

Norwegian School of Economics
Bergen, Autumn 2018

NHH



CEO Options and Payout Decisions

An empirical analysis of the effects of CEO stock option on the payout decision

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Master Thesis, MSc, Finance

NORWEGIAN SCHOOL OF ECONOMICS

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work

Abstract

This thesis studies the effects of CEO stock options on the choice between dividends and share repurchases, by examining 165 companies listed on the Oslo Stock Exchange in the period from 2012 to 2016. Given the growth in importance and popularity of managerial stock options, we investigate how these stock options affect corporate payout policy. Specifically, we test whether CEO stock options lead reduce dividends and increase share repurchases.

We rely on two different regression models in our research. Logistic regression models to estimate the likelihood of a dividend or repurchase payout, while random effects regression models to estimate how the CEOs stock options affect the size of each payout method.

Our study presents two main findings; firstly, for the companies that pay dividends, our results indicate that for each percentage point increase in CEO stock options, companies lower the level of dividends by 0.095 percentage points. Secondly, our study does not find a significant relationship between CEO stock options and share repurchases. In other words, we fail to find that the presence of CEO stock options lead to increased share repurchases in Norway.

To the best of our knowledge, this thesis provides unique insight to the companies listed on the Oslo Stock Exchange, as such studies have never been conducted on the Norwegian market before.

Keywords: Stock Options, Share Repurchases, Dividends, Payout Policy, Compensation

Acknowledgements

With this thesis, we complete our Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH). We found great pleasure by writing this thesis as we got the opportunity to use the skills and understanding of economics gained through the master's degree at NHH.

The process of writing this assignment has been both challenging and educational. In addition to using knowledge from our studies, we have used this opportunity to expand our understanding within econometrics and corporate finance.

We would like to express our gratitude to our supervisor, Maximillian Rohrer, who has provided us with essential guidance, valuable contributions and quick responses throughout the process. Additionally, we are grateful for Jørgen Dessingthon providing us with continuous feedback and suggestions.

Bergen 20.12.2018



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1. Introduction

Managerial stock incentives have the potential to align the interests between different stakeholders. Therefore, many companies have introduced stock options as part of the compensation in an attempt to reduce agency costs (Fenn and Liang, 2001). As first discussed by Jensen and Meckling (1976), these costs occur due to the separation of ownership and control. The stock options should reduce the agency costs because the holder only benefits if the price of the underlying asset rises, which is also in the shareholders' interest. More than half of the companies on the Oslo Stock Exchange had CEO options as part of their compensation in 2005. Stock options and shares made up 34% of the compensation, from being almost absent during the 1990s (Randøy and Skalpe 2007). This pattern is the same as in other countries. Companies on the S&P 500 increased the percentage of CEO stock options of total pay from 27% in 1992 to 51% in 2000 (Murphy, 2000). Several studies investigate how CEO stock options influence management activities, and in particular, the extent to which they mitigate various agency problems. So far, no studies have explicitly investigated the relationship between CEO stock options and corporate payout decisions, in the form of dividends or share repurchases, on the Norwegian stock market. This thesis examines how corporate payout policy is affected by the CEO options for the companies listed on the Oslo Stock Exchange.

The two choices of corporate payout policy are dividends and share repurchases. These methods are similar in that the company transfer value to their shareholders, however, they are performed in two different ways. Dividends represent cash or stock transfer while repurchases increase the value of each share by reducing the shares outstanding and signalling undervaluation (Dann, 1981). In a `perfect` capital market there is indifference between these two payout methods (Modigliani and Miller, 1958). In reality, financial markets are not perfect, and there are reasons to believe that the choice between dividends and share repurchases matter. The purpose of this paper is not to document that capital markets are imperfect, but rather to investigate how the presence of CEO options affect the choice between dividends and share repurchases.

When examining the payout activity over the last decades, markets seem to suggest that there are differences between the payout methods. As an example, US companies' expenditures on repurchases relative to earnings increased from 4.8% to 41.8% between 1980 and 2000. Repurchases as a percentage of total dividends rose from 13.1% to 113.1% during the same period (Grullon and Michaely, 2002). The increase in share repurchases may indicate that there are differences between the two payout methods driving the preference. In Norway, share repurchases were illegal up to January 1999 due to the possibility of manipulating the share price. In the following three years after the legislation, 163 companies made repurchases announcements (Skjeltop, 2004). There are generally three possible reasons why a company might announce share repurchases. The first reason for the announcement could be that management believes their stock is undervalued and they want to signal that to the market. A second explanation could be that institutional investors dominate the stockholder base. These investors favour repurchases because they do not have claims on dividends. Thirdly, companies might repurchase shares because the management's compensation includes stock options (Bartov, Krinsky, and Lee, 1998). The value of the stock options, like all call options, are negatively related to future dividends. Therefore, CEO options are believed to incentivise CEOs to favour share repurchases over dividends (Lambert, Lannen, and Larcker, 1989). Examining stock options and payout policy, Kahle (2002) finds that firms who rely on stock options to compensate their executives exhibit a higher likelihood of repurchasing stocks, providing some merit to the idea that options do incentivise repurchases. In addition to the increase in repurchases, Weisbenner (2000), shows that the use of managerial stock options also leads to a decline in dividend payout. The incentives stock options provide to favour repurchases over dividends, is the rationale behind our research. Thus, our research question is:

To what extent do companies with option-based compensation use share repurchase over dividends when transferring value to their shareholders?

To answer our research question, we combine data from several sources, such as Bloomberg Intelligence, NewsWeb, and the companies' financial statements. By combining all the information, we use data on 165 companies to examine the determinants of open market share repurchases and dividends during the period from 2012 to 2016.

Our research presents two main findings; Firstly, CEO stock options are associated with reductions in dividend payout for the firms that do pay dividends. Firms that have already implemented a dividend-strategy reduce dividend payout as they increase the stock option holdings of their CEO. Our estimate implies that a ten percentage point increase in CEO options reduces dividend payouts by 0.95 percentage points. Moreover, for the companies that have completely changed their dividend policy, either from paying dividends to not paying dividends at all, or *vice versa*, we find that the effect of CEO options is even stronger. For these firms, a ten percentage point increase in CEO options reduce dividends by 1.87 percentage points. Similarly, Fenn and Liang (2001) find that for US firms, a one standard deviation increase in stock options reduces dividends by 38 percentage points. Secondly, in contrast to previous research on the topic by Fenn and Liang (2001), Weisbach (2000) and Weisbenner (2000), we do not find a significant relationship between CEO stock options and share repurchases. In other words, we fail to find that the presence of CEO options lead to increased share repurchases. There could be several explanations for this, one being that Norwegian companies do not have a target payout-ratio, and hence can reduce dividends without increasing share repurchases. By not increasing share repurchases following a reduction in dividends, these companies reduce the total payout. Another explanation could be that due to the short history of share repurchases in Norway, CEOs holding stock options, may not have adapted the substitution of repurchases for dividends yet. Repurchases were legalised in 1999, which is 17 years later than in the US. This difference could explain why we fail to find the same significant relationship in Norway as in similar studies on the US market. Our results remain constant over several specifications.

The rest of this thesis is organised as follows; section 2 provides an introduction to the fundamental aspects of stock options, dividends and share repurchases, in addition to a review of relevant literature and previous research on the topic. Further, section 3 provides the empirical methodology, including a description of the variables used, in addition to an explanation of the regression models. Next, we present our data and descriptive statistics in section 4. In section 5 the results are provided, followed by explanations of possible endogeneity problems in section 6. Finally, the conclusion of the thesis is presented in section 7 alongside suggestions for further research.

2.Theoretical background

This section starts by explaining the theory behind our investigation. After that, we comment on the current state of the literature, before explaining our hypothesis.

Modigliani and Miller (1961) describe the indifference between dividends and share repurchases in a perfect capital market characterised by:

- Equal or costless access to information
- No fees, taxes and other transaction costs
- No difference between distributed and undistributed profits, and dividends and capital gains
- Rational behaviour
- Perfect certainty, complete assurance of future investments and profits

In this world, shareholders are indifferent between receiving cash from dividends or share repurchases. However, markets are not perfect, and real-world evidence suggests that the two cannot be considered perfect substitutes. Goedhart, Koller and Wessles (2015) for instance, show that share repurchases have been increasingly favoured over dividends in the US. Research demonstrates this divergence across various geographies and markets, for example, Liljeblom and Pasternack (2006) in Finland, Oswald and Young (2004) in the UK, and, Ikenberry, Lakonishok and Vermaelen (2000) in Canada. Factors believed to drive the preference for share repurchases over dividends include taxes, stock options, ownership and for strategical reasons (such as takeover defence). In the following paragraph, we outline the effect these variables are believed to have on the payout decision.

2.1 Principal-agent problem

In line with the use of share repurchases at the expense of dividends, companies have increased the use of stock options as part of their management's compensation (Fenn and Liang, 2001). Managerial stock options can partly solve one of the most prominent issues in corporate finance. The principal-agent problem was first discussed by Jensen and Meckling (1976). These problems arise due to the separation of ownership and control. They define the problem as a consequence of an agency contract under which one or more persons (the principals) engage another person (agent) to perform some services on their behalf. Moreover, they state that if both parties want to maximise utility, it is reasonable to believe that the agent does not act in the interest of the principal. An example could be that the agent maximises personal wealth, at the expense of the companies. These agency costs could reduce firm value, and companies should try to minimise them.

There are two approaches that potentially can reduce agency costs. These are monitoring and bonding mechanisms, (Jensen and Meckling, 1976). In the case of the question of dividends and repurchases, in particular, bonding is pertinent. The principal may want to establish appropriate incentives for the agent (bonding mechanism), the idea is to align the interest of the manager and the shareholders to make sure that the manager acts in a way that benefits the shareholders. The use of equity-based compensation is one such bonding mechanism that attempts to align the interests between managers and shareholders. One compensation method which has increasingly used in recent years is stock options. The fundamental idea behind option granting is to encourage managers to undertake investments that increase shareholder wealth (Geiler and Renneboog, 2011). Because a stock option only benefits the holder of that option if the price of the underlying asset rises, the manager wants to increase share value, which is in line with the shareholders' interest. When the manager has an incentive to increase share value as a consequence of their stock options, interests are more likely to be aligned between management and shareholders. As the CEOs holding stock options are incentivised to increase their company's value, he/she might favour the payout method which increases the stock price the most.

2.2 Dividend payouts

Traditionally, dividends have been paid by large companies with stable cash flows (Smith and Watts, 1992). These companies tend to have fewer investment opportunities and may return the excess cash to the shareholders to avoid misuse. Dividend-paying firms are typically more profitable, as the dividends are generally paid with excess cash (Fama and French, 2001). Consequently, some companies pay dividends to create an illusion of profitability and may pay dividends using debt. As an example, between 1985 and 2008 General Motors paid stable dividends, even in years with negative earnings (Appendix A.1). However, this is the exception rather than the rule. Even though dividends may indicate profitability, the share price drops. In a `perfect` capital market, the stock price falls by the amount of the dividends on the ex-dividend day (Modigliani and Miller, 1961). The reason for the fall is that the amount paid in dividends no longer belongs to the company. The company's equity is reduced by the same amount, and the share price falls accordingly. The amount now belongs to the individual shareholders. Investors who purchase the share after the ex-dividend date, no longer have a claim to the dividend, and the stock price falls to reflect this fact. Durand and May (1960) test this relationship and hypothesise that the ex-dividend price drops by exactly the dividend amount. When examining 45 consecutive dividend dates for AT&T between 1948 and 1959, they show that with a constant dividend per share at \$2.25 per quarter, the average decline in the price is \$2.16. Even though the price drop is somewhat smaller than the dividend, it is not significantly different; hence they fail to reject their hypothesis. Using a sample of dividends paid by US-listed companies between 1962 and 1994, Bali and Hite (1998) show that the average drop in share price is 76.53% of the dividend payment. These studies, among others, show that the dividend reduces the share price. Therefore, managers holding stock options might be incentivised to use an alternative method when distributing value to their shareholders.

2.3 Repurchase payouts

In contrast to dividends, open market share repurchases have no effect on the share price in perfect capital markets. This is because the reduction in cash holdings caused by the payout is offset by the decrease in shares outstanding, and the share price remains unchanged (Modigliani and Miller, 1961). However, in imperfect markets, the share price changes due to information asymmetries between investors and insiders (managers). As the main reason for initiating a share repurchase is to signal undervaluation to the market (Grullon and Michaely, 2004), investors react positively because they believe the manager has superior information. This informational advantage allows the manager to anticipate undervaluation and thereby repurchase shares at a discount (Brockman and Chung, 2001). If the repurchases are financed with debt, the share price may also increase because the tax deduction linked to the interest payments benefit the shareholders. By changing the capital structure, and benefit from a tax shield, the value of the company might increase (Vermaelen, 1981).

When examining 1,239 open-market share repurchase programs between 1980 and 1990, Ikenberry, Lakonishok, and Vermaelen (1995) find an average post-announcement increase in share price of 3.5% in the US. Furthermore, compounded holding-period returns, show an abnormal long-run increase in performance of 12.14% over four years after the initial announcement, indicating that repurchasing firms had higher returns than the market following the announcement. Extending their prior study, Ikenberry, Lakonishok, and Vermaelen (2000) examine 1060 open market repurchase programs for Canadian corporations. They show that the abnormal return is 0.93% in the month of the announcement and 7.08% annually for the three years following the announcement. Comparable studies on the Norwegian market for the same period is non-existent because repurchases were illegal in Norway up to 1999 due to the possibility of share price manipulation. Following the legislation, Skjeltop (2004) finds that the performance around the repurchase announcement is 2.5% above the market return on average. Skjeltop's study examines 318 repurchase programs made by 163 Norwegian companies between 1998 and 2001. These studies, among others, demonstrate that the share price reacts somewhat differently across markets, but the consensus is that share repurchases increase the share price. Thus, when managers have stock options as part of their compensation, they might favour repurchases over dividends.

2.4 CEO Options and payout decisions

Because of the different effects dividends and share repurchases have on the stock price, managers might adjust the payout policy in a way that maximises their personal wealth. As the stock option value is negatively affected by dividends (Black and Scholes, 1973), CEOs holding options make personal gains from cutting dividends. Studies show that executive stock options are positively related to stock repurchases because option values are positively correlated to share price. For instance, Kahle (2002) shows that firms who rely on stock options to compensate their executives have a higher likelihood of repurchasing shares. In addition to the increase in repurchases, Weisbenner (2000) finds that the use of managerial stock options also leads to a decline in dividend payout. Comparable with these results, Fenn and Liang (2001) show that the growth in share repurchases is positively related to the increase in executive stock options for nonfinancial firms during the 1990s. Furthermore, they find that the relationship is negative between dividends and managerial stock options. Recently, Geiler and Renneboog (2015) conducted a similar study on UK-listed firms, showing the same negative relationship between CEO stock options and dividends. The relationship only exists if the options are not dividend protected, which means that the option holders are not entitled to receive the dividend payouts. Contrarily, when the options are dividend protected, the manager's choice of payout becomes a neutral decision as the total gain is equal given that both methods are taxed at the same rate.

The absence of dividend protection appears to be the norm. Murphy (1998) reports that among 618 large firms across several markets, only 7 of the option granting firms had plans that included dividend-protection. Weisbenner (2000) documents the same absence in his study on US firms. In a more recent study, Geiler and Renneboog (2015) show that the lack of dividend protection also exists for UK-listed firms. Liljeblom and Pasternack (2006) demonstrate that Finnish firms do not avoid dividends if the executive stock options are dividend protected. When the stock options are not dividend protected, they find supporting evidence of CEOs changing the payout decision, in line with the results of Fenn and Liang (2001). All these findings indicate that CEOs holding stock options reduce dividends and increase share repurchases as the value of their option holdings increase by doing so.

2.5 Tax perspective

In addition to preferences stemming from an option perspective, possible differences in taxation may also affect the payout decision. In a perfect capital market, the choice of payout method is irrelevant, as the total gain is the same (Modigliani and Miller, 1961). Therefore, the preference between the two methods comes down to whether the shareholder prefers cash today or cash in the future. In reality, the preference could also be driven by taxation. When firms pay a dividend, shareholders are taxed according to the dividend tax rate. On the other hand, share repurchases are taxed as capital gains, which occur upon realisation. In the US, dividends were taxed at a higher rate than capital gains up until 2003 (DeMarzo and Berk, 2013), thereby creating a preference for share repurchases over dividends. However, the taxation rate for the two payout methods is now the same, and the shareholders should be indifferent between the payout methods from a tax perspective. However, in some countries, like Switzerland, dividends are still taxed at a higher rate than capital gains (Deloitte, 2017). In Norway, dividends and capital gains are taxed using the same rate; hence, the shareholders should be indifferent between dividends and repurchases from a tax perspective. Potential tax differences show the importance of considering national context when analysing the choice between dividends and share repurchases.

2.6 Diluted earning per share (EPS)

Diluted EPS is another factor that could drive the preference for repurchases over dividends. Even though the intention is to align the interest between different stakeholders, the granting of executive stock options may induce problems. When a company grants stock options, the number of possible outstanding stocks increase, causing a dilution effect. Diluted EPS works as a "worst-case" scenario regarding EPS (e.g., Andrade, 1999, and Graham and Harvey, 2001), and is an important measure to analysts and investors since it tells something about the financial state of the company. The diluted EPS increase the number of shares in the denominator to reflect the dilutive effects of stock options and other convertible securities. The computing method of the dilution which results from stock options assumes that the proceeds received from exercising options are used to repurchase shares. Specifically, when calculating how much earnings each share receives, each outstanding share is weighted as one, and each stock option is weighted as $(P-X)/P$ (Burgstahler and Dichev, 1997). In this example, P is the stock price, and X is the exercise

price of the option. Therefore, without repurchases, stock options have a direct dilutive effect on future earnings per share (Weisbenner, 2000).

However, the dilution does not appear directly after the granting nor when they are to be exercised. Rather, the dilution effect increases over option's time-period as the stock price increases beyond the strike price. Consequently, this could incentivise the company to repurchase shares when the option is in-the-money to offset the dilution effect. Due to the importance of diluted EPS, the share price will decrease if repurchases are absent, which in turn will harm both the CEO and the shareholders (Weisbenner, 2000). Brav et al. conducted a management survey in 2005 showing that 76% of the responding CEOs considered increased EPS as an important factor when deciding to repurchase shares. Managing diluted EPS is one of the ways stock options affect the payout decision. The increase in CEO stock options give incentives to increase share repurchases to offset the reduction in diluted EPS.

2.7 Takeover defence

Contrary to previously explanations where the payout decision only affects the company and its investors, repurchases can also affect the relationship between the company and other actors outside the company. Several studies, such as Dittmar (2000), suggest that companies use repurchases as a defence mechanism against hostile acquisitions. Furthermore, they also state that the probability of such takeovers increases in periods with high activity and many acquisitions in the market overall. Hence, repurchase activities might be more present in periods of high market activity. Bagwell (1991) argues that share repurchases will make the company and its shares costlier. This is because the shareholders who redeem their shares in a repurchase, typically value the company the lowest; thus, the remaining shareholders are the ones who value the company the highest.

As a consequence, the lowest price for the remaining shares increases. Moreover, given that there is a positive demand for the company's stocks, the takeover price increase more by a repurchase than by dividends (Dittmar, 2000). Share repurchases will also be more effective as a defence mechanism when approaching the marginal shareholder, the heterogeneity of shareholders is substantial, and when the private benefit of control from the acquisition is limited (Bagwell, 1991). When considering asymmetric information, Bagnoli and Lipman (1989) support Bagwell's (1991) finding that share repurchases make

possible acquisition costlier. Moreover, they suggest that management only consider repurchases if the costs, in the form of increased premiums, are not too high. As the premiums rise, it reduces the company's value. This inverse relationship between cost and value implies that repurchases signal that the value of the stock is high. Consequently, this signal could also convince shareholders to not tender their shares making a potential hostile takeover even more difficult (Bagnoli and Lipman, 1989). In the presence of asymmetric information, share repurchases could be an effective defence strategy. These mechanisms are some of the reasons why firms may prefer repurchases over dividends when they want to avoid possible hostile takeovers.

2.8 Hypothesis development

The theory suggests that companies may favour repurchases over dividends due to several reasons, with CEO stock options being one of the most prominent factors. Managers holding stock options have substantial personal wealth at stake in the choice between dividends and share repurchases. Because of the negative effect dividends have on stock options, CEOs may be incentivised to decrease the dividend payouts. As an example, assuming an option with a life of ten years, stock volatility of 30%, and a risk-free rate of 5%, reducing dividend yields from .02 to .01 will *ceteris paribus* increase the Black-Scholes value of an option by 18 per cent, and by 39 per cent if dividends were eliminated (Weisbenner 2000). As the example shows, a reduction in dividends increases the option value, which could result in a wealth transfer from the shareholders to the CEO. The incentive to reduce dividend payments is often referred to as the managerial power hypothesis (Geiler and Renneboog, 2015). The hypothesis states that CEOs holding non-dividend protected options prefer to avoid dividend payments, as they hurt the option value. In this thesis, we test if the managerial power hypothesis holds for the Norwegian market, hence our first hypothesis is:

H1: *Increased CEO stock options reduce dividend payouts*

Another way CEO stock options affect the payout decision is due to the positive effect of repurchases on option values. Consequently, CEOs holding options are incentivised to substitute dividends for share repurchases. The reduction in dividends followed by an increase in repurchases has often been called the substitution hypothesis (Kahle, 2002).

For this hypothesis to hold, there should be a positive relationship between stock options and share repurchases. Hence, our second hypothesis is:

H2: *Increased CEO stock options increase share repurchases*

By testing these hypotheses, we will be able to answer our research question; *To what extent do companies with option-based compensation use share repurchase over dividends when transferring value to their shareholders?* According to the theory, there should be a negative relationship between CEO stock options and dividends. For the second hypothesis to hold, CEO stock options should correlate positively with repurchase payouts. Previous research shows supporting evidence for both of these hypotheses. We investigate if the same applies to the companies listed on the Oslo Stock Exchange. Because share repurchases were illegal in Norway up to 1999, it is interesting to see if the pattern is the same given its relatively short existence. If hypothesis (1) holds, a plausible explanation is that CEOs adjust the dividend policy to benefit personally. Whether the cut in dividends is optimal for the firm or not, depends on the effects on the total payout, but this is not in the scope of our study. For hypothesis (2) to hold, we should find a positive and significant relationship between CEO stock options and share repurchases. By finding evidence in favour of hypothesis (2), we would have an indication of CEOs trying to maximise personal wealth, due to the positive effect of repurchases on option values. Research shows that the increase in repurchases benefits the company as a whole because firm-performance increases after a repurchase announcement (Ikenberry, Lakonishok, and Vermaelen, 1995). If both hypotheses hold, this could indicate that the *substitution hypothesis* holds in Norway, in that CEOs substitute dividends for repurchases as their stock option holdings increase. Moreover, by finding evidence in favour of both hypotheses, we will provide stronger evidence of CEOs adjusting the payout policy for personal gains. However, the argument that CEOs maximise personal wealth by choosing to reduce dividends, is still strong, as even small reductions in dividends increase the option-values substantially. By testing the hypotheses, we investigate to what extent CEOs adjust payouts to benefit personally. In other words, how the stock options affect each of the payout methods.

3. Methodology

This section will first explain the construction of the following variables; (1) CEO options, (2) repurchase payout, (3) dividend payout, and (4) control variables. Subsequently, we explain the regressions used to test our hypothesis. We address potential problems regarding endogeneity in the robust section.

3.1 CEO options

Our measure of stock options is the number of CEO options scaled by the number of shares outstanding. This variable measures the CEO incentives provided by the stock options. By scaling the number of options by total shares outstanding, this variable measures how much of the company the CEO can acquire if exercising all the options. Our study focuses on the CEO because he/she is the most influential decision maker of the firm. The incentive to reduce dividends and increase share repurchases only exists if the stock options are not dividend-protected. When examining the option transactions on Newsweb as well as financial statements, we find no information about dividend protection for any of the companies in our sample; therefore, all the companies in our sample are valid for testing our hypotheses.

$$CEO\ options = \frac{Number\ of\ options\ held\ by\ the\ CEO}{total\ number\ of\ shares\ outstanding}$$

3.2 Repurchase payout

To measure share repurchases, we use the same approach as Fenn and Liang (2001). We scale the NOK-amount spent on open market repurchases in each fiscal year by the total market value of the company. While the companies could have repurchased the same number of shares in several years, the amount spent could vary because of fluctuations in the share price. Therefore, for each share repurchase, the number of shares is multiplied by the price of the stock at the time and summarised to a yearly measure.

$$Repurchase\ payout = \frac{NOK\ value\ of\ open\ market\ share\ repurchase}{Market\ value\ of\ common\ stocks\ outstanding}$$

3.3 Dividend payout

This measure expresses how much capital the company distributes to shareholders by cash dividends relative to the market value of the firm. This variable enables us to compare dividend payouts between firms. We calculate the sum of dividends by multiplying dividend per share by the number of shares outstanding. This approach has been used in previous research by Fenn and Liang (2001) and Weisbenner (2000).

$$\text{Dividend payout} = \frac{\text{NOK value of total cash dividend}}{\text{Market value of common stocks outstanding}}$$

3.4 Control variables

The payout decision does not rely solely on CEO stock options. Other firm characteristics have an impact as well. We include free cash flow, leverage and external financing costs as our control variables. Besides, we control for year-, industry-, and firm fixed-effects.

3.4.1 Free Cash Flow

Free cash flow is the excess cash after financing all projects with positive net present value, representing the amount available for distribution to shareholders (Jensen, 1986). Free cash flow may be used to finance acquisitions, invest in new projects, repay debt, repurchase shares or paying dividends. Firms with high free cash flow are at a greater risk of overinvesting and hence derive more significant benefits from distributing cash to shareholders. Moreover, dividends and repurchases have a positive relationship with net operating cash flow (Fenn and Liang, 2001). We scale the free cash flow by total assets, in order to get comparable figures across differently sized companies in our sample.

$$\text{Free cash flow} = \frac{\text{Free cash flow}}{\text{Total assets}}$$

3.4.2 Leverage

Leverage could also affect the payout decision. Highly levered firms have a higher probability of default and higher external financing costs. There is a direct and restrictive impact of debt covenants on payouts. There may be an indirect negative effect because debt-related payouts reduce the firms' liquidity and constrain payouts to shareholders (Aidong and Praveen, 2004). The higher the leverage, the less desirable it is for the company to distribute cash to their shareholders, either in the form of dividends or share repurchases. We measure leverage as total debt scaled by total assets, this is similar to previous research (e.g., Garvey and Hanka, 1999; Weisbenner, 2000; Fenn and Liang, 2001).

$$\text{Leverage} = \frac{\text{Total debt}}{\text{Total assets}}$$

3.4.2 Firm size

Previous research suggests that firm size also affects the choice of payout. Our measure of firm size is the logarithm of total assets, which serves as a proxy for external financing costs, asymmetric information and variance in cash flows (Weisbenner, 2000). Higher information asymmetry induces share repurchases over dividends, as companies have more information on the true value of the company and might benefit from repurchasing at a discount. External financing is more costly than internal financing for firms with volatile cash flows, because they may be financially constrained. Thus, firms with high cash-flow uncertainty are expected to be more reliant on internal funds and to pay low dividends. These firms usually rely on repurchases, as it offers greater flexibility. The flexibility emerges as the company may announce a repurchase program without executing it or repurchase shares over a longer time-period compared to dividends (Chay and Suh, 2009). Larger firms usually have lower external financing costs, less asymmetric information and more stable cash flow (Weisbenner, 2000).

$$\text{Firm size} = \text{Log of assets}$$

Industry-specific differences may also influence the payout policy. Thus, specifications include controls for the sectors represented on the Oslo Stock Exchange (Appendix A.2). Additionally, we control for year-specific effects, to capture year specific events that could affect the payout decision. By including these controls, the coefficients are mostly driven by variation across firms at the moment of time. At last, we measure the variation over time within each firm, by controlling for firm fixed-effects.

We measure the payout methods (dependent variables) at time t , because they may take place throughout the year. To estimate how the payout decision is affected by the control variables, we measure the control variables at time $t-1$. Meaning that for the payout variables of 2012, the equivalent control variables are the closing balance values of 2011.

3.5 Main regression models

To examine the relationship between CEO options and payout decision, we rely on two different regression methods. First, we estimate logistic regression models on each of our two dependent variables; repurchase payout and dividend payout. The logistic regressions estimate the possibility that a firm with CEO options will pay a dividend or repurchase shares. Further, we examine which factors affect the payout decision by estimating a regression including all control variables. To account for possible heteroskedasticity and autocorrelation problems, we use robust standard errors (White, 1980). We address possible endogeneity problems in section 6, robustness.

3.5.1 Logistic regression models

We conduct logistic regression models for the dependent binary variables repurchase payout and dividend payout to estimate the likelihood of companies paying a dividend or repurchase shares. The binary variables dividend payout and repurchase payout take the value of zero if companies do not pay a dividend or repurchase shares, and one if they do. The logistic regressions estimate the probability of these variables to take the value of 1. The Ordinary Least Square (OLS) estimators will be unbounded in its simplest form, meaning that the outputs may indicate probabilities above 100%. The logistic regressions avoid this problem by outputting the log-odds and generating coefficients between 0 and 1. An example of the logistic regression model is:

$$\ln \left(\frac{P(Y = 1)}{1 - P(Y = 1)} \right) = \sum_{i=0}^n \beta X_i$$

In order to interpret the coefficients with a more familiar scale, we need to transform the coefficient to express an odds ratio:

$$Odds = \frac{P(Y = 1)}{1 - P(Y = 1)} = e^{\sum_{i=1}^n \beta X_i}$$

After transforming the coefficients, a value above 1 increases the probability of paying a dividend or repurchasing shares. We logically regress the binary outcome variables, dividend payout, and repurchase payout, on the various firm characteristics, in line with our hypotheses:

$$\ln \left(\frac{Dividend\ payout}{1 - Dividend\ payout} \right) = \alpha + \beta_1 CEOoptions + \beta_2 FCF + \beta_3 Leverage + \beta_4 FirmSize + Industry\ effects + Firm\ fixed\ effects + Year\ effects$$

$$\ln \left(\frac{Repurchase\ payout}{1 - Repurchase\ payout} \right) = \alpha + \beta_1 CEOoptions + \beta_2 FCF + \beta_3 Leverage + \beta_4 FirmSize + Industry\ effects + Firm\ fixed\ effects + Year\ effects$$

3.5.2 Random effects (RE) regression models

While the logistic regression models estimate the probability of firms paying a dividend or repurchasing shares, our RE regression models measure how much the variables affect the size of the payout. As we use panel data in our research, we control for unobservable variables and measures which are constant over time. Three regression models that apply to panel data; pooled OLS, fixed effects (FE) and RE estimations. Pooled OLS regressions are preferable when there are no unique firm characteristics and no universal effects across time. However, the Breusch-Pagan Lagrangian multiplier test (Appendix A.3) shows that pooled OLS is not the preferred model for our study.

FE estimation explores the relationship between the predictor and outcome variables within an entity, which in our case is the firms listed on the Oslo Stock Exchange. Each firm has unique characteristics which may affect the payout decision. FE removes the effects of the characteristics that do not vary over time. An essential assumption of the FE model is that the time-invariant characteristics do not correlate with other firm characteristics. If the error terms are correlated, FE is not the correct model, as inference may not be correct; thus, a random effects model might be preferable. The rationale for using a random effects estimation is that the variation across firms is assumed to be random and uncorrelated with the variables included in the model. This assumption allows random effects models to include time-invariant variables as explanatory variables. By testing whether the assumption $Cov(x_{it}; a_i) = 0$ holds or not, we apply the Hausman test and conclude that RE models are preferable for our study (Appendix A.3).

In addition to the Hausman test, the choice of model is a result of several other specifications and statistical tests (Appendix A.3). In order to test our hypotheses, we estimate RE regressions on different sub-samples. Firstly, we investigate the effect of CEO options on the payout decision for the firms that pay dividends or repurchase shares. We do so because the payouts are stable, and do not evolve arbitrarily and randomly (Allen and Michaely, 2003). We expect to find a stronger relationship between CEO options and payouts for these firms compared to the full sample. Secondly, we examine the relationship for the companies that change their dividend policy from paying dividends to not, or *vice versa*. By excluding the companies that either pay dividends in all years or do not pay any dividends throughout the sample period, this leaves us with 53 companies.

We run the following main regressions:

$$\text{Dividend payout} = \beta_0 + \beta_1 \text{CEO options} + \beta_2 \text{FCF} + \beta_3 \text{Leverage} + \beta_4 \text{Firm Size} + \text{Year effects} + \text{Industry effects} + \text{Firm fixed effects} + \varepsilon$$

$$\text{Repurchase payout} = \beta_0 + \beta_1 \text{CEO options} + \beta_2 \text{FCF} + \beta_3 \text{Leverage} + \beta_4 \text{Firm Size} + \text{Year effects} + \text{Industry effects} + \text{Firm fixed effects} + \varepsilon$$

4.Data

To examine the relationship between corporate payout policy and CEO stock options in Norway, we use data from the Brønnøysund registers, the Oslo Stock Exchange, NewsWeb, The Norwegian Bank, Bloomberg, and Asche and Solberg (2017).

4.1 Sample

The sample is limited to the companies listed on the Oslo Stock Exchange during the last six months of 2017, representing a total of 192 companies. For these firms, we obtain company data and information on CEO compensation from 2011 to 2016. Our dataset contains information on free cash flow, leverage, and dividends per share from Bloomberg Intelligence. Further, we acquire data on share repurchases through the Oslo Stock Exchange's database, stemming from thousands of repurchase announcements on NewsWeb. The companies' financial statements are the primary source of information on CEO compensation and company performance. Some of the companies have not been listed on the Oslo Stock Exchange throughout the sample period, for these companies, we collect the corresponding information from the Brønnøysund registers. Asche and Solberg (2017) provide data regarding CEO stock options, we cross-check the data against the official transaction information on NewsWeb. Lastly, we use the average annual exchange rates, provided by the Norwegian Bank, to convert data stated in a foreign currency.

This study does not include all of the 192 companies listed on the Oslo Stock Exchange. We exclude 25 of these, as sufficient information on CEO compensation is not available. These companies are either foreign-registered firms that are not required to report executive pay, or companies in which a different non-consolidated company remunerate the CEO. Therefore, our sample consists of data on 165 companies. Consequently, this study contains 85.93 per cent of the listed firms listed on the Oslo Stock Exchange in the second half of 2017. Finally, our sample contains 825 observations for 165 firms. Each company has between one and five observations, one for each fiscal year. In total there are 172 observations of options granted, distributed among 52 companies. Concerning the dependent variables, there are 183 instances of share repurchases, and 354 dividend payments, conducted by 72 and 95 companies respectively.

4.2 Descriptive statistics

This section describes the characteristics of our final dataset. To begin with, we present summary statistics for the full sample. Next, we compare the summary statistics between different sub-samples. Then we post summary statistics for the observations above and below median dividend payout, before examining the companies with and without repurchase payouts. By analysing these statistics, we get a better understanding of the firms' characteristics, thus enabling us to relate these to behaviour.

Table 4.1 shows the summary statistics of all the variables used in our regression models. The repurchase variable has a minimum value of zero, meaning that when a company does not repurchase any shares, the variable takes the value of zero. The same applies to dividends. Further, the statistics show that the mean of the payout variables is 0.0021 for repurchase and 0.0323 for dividends, implying that companies, on average, pay out 3.23% of their market values in dividends and 0.21% in share repurchases. Repurchase payout has a median of 0, which means that most firms in our sample do not repurchase shares, in a given year within our sample.

As a CEO cannot have negative option holdings, the variable has a minimum value of zero. The mean value of CEO options for the full sample is 0.0044, implying that the average number of CEO options is 0.44% of the total number of shares outstanding. However, since the majority of companies in our sample do not compensate their CEO with options, this average might be misleading. For the firms that remunerate their CEOs with options, the variable has a mean value of 2% and a standard deviation of 0.0297 (not shown). Regarding leverage, the average value is 0.2830. This means that companies on average have 28.3% debt outstanding relative to their market value, which indicates that most firms are not highly levered. However, the sample contains some highly levered firms, which the maximum value of 190.86% indicates. The minimum value is 0, which makes sense because companies cannot have negative debt. Concerning free cash flow, the median (not shown) indicates that most companies have a positive free cash flow. Despite the positive median, the mean value is negative, indicating that some firms have highly negative cash flows.

Table 4.1

This table presents the summary statistics for the variables in our sample. In section 3, there is a detailed description of each variable.

Variables	N	Mean	Std. Dev.	Min	Max
<u>Dependent Variables:</u>					
Repurchase Payout	708	0.002	0.010	0.000	0.190
Dividend Payout	678	0.032	0.066	0.000	0.969
<u>Independent Variables:</u>					
CEO Options	782	0.004	0.030	0.000	0.568
<u>Control Variables:</u>					
Free Cash Flow	778	-0.022	0.205	-2.331	0.493
Leverage	794	0.283	0.235	0.000	1.907
Firm Size	800	21.572	2.283	15.266	28.607

Table 4.2 show summary statistics for the observations that have above or below median dividend payout. Additionally, the table includes a t-test for differences between the two sub-groups. Regarding CEO options, we find a positive and significant difference between the groups. For the companies with a dividend payout above the median, CEO stock options are 0.16% of total shares outstanding. The corresponding value for the below median companies is 0.84%. The high dividend paying companies have on average a higher free cash flow than the below median companies. Regarding leverage, the above-median dividend companies are less levered than the companies above the median. Concerning size, firms with high dividend payouts are relatively larger than the low paying firms.

Table 4.2

This table shows the summary statistics for two sub-samples, above and below the median dividend payouts in addition to a t-test for the difference between the two sub-samples.

	Above median		Below median		t-test	
	Mean	Std. Dev.	Mean	Std. Dev.	Coef.	t
CEO options	0.002	0.017	0.008	0.041	0.006**	(2.776)
Free cash flow	0.038	0.076	-0.084	0.273	-0.122***	(-7.896)
Leverage	0.246	0.179	0.320	0.268	0.073***	(4.202)
Firm Size	22.580	1.875	20.560	2.074	-2.020***	(-13.305)
Observations	339		339		678	

Table 4.3 shows summary statistics for the companies that repurchase shares and for those that do not. The table also includes a t-test for the differences between the two groups, which shows that there are significant differences between them. In contrast to our expectations, the average number of CEO options for the repurchasing companies is 0.11% of shares outstanding, while this value is 0.61% for the non-repurchasing firms. Further, Concerning the control variables, there are significant differences between the groups.

Table 4.3

This table shows the summary statistics for two sub-samples, those companies with positive repurchase payout, and those without any repurchase payouts. The table also includes a t-test for the difference between the sub-samples.

	Positive		Without		t-test	
	Mean	Std. Dev.	Mean	Std. Dev.	Coef.	t
CEO options	0.001	0.003	0.006	0.036	0.005**	(3.183)
Free cash flow	0.031	0.079	-0.040	0.232	-0.071***	(-5.982)
Leverage	0.256	0.197	0.295	0.246	0.039*	(2.130)
Firm Size	22.373	2.012	21.325	2.255	-1.048***	(-5.827)
Observations	178		530		708	

5.Results

5.1 Dividend

5.1.1 Logistic regression models

Table 5.1 show three logistic regressions for dividend payouts. We explain the sign and magnitude of the coefficients, as well as our interpretations. We conduct these regressions to test our first hypothesis: *Increased CEO options reduce dividend payouts*

The logit-model regress the binary dependent variable *dividend payout* on various independent variables, to estimate the likelihood of a company paying a dividend. We fail to find a significant relationship between CEO options and dividend payouts in the logit model; hence we cannot conclude that CEO options reduce the likelihood of companies paying a dividend. These results do not support hypothesis (1) and are not statistically significant at any of the conventional levels (1%, 5%, and 10%). If one is willing to overlook the insignificance, column (2) indicates that for each percentage point increase in CEO options, the estimated odds of paying a dividend decrease by roughly 0.0298%, when controlling for the year- and industry effects. However, we cannot state that companies with CEO options are less likely to pay a dividend or not, and the same holds when we control for firm fixed-effects in column (3). The regression in column (3) has significantly fewer observations than column (1) and (2) because we control for firm fixed-effects. We gain confidence in our model and included variables as the relationship between controls and dividends is intuitive and significant.

Table 5.1

This table provides the results of the logistic regressions for dividend payout, full sample, as specified in equation in section 3.5.1. The first number is the log odds ratios, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Dividend Payout	(2) Dividend Payout	(3) Dividend Payout
CEO Options	-8.790 (-1.01)	-3.512 (-0.49)	-23.38 (-1.07)
Free Cash Flow		8.048*** (3.37)	3.192 (1.76)
Leverage		-7.642*** (-4.47)	-13.51*** (-3.49)
Firm Size		1.411*** (5.73)	4.028*** (4.42)
Cons	-0.890* (0.64)	-31.706*** (-5.59)	-75.69*** (-4.41)
/Insig2u	3.025*** (11.53)	2.499*** (8.74)	-18.04 (-0.03)
Year effects	No	Yes	Yes
Firm fixed effects	No	No	Yes
Industry effects	No	Yes	No
<i>N</i>	782	759	225

5.1.2 Random effects (RE) regression models

As opposed to the logit-models which estimate the probability of a firm paying a dividend, our RE regression models aim to measure how much dividends decrease with CEO options.

Table 5.2 shows the regressions using only the positive dividend payouts. Column (1) indicates that the marginal effect of CEO options is -0.06, meaning that a ten percentage point increase in CEO options represents a 0.6 percentage point decrease in dividends. When we control for free cash flow, leverage, external financing costs, year- and industry effects, the marginal effect is -0.0952 (column 2). These findings indicate that a ten

percentage point increase in CEO options leads to a 0.952 percentage points decrease in dividend payouts. Both regression coefficients of the key independent variables are statistically significant at the 1%-level. These results indicate that companies reduce dividend payouts when increasing the number of CEO options. When we control for firm fixed effects instead of industry effects (column 3), we find no significant relationship between CEO options and dividend payouts. The insignificant relationship in column (3) indicates that the CEO options have no significant impact on dividends when examining the variation over time within each of the firms in our sample.

Table 5.2

This table presents regressions for dividend payouts, including only the positive values, as specified in equation in section 3.5.2. The first number is the marginal effect, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Dividend Payout	(2) Dividend Payout	(3) Dividend Payout
CEO Options	-0.060*** (-15.21)	-0.095*** (-3.21)	-0.033 (-0.58)
Free Cash Flow		0.047** (2.25)	0.027 (0.95)
Leverage		0.104 (0.64)	-0.029 (-0.09)
Firm Size		-0.033 (-1.61)	-0.248** (-2.34)
cons	0.052*** (20.11)	0.133*** (2.81)	0.612*** (2.59)
Year effects	No	Yes	Yes
Firm fixed effects	No	No	Yes
Industry effects	No	Yes	No
<i>N</i>	353	344	344

Table 5.3 shows the results of the regression of the firms that have completely changed their dividend policy. Specifically, we exclude all the firms that either pay dividends in all five years or do not pay any dividends throughout our sample period. The rationale behind this investigation is that such changes in dividend payout are due to significant and relatively permanent changes in profitability (Ali, Gohar, and Meharzi, 2017), which can affect the option values. Consequently, this leaves us with 219 observations distributed among 53 companies.

Without any control variables (column (1)), the marginal effect of CEO options on dividend payout is significant and negative, indicating that a ten percentage point increase in CEO options represents a 0.9 percentage point decrease in dividends. In column (2) and (3) we include the control variables, free cash flow, leverage, external financing costs, and the significant relationship holds. Specifically, in column (2) the marginal effect is -0.187, when controlling for the year- and industry effects. This indicates that a ten percentage point increase in CEO options leads to a 1.87 percentage point decrease in dividend payout. Column (3) shows the same pattern as column (2) when controlling for firm fixed effects. The marginal effect of CEO options shows that a ten percentage point increase in CEO options leads to a 2.29 percentage point decrease in dividend payouts. The primary independent variable CEO option is significant in all three models.

Table 5.3

This table shows the regressions for the companies that have changed their dividend policy, as specified in equation 3.6.5. The first number is the marginal effect, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Dividend Payout	(2) Dividend Payout	(3) Dividend Payout
CEO Options	-0.091*** (-2.66)	-0.187** (-2.41)	-0.229*** (-3.13)
Free Cash Flow		0.106*** (3.47)	0.074*** (2.62)
Leverage		0.708 (0.89)	-0.095 (-0.08)
Firm Size		-0.088 (-0.91)	0.163 (1.06)
_cons	0.047*** (3.71)	0.204 (1.05)	-0.392 (-1.10)
Year effects	No	Yes	Yes
Firm fixed effects	No	No	Yes
Industry effects	No	Yes	No
<i>N</i>	220	219	219

After failing to find a significant relationship between CEO options and dividends using a logit-model, we further investigate hypothesis (1) using a random effects model. In both random effects regressions, we fail to reject the managerial power hypothesis. In other words, these results show supporting evidence of CEOs reducing dividend payouts to increase the value of their option holdings. The random effects regression results are significant, indicating that hypothesis (1) holds for the companies listed on the Oslo Stock Exchange.

5.2 Repurchase

In addition to testing the effect of CEO options on dividends, we estimate regressions on share repurchases, in order to test our second hypothesis: *Increased CEO stock options increase repurchases*. For this hypothesis to hold, there should be a significant and positive relationship between CEO stock options and repurchase payout.

5.2.1 Logistic regression models

In order to investigate if CEO options increase the probability of repurchasing shares, we conduct a logit-model. Table 5.4 shows the regression results from the logistic models. It is worth noticing that there are substantially fewer observations in column (3) compared to column (1) and (2). This is because the dependent variable repurchase payout is binary, causing a significant reduction in observations due to the control for firm fixed-effects. The results of our logistic regression models show no indication of CEO options increasing the probability of a repurchase. Thus, we reject the hypothesis stating that stock options positively influence share repurchases. If anything, by calculating the odds ratio, we find that CEO options reduce the probability of a repurchase payout. This relationship is however not significant, and we cannot conclude that CEO options negatively affect the probability of a repurchase payout. As with the dividend models we gain confidence in our repurchase models and included control variables as their relationship with repurchases is intuitive and for the most part significant.

Table 5.4

This table provides the estimates of the logistic regressions for repurchase payout, full sample, as specified in equation 3.6.2. The first number is the marginal effect, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Repurchase Payout	(2) Repurchase Payout	(3) Repurchase Payout
CEO Options	-26.33 (-0.91)	-21.57 (-0.88)	-13.16 (-0.90)
Free Cash Flow		3.792** (2.28)	2.154 (1.06)
Leverage		-2.682** (-2.25)	-4.419* (-1.68)
Firm Size		0.495*** (3.30)	0.592 (1.27)
cons	-2.053*** (-6.75)	-12.67*** (-3.52)	-11.87 (-1.15)
/lnsig2u	1.882*** (7.12)	1.658*** (5.97)	-18.25 (-0.03)
Year effects	No	Yes	Yes
Firm fixed effects	No	No	Yes
Industry effects	No	Yes	No
<i>N</i>	707	691	272

As the logit-models show no significance for our primary independent variable using the full sample, it seems reasonable to estimate regressions for the firms with positive repurchase payouts. As most companies in the sample do not repurchase shares, and we expect that the effect of options is stronger for the repurchasing firms.

5.2.2 Random effects (RE) regression models

Our RE regression models aim to measure how much CEO options affect repurchases. In contrast to previous research (e.g. Fenn and Liang, 2001), we find no significant relationships in these regressions. These results indicate that CEOs do not increase share repurchases as their stock option holdings increase. The insignificant relationship is present using both the full sample and in the sub-sample with only the repurchasing firms. Consequently, our prediction of a stronger relationship for this sub-sample proves not to be right. We present the regression results in Appendix A.4.

As both the logistic- and random effects regression models for repurchases show, we fail to find supporting evidence of hypothesis (2); *Increased CEO options increase share repurchase*. Thus, we cannot conclude that CEOs increase share repurchases for personal gains.

5.3 Analysis

By analysing our regression models, we draw two main conclusions:

Firstly, there seems to be no relation between our payout variables and CEO options using the full sample. This finding is in contrast to previous research, such as Geiler and Renneboog (2015), who find that the probability of a dividend payout negatively correlates with CEO options for the firms listed on the London Stock Exchange. After failing to find evidence supporting the managerial power hypothesis investigating the full sample, we research the companies that actually pay dividends. These RE regressions suggest that CEOs cut dividends, which show supporting evidence in favour of the managerial power hypothesis holding for the companies listed on the Oslo Stock Exchange. These results are in line with previous research on the hypothesis (e.g. Weisbenner, 2000), in that CEOs cut dividends to avoid the negative effects on their option holdings. Our findings suggest that a ten percentage point increase in CEO stock options reduce dividends by 0.6 percentage points, which could seem like a small effect. However, the CEO wealth effect that results from a relatively modest alteration in dividends equals or exceeds the average shareholder wealth effects that occur due to a major dividend payout or repurchase announcement (Fenn and Liang, 2001). As the example in section 2.9 shows, a reduction in dividend yields from .02 to .01 will increase the Black-Scholes value of a ten-year option by 18 per cent, *ceteris paribus* (Weisbenner, 2000).

Secondly, while we find supporting evidence for our first hypothesis, we fail to do so for our second hypothesis. For this hypothesis to hold, an increase in option holdings should lead to an increase in repurchases. In contrast to previous findings (e.g., Fenn and Liang, 2001; Grullon and Michaely 2002), we do not find a significant increase in repurchase payout following increased option holdings. Consequently, we reject the second hypothesis for the Norwegian market. One possible explanation is that companies do not have a target payout ratio, which implies that they may cut dividends without increasing repurchases, thus reducing the total payout (Brav et. al. 2005). Moreover, Brav et. al. (2005) show that a target payout ratio is no longer the preeminent decision variable affecting the payout choice and that managers do not correct toward the target as fast as they used to. The observed reduction in dividends may, therefore, be offset by an increase in repurchases at a later stage. Hence, the substitution of dividends for repurchase might be present after our sample period, which we have not tested for. The declining importance of the target payout ratio contrasts to theory, such as Lintner (1956), which argue that managers target a long-term ratio when determining dividend policy.

Another explanation could be that the CEOs in Norway have a higher fixed compensation, compared to other countries where researchers find supporting evidence of hypothesis 2. *Ceteris paribus*, this would imply fewer incentives for the Norwegian CEOs to increase repurchases as they gain less personal wealth from doing so. However, measured in 2016 money, the Norwegian CEOs have an average fixed salary of 4.43MNOK, and the comparable salary for the British CEOs is 6.83MNOK (Ernst and Young, 2016). There is however doubt regarding the plausibility of such an explanation given that the British CEOs have a higher fixed salary. However, this example only illustrates the difference between Norway and the UK. Further research might investigate the differences across other countries, in order to produce a better and more comprehensive comparison.

The difference between our findings and the findings of previous research could stem from tax differences. The research conducted by Fenn and Liang (2001) find evidence of managers increasing repurchases as their option holding increases when examining data on payout activities and firm characteristics for US firms between 1993 and 1997. In this period, the dividend tax was higher than the tax on share repurchases in the US. Between 1993 and 1996, dividends were taxed at 40%, while repurchases were taxed using the capital gains tax of 28% (DeMarzo and Berk, 2013), thus, providing incentives to substitute repurchases for dividends. As of 2003, repurchases and dividends are both taxed at 15%;

therefore, the same relationship may not exist today. Likewise, in Norway, dividends and share repurchases are taxed at the same rate. Additionally, repurchases were legalised in Norway in 1999, 17 years later than in the US. Therefore, CEOs in Norwegian may not have adapted to the substitution of repurchases for dividends yet. These two differences between the US and Norway may explain why we fail to find the same results.

Our findings suggest that CEOs reduce dividends as their option holdings increase. However, in contrast to previous findings on other markets, we do not find evidence of CEOs increasing repurchases. There are several explanations why we do not find the same results. Most of these explanations arise due to national differences, which show the importance of considering national context in empirical corporate finance. As we indicate, the *substitution hypothesis* might reveal its presence in the coming years, which calls for further research to investigate the relationship in Norway as more data becomes available.

5.4 Alternative specifications

As our results fail to find evidence of hypothesis 2, we consider two alternative specifications to our regression models. We do so in order to find plausible explanations for our results. Firstly, we re-run the regressions excluding the financial firms. These firms do often have a different asset structure and have to comply with different regulations than other industries. This implies to a total of 16 companies. However, our results are largely unaffected by the exclusion of these firms (Appendix A.5).

Secondly, we re-run the regressions excluding the leverage variable. This is because leverage is endogenously determined, hence, it may correlate with the error terms. Leverage is a fixed variable relative to the payout decision in a given year. Hence it should not cause problems in our regression analysis. Despite that fact, we redo the regressions with leverage removed from the equations to verify that the results are not sensitive to its inclusion. The results show that there is not a significant difference from those regressions including leverage (Appendix A.6).

6. Robustness

This section will address the endogeneity problems we face in our analysis. Like most empirical research in corporate finance, our regressions may suffer from endogeneity. Endogeneity could refer to situations where the explanatory variables correlate with the error term, meaning that we omit relevant variables in our regressions. In addition to endogeneity caused by omitted variables, endogeneity problems from measurement error and reverse causality may also be present. Endogeneity leads to biased and inconsistent estimates that make reliable inference difficult.

6.1 Endogeneity

6.1.1 Omitted variables

Causal interpretation is difficult because CEO options, repurchases and dividends are endogenously determined. Several omitted variables that make causal interpretation difficult. Managerial compensation depends on executives' abilities. These abilities are hard to quantify, and hence virtually impossible to include. Likewise, information asymmetries and incentive conflicts among stakeholders are both theoretically important determinants of payout policies, yet both frictions are difficult to quantify and observe. These variables are most likely correlated with the included explanatory variables, causing an endogeneity problem, and causal inference breaks down. By excluding a variable that is negatively correlated with dividends and positively correlated with options, our estimated coefficient suffers from a downward bias. This bias indicates that the coefficient is lower than the true value. The heterogeneity caused by omitted variables may be present in our study. However, we are analysing a panel data set, which allows us to control for firm-specific differences that could potentially influence the decision to repurchase stocks, and thus reduce these problems. Random effects reduce the problems of omitted variables, but not all endogeneity problems, and are by no means an endogeneity panacea.

6.1.2 Measurement error

In addition to endogeneity problems caused by omitted variables, problems regarding measurement error may also be present. Measurement error is the difference between the actual value of a quantity and the value obtained by measurement. As in most studies in corporate governance, we use proxies for unobservable or difficult to quantify variables. Governance is itself a vague concept with a variety of different aspects (Constantinides, Harris and Stulz, 2013). When the variables are measured imperfectly, the measurement error becomes part of the error term. As an example, the total CEO compensation including stock options can be difficult to measure. Stock options often vest over time and are valued using an approximation, such as Black-Scholes (Core, Guay, and Larcker, 2008). The presence of measurement error can cause biased and inconsistent estimates.

6.1.3 Reverse causality

The problem of reverse causality in empirical corporate finance also relates to our research. Reverse causality means that instead of CEO options (independent variable) causing a change in payout (dependent variable), we can argue the opposite. It is likely that the payout decision partly or jointly determines the number of CEO options. This relationship means that CEO options are not exogenously determined. One problem of conducting regressions that suffer from reverse causality is that we might find results that are not in the direction we would expect (Ketokivi and McIntosh, 2017). An example of reverse causality would be that higher dividend payout resulted in higher stock prices. If so, the CEO would exercise more options, and hence the dividend payout caused a change in CEO options. Another example: suppose two firms have the same total payout, however one pays dividends and the other repurchase shares. If both firms want to distribute the same amount of wealth to the CEO via stock options, the dividend paying company will have to grant more stock options to compensate for the decline in share price, relative to the repurchasing company (Weisbenner 2000).

An intuitive check for whether our regressions suffer from reverse causality is to re-estimate our regression models using CEO options lagged by one year so that the payout variables is a function of CEO options at $t-1$. The logic is that the relationship between CEO options and the payouts has to be the same irrespective of the time lag. Consequently, if the sign of the option variable changes and is significant, our regression may suffer from

reverse causality. By examining the regression results (Appendix A.7), it seems that we may have a reverse causality problem, as there is a positive and significant relationship between lagged CEO options and dividends. However, there could be economical explanations behind this relationship. For example, CEOs holding options may have a positive view of their company's future, which incentivises them to make better decisions. Consequently, this could improve results and yield higher dividends one year ahead in time. Nevertheless, because these incentives are difficult to quantify, they are hard if not impossible to measure; therefore, we cannot rule out reverse causality.

6.1.4 Instrumental variable

One way to address endogeneity problems is the instrumental variable approach. Instruments are used to account for unexpected behaviour between variables. For an instrumental variable to solve the endogeneity problems, it should satisfy the relevance and exclusion conditions (Constantinides, Harris and Stulz, 2013). First, it should be relevant, meaning that the instrument should be correlated with the endogenous independent variable stock options, but not with the two dependent variables dividends and repurchases. Second, the instrument should be exogenous, meaning that the variable should not correlate with the error term.

Relevance condition: $Corr(Z_i, X_i) \neq 0$

Exclusion condition: $Corr(Z_i, u_i) = 0$

In order to solve the endogeneity problems, the instrumental variable method is the most favourable approach. Even though some of the similar studies (e.g. Fenn and Liang, 2001) apply instruments to their research, cautions should be taken when using this approach. The instruments are valuable in testing for endogeneity but only under the ideal circumstances are they likely to produce estimates with less estimation error than OLS (Crown, Henk, and Vanness, 2011). Even though the instrumental variable approach has been frequently used to partly solve endogeneity problems, it is not a perfect solution. Lastly, finding valid instruments that fulfil the criteria is virtually impossible.

6.2 Survivorship bias

Finally, one should keep in mind a key caveat when interpreting the results. Any study that uses a panel data set naturally imposes some survivorship bias. Survivorship bias occurs when researchers only focus on units that made it past some selection process and ignore those that did not, typically because of their lack of visibility. By only including the companies listed on the Oslo Stock Exchange at the end of 2017, we ignore the companies that delisted before the end of 2017. The total number of delisting's in our sample period is 57 companies, with three of them delisted by mergers. By not including these companies, our data may suffer from selection bias; hence our estimates might have been different if we had included these companies.

7. Conclusion and further research

This thesis investigates our research question: *To what extent do companies with option-based compensation use share repurchase over dividends when transferring value to their shareholders?* To answer this question, we test two hypotheses.

H1: *Increased CEO stock options reduce dividend payouts*

H2: *Increased CEO stock options increase repurchases*

Using a sample of 165 companies listed on the Oslo Stock Exchange, we find evidence supporting hypothesis 1, CEO stock options induce a reduction in dividend payouts for the firms that pay dividends. Therefore, our results are in line with our first hypothesis, stating that the CEO has a substantial impact on the payout decision. As demonstrated in other countries (Geiler and Renneboog, 2015), our research shows that the managerial power hypothesis also holds in Norway.

In our sample, payouts appear to conform agency-based theories, with the level of both dividends and repurchases increasing with free cash flow and decreasing with external financing costs. In contrast to previous research finding supporting evidence for the substitution hypothesis in other countries, we fail to find such a tendency in Norway. There are several possible explanations for the substitutional hypothesis not holding in Norway. Companies may reduce dividends without increasing share repurchase as they do not have a target payout ratio. Further, share repurchases have been a payout method for a relatively short period in Norway, compared to the US, where they find support for the substitutional hypothesis. Therefore, we believe that Norwegian companies, using executive options, may follow a similar tendency to substitute repurchases for dividends in the future. This would be an interesting topic for further research. Another interesting topic for further research would be to investigate both hypotheses on companies in the rapid growth phase of their life cycles. These companies tend to retain all the earnings and reinvest them into their business. For the Norwegian market, such a study could involve the investigation of the companies listed on the Oslo Axess. We believe that conducting such a study, will provide a better picture of the impact of CEO options in Norway as a whole.

8. References

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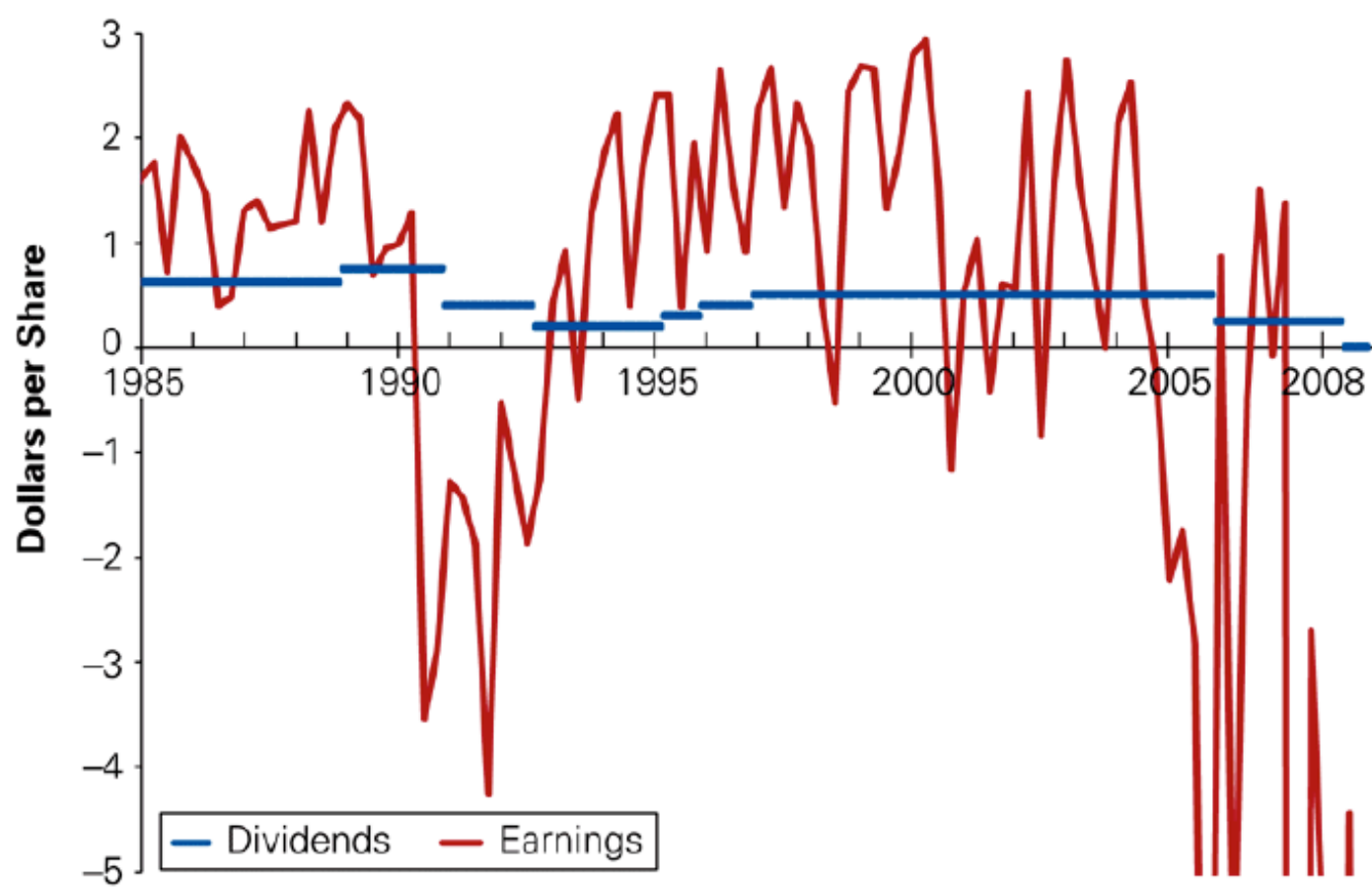
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9. Appendix

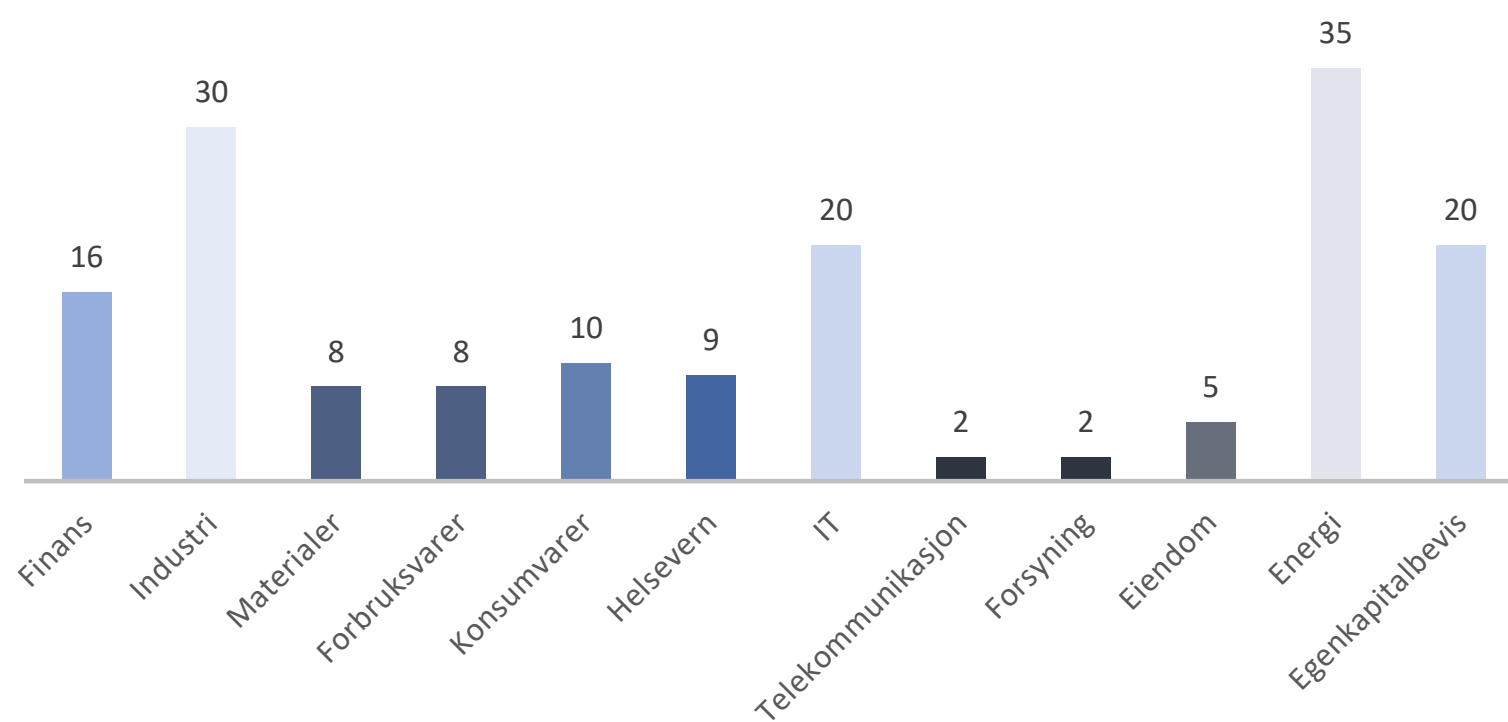
A.1 Stable dividends

General Motors earnings and dividends per share between 1985 and 2008. Compared to GM's earnings, its dividend payments were relatively stable (sticky) (Berk and DeMarzo, 2017). (Data adjusted for splits, earnings exclude extraordinary items.)



A.2 Industry distribution

This diagram shows the distribution of the companies in our sample. Energy is the sector with most companies represented on Oslo stock exchange during our sample period. Industry is the second largest sector in our sample.



A.3 Regression Diagnostics

As this study relies on a panel dataset, we test the OLS assumptions in order to check the reliability, and thereby determine whether OLS is the appropriate model. If not, a fixed-effects (FE) or a random effects (RE) regression model will produce better estimates. Consequently, we test which of the two methods that best suits our data and hence give the most reliable estimates.

		(1) Dividend Payout	(2) Repurchase Payout
Breusch-Pagan test for heteroskedasticity	chi2 P > chi2	7.706 0.005	26.47 0.000
Woolridge test for Autocorrelation	F P > F	0.318 0.575	0.050 0.825
Breusch-Pagan test for random effects	chi2 P > chi2	93.68 0.000	14.68 0.000
Hausman test	chi2 P > chi2	2.26 0.972	8.16 0.418

Firstly, we conduct a Breusch-Pagan/Cook-Weisberg test for detecting heteroscedasticity for both of our OLS models. By rejecting the null of homoscedasticity, we conclude that the assumption of a constant variance in the error term is not met. The conclusion of the test is that both our models display evidence of heteroskedasticity at a 1%-significance level. Secondly, the Woolridge test shows that our models do not suffer from serial correlation. By failing to reject the null of no autocorrelation, we conclude that the error terms do not correlate over time. As our OLS models suffer from heteroscedasticity, we conduct a Breusch-Pagan Lagrangian multiplier test to check if OLS regression can be used on our panel dataset. The test shows that we reject the null hypothesis that there is zero cross-sectional variance across all components, i.e. that there is no panel effect. Therefore, the conclusion is that we should use an effects model. The Hausman test checks if the assumption for RE holds. By failing to reject the null, we conclude that the assumption holds, indicating that an RE model is more efficient than an FE model.

Finally, we use the variance inflation factor (VIF) to detect potential multicollinearity problems. The VIF variable is an explanatory variable's R² when they are regressed on the other explanatory variables. A generic rule of thumb states that a VIF above 10 is an indication of multicollinearity. However, a VIF statistic of 10 corresponds to an R² of 0.9, and we believe that is too high. Other research suggests that any VIF above 2.5, which corresponds to an R² of 0.6, show indications of multicollinearity. The VIF for our main regression models is 1.16 and 1.22, hence we conclude that multicollinearity is not a problem in our regressions.

VIF statistic for the main repurchase regression

Variable	VIF	1/VIF
Firm Size	1.24	0.81
Leverage	1.18	0.85
CEO Options	1.14	0.87
Free Cash Flow	1.09	0.91
Mean	1.16	0.86

VIF statistic for the main dividend regression

Variable	VIF	1/VIF
Firm Size	1.34	0.75
Leverage	1.24	0.81
CEO Options	1.22	0.82
Free Cash Flow	1.07	0.94
Mean	1.22	0.83

A.4 RE model for repurchase payout

This table shows the random effects regression models for repurchase payout. Column (1) shows the regression for the complete sample. Column (2) shows the regression including only the companies that do repurchase shares.

The first number is the marginal effect, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Repurchase Payout All	(2) Repurchase Payout Positive
CEO Options	-0.004 (-0.98)	0.101 (0.23)
Free Cash Flow	-0.001 (-0.07)	-0.003 (-0.56)
Leverage	0.003 (0.84)	-0.002 (-0.15)
Firm Size	-0.001 (-0.22)	-0.005 (-0.94)
_cons	0.009 (0.57)	0.123 (0.98)
Year effects	Yes	Yes
Firm Effects	Yes	Yes
<i>N</i>	691	172

A.5 Excluding financial firms

This table shows two random effects regression models, one for each payout method excluding financial firms.

The first number is the marginal effect, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Repurchase Payout positive	(2) Dividend Payout positive
CEO Options	0.000 (1.06)	-0.000 (-1.26)
Free Cash Flow	-0.001 (-0.21)	0.030 (1.02)
Leverage	0.001 (0.08)	-0.006 (-0.28)
Firm Size	-0.005 (-0.70)	-0.013* (-1.75)
_cons	0.112 (0.74)	0.338** (2.13)
Year effects	Yes	Yes
Firm Effects	Yes	Yes
<i>N</i>	153	311

A.6 Excluding leverage

This table shows two random effects regression models, one for each payout method excluding leverage.

The first number is the marginal effect, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Dividend Payout	(2) Repurchase Payout
CEO Options	-0.059*** (-12.40)	-0.093 (-0.59)
Free Cash Flow	0.0370* (1.80)	-0.000 (-0.10)
Firm Size	-0.003* (-1.88)	-0.001*** (-3.55)
_cons	0.113*** (3.35)	0.037*** (4.10)
<i>N</i>	344	172

A.7 Including lagged options

This table shows two random effects regression models, one for each payout method including options lagged by one year.

The first number is the marginal effect, the second entry (in parentheses) is the t-statistic of the marginal effect. Three stars, two stars, and one star represent statistical significance at 1%, 5%, and 10%-level, respectively.

	(1) Dividend Payout	(2) Repurchase Payout
CEO Options (lagged)	0.131*** (10.52)	-0.011*** (-6.97)
CEO Options	-0.030 (-1.01)	-0.061 (-0.40)
Free Cash Flow	0.031 (1.26)	-0.003 (0.51)
Leverage	0.011 (0.67)	-0.001 (-0.12)
Firm Size	-0.003** (-2.04)	-0.001*** (-2.86)
_cons	0.122*** (3.29)	0.033*** (3.52)
<i>N</i>	284	145

A.8 Variable definitions

Variable	Description	Source
CEO Stock Options	<i>Number of options scaled by total number of shares outstanding</i>	NewsWeb
Free Cash Flow	<i>Free cash flow</i>	Bloomberg Intelligence
Leverage	<i>Total debt scaled by total assets</i>	Bloomberg Intelligence
Dividend payout	<i>Total cash dividends scaled by market value</i>	Bloomberg Intelligence
Share repurchases	<i>Total value of open market share repurchases scaled by market value</i>	NewsWeb
Firm size	<i>Log of assets</i>	Bloomberg Intelligence
