q). Finally, this research considers different payout groups and non-paying firms using several approaches from a broad perspective. However, a more in-depth research focused on one or two payout groups might be able to shine a different light on payout policy and firm characteristics surrounding the subprime-crisis. For instance, when focusing on dividend paying firms, one would not be limited to use annual data, since many firms pay dividends quarterly or semiannually. Thus, this offers a possibility for future research. On the same line, considering different variable definitions in the case of earnings or firm characteristics such as profitability, investment and investment opportunities might yield more accurate results. Further, this research provides some

justification for the concerns of Lazonick (2014) that listed firms might be returning too much wealth to shareholders and invest too little in productive capabilities. However, future research could examine what levels of investments truly are sufficient or insufficient for different payout groups. Future research should also aim to incorporate recent data as quickly as possible, since the results of this paper highlight that aggregate payouts and median payout ratios are historically high in 2015. It will be interesting to track the developments of aggregate payouts and payout ratios in the upcoming years. Considering the results of aggregate payouts, earnings per share, median payout ratios and firm characteristics of different firm types, high-technology firms and firm with both payouts are the most likely candidates for a possible crash.

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Appendix

Table 10
Annual logistic regressions, dependent variable is coded 1 for dividend-only firm/years and 0 for firm/years no payouts, 1980 – 2015.

RE_t is retained earnings (Compustat #36) and is scaled by A_t, the book value of assets (Compustat #6) to represent a life-cycle measure. This variable is assigned a value of 0 if RE_t is negative. E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. E_t is scaled by assets to represent a profitability measure. L_t is total liabilities (Compustat #181) and is scaled by assets to indicate the debt ratio. $CAPEX_t$ is capital expenditures (Compustat #128), and is scaled by assets to construct an investment measure. $Ln(A_t)$ is the natural logarithm of assets and represents a measure of firm size. V_t / A_t is the market-to-book assets ratio, a proxy for investment opportunities, where V_t is the market value of assets and A_t is the book value of assets (Compustat #6). V_t is measured as ($A_t - BVE_t + MVE_t$), where BVE_t is the book value of equity (Compustat #216) and MVE_t is the market value of equity, calculated as the stock price (Compustat #199) times the shares outstanding (Compustat #25). Ps. R-squared is the Pseudo R-squared. All variables are winsorized at the 1 percent and 99 percent quantiles. Significance levels for the 1 percent, 5 percent, and 10 percent level are denoted by ***, **, and * respectively.

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
1980	5.539***	8.008***	0.208	0.390	0.713***	-0.375***	-3.826***	3,460	0.430
1981	5.536***	6.458***	0.532	-2.195***	0.808***	-0.352***	-4.398***	3,890	0.458
1982	5.602***	6.097***	0.843**	-1.591***	0.751***	-0.266***	-4.620***	3,792	0.447
1983	6.206***	6.297***	1.230***	-1.670**	0.695***	-0.340***	-4.886***	3,486	0.464
1984	7.017***	3.875***	2.027***	-1.394**	0.725***	-0.196**	-5.977***	3,246	0.461
1985	6.067***	3.788***	1.464***	-0.395	0.761***	-0.121*	-5.828***	3,121	0.446
1986	6.399***	3.824***	1.779***	-1.053	0.719***	-0.080	-6.118***	3,126	0.433
1987	7.157***	4.094***	1.780***	0.286	0.817***	-0.046	-7.128***	2,937	0.476
1988	5.870***	5.315***	1.120***	0.715	0.736***	-0.140*	-6.062***	2,840	0.449
1989	5.107***	6.387***	1.237***	1.768**	0.721***	-0.295***	-5.712***	2,847	0.442
1990	5.455***	5.231***	1.065***	0.364	0.747***	-0.253***	-5.905***	2,687	0.461
1991	5.002***	6.678***	0.717*	1.596*	0.757***	-0.286***	-5.762***	3,014	0.457
1992	5.266***	5.278***	1.410***	1.636*	0.734***	-0.136**	-6.272***	3,358	0.435
1993	4.262***	7.438***	0.645**	0.932	0.681***	-0.212***	-5.408***	3,701	0.384
1994	4.974***	6.546***	1.132***	0.584	0.683***	-0.245***	-5.947***	3,887	0.393
1995	4.389***	6.311***	1.426***	0.290	0.577***	-0.165***	-5.563***	4,117	0.359
1996	3.915***	4.033***	1.077***	-0.141	0.563***	-0.069**	-5.313***	4,257	0.322
1997	4.311***	4.949***	0.881***	-1.031	0.548***	-0.174***	-5.103***	3,974	0.333
1998	5.080***	3.407***	1.667***	-0.384	0.547***	-0.099**	-5.925***	3,522	0.337
1999	5.353***	2.405***	1.677***	0.194	0.590***	-0.148***	-6.235***	3,625	0.387
2000	5.594***	4.174***	1.993***	-2.830***	0.642***	-0.234***	-6.832***	3,647	0.419

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
2001	4.895***	4.077***	2.116***	-3.103***	0.617***	-0.161***	-6.675***	3,313	0.405
2002	4.633***	3.535***	1.654***	-2.112*	0.562***	-0.148**	-6.136***	3,201	0.360
2003	4.913***	4.147***	1.371***	-0.879	0.471***	-0.249***	-5.337***	3,141	0.354
2004	4.605***	6.172***	1.413***	-0.952	0.512***	-0.171***	-5.660***	3,179	0.371
2005	5.231***	3.537***	2.056***	-0.473	0.476***	-0.083	-5.730***	3,008	0.358
2006	4.204***	5.685***	2.134***	-0.818	0.447***	-0.119**	-5.537***	2,830	0.337
2007	4.609***	3.237***	1.699***	0.138	0.435***	-0.052	-5.471***	2,747	0.321
2008	4.476***	1.871***	1.440***	-2.367***	0.542***	0.110*	-5.909***	2,381	0.352
2009	3.777***	3.505***	1.578***	-0.050	0.477***	0.002	-5.722***	2,583	0.316
2010	3.785***	1.945***	1.129***	-0.962	0.472***	0.090**	-5.525***	2,492	0.293
2011	3.565***	3.286***	0.976***	-1.389	0.480***	-0.031	-5.143***	2,278	0.309
2012	3.267***	4.881***	1.241***	-1.580*	0.428***	0.018	-4.740***	2,301	0.329
2013	3.055***	4.520***	1.071***	-0.670	0.402***	-0.041	-4.407***	2,303	0.305
2014	3.064***	5.618***	0.289	-1.442*	0.426***	-0.142***	-3.965***	2,295	0.334
2015	3.524***	3.662***	0.846**	1.678*	0.427***	-0.154***	-4.392***	2,142	0.338

Table 11

Annual logistic regressions, dependent variable is coded 1 for repurchase-only firm/years and 0 for firm/years with no payouts, 1980 – 2015.

RE_t is retained earnings (Compustat #36) and is scaled by A_t, the book value of assets (Compustat #6) to represent a life-cycle measure. This variable is assigned a value of 0 if RE_t is negative. E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. E_t is scaled by assets to represent a profitability measure. L_t is total liabilities (Compustat #181) and is scaled by assets to indicate the debt ratio. $CAPEX_t$ is capital expenditures (Compustat #128), and is scaled by assets to construct an investment measure. $Ln(A_t)$ is the natural logarithm of assets and represents a measure of firm size. V_t / A_t is the market-to-book assets ratio, a proxy for investment opportunities, where V_t is the market value of assets and A_t is the book value of assets (Compustat #6). V_t is measured as $(A_t – BVE_t + MVE_t)$, where BVE_t is the book value of equity (Compustat #216) and MVE_t is the market value of equity, calculated as the stock price (Compustat #199) times the shares outstanding (Compustat #25). Ps. R-squared is the Pseudo R-squared. All variables are winsorized at the 1 percent and 99 percent quantiles. Significance levels for the 1 percent, 5 percent, and 10 percent level are denoted by ***, **, and * respectively. Since net share repurchases start at 1983, this is the first year of the estimation window.

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
1983	1.679***	1.002*	1.109***	-0.766	-0.067	-0.213***	-2.188***	2,337	0.042
1984	1.949***	-0.511	0.192	-0.456	0.135***	-0.165***	-2.244***	2,440	0.035
1985	0.915**	0.103	-0.615**	0.300	0.146***	-0.251***	-1.577***	2,400	0.039
1986	1.420***	0.057	-0.219	-1.262*	0.108***	-0.236***	-1.635***	2,567	0.041
1987	2.144***	0.020	-0.478*	-0.029	0.226***	-0.114***	-2.016***	2,721	0.062
1988	2.041***	0.371	-0.779***	-0.792	0.132***	-0.289***	-1.167***	2,603	0.067
1989	2.008***	0.325	0.195	0.451	0.124***	-0.269***	-1.901***	2,474	0.059
1990	2.504***	0.726*	0.028	-0.272	0.131***	-0.391***	-1.631***	2,444	0.088
1991	2.141***	-0.480	0.000	1.830**	0.061	-0.312***	-1.783***	2,542	0.061
1992	2.504***	0.089	0.156	1.284	0.126***	-0.154***	-2.529***	2,820	0.060
1993	2.510***	0.407	0.117	-0.280	0.065*	-0.243***	-2.051***	3,158	0.066
1994	2.663***	0.218	-0.174	-0.013	0.133***	-0.216***	-2.246***	3,460	0.067
1995	1.931***	0.361	-0.232	-0.816	0.160***	-0.147***	-2.195***	3,747	0.052
1996	2.172***	0.814***	0.381	0.764	0.128***	-0.153***	-2.425***	3,984	0.062
1997	2.621***	0.804***	0.178	-0.696	0.118***	-0.187***	-1.929***	3,926	0.076
1998	2.260***	0.615***	-0.371*	-0.808	0.140***	-0.138***	-1.455***	3,846	0.069
1999	3.019***	0.860***	-0.061	0.845	0.127***	-0.201***	-1.558***	4,006	0.130
2000	3.455***	0.536***	0.681***	-0.383	0.115***	-0.158***	-2.180***	3,995	0.112
2001	1.825***	0.349**	-0.423**	-0.489	0.095***	-0.139***	-1.282***	3,632	0.050
2002	1.527***	0.416**	-1.201***	-0.144	0.165***	-0.107***	-1.378***	3,459	0.064
2003	1.521***	1.327***	-0.680***	-1.083	0.122***	-0.112***	-1.435***	3,218	0.066
2004	1.534***	0.958***	-0.251	-0.926	0.253***	-0.056*	-2.678***	3,036	0.085
2005	2.498***	1.337***	-0.334	-2.363***	0.321***	-0.049	-3.030***	2,884	0.136
2006	2.022***	1.746***	0.088	-2.947***	0.327***	0.005	-3.125***	2,870	0.141
2007	2.507***	1.861***	0.497**	-2.777***	0.290***	-0.071**	-2.947***	2,891	0.155

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
2008	1.705***	0.784***	-0.385*	-2.834***	0.301***	-0.007	-2.109***	2,742	0.109
2009	0.781***	0.899***	-0.542**	-1.865**	0.208***	-0.111***	-1.792***	2,628	0.061
2010	1.382***	1.298***	-0.002	-4.600***	0.279***	-0.020	-2.591***	2,560	0.106
2011	1.421***	1.895***	-0.067	-2.906***	0.293***	-0.059*	-2.384***	2,461	0.132
2012	1.307***	2.588***	-0.073	-2.241***	0.290***	-0.082**	-2.410***	2,293	0.153
2013	1.223***	2.639***	0.075	-2.121***	0.236***	-0.039	-2.250***	2,304	0.135
2014	2.096***	1.903***	0.318	-1.095	0.227***	-0.070**	-2.399***	2,323	0.148
2015	2.157***	2.500***	0.382	-0.289	0.196***	-0.081**	-2.174***	2,207	0.160

Table 12

Annual logistic regressions, dependent variable is coded 1 for dividend-only firm/years and 0 for firm/years with both dividends and repurchases, 1980 – 2015.

RE_t is retained earnings (Compustat #36) and is scaled by BVE_t, book value of equity (Compustat #216) to represent a life-cycle measure. E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. E_t is scaled by assets to represent a profitability measure. L_t is total liabilities (Compustat #181) and is scaled by assets to indicate the debt ratio. $CAPEX_t$ is capital expenditures (Compustat #128), and is scaled by assets to construct an investment measure. $Ln(A_t)$ is the natural logarithm of assets and represents a measure of firm size. V_t / A_t is the market-to-book assets ratio, a proxy for investment opportunities, where V_t is the market value of assets and A_t is the book value of assets (Compustat #6). V_t is measured as ($A_t – BVE_t + MVE_t$), where BVE_t is the book value of equity (Compustat #216) and MVE_t is the market value of equity, calculated as the stock price (Compustat #199) times the shares outstanding (Compustat #25). Ps. R-squared is the Pseudo R-squared. All variables are winsorized at the 1 percent and 99 percent quantiles. Significance levels for the 1 percent, 5 percent, and 10 percent level are denoted by ***, **, and * respectively. Since net share repurchases start at 1983, this is the first year of the estimation window.

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / BVE_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
1983	-1.438***	-0.569	-0.613	1.008	0.026	0.145	2.318***	1,766	0.020
1984	-0.809***	-4.528***	-0.490	1.418	-0.033	0.235**	1.706***	1,672	0.020
1985	-1.462***	-4.846***	-0.313	2.013*	-0.039	0.262**	2.015***	1,555	0.041
1986	-1.816***	1.095	0.683*	0.707	-0.072**	0.128	1.744***	1,431	0.053
1987	-0.772***	1.026	0.417	-0.193	-0.059*	0.062	0.753***	1,353	0.016
1988	-1.122***	-0.896	0.473	2.010*	-0.078**	0.202*	1.029***	1,268	0.036
1989	-1.229***	-0.207	0.109	1.234	-0.054	0.049	1.543***	1,261	0.039
1990	-0.870***	-3.412**	-0.057	0.244	0.012	0.301***	0.654**	1,241	0.027
1991	-1.307***	-3.036*	0.140	3.233**	0.090**	0.204**	0.825***	1,226	0.050
1992	-1.095***	-5.807***	-0.120	3.973***	-0.000	0.167*	1.566***	1,280	0.048
1993	-1.263***	-7.502***	-0.485	0.872	-0.031	0.229**	2.275***	1,323	0.051
1994	-1.557***	-1.127	-0.266	0.287	0.007	0.067	1.794***	1,340	0.059
1995	-1.312***	-1.631	-0.241	0.848	-0.017	0.117*	1.509***	1,396	0.053
1996	-1.455***	-5.703***	-0.917**	2.271**	-0.032	0.196***	1.927***	1,407	0.084
1997	-1.164***	-4.013***	-1.022***	1.380	-0.072**	0.120*	1.950***	1,351	0.062
1998	-0.866***	-4.896***	-0.486	1.375	-0.137***	0.182***	1.551***	1,279	0.059
1999	-1.084***	-7.553***	-0.474	1.159	0.007	0.226***	0.947***	1,165	0.082
2000	-0.972***	-2.924**	-0.798**	1.880	0.081**	0.055	0.378	1,090	0.055
2001	-0.072	-4.098***	0.332	-1.162	0.013	0.007	0.294	989	0.020
2002	-0.388***	-8.075***	0.341	-0.578	-0.093**	-0.081	1.787***	960	0.063
2003	-0.434***	-3.300*	0.339	1.646	-0.103***	-0.156*	1.585***	1,055	0.044
2004	-0.293***	-1.929	0.027	0.321	-0.197***	-0.246***	2.630***	1,153	0.052
2005	-0.569***	-4.473***	-0.194	2.577**	-0.262***	-0.070	2.934***	1,217	0.088
2006	-0.248**	-5.283***	-0.068	2.941***	-0.225***	-0.076	2.208***	1,188	0.067
2007	-0.140*	-6.420***	-1.145***	5.363***	-0.207***	0.078	2.032***	1,180	0.077

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / BVE_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
2008	-0.214***	-3.369***	-0.570*	4.682***	-0.068**	-0.002	0.749***	1,118	0.039
2009	-0.169*	-2.719**	0.357	3.331**	-0.076**	-0.021	0.963***	1,017	0.020
2010	-0.052	-6.717***	-0.816**	3.064**	-0.095***	0.171**	1.346***	1,054	0.034
2011	-0.378***	-3.884***	-0.820**	4.922***	-0.121***	0.016	1.457***	1,113	0.057
2012	-0.087**	-3.616***	-0.548	5.311***	-0.082**	0.043	0.843***	1,228	0.034
2013	-0.123*	-3.934***	-0.043	4.156***	-0.203***	-0.111	1.861***	1,206	0.061
2014	-0.341***	-3.341**	-1.344***	1.951*	-0.129***	-0.131*	2.054***	1,225	0.069
2015	-0.143**	-5.602***	-0.553	2.595**	-0.120***	-0.077	1.316***	1,215	0.061

Table 13

Annual logistic regressions, dependent variable is coded 1 for repurchase-only firm/years and 0 for firm/years with both dividends and repurchases, 1980 – 2015.

RE_t is retained earnings (Compustat #36) and is scaled by BVE_t, book value of equity (Compustat #216) to represent a life-cycle measure. E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. E_t is scaled by assets to represent a profitability measure. L_t is total liabilities (Compustat #181) and is scaled by assets to indicate the debt ratio. $CAPEX_t$ is capital expenditures (Compustat #128), and is scaled by assets to construct an investment measure. $Ln(A_t)$ is the natural logarithm of assets and represents a measure of firm size. V_t / A_t is the market-to-book assets ratio, a proxy for investment opportunities, where V_t is the market value of assets and A_t is the book value of assets (Compustat #6). V_t is measured as ($A_t – BVE_t + MVE_t$), where BVE_t is the book value of equity (Compustat #216) and MVE_t is the market value of equity, calculated as the stock price (Compustat #199) times the shares outstanding (Compustat #25). Ps. R-squared is the Pseudo R-squared. All variables are winsorized at the 1 percent and 99 percent quantiles. Significance levels for the 1 percent, 5 percent, and 10 percent level are denoted by ***, **, and * respectively. Since net share repurchases start at 1983, this is the first year of the estimation window.

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / BVE_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
1983	-2.393***	-7.789***	2.437***	1.020	-0.770***	0.293*	2.855***	617	0.412
1984	-1.629***	-5.193***	1.195**	0.566	-0.671***	0.263	2.776***	866	0.355
1985	-2.582***	-10.102***	0.516	3.495**	-0.729***	0.109	4.159***	834	0.453
1986	-3.310***	-4.336**	1.899***	-0.513	-0.658***	0.194	3.650***	872	0.446
1987	-1.771***	-1.493	1.004**	-0.227	-0.666***	0.048	3.567***	1,137	0.330
1988	-2.162***	-5.794***	1.442***	0.233	-0.790***	0.182	4.304***	1,031	0.414
1989	-1.444***	-4.658***	1.930***	-0.188	-0.760***	0.022	3.650***	888	0.388
1990	-1.258***	-6.632***	1.250**	-0.890	-0.683***	0.354**	3.211***	998	0.333
1991	-1.926***	-7.248***	1.463**	1.925	-0.636***	0.244*	3.292***	754	0.375
1992	-1.724***	-7.380***	0.106	2.748	-0.560***	0.183	3.650***	742	0.334
1993	-1.014***	-7.691***	0.083	1.266	-0.656***	0.342***	3.677***	780	0.323
1994	-2.318***	-2.246	-0.775	0.276	-0.478***	0.132	4.055***	913	0.331
1995	-2.585***	-3.067*	-0.162	0.432	-0.525***	0.245***	3.917***	1,026	0.363
1996	-2.205***	-6.123***	-1.052**	2.090*	-0.463***	0.271***	4.016***	1,134	0.343
1997	-1.829***	-4.020***	-0.301	1.220	-0.547***	0.198**	4.170***	1,303	0.321
1998	-1.684***	-3.818***	-0.663*	1.943*	-0.568***	0.199***	4.491***	1,603	0.339
1999	-1.867***	-5.416***	-0.296	1.974	-0.502***	0.253***	4.354***	1,546	0.308
2000	-1.579***	-1.789	-0.461	2.091*	-0.420***	0.125**	3.736***	1,438	0.269
2001	-0.862***	-4.771***	-0.366	-0.101	-0.462***	0.211***	3.725***	1,308	0.304
2002	-1.295***	-6.241***	-0.686	0.535	-0.469***	0.182*	4.601***	1,218	0.317
2003	-1.348***	-4.204**	0.269	0.617	-0.469***	0.209**	3.658***	1,132	0.299
2004	-1.028***	-4.136**	-0.151	1.455	-0.514***	0.038	4.197***	1,010	0.252
2005	-0.968***	-7.486***	-0.897**	1.119	-0.459***	0.221***	4.063***	1,093	0.272
2006	-0.793***	-9.502***	-1.073***	1.384	-0.469***	0.298***	4.124***	1,228	0.232
2007	-0.349***	-7.926***	-0.996***	2.231*	-0.466***	0.299***	3.796***	1,324	0.218

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / BVE_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
2008	-0.604***	-4.754***	-1.402***	2.756**	-0.370***	0.107	3.660***	1,479	0.243
2009	-0.841***	-3.605***	-1.038**	-0.060	-0.297***	0.059	3.264***	1,062	0.230
2010	-0.367***	-8.243***	-0.951**	-1.955	-0.357***	0.222**	3.543***	1,122	0.191
2011	-0.600***	-4.605***	-0.654*	1.029	-0.407***	0.083	3.757***	1,296	0.206
2012	-0.266***	-5.652***	-0.594*	3.308***	-0.338***	0.095	2.737***	1,220	0.153
2013	-0.327***	-6.061***	-0.259	1.363	-0.409***	0.179***	3.039***	1,207	0.202
2014	-0.390***	-6.580***	-0.536	2.364**	-0.431***	0.251***	3.148***	1,253	0.215
2015	-0.269***	-6.940***	-0.163	0.471	-0.419***	0.190***	2.999***	1,280	0.190

Table 14

Annual logistic regressions, dependent variable is coded 1 for firm/years with both dividends and repurchases and 0 for firm/years with no payouts, 1980 – 2015.

RE_t is retained earnings (Compustat #36) and is scaled by A_t, the book value of assets (Compustat #6) to represent a life-cycle measure. This variable is assigned a value of 0 if RE_t is negative. E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. E_t is scaled by assets to represent a profitability measure. L_t is total liabilities (Compustat #181) and is scaled by assets to indicate the debt ratio. $CAPEX_t$ is capital expenditures (Compustat #128), and is scaled by assets to construct an investment measure. $Ln(A_t)$ is the natural logarithm of assets and represents a measure of firm size. V_t / A_t is the market-to-book assets ratio, a proxy for investment opportunities, where V_t is the market value of assets and A_t is the book value of assets (Compustat #6). V_t is measured as $(A_t – BVE_t + MVE_t)$, where BVE_t is the book value of equity (Compustat #216) and MVE_t is the market value of equity, calculated as the stock price (Compustat #199) times the shares outstanding (Compustat #25). Ps. R-squared is the Pseudo R-squared. All variables are winsorized at the 1 percent and 99 percent quantiles. Significance levels for the 1 percent, 5 percent, and 10 percent level are denoted by ***, **, and * respectively. Since net share repurchases start at 1983, this is the first year of the estimation window.

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
1983	7.786***	7.213***	2.899***	-1.813	0.688***	-0.564***	-7.358***	2,434	0.482
1984	7.785***	6.006***	2.791***	-2.277**	0.748***	-0.497***	-7.360***	2,574	0.510
1985	8.160***	8.873***	3.367***	-1.224	0.783***	-0.634***	-8.041***	2,492	0.530
1986	9.139***	4.828***	3.012***	0.150	0.749***	-0.565***	-8.061***	2,653	0.537
1987	8.190***	3.109**	2.226***	0.051	0.823***	-0.172*	-7.894***	2,780	0.540
1988	8.715***	5.775***	2.499***	-0.127	0.828***	-0.470***	-8.220***	2,572	0.563
1989	7.666***	4.233***	1.998***	1.141	0.849***	-0.467***	-7.892***	2,484	0.544
1990	6.537***	9.161***	1.402***	-0.204	0.764***	-0.832***	-6.345***	2,480	0.525
1991	7.410***	9.702***	1.879***	-0.027	0.698***	-0.678***	-7.157***	2,506	0.506
1992	7.664***	8.636***	2.683***	-1.382	0.819***	-0.429***	-8.675***	2,792	0.528
1993	7.707***	10.402***	2.647***	-0.442	0.806***	-0.392***	-9.002***	3,120	0.535
1994	7.878***	7.524***	2.710***	0.685	0.726***	-0.616***	-8.206***	3,407	0.505
1995	7.426***	7.953***	2.792***	-0.239	0.700***	-0.483***	-8.074***	3,703	0.496
1996	8.357***	8.564***	4.117***	-1.108	0.695***	-0.518***	-8.972***	3,912	0.531
1997	7.933***	7.373***	3.495***	-2.280**	0.710***	-0.422***	-8.492***	3,761	0.523
1998	7.791***	9.271***	3.420***	-1.135	0.767***	-0.477***	-8.768***	3,521	0.536
1999	8.381***	10.643***	3.959***	-0.496	0.733***	-0.566***	-9.039***	3,576	0.575
2000	7.998***	5.578***	3.681***	-3.745***	0.624***	-0.325***	-8.250***	3,679	0.533
2001	6.629***	8.065***	3.052***	-1.109	0.579***	-0.355***	-7.736***	3,184	0.481
2002	6.516***	7.833***	2.604***	-0.288	0.656***	-0.205**	-8.646***	2,991	0.496
2003	6.210***	7.252***	1.735***	-0.371	0.609***	-0.156**	-7.687***	2,954	0.470
2004	6.113***	5.586***	1.962***	-1.077	0.734***	0.038	-8.918***	2,942	0.516
2005	7.179***	9.096***	3.099***	-2.630**	0.820***	-0.157**	-9.779***	2,855	0.587
2006	6.667***	7.420***	2.977***	-3.151***	0.740***	0.001	-9.177***	2,830	0.564
2007	6.799***	7.600***	3.692***	-4.869***	0.690***	-0.215***	-8.667***	2,837	0.569

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
2008	6.079***	4.285***	2.737***	-5.829***	0.657***	0.000	-7.685***	2,431	0.519
2009	4.569***	4.421***	1.688***	-3.287**	0.534***	-0.019	-6.847***	2,368	0.386
2010	4.943***	4.639***	2.373***	-3.699***	0.611***	0.012	-7.694***	2,396	0.438
2011	4.560***	5.845***	1.655***	-5.110***	0.698***	0.038	-7.535***	2,309	0.485
2012	4.258***	7.466***	2.004***	-5.877***	0.553***	-0.032	-6.291***	2,283	0.469
2013	3.857***	7.487***	1.401***	-4.464***	0.642***	0.007	-6.775***	2,313	0.492
2014	4.683***	10.175***	1.798***	-3.671***	0.621***	-0.162***	-6.733***	2,376	0.533
2015	4.814***	10.388***	1.476***	-0.465	0.604***	-0.188***	-6.390***	2,299	0.540

Table 15
Annual logistic regressions, dependent variable is coded 1 for high-technology firm/years and 0 for non-technology firm/years, 1980 – 2015.

Firm/years with one of the following three-digit SIC-codes are classified as high-technology, and non-technology otherwise: 283, 357, 366, 367, 382, 384, 481, 482, 489, 737, and 873. RE_t is retained earnings (Compustat #36) and is scaled by A_t, the book value of assets (Compustat #6) to represent a life-cycle measure. This variable is assigned a value of 0 if RE_t is negative. E_t is earnings, measured as income before extraordinary items (Compustat #18) minus 60 percent of special items (Compustat #17) to adjust for the effect of special items, thereby assuming an effective tax rate of 40 percent. E_t is scaled by assets to represent a profitability measure. L_t is total liabilities (Compustat #181) and is scaled by assets to indicate the debt ratio. $CAPEX_t$ is capital expenditures (Compustat #128), and is scaled by assets to construct an investment measure. $Ln(A_t)$ is the natural logarithm of assets and represents a measure of firm size. V_t / A_t is the market-to-book assets ratio, a proxy for investment opportunities, where V_t is the market value of assets and A_t is the book value of assets (Compustat #6). V_t is measured as ($A_t – BVE_t + MVE_t$), where BVE_t is the book value of equity (Compustat #216) and MVE_t is the market value of equity, calculated as the stock price (Compustat #199) times the shares outstanding (Compustat #25). Ps. R-squared is the Pseudo R-squared. All variables are winsorized at the 1 percent and 99 percent quantiles. Significance levels for the 1 percent, 5 percent, and 10 percent level are denoted by ***, **, and * respectively.

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
1980	-1.297***	1.655***	-1.113***	-2.219***	-0.115***	0.102***	-0.323	3,310	0.044
1981	-1.514***	0.963***	-1.723***	-2.973***	-0.048*	0.286***	-0.337*	3,460	0.044
1982	-1.682***	1.733***	-1.934***	-2.204***	-0.026	0.333***	-0.422**	3,890	0.075
1983	-1.893***	0.488*	-2.670***	-1.583***	0.025	0.274***	-0.171	3,792	0.100
1984	-1.616***	-0.068	-2.356***	-0.512	0.001	0.254***	-0.111	4,103	0.111
1985	-1.359***	-0.157	-2.331***	-1.479***	-0.037	0.130***	0.269*	4,112	0.081
1986	-1.491***	0.209	-2.265***	-2.931***	-0.049**	0.102***	0.526***	3,955	0.074
1987	-1.177***	-0.290	-2.272***	-3.362***	-0.034	0.108***	0.431***	3,998	0.074
1988	-1.084***	-0.602***	-1.974***	-2.214***	-0.050**	0.086***	0.367***	4,074	0.074
1989	-0.922***	-0.468**	-1.484***	-3.148***	-0.066***	0.111***	0.208	3,871	0.066
1990	-0.944***	-0.388*	-1.709***	-4.007***	-0.060***	0.205***	0.224*	3,735	0.061
1991	-0.952***	0.025	-1.794***	-3.344***	-0.052**	0.193***	0.106	3,685	0.076
1992	-0.979***	-0.016	-2.153***	-3.848***	-0.041*	0.182***	0.319**	3,768	0.087
1993	-0.785***	-0.748***	-2.438***	-3.858***	-0.004	0.142***	0.264**	4,100	0.086
1994	-0.918***	-0.648***	-2.417***	-4.420***	-0.013	0.213***	0.317**	4,481	0.093
1995	-0.927***	-0.472***	-2.364***	-4.110***	0.007	0.234***	0.105	4,800	0.097
1996	-0.947***	-0.966***	-2.393***	-3.130***	0.016	0.215***	0.110	5,143	0.122
1997	-1.416***	-0.796***	-2.370***	-3.750***	-0.007	0.295***	0.199*	5,391	0.114
1998	-1.450***	-0.875***	-2.451***	-3.456***	-0.000	0.233***	0.418***	5,277	0.133
1999	-1.210***	-0.737***	-2.512***	-3.293***	0.033*	0.200***	0.201*	5,125	0.125
2000	-1.878***	-1.010***	-2.934***	-1.526***	0.082***	0.208***	0.251**	5,171	0.162
2001	-1.813***	-1.420***	-3.004***	-2.278***	0.087***	0.154***	0.358***	5,085	0.151
2002	-1.918***	-1.424***	-2.845***	-5.077***	0.045***	0.132***	0.783***	4,621	0.148
2003	-2.089***	-0.408**	-2.757***	-7.829***	0.040**	0.149***	0.842***	4,419	0.131

Year	*Life-cycle*	*Profitability*	*Debt-ratio*	*Investment*	*Size*	*Investment opportunities*			
	RE_t / A_t	E_t / A_t	L_t / A_t	$CAPEX_t / A_t$	$Ln(A_t)$	V_t / A_t	Intercept	Observations	Ps. R-squared
2004	-1.961***	-0.796***	-2.686***	-6.886***	0.037**	0.123***	0.864***	4,273	0.128
2005	-1.923***	-0.777***	-2.630***	-7.657***	0.029	0.096***	0.996***	4,189	0.128
2006	-1.807***	-0.635***	-2.462***	-8.094***	0.033*	0.085***	0.918***	4,101	0.125
2007	-1.780***	-0.528***	-2.067***	-8.415***	0.030	0.096***	0.776***	4,058	0.120
2008	-1.590***	-0.867***	-1.928***	-7.115***	0.034*	0.075***	0.678***	4,071	0.114
2009	-1.817***	-0.438**	-1.957***	-9.070***	0.030	0.176***	0.528***	3,860	0.099
2010	-1.735***	-0.320*	-2.033***	-7.832***	0.003	0.141***	0.740***	3,645	0.096
2011	-1.682***	-0.811***	-2.274***	-7.756***	0.044**	0.118***	0.673***	3,614	0.096
2012	-1.629***	-0.750***	-2.073***	-9.214***	0.038*	0.122***	0.663***	3,574	0.106
2013	-1.677***	-0.303*	-2.104***	-10.284***	0.041**	0.169***	0.577***	3,521	0.114
2014	-1.523***	-0.974***	-2.222***	-9.757***	0.048**	0.211***	0.501***	3,510	0.132
2015	-1.645***	-0.868***	-2.200***	-10.402***	0.047**	0.344***	0.335**	3,548	0.153