

Thesis

Share repurchases and personal benefits of executive stock option grants



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Abstract

This thesis examines the impact of private benefits related to executive stock option grants on repurchase behavior. In doing so, I construct a dataset of 1,671 U.S. firms, 95,323 firm-months and 4,012 actual repurchases. I find negative cumulative abnormal returns before actual share repurchases and a positive market reaction afterwards, which suggests that share repurchases are a valid managerial instrument to affect the stock price. Subsequently, I find that firms are less likely to repurchase shares during the period of three months before executive stock options are granted and more likely to repurchase shares during the period of three months afterwards. I further examine the association between share repurchases and the decision to exercise the stock options. Hereby, I find a positive relation, regardless the timing of exercise. This result implies that repurchase behavior is also affected by other factors. I therefore conclude that repurchase behavior is – among other factors – affected by the managerial desire to increase profits from executive option grants.

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1. Introduction

Motives for repurchasing shares or granting executive stock options have been broadly discussed in the literature. Several studies have suggested an association between both topics (Yermack, 1997; Fenn and Liang, 1997; Chauvin and Shenoy, 2001; Moore, 2017). However, those studies often focus on the incentives from the firm's perspective and tend to overlook the managerial desire to profit. The value of stock options depends on the stock price at the grant date. However, the stock price can be influenced by executives through share repurchases. This raises the question of whether share repurchases are strategically used by executive managers to obtain personal benefits that are related to their stock option grants.

Executive stock options are often granted by firms as part of the executive's compensation package so that the interests of the manager and the firm are aligned. The holder of the stock option reserves the right to buy a specified number of shares at a pre-determined exercise price X . Generally, the exercise price will be equal to the stock price P at grant date. After granting, stock options are usually subject to a vesting period and a maturity date. The vesting period is the length of time the manager must wait before they can exercise the option rights. Typically, option rights will be forfeited when the manager resigns during this period. Once the vesting period has passed, the stock option is vested, and the option holder can exercise the option. The option can be exercised until the maturity date of the option program, which is typically 10 years from grant date. When $X > P$, the option will not be exercised since it is cheaper to buy stocks in the open market. However, when $X < P$, it is beneficial for the option holder to exercise and realize a profit of $P - X$.

Research concerning stock option grants has identified a pattern of abnormal returns: a price decline before the option grant and a price increase afterwards. This suggests that managers benefit from a low stock price before grant date that locks in the exercise price at an attractive level. Subsequently, however, the option value will increase because of a rising stock price. This could be the result of stock price manipulation by executives. Zhang (2005) has found a similar pattern of abnormal returns for share repurchases: share prices tend to decline before share repurchases and rise afterwards. Thus, share repurchases could be an effective instrument to increase stock prices after stock options are granted. Fenn and Liang (1997) and

Chauvin and Shenoy (2001) have related both topics and found evidence that stock option grants and share repurchases are related: repurchases happen more often for companies that have awarded stock options to its executives. Moore (2017) has examined the timing of share repurchases relative to executives' equity sales. His results confirm managerial self-interest as a motive for the buyback of shares.

In line with Moore (2017), I propose insights on the literature of share repurchase motives. I do so by researching whether managers defer share repurchases until stock options are granted. This way, they benefit from a low exercise price for the options and from a subsequent uplift in the stock price after a share repurchase.

To address whether managers are timing share repurchases for personal benefit (i.e., to optimize the value of their stock option package), I develop three sets of hypotheses:

1. Abnormal returns can be observed in connection with share repurchases;
2. Share repurchases tend to occur less often before stock option grants and more often after stock options have been granted;
3. Share repurchases tend to occur more often before executive stock options are exercised.

The first hypothesis is to assess whether share repurchases can be used to obtain personal benefits by examining abnormal returns from actual share repurchases. The literature on share repurchases distinguishes different motives to repurchase shares, but a commonly accepted finding is the pattern of abnormal returns from repurchases. Therefore, I hypothesize that negative abnormal returns are generated before share repurchases. I also expect positive abnormal returns after share repurchases. I refer to this set of hypotheses as the "abnormal return hypotheses."

The second hypothesis focuses on the timing of the decision to repurchase shares relative to stock option grant dates. Executives benefit from a low stock price by obtaining stock options with a low exercise price. Since stock prices increase after share repurchases, I expect less repurchases before options are granted. After the options are granted, they become more

valuable when the stock price increases. Therefore, I expect repurchases to increase after stock buybacks. I refer to this set of hypotheses as the “option grant hypotheses.”

My last hypothesis focuses on the next decision after stock options are granted: the decision to exercise the options. When managers manipulate repurchase behavior to increase their option value, they obtain profit on paper. However, to realize those profits, the options must be exercised and the underlying shares must be sold. The managers’ payout increases when the stock price increases before the exercise decision. Executives can use share repurchases to boost stock prices during exercise decisions. Therefore, I expect executives to increase repurchases before they exercise their stock options. I refer to this hypothesis as the “option exercise hypothesis.”

To empirically test the hypotheses, I construct the main dataset by combining the repurchase data from Hillert et al. (2016) with executive data extracted from ExecuComp. The final dataset covers a sample of 1,671 firms and 95,323 firm months from 2006 to 2010. I use this dataset to test the option grant hypotheses. To test the abnormal return hypotheses, I construct a sample of daily stock returns obtained from the Center for Research in Security Prices (CRSP), which covers the same 1,671 firms and 4,012 actual repurchases between 2006 and 2010. To test the option exercise hypothesis, I add exercise data from Thomson Financial Insider Filing Data Table I to the main dataset.

Application of an event study methodology to actual repurchases yields a pattern of abnormal returns that is consistent with the literature. Firms in my sample generate on average a negative cumulative abnormal return of -0.43% before repurchases. Subsequent to repurchases, the firms also generate a positive cumulative abnormal return of 0.19 and 0.33% for the short term and 1-month time horizon respectively. My findings confirm the hypothesis that share repurchases are an effective instrument to boost the stock price. I use ordinary least squares (OLS) regression technique to find evidence that firms are 0.74%-2.44% less likely to repurchase shares before stock options are granted and 0.57%-2.42% more likely to repurchase afterwards. Additionally, my results suggest that share repurchases are associated with the value of stock option grants. My results imply that less shares are repurchased before more valuable stock options are expected to be granted, while more shares are repurchased

after more valuable stock option grants. Additional research provides evidence that this repurchase behavior is more likely to be driven by CEOs than by CFOs.

These findings suggest that executives time share repurchases to obtain personal benefits that are related to their stock option grants. However, those benefits are only profits on paper. To realize those profits, the options must be exercised and the shares must be sold. My findings on this sequential decision suggest that firms are 0.90%-1.29% more likely to repurchase shares in the periods before and after option exercises. This result can be explained as either executives time share repurchases to increase the stock price before exercising their options or firms repurchasing shares in anticipation of stock dilution due to future option exercises.

Since this result can be interpreted as manipulative behavior or as rational repurchase behavior, I also test how the value of stock exercises affects repurchase behavior. I find a negative and statistically significant relation, which implies that firms decrease their share repurchases when the value of option exercises increases. This relation is likely to be driven by rational repurchase behavior, since the value of option exercises is positively related with stock price and repurchases become more expensive as the stock price increases. These findings suggest that repurchase behavior regarding option exercises is more likely to be driven by rational decisions that are in the firm's interest than the desire of executives to increase their payout.

I also test my results on endogeneity issues to determine the direction of causality. I apply a 2 Stage Least Square (2SLS) methodology following Baker et al. (2003) and Sun and Hovey (2013). Both these studies have examined the effect of stock option grants on a managerial policy decision that could affect the value of the options. Therefore, I consider both studies to be similar with this study. Besides, the related literature fails to provide a valid instrument for option grants related to share repurchases. Therefore, I apply the instrument used in previous mentioned studies in the 2SLS analysis. I estimate fitted values for my option grant value variable and substitute those values in my original model. The results in most of my samples are insignificant, reflecting the mismatch between my research and the applied instrument. However, I do find a negative and statistically significant result in the 3-month pre-granting

sample. This could corroborate my findings in the previous model and suggest that causality runs from option grants to repurchase behavior.

This paper contributes to the literature of share repurchases by providing insights on the role that executives play in a firm's repurchase behavior. Research has broadly covered motives to initiate share repurchases, but the element of executive personal benefits has often been overlooked. Moore (2017) has identified the lack of research concerning managerial personal benefits, but he focuses on the process after options are already granted, namely the vesting and sale of equity. Therefore, my research fills the literature gap on managerial decision-making before options are granted and enlarges the understanding of the managerial role in share repurchases.

The rest of this thesis is organized as follows. Chapter 2 discusses related literature in the field of share repurchases and stock option grants. I establish an association between both topics. Chapter 3 elaborates on the construction of the hypotheses tested in this research, which provide additional insight on how the managerial role affects share repurchase behavior. Chapter 4 briefly discusses the construction of the dataset and variables used in this research. Chapter 5 provides an outline of the variety of methodologies applied to conduct the studies. Chapter 6 presents the findings and discusses their economic and statistical relevance. Chapter 7 briefly summarizes my research and emphasizes the key takeaways. Finally, chapter 8 presents the limitations of the research and recommendations to overcome those issues.

2. Theoretical framework

This section reviews the relevant literature concerning share repurchases and stock option grants. I establish an association between both topics, which constitutes the essential theoretical framework of this research. Since I focus on managerial self-interest, I start by outlining the literature on the source of possible managerial profits: stock option grants. Next, I relate option grants with share repurchases, which are the managerial instrument to obtain profits. Then, I provide theoretical background concerning the decision to repurchase shares. Finally, I relate share repurchases to option exercises, which are the decisions that realize the profits on paper.

2.1 Stock option grants

Many firms use a compensation committee to determine executive compensation packages. This committee is composed primarily of non-executive and independent directors to guarantee fairness. The committee adjusts the compensation package to attract, retain, and incentivize the right executive (Horwitz et al., 2003). The latter goal can be achieved by including stock options in the compensation package. Those instruments are designed to align the executive's wealth with firm performance. Stock options grant the right to exercise the option and buy stock S for a pre-determined *exercise price* X .

Most stock options are granted "*at-the-money*," which means that the exercise price of the option is equal to the stock's closing price at grant date $X = P_s$. When the stock price increases in the future, the option holder has the right to buy the stock against a price lower than the market price, which means the option is valued "*in-the-money*." By doing so, the option holder can make a profit equal to the difference between the market price and exercise price, or $P_s - X$. On the other hand, when the stock price decreases in the future, the exercise price will exceed the stock price on the open market at $X > P_s$. In this case, the option holder will decide not to exercise and wait until the stock price rises above the exercise price. Typically, the stock options cannot be exercised within the *vesting period*, which is a pre-set number of years after granting. After the options vest, they may be exercised until they reach maturity, which is generally in 10 years.

Studies about stock option grants focus on agency issues because the nature of pay-for-performance in executive compensation may result in unintended incentives. Executives benefit from a low stock price before stock options are granted because they obtain options with a low exercise price. Yermack (1997) has found positive abnormal returns after stock option grants, which he interpreted as the manipulation of grant dates. Since executives do not grant stock options themselves, he suggests that executives influence the compensation committee to grant stock options at favorable moments.

Lie (2005) has complemented Yermack's research by finding abnormal negative stock returns before grant dates, which supports the theory of grant date manipulation. He explains this pattern as retroactive timing of grant dates by executives to obtain a lower exercise price, which is known as "backdating." This seems clearly fraudulent but was in fact a gray legislative area at the time. Consequently, new legislation was introduced to restrict the effect of backdating, which has been examined by Heron and Lie (2007). They still recognized the effects of backdating in the new regulatory environment, but the abnormal returns around the grant dates decreased strongly.

Chauvin and Shenoy (2000) have provided a different explanation for the abnormal return pattern around grant dates. They have argued that executives know when the compensation committee meets and therefore when they can expect their compensation package. Executives can therefore time the flow of information to the market and influence the exercise price of the stock options granted. Hence, abnormal returns around stock option grants are not generated because the grant date is timed, but because executives manipulate information that could affect stock prices.

Aboody and Kasznik (2000) and Balsam et al. (2003) have supported the finding of stock price manipulation due to the executive's decision to disclose information to the market. Additionally, they have focused on earnings management before grant dates and found evidence that executives maximize the value of their stock option compensation when making decisions regarding information disclosure. Similarly, Baker et al. (2003) and Bergstresser and Phippon (2006) have found evidence that executives whose compensation packages heavily depends on stock options are associated with the manipulation of reporting earnings. Those

managers make income-decreasing accrual choices in periods before grant dates to obtain stock options with a lower exercise price.

To summarize the literature, stock options are used by firms to align executive wealth with firm performance to incentivize executives to act in the firm's interest. However, several studies have found evidence for executives acting in their own interest, especially when their compensation depends on stock options. Therefore, share repurchases are a powerful tool used by managers to influence the firm's stock price and therefore their option value.

2.2 Share repurchases

Share repurchases and their related motives and consequences have been broadly studied in the literature. One of the undisputed reasons behind share repurchases suggests that firms benefit from undervaluation by the market. This is based on the premise of information asymmetry between managers and investors. Managers have access to non-public information about the firm's future performance when they assess the firm's value. The efficient market hypothesis (EMH) suggests that they should therefore be able to make a better estimation than the market (Fama, 1970). When managers believe that the firm's equity is undervalued by the market, they can decide to repurchase stock to exploit the undervaluation and increase shareholder value. Hence, share repurchase announcements send a signal of undervaluation to the market, which investors will recognize and correct with a positive market reaction (Stephens and Weisbach, 1998; Vermaelen, 1981).

Another plausible reason to repurchase shares is to distribute excess capital to shareholders as an alternative to paying dividends. Share repurchases are generally preferred to dividends because of the flexible character of repurchase announcements and the personal tax advantage of capital gains. Capital gains from shares are often taxed at a lower rate than income from dividend payments, and investors can defer those gains until they sell the stock and realize a profit. Additionally, firms may announce the initiation of a stock repurchase plan but are not obligated by law to actually repurchase shares.

Firms are tied to their investors who expect periodic dividend payments. A decrease in dividends sends a signal of poor future cash flows to the market, which results in a loss in faith

by investors. Therefore, reducing dividends is considered a firm's last resort. However, an increase in dividends is costly and permanent. Future payments to each shareholder will increase, but a decrease in dividends should be avoided at all costs (Dittmar, 2000; Fenn and Liang, 1997). Repurchases are more investor-friendly, and the market also believes that agency issues are better controlled if funds are distributed to shareholders. Investors interpret the share repurchase announcement as a limitation of managers' excess cash and that the managers are being disciplined to conduct more efficient decision making. As a result, the market responds favorably because better decision making is expected to improve firm performance (Jensen, 1986; Fenn and Liang, 1997).

Another often-described motive to repurchase shares is to address the dilution of shares that results from exercises under stock option programs (Kahle, 2002; Klassen & Sivakumar, 2001; Weisbenner, 2000). Fenn and Liang (1997) have found evidence that the substitution effect of repurchases for dividends is positively related to executive stock options. In other words, firms are more likely to repurchase shares when managers are holding more stock options. A possible explanation for this relation is that firms try to avoid the dilution in earnings per share (EPS) which results from stock option programs. Another explanation could be that managers increase personal benefits because the stock price generally increases after share repurchases, increasing the value of their stock options. This explanation is consistent with the findings of Jolls (1998), who has emphasized the importance of agency problems in determining a firm's payout policy. She has argued that stock option grants are used to optimize the incentives of executives by aligning executive wealth with firm performance but may cause unintended managerial behavior.

Moore (2017) has identified a scarcity of literature about executives' personal benefits following repurchase programs. He has examined the relation between executive equity sales and share repurchases to determine whether managerial benefits affect repurchase behavior. Moore has found a positive relation between equity sales by managers and the firms' share repurchases. This relation suggests a personal motivation to repurchase shares. However, although managers act in their own interest, no evidence has been found to support the hypothesis that managers' decisions destroying firm value.

In summary, the literature has described several motives for firms to initiate share repurchases. Additionally, several studies have found evidence that managers manipulate repurchase behavior to increase their benefits from stock options. However, it is difficult to assess the underlying motives for those actions, which makes it more likely that firms have several motives to initiate share repurchases.

2.3 Stock option exercises

After stock options are granted, they must be exercised by the option holder so that the underlying stocks are purchased for the pre-determined exercise price. When the exercise price is below the market price, the option holder can buy shares more cheaply for profit. Next, the shares can be sold directly to realize the profits made on paper, or the shares can be held when the stock price is expected to rise.

Logically, an option holder should exercise at a favorable moment to realize a profit. Carpenter and Remmers (2001) have examined the exercise behavior of insiders to assess whether employees can use inside information in their exercise decision. They find that bad news could cause an exercise action for executives, but a similar effect does not hold for good news. This interaction is reflected in stock price, which indicated negative abnormal returns in the post-exercise period. Brooks et al. (2012) have found the same pattern in a more recent dataset, which suggests that legislative changes did not prevent managers from using inside information to make their exercise decision. Huddart and Lang (2003) have supported the finding of declining stock returns after insiders' exercise decisions. However, they have argued that exercise decisions from employees in lower functions than management also have explanatory power.

However, policymakers should be aware that conflicting interests could arise between optimization of the value of stock options and optimal running of the firm. Bartov and Mohanram (2004) have found evidence that firms generate positive abnormal returns in the period before executives decide to exercise their options and generate negative abnormal returns afterwards, which is consistent with previous literature. They have also extended the research of Carpenter and Remmers (2001) by applying another method to their data set. The results suggest that managers use private information to time their decision to exercise.

However, their findings on executive policymaking are more remarkable. They have argued that in the pre-exercise period, executives inflate earnings to increase their payout when exercising their options. This effect reverses after exercise, which should affect future revenues from exercises. However, they already have obtained a large amount of cash by then. All these results suggest that executives manipulate firm performance and use this private information to increase their payouts when exercising stock options.

Bens et al. (2002) have examined the real costs of executive stock options and found that when executives exercise many stock options, the firm reallocates funds from real investments towards share repurchases. Additionally, they have argued that this affects firm performance in the subsequent year. This finding suggests a positive relationship between executive stock option exercises and share repurchases. These findings also suggest that managers act self-interestedly in the period before their exercise decision. However, the same management makes the decision to exercise, the decision to repurchase shares, and the decision to make investments. This could cause endogeneity problems. Bens et al. (2002) did not control for this issue and their results should therefore be interpreted with caution. Bens et al. (2003) has continued research on this topic by relating stock options, share repurchases, and the EPS dilution motive. The authors did not find evidence for a relationship between share repurchases and executive stock option exercises.

To summarize the literature concerning option exercises, several studies find evidence for manipulative repurchase behavior to increase personal benefits at exercise. The abnormal return pattern around exercises is consistent with managers realizing personal benefits and with the significant relation between exercises and share repurchases. However, not all evidence is in favor of this idea. Again, this most likely suggests that besides other factors, the exercise of stock options play a role in repurchase behavior.

3. Hypotheses development

In this section, I elaborate on the hypotheses tested in this research to assess whether executives defer share repurchases before their stock options are granted. I use the relevant literature to distinguish three steps in the process to postpone share repurchases. The key concepts are the motivation to postpone repurchases, the consequences of the actual decision to repurchase shares, and the sequential decision following the granting of stock options.

The first two hypotheses in this research are based on the market reaction around repurchases and seek to examine whether personal benefits can be obtained through share repurchases. As mentioned previously, the literature on share repurchases distinguishes different motives for firms to buy back shares. However, the pattern of abnormal returns is a commonly accepted finding in those studies. Firms tend to generate negative abnormal returns before share repurchases and will generate positive abnormal returns afterwards, regardless of the underlying motive to initiate the buyback. This suggests that firms can boost the stock price by repurchasing shares without revealing their motive for the repurchase. From a managerial perspective, the decision to repurchase shares is therefore an efficient instrument to manipulate the stock price and increase their payout of equity-based compensation. The generation of positive abnormal returns is key for executives trying to increase the value of their stock options. Hence, I expect a price decline before firms repurchase shares and a price increase afterwards.

Hypothesis 1a: Firms generate negative abnormal returns before repurchase dates.

Hypothesis 1b: Firms generate positive abnormal returns after repurchase dates.

Several studies have related share repurchase behavior to employee stock option grants and argue that stock repurchases are used as a counter against the dilution effect that results from stock option programs. Those programs were originally designed to align managerial incentives with firm interest. However, Jolls (1998) has emphasized the importance of agency issues for firms granting stock options because stock option compensation may cause unintended behavior.

The value of stock options depends on the exercise price and the price of the underlying stock: stock options with a low exercise price and an increasing stock price are more valuable. Although markets respond favorably to both share repurchases and executive stock option grants, managers can only influence repurchase decisions. This enables them to manipulate the stock price and thus the value of their stock options. Therefore, the next two hypotheses focus on the timing of share repurchases relative to stock option grants. Given the abnormal return pattern around repurchases, I expect managers to defer repurchases until executive stock options are granted. Stock options will be easier valued in-the-money when the exercise price is low and the option value increases when the stock price increases afterwards.

Hypothesis 2a: Firms repurchase less shares before many stock options are granted.

Hypothesis 2b: Firms repurchase more shares after many stock options are granted.

These hypotheses suggest that executives act in their own interest when making the decision to repurchase shares. However, granting stock options only results in value on paper. To realize those profits, the options must be exercised and the underlying shares must be sold. Therefore, I also examine share repurchases around executive stock option exercises in the last hypothesis of this research.

Similar to stock option grants, executives can use share repurchases to affect stock prices around exercise decisions. In line with the second set of hypotheses (2a and 2b), I expect executives to manipulate repurchase behavior to increase their own payout from the exercise decision. The payout maximizes when the stock price is as high as possible, and stock prices increase after share repurchases. Therefore, I expect self-interested executives to increase share repurchases before exercising their stock options and selling the stocks.

Hypothesis 3: Firms are more likely to repurchase shares before stock options are exercised.

4. Data

In this section, I discuss the construction of the final dataset used in this research, which focuses on share repurchases and executive stock option grants from U.S. firms. In 2006, the Securities and Exchange Commission (SEC) implemented new accounting regulations regarding stock option grants. This has resulted in incomparable data before and after 2006. This research uses repurchase data from Hillert et al. (2016) that covers 2004 - 2010. Given the accounting change, I will only use the data from 2006 - 2010.

4.1 Sample selection

Monthly data about share repurchases from January 2004 – December 2010 is obtained from Hillert, Maug, and Obernberger (2016). They used the Center for Research in Security Prices (CRSP) to detect all firms traded on the New York Stock Exchange (NYSE), Amex, and Nasdaq (6,504 firms) and matched the data with firm-specific data from Compustat (6,315 firms left). Repurchase data for all firms is extracted from 10-Q and 10-K filings and manually checked and corrected, thereby completing the dataset with 6,537 repurchase programs for 6,238 firms.

Data about grants of executive stock options is obtained from the Compustat Executive Compensation database (ExecuComp) from 2006 to 2010. The plan-based awards database provides grant dates, the fair value of stock options granted to executives, and the fair value of the options exercised. I add data about executives' total compensation and a control measure for the options' fair value, which are obtained from the annual compensation database. Additionally, I extract firm-specific financial characteristics from the Compustat Capital IQ database. All the data obtained from Compustat databases are yearly measures, which I include in this research for two reasons. First, the yearly ExecuComp database is far more complete than the quarterly database. Second, firms tend to use their annual performance instead of quarterly performance to calculate bonuses and compensation packages (McAnally et al., 2008).

Since repurchase data and executive compensation data originate from CRSP and Compustat respectively, I edit both datasets to construct the final data sample. First, the company

identifier variable should match to ensure both datasets contain data about the same firms. I extend the repurchase dataset with identifier variables from the CRSP/Compustat linking table that was made accessible by Wharton Research Data Services (WRDS). The repurchase dataset starts with 6,238 firms identified by the CRSP identifier, which equals 5,298 firms identified by the Compustat identifier.

Second, the repurchase dataset is measured in calendar years, whereas the Compustat dataset is measured in fiscal years. Therefore, I extract fiscal year-ending months from Compustat and construct a fiscal year variable for each firm year in the monthly repurchase data. Thereafter, both databases can be merged. Only 2,124 firms have data about executive compensation, resulting in a drop of 3,174 firms in the sample. An additional six firms fall out because there is no data available in the annual compensation database, and four firms fall out because of a lack of data in the Compustat Capital IQ database. Controlling for the completeness of the dataset results in 412 firms falling out due to missing values for grant dates (114), fair value of stock options (298), repurchase data (5), and values for control variables (26). The final sample numbered 1,671 firms and 95,323 firm months. Table 2 in the appendix depicts the filters applied to construct the final sample.

Finally, as is determined which firms are included in the final data sample, I obtain relevant stock characteristics for these firms from CRSP. Daily data for the stock price, holding period returns, and weighted-average index returns are obtained from 2005 to 2011. For those firms, I also extract option exercise data from the Table II file and stock disposition data as reported in Table I, both from Thomson Financial Insider Filing Data (TFI). There was no data available in TFI for four firms, resulting in 1,667 firms and 259,775 firm months being included in this sub-sample.

4.2 Variable construction and descriptive statistics

I construct a measure for share repurchases and a measure for executive stock option grants to examine whether executives defer share repurchases until they obtain stock option grants. Additionally, I construct a dummy that takes the value of 1 in the months when shares are repurchased and a dummy that takes the value of 1 when stock options are granted. The data for the repurchase measure is obtained from Hillert et al. (2016), defining the repurchase

measure as the shares repurchased during the month divided by the total shares outstanding at the beginning of the month. In my sample, firms on average repurchased 0.17% from the shares outstanding in 24.3% of the months. The repurchase intensity of 0.17% is approximately a quarter of the repurchase intensity of 0.66% that Hillert et al. (2016) found in their sample. However, Moore (2017) has also found an average repurchase measure of 0.17% in 27.8% of the months. The difference between both can be explained by the change in accounting legislation concerning stock option grants, which was introduced in 2006. As a result of the changing legislation, stock option grants decreased, and repurchases related to those option grants consequently decreased. Since my sample only includes data after the change in legislation, the lower repurchase intensity makes sense.

The grant date and the measure for stock option grants are obtained from the ExecuComp database. Stock options are measured by taking the fair value of the option grants as reported by the firm on grant date divided by the executives' yearly total compensation. The variable will thereby capture the relative effect of the option value on the executives' total compensation (McAnally et al., 2008; Moore, 2017). In my sample, annual stock options accounted for 25% of an executive's total annual compensation on average. This finding is consistent with the existing literature, since Ferri and Li (2016) have found that stock option grants account for 24.0% of an executives' total compensation on average.

I follow Bens et al. (2002) in the construction of a variable to measure the exercise of executive options. They have measured the value of the option exercise as the market price minus the exercise price and deducted this value by the firm's total yearly sales. This allows the exercise variable to measure the value of the option exercise relative to firm performance. I find that the value of exercises accounts for 0.9% of the firm's total sales on average, which is significantly larger than the 0.2% Bens et al. (2002) found in their sample. The sample range I use in my research is more recent, which suggests that executives increased their exercise value over time. This could suggest that executives exercise less frequently but increase the value per exercise. However, I am not able to verify this idea because Bens et al. (2002) does not provide data about exercise frequency.

This research focuses on the executives of a firm who can influence the firm's repurchase policy. Therefore, I treat every combination between a firm's share repurchases and executives separately because stock options are granted to individual managers instead of the executive board. I examine all executives included in the ExecuComp database, namely the firm's top five management. I also construct separate samples for the CEO and CFO to examine the sole effect of the top management on repurchase behavior.

To construct the dataset, I first align calendar years and fiscal years to match data from both datasets in the same month. Second, I construct a dummy variable which is valued at 1 at the month of the grant date and 0 otherwise, which results in 22,191 grant dates. Next, I construct three dummy variables that are equal to 1 at the first month, the first 3 months, and the first 6 months before and after the grant date. Only those observations are included in the analyses. This makes it possible to observe the difference in impact between different time horizons before and after stock option grants.

Additionally, I control for factors that may affect the relation between share repurchases and stock option grants. Since I try to examine the sole effect of new stock option grants, I include a measure for outstanding stock options to control for repurchase incentives caused by earlier-granted stock options. Following Kahle (2002), this measure is constructed as the total number of outstanding stock options relative to the total outstanding shares. I find an average ratio for this measure that is equal to 44.5%.

Furthermore, I include a measure for institutional ownership. Institutional investors can hold many of a firm's outstanding shares (i.e., a "block holder"), thereby increasing ownership concentration. Following Ferri and Li (2016), those block holders can affect a firm's payout decision and their share repurchases. The measure is constructed as the percentage of shares owned by institutional investors relative to the total shares outstanding. In my sample, I find that 83.5% of a firm's outstanding shares on average are owned by institutions, which is a slightly higher value than the 75.3% that Ferri and Li (2016) found in their sample. Scott (2014) has found that institutional ownership positively affects share repurchases, which suggests that block holders encourage managers to exploit their informational advantage. Therefore, I

expect that a higher degree of institutional ownership is related to an increase in share repurchases.

Klassen and Sivakumar (1997), Fenn and Liang (2001), Ferri and Li (2016), and Moore (2017) and Weisbenner (2000) have controlled for leverage and firm size. Highly leveraged firms are obligated to pay interest, which reduces the funds available to repurchase shares. Firm size may affect financing costs or asymmetric information and could therefore influence repurchase behavior. The authors have found a statistically significant negative effect on repurchases for leverage and a statistically positive effect on repurchases for firm size.

I control for firm size by including the logarithm of the market capitalization and find an average value of 7.6 in my sample. My measure for firm size is consistent with the literature, since Ferri and Li (2016) and Moore (2017) have used the same measure and found a value of 8.0 for the logarithm of firm value. I also include a measure of total debt divided by total assets as a proxy for a firm's relative debt. Firms in my sample are on average leveraged for 18.9%, which is close to 19% (Klassen and Sivakumar, 1997), 20.3% (Ferri and Li, 2016), and 25.6% (Moore, 2017).

In respect of the firm's leverage, I follow Ferri and Li (2016) by including a measure for asset tangibility. This measure is defined as total assets minus intangible assets divided by total assets. Low values for this ratio indicate that most of the firm's assets are intangible and cannot be used as collateral for leverage. Therefore, I expect and find a negative correlation between the measures for leverage and asset tangibility. Having more tangible assets could suggest that funding for share repurchases is more easily available. I find an average ratio for this measure in my sample of 79.6%, compared to the 80.6% found by Ferri and Li (2016).

Consequently, I follow Hillert et al. (2016) and Moore (2017) by including a measure for liquidity. They have found evidence that share repurchases improve liquidity, which suggests that less-liquid firms may repurchase shares to increase their liquidity. Hence, I follow Amihud (2002) by constructing the proxy for liquidity of the stock. The Amihud measure for illiquidity is defined as the yearly average of the daily constructed ratio of absolute stock return divided by the dollar value of trading volume. This measure for illiquidity can be interpreted as the

daily price response associated with 1 dollar of trading volume and serves as a measure of price impact. I find an average ratio for illiquidity of 0.014, which is significantly higher than the median. This implies that most firms in my sample are valued below average for the Amihud ratio. In other words, most firms' stocks are more liquid than average. More liquid firms have low valuations according to the illiquidity measure, which originates from the stock's high trading volume. Therefore, I expect a negative relation between the Amihud illiquidity measure and share repurchases. Moore (2017) has used a different measure for illiquidity that makes the summary statistics incomparable. Hillert et al. (2016) have found an average value of 3.6 for the Amihud measure, which is most likely caused by different scaling. After all, both studies have found a negative relation between illiquidity and share repurchases.

Following Moore (2017), I also control for lagged stock returns, since firms may repurchase more shares after poor stock returns due to a perception of undervaluation. Additionally, I include measures for cash holdings and cash flow availability, since those factors may also affect repurchase behavior (Klassen & Sivakumar, 1997; Ferri and Li, 2016). The measure for cash holdings is a firm's cash divided by total assets, and cash flow availability is the net operating cash flow minus the capital expenditures divided by the total assets. I find that assets of firms in my sample comprise 13.3% of cash on average, which is consistent with the findings of Moore (2017), who found a ratio of 14.4%. I find that firms in my sample have 6.4% of total assets available to fund repurchases on average. This is consistent with Ferri and Li (2016), who have used the same measure for cash flow availability and found a value of 5.7%.

Furthermore, Moore (2017), Klassen and Sivakumar (1997), Fenn and Liang (2001), and Ferri and Li (2016) have included the book-to-market ratio as a proxy for a firm's growth opportunities. Book-to-market ratios above 100% indicate that book value exceeds market value, which implies low growth opportunities. When market value exceeds book value, this implies that the market overvalues the firm's equity, since investors expect the growth opportunities to pay off in the future. Several studies have argued that firms with high growth opportunities will use their internal cash to fund investment opportunities and are therefore reluctant to repurchase shares. Those statements are supported by significant findings that indicate that a larger book-to-market ratio has a negative effect on repurchase behavior.

I construct a proxy for book-to-market ratio as the book value of equity, which is measured as total assets minus total liabilities, divided by the market value of equity. I find an average book-to-market value of 50.7% in my sample, which implies that my sample is dominated by firms with ample growth opportunities. However, the average book-to-market value in my sample is a little higher than the book-to-market values in related literature; Moore (2017) has found an average value of 43.4% while Ferri and Li (2016) have found 45.3%. This indicates either that the market recognizes less growth opportunities for firms in my sample or that my sample's firm equity value is less overvalued.

I also control for the dilution effect as an explanation for repurchase behavior, since Kahle (2002), Klassen and Sivakumar (2001), and Weisbenner (2000) have found evidence for the motive to counter dilution as an explanation for repurchase behavior. Therefore, I follow Moore (2017) by constructing a variable to control for the dilution effect. This method focused on the convertible part of the total outstanding shares, which may cause dilution. The percentage of this convertible part of outstanding shares is calculated by dividing the difference in the shares used to calculate normal EPS and diluted EPS by the total number of outstanding shares as stated in Compustat. On average, 2% of a firm's total outstanding shares is convertible and may cause dilution, which is equal to Moore's (2017) finding of 2%.

I also include year fixed effects, month fixed effects, and industry fixed effects in the model. The fixed effects control for macro-economic events in a year, specific seasonal events in a month, and industry-level trends in repurchase behavior respectively. Furthermore, all variables included in my research are winsorized at the 1st and 99th percentile. The summary statistics of the variables in my sample are comparable with the statistics from the related literature of Ferri and Li (2016) and Moore (2017). This implies that my data sample does not contain biases caused by outliers or incorrect data and should therefore be able to produce plausible estimates.

Panel A from Table 3 depicts the summary statistics of the variables included in this research for the complete sample. The complete dataset for models without control variables consists of 139,933 firm-year observations. The final dataset with control variables consists of 95,323 observations and 1,671 firms. Table 4 provides a more detailed description of the data by

presenting summary statistics for different sub-samples in the periods before and after grant dates. Panel A includes all observations that are included in at least one analysis and Panels B, C, and D depict summary statistics only for observations included in the 1-month analysis, 3-months analysis, and 6-months analysis respectively.

Panel B from Table 3 depicts the pairwise Pearson correlation matrix for all variables included in the research. All variables indicate the expected sign related to repurchases and are therefore in line with prior documented literature. The results from the correlation matrix suggest that firms repurchase more shares when they are larger, have more cash available, have more cash holdings, have less leverage, have less growth opportunities, have more options outstanding, have more tangible assets, have larger institutional ownership, and have higher liquidity.

5. Methodology

This section discusses the methodology applied in this study. The research is subdivided into three sub-sections. First, abnormal returns around repurchase announcements are examined to determine whether profits are being realized around share repurchases. Then, the relation between stock option grants and share repurchases is investigated to determine how the factors affect each other and if self-interest affects executive repurchase behavior. Finally, I investigate executive option exercises to examine whether personal benefits are being realized as a result from those repurchase decisions.

5.1 Abnormal returns around repurchases

The first step of this research is to determine whether firms generate abnormal returns around share repurchases. A common method to investigate this is to examine abnormal returns around share repurchase announcements (Chan et al., 2007; Stephens and Weisbach, 1998; Vermaelen, 1981). However, this research is interested in excess returns around each separate event of share buybacks for two reasons. First, share repurchase announcements do not obligate firms to actually repurchase shares. Second, the value of stock options is directly affected by the changes in stock price due to the market reaction to share repurchases. Therefore, I follow the methodology of Zhang (2005) to examine abnormal returns around each of a firm's actual repurchases. Zhang (2005) has applied an event study methodology to determine the abnormal returns generated around repurchase dates. An event study measures the impact of a specific event on the stock price in a specified timeframe. Abnormal returns are calculated as the difference between the realized return and the expected return in the following equation:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (1)$$

where $AR_{i,t}$ represents the abnormal return from firm i at month t . Similarly, $R_{i,t}$ represents the realized return, and $E(R_{i,t})$ represents the expected return. The first step in the event study methodology is to determine the event date or the period in which the event occurs, since I try to determine the impact of this specific event. For this event window, expected returns are calculated based on past returns and a market index. Finally, the generated returns

in the event window are compared to the expected returns, and the difference between both are considered as abnormal returns.

Following Zhang (2005), I use three event windows that cover a total of 41 trading days, ranging from 20 days before the repurchase date to 20 days after (-20, +20). Since shares are not traded during weekends, 20 trading days count as 1 calendar month. To examine abnormal returns before the repurchase date, I use an event window ranging from 20 days before repurchase date until 1 day before repurchase date (-20, -1). I examine abnormal returns after share repurchases by using two event windows: a short-term window ranging from repurchase date till 2 days thereafter (0, +2), and a medium-term window ranging from repurchase date until 20 days thereafter (0, +20). I thereby capture the initial market reaction in the short-term window and additional effects during the 1-month period after repurchases.

To calculate expected returns in the event window, I apply an estimation window of 250 trading days and use the market model to predict returns in the event window. The estimation window ranges from 270 days before the repurchase date to 21 days before repurchase date (-270, -21). This period of 250 trading days equals 1 calendar year and should therefore capture all recent firm developments that may help to predict stock returns. The market model compares the realized returns in the estimation window to the market index in the same period as follows:

$$E(R_{i,t}) = \alpha + \beta * (R_{m,t}) \quad (2)$$

In this research, I use the equal-weighted market index as a proxy for the market return $R_{m,t}$. The model regresses the market index on the realized returns in the estimation window, which results in coefficients for α and β for each repurchase date. Then, expected returns can be calculated by inserting equation 2 in equation 1 and applying the calculated coefficients:

$$AR_{i,t} = R_{i,t} - (\alpha + \beta * (R_{m,t})) \quad (3)$$

After calculating abnormal returns for each repurchase date, I calculate the sum of the results for each event window to construct my variable of interest: the cumulative abnormal returns

(CAR). The CAR represents the effect of the event on the stock price for all repurchase dates in the specific event window. Finally, I test my results on significance by conducting a t-test.

5.2 Relation between stock option grants and share repurchases

After determining whether firms generate abnormal returns around repurchase announcements, I focus on the personal benefits related to executive stock options by the timing of share repurchases. More specifically, I focus on whether executives defer share repurchases before stock options are granted. In general, the decision to grant stock options is made by the firm's compensation committee, of which executive managers are typically not a member. Therefore, executives should lack information about the size of the grant or the moment they will be awarded. This information asymmetry is important for the research, since managers can alter their behavior when they expect stock option grants.

Therefore, I divide the research into two parts. First, I separate my full sample in two samples: 1) one sample that includes observations before option grants, and 2) one sample that includes observations after option grants. Second, I conduct studies to examine the likelihood of repurchases in both samples and to examine the relation between repurchases and option grant value.

I examine repurchase behavior prior to stock option grants by running the following regression in *equation 4*:

$$\begin{aligned} \text{Repurchases}_{i,t,m} &= \text{Options granted}_{i,m,[t+1,t+k]} + \text{Control}_{i,t} + \text{Year}_i + \text{Month}_{i,t} \\ &+ \text{Industry}_i \end{aligned}$$

where $\text{Repurchases}_{i,t,m}$ represents the repurchase measure in month t to executive m from firm i . $\text{Options granted}_{i,m,[t+1,t+k]}$ represents the option grant measure from firm i to executive m relative to $\text{Repurchases}_{i,t,m}$ by k months, where k can be valued at 1, 3, or 6. This means that the first k months before the option grant month are included in the analysis. For comparability purposes, I only include observations around grant dates in the research when k months are available both before and after the grant date.

Additionally, $Control_{i,t}$ represents the measures for firm characteristics from firm i in the months equal to the repurchase measure. Finally, $Year_i$, $Month_{i,t}$, and $Industry_i$ represent the included fixed effects for year, month, and industry respectively. The repurchase measures included in the research are a binary repurchase dummy and a continuous measure for repurchase intensity. Furthermore, I use an option grant dummy as a binary measure and the fair value of the option grant as a continuous measure.

Similarly, I run the following regression (*equation 5*) to examine repurchases after stock options are granted:

$$Repurchases_{i,t,m} = Options\ granted_{i,m,[t-1,t-k]} + Control_{i,t} + Year_i + Month_{i,t} + Industry_i$$

where the variables included can be explained similarly to equation 4. The only difference between both regressions is the timing of the option grants relative to the repurchase measure. Equation 4 only includes the first k months observations before stock options are granted, and equation 5 only includes the first k months observations after option grants.

The repurchase measure, which is the dependent variable in this research, is by definition always larger or equal to 0. The measure will be valued at non-zero and will be positive only in months when firms repurchase shares. This characteristic may result in clustered values at 0 when the firm makes no repurchases. Therefore, some studies apply a Tobit regression technique whilst others use OLS. The literature does not suggest that one model outperforms the other. However, I follow Moore (2017) in using OLS because that study is the most comparable with my research. Therefore, I apply OLS as main method and use Tobit analysis to test for robustness where appropriate.

5.3 Relation between stock option exercises and share repurchases

To determine whether executives realize the profits made with their decisions regarding stock option grants, I also conduct a study concerning repurchase behavior that is related to stock option exercises. It is beneficial for executives to drive up the stock price by repurchasing shares and subsequently taking the decision to exercise. This increases their realized profits from stock options.

To examine repurchase behavior before option exercises, I base my methodology on Bens et al. (2002) and test this relation by running the following regression in *equation 6*:

$$\begin{aligned} \text{Repurchases}_{i,t,m} &= \text{Options exercised}_{i,m,[t+1,t+k]} + \text{Control}_{i,t} + \text{Year}_i + \text{Month}_{i,t} \\ &+ \text{Industry}_i \end{aligned}$$

where the variables included can be explained similarly as in equation 4. The new variable, *Options exercised*_{*i,m,[t+1,t+k]*}, represents the exercise measures. Similar to previous regressions, the exercise measures I include in the research are binary and continuous measures for the value of the option exercise. I adjust the methodology of Bens et al. (2002) slightly because they used yearly data in their research. I use monthly exercise data obtained from TFI, which is in line with the methodology I apply in respect of the previous hypotheses. Hence, I conduct my study of the exercise decision similarly to the study concerning option grants, which should improve the comparability of my results.

6. Empirical results

This section presents the findings on the relation between share repurchases and the personal benefits of granting executive stock options. First, I provide evidence that abnormal returns are generated around actual share repurchases. Second, I discuss the relation between share repurchases in the months surrounding stock option grants. Then, I conduct the same analysis on different subsets of executive job titles to examine the differences in the influence of managerial function on repurchase behavior. Next, I examine the relation between option exercises and share repurchases to observe whether executive decision making is consistent for consecutive decisions on stock option grants. Finally, I perform robustness tests on the main results to determine whether conclusions can be drawn from my results.

6.1 Event study analysis

I conduct an event study to determine abnormal returns around actual share repurchases, following the methodology of Zhang (2005). Table 5 depicts the CAR for three event windows: a pre-event window (-20, -1), a short-term event window (0, +2), and a 1-month event window (0, +20). For the full sample of 4,012 repurchases, I find significant results in the expected direction for all event windows, which is consistent with the literature.

I find a negative CAR of -0.43% for the pre-event window at 1% significance level, a positive CAR of 0.19% for the short-term event window at 1% significance level, and a positive CAR of 0.33% for the 1-month event window at 5% significance level. This is consistent with the theory that firms repurchase shares after a price decline to benefit from the perceived undervaluation by the market. This process is followed by a price increase as the market recognizes the mispricing.

Additionally, I construct CARs for sub-samples based on the number of repurchases and repurchase size to provide additional insight on how the abnormal returns within the sample are distributed. In the pre-repurchase event window, I find a negative and statistically significant abnormal return of -0.58% for the firms that do not often initiate a repurchase and -0.68% for smaller repurchases. In the post-repurchase event window, I find a positive and

statistically significant result of 0.39% for firms that repurchase more often and for larger actual repurchases.

Based on these results, I find evidence that abnormal returns are generated surrounding actual share repurchases. Therefore, executives who are responsible for this decision can influence the stock price through share repurchases. This ability enables them to increase the value of stock-related compensation. If the stock price is expected to fall, they can decide not to repurchase, which may lead to an even larger decline in the stock price. Hence, executives are in some way able to negatively affect the stock price, which could be useful in anticipation of future stock option grants. My additional results imply that the negative abnormal returns before actual repurchases in my sample are driven by firms that initiate less repurchases and repurchase less shares. On the other hand, the positive abnormal returns are most likely driven by firms that repurchase often and repurchase more shares.

6.2 Option grant analysis

I run equations 4 and 5 to examine whether share repurchases are being deferred before stock options are granted. Tables 6 and 7 depict the results from these regressions. Panels A, B, and C separately present the findings of the 1-month, 3-month and 6-month timespans respectively. I first present a global overview of my results, followed by a specific evaluation of the results per sample period.

As expected, the results in table 6 indicate that firms are 0.74%-2.44% less likely to repurchase shares during the 6 months before stock options are granted. They also indicate that firms are 0.57%-0.74% more likely to repurchase shares between 3 and 6 months after stock options are granted. Table 7 addresses how the value of the stock option grants affects the repurchase behavior over different timespans. For all samples, I find a positive and statistically significant relation between the value of the stock option grants and share repurchases afterwards. This finding suggests that when the stock option grant value in the executive's total compensation package increases by 1%, the firm's share repurchases increase by 0.11%-0.12% in the first 6 months afterwards.

In my sample, stock option grants account for 25% of the total compensation package on average. This implies that the firms increase their share repurchases by 2.75%-3.00% on average within a half year after stock option grants.

However, my findings are ambiguous on the relation between share repurchases before option grants and the value of those option grants. The results differ per timespan. I do not find a significant effect on the short run; I find a negative relation during the 3-month period and a positive relation during the 6-month period. The differences in results per timespan may suggest that one sample period is better able to isolate the effect of the explanatory variable than the other. This could explain why the R-squared decreases when the timespan increases. To better understand the differences in results between the different sample periods I examine the results for each timespan separately to better understand the differences in results between the different sample periods.

During the 1-month sample period, I only find evidence that firms are less likely to repurchase shares before stock option grants and that firms increase their share repurchases after more valuable stock options are granted. I find no evidence for an increasing likelihood of share repurchases after grant dates, which could be explained by the short time horizon of this sample. In the short run, it is important for executives to obtain options with a low exercise price before they can benefit from a price increase afterwards. This is supported by my findings on the association between share repurchases and granting value. The short-term decrease in repurchases before option grants is not associated with the value of those stock options, although share repurchases increase after more valuable stock options are granted. These results suggest that firms are less likely to repurchase shares before grant dates, regardless of the value of the grant. This implies that executives' short run focus is on obtaining options with a low exercise price.

My findings in the 3-month sample are as expected and consistent with the literature. I find evidence that firms are less likely to repurchase shares before a stock option grant and more likely to repurchase afterwards. This is supported by my findings that when stock option grants are more valuable, share repurchases decrease beforehand and increase afterwards. Increasing repurchases after more valuable option grants could also be explained as an

anticipation of future dilution caused by the option. However, I reject this argument since I also find that firms decrease repurchases before more valuable stock options are granted. The counter-dilution motive would suggest that repurchases should also increase before high-value option grants. Therefore, the results from the 3-month samples confirm my expectations and suggest that share repurchases are motivated by personal benefits.

After including control variables, I find that firms are less likely to repurchase shares 6 months before option grants and are more likely to repurchase shares the first 6 months afterwards. This is consistent with my findings from the shorter sample periods. However, I also find a positive association between share repurchases and the value of the stock option grants, regardless of the moment of granting. Those findings contradict, since they suggest that firms are less likely to repurchase shares before grant dates but also increase repurchases when the options are more valuable. As already mentioned in the 3-month sample, this could be explained as an anticipation of future dilution caused by the option. However, I do not find a significant result for the dilution control variable in the 6-month pre-granting sample. Hence, this suggests that long-run repurchase behavior is affected by other factors not captured by the model. The long-run results may be an indication that 6 months is too large of a sample period for this research, since I find strong evidence in favor of the personal benefits hypothesis in shorter sample periods. This implies that the 6-month model is unable to isolate the sole effect of stock option grants on repurchase behavior and therefore has weak explanatory power in this study.

To address a part of this problem, I included several control variables. In all three sample periods, I find evidence for the motives to repurchase shares to exploit undervaluation, to repurchase shares after option grants to anticipate a future dilution of stock, and to repurchase due to earlier-granted stock options. Additionally, I find strong evidence for a positive association between share repurchases, the size factor, and cash flow availability. I also find moderate evidence for a negative relation between share repurchases, growth opportunities, and cash holdings. Combining all the results of the analyses, I find evidence that firms defer share repurchases before executive options are granted, but I also find significant evidence for other factors affecting share repurchases. This implies that, besides other factors, personal benefits of stock option grants play a role in a firm's decision to repurchase shares.

6.3 Additional analysis

When I focus on specific positions in the executive board, I find similar results in the short-run in separate samples for CEOs and CFOs. Firms are 2.54% and 2.16% less likely to repurchase shares during the month before stock options are awarded to CEOs and CFOs respectively. Additionally, I find evidence that share repurchases increase by 0.18% after stock options awarded to CEOs increase the percentage of stock option value in their total compensation package with 1%. I do not find evidence for a similar relation for CFOs. Table 8 presents my findings regarding the likelihood of share repurchases and option grants, and Table 9 presents my findings regarding share repurchases and the value of option grants.

My results from the 3-month sample suggest that firms are less likely to repurchase shares before stock options are granted to CEOs, but I do not find significant results in the CFO sample. In line with findings in the full sample, firms are 1.01%-1.06% more likely to repurchase shares after stock options are granted to CEOs and CFOs respectively. Again, I find that share repurchases increase by 0.11% after the value of stock options in the CEOs' total compensation package increases by 1%.

The results for the control variables also yield meaningful results. In the CFO sample, my findings on the personal benefit motive are weak. However, I find strong evidence for the undervaluation motive and moderate evidence for repurchase incentives that are caused by options that are granted earlier. This suggests that CFOs are more focused on firm-related incentives to repurchase shares than on benefiting from stock option grants. In the CEO sample, I find stronger evidence for personal benefits affecting share repurchases, but I also find evidence for shares being repurchased to exploit perceived undervaluation. Therefore, my findings suggest that a firm's share repurchases are at least partly explained by the personal benefits that derive from stock options granted to CEOs.

In summary, organizing my sample by job title provides additional insights on the results. I find strong evidence that a firm's repurchase behavior is related to the granting of stock options to their CEOs. Little evidence is found regarding CFOs. Share repurchases around the grant dates of CEO stock options confirm the expected pattern and are therefore likely to be motivated by personal benefits. However, I also find significant results for different motives

to repurchase shares. These motives were captured in the model as control variables. This implies that the personal benefits of CEOs cannot fully explain the firms' repurchase behavior.

6.4 Option exercise analysis

In the final study of this thesis, I examine and find a positive association between the likelihood of share repurchases and option exercises. My results, presented in table 10, demonstrate that firms are 1.18%-2.42% more likely to repurchase shares in the periods before and after exercises. This could be explained as executives trying to increase the firm's stock price by repurchasing shares before exercising their options. Afterwards, firms could repurchase shares as a reaction to the dilution in stock caused by the option exercises. However, I find in the short-run a significant change in the sign of the coefficient after including control variables in the pre-exercise sample. This could imply that firms are able to recognize exercises shortly before they are exercised and save funds for future repurchases in anticipation of future diluted stock. This serves as a rational explanation for firm repurchasing behavior.

Table 11 depicts my findings on the relation between the value of option exercises and share repurchases. All results are negative and statistically significant in the samples before and after exercises. This implies that firms decrease their share repurchases when the value of option exercises increases. The value of option exercises depends on the stock price and exercise price, where the exercise price is pre-determined and constant. Therefore, the value of option exercises only increases when the stock's market price increases. When a firm repurchases shares, it most likely does so on the open market, which means that firms must pay the market price for the repurchased shares. This mechanism could explain the negative relation between share repurchases and the value of option exercises. Hence, firms rationally adjust their repurchase behavior regarding option exercises.

To summarize the results, my findings on the increased likelihood of share repurchases before option exercises can be explained in multiple ways. One explanation confirms the personal benefit hypothesis while the other explanation rejects this hypothesis. This contradiction in explanations suggest that executives manipulate the firm's repurchase behavior to obtain personal benefits from their stock options, or, alternatively, firms rationally respond to stock dilution by repurchasing shares. My findings on the decrease in share repurchases related to

the value of option exercises can be explained as rational repurchase behavior rather than motivation for personal benefits. Therefore, my findings suggest that firms repurchase shares to cater to the firm's interest. The fact that executives benefit from those repurchases seems to be an additional benefit and not the main purpose.

6.5 Robustness checks

I conduct several robustness checks to assess the validity of my results, which is essential to the interpretation of my findings. The main concern of repurchase-related studies is the interpretation of causality, because the literature documents many factors as being associated with repurchases. Those endogeneity issues may arise when one of the most important OLS assumptions is violated. This assumption states that the error terms of independent variables are uncorrelated with the dependent variable. If this assumption holds, the dependent variable may be explained by the explanatory variables. If the assumption does not hold, the results could be biased and difficult to interpret. Those biases can arise in the form of measurement errors, reverse causality, and omitted variables biases. These are all relevant to studies on share repurchases, which makes them relevant to my research.

Measurement errors arise in OLS because not every variable can be observed all the time. Therefore, variables can be estimated with calculations that use other variables. These constructed variables are likely to be close to reality but are not equal to the real value of the variable because they are estimates. The measurement error is defined as the difference between the real value and the estimated value and is captured in the error term of the estimated value.

However, when the estimated variable is included in the regression, the measurement error becomes part of the error term of the regression. The assumption of independent error terms will be violated and creates an endogeneity bias, which results in a biased OLS coefficient. I obtained all the variables used in this study from reputable databases. Furthermore, data for the repurchase measure is extracted from SEC filings, which should be the most reliable source of repurchase data. However, several variables are constructed as calculations using other variables, because those variables of interest are not provided by databases. Therefore, it is possible that my results suffer from measurement errors. However, since the constructed

variables are key to my research, I can only identify this possible bias and cannot solve the issue.

An important point that should be considered by studies of repurchases is the possibility of reverse causality. It must be determined what factors affect share repurchases and vice versa. My research focuses on how repurchase behavior is affected by the timing and value of stock option grants. The research produces significant findings that suggest that causality runs from option grants to repurchase behavior. However, this does not rule out the possibility that the granting of options is affected by share repurchases.

Since the literature has distinguished many factors that are related to share repurchases, it is possible that not every variable with explanatory power has been included in the research. The ubiquity of related factors poses the risk of unintentionally excluding an important factor from the model. If this exclusion occurs, some results may be biased. Although all the variables included in my research are supported by the literature and have been proven to have a significant effect on share repurchases, this does not imply that no other variables have a significant effect on repurchases. To eliminate this bias, those missing factors should be identified, measured, and held constant in the regression. However, this is difficult to attain in practice. Therefore, I have to be careful with the interpretation of results due to the potential upward or downward bias of the regression coefficients.

To address these endogeneity issues, I apply a 2SLS analysis to determine the direction of causality. However, this method required the inclusion of an instrumental variable in the model to capture the effects of the independent variable. An efficient instrumental variable must partly explain the endogenous regressor while not correlating with the error term of the regression. However, this is where the relevant literature falls short. Namely, due to the endogenous nature of both share repurchases and option grants, the existing literature does not provide an appropriate variable to act as instrument for the value of stock option grants to explain share repurchases.

However, Sun and Hovey (2013) has examined the relation between executive compensation and earnings management. The researchers have followed the 2SLS methodology applied by

Baker et al. (2003) to test their findings on causality. Since Sun and Hovey (2013) and my study both examine the effect of stock option grants on a managerial policy decision that could affect the value of the options, I consider both studies to be similar. The literature fails to provide an instrument related to stock option grants and repurchases and because of the considered similarity of the studies, I apply the instrument used in Sun and Hovey (2013) in my 2SLS analysis.

Hence, I first construct an estimator for the fitted values of my measure of option grant value by regressing the stock option value measure on several instrumental variables provided by Baker et al. (2003). Those instrumental variables include CEO tenure, return on assets, stock return, market-to-book ratio, and an indicator for the final year of CEOs.

I also include all other exogenous variables of the original model in this regression. In the second stage, I use the original model and replace the measure for option value with the fitted values of this variable. Table 12 presents the findings of the 2SLS regression. I recognize that this instrument does not perfectly fit my research, which is reflected in the results of most samples. The instrument is far from significant in almost all samples, which indicates that the instrument is not capable of determining causality. However, I find a significant negative coefficient in the 3-months sample before options are granted. This corroborates my findings from the previous model and suggests that causality runs from option grants to repurchase behavior.

As mentioned in the section on data, I applied OLS analysis to this research. The Tobit regression technique is another commonly used method to study share repurchases. The 0 values in months when firms did not repurchase can be clustered and have therefore less explanatory power than repurchase months. Since the literature does not point to a superior model, I also used Tobit regression analysis on my data. Table 13 depicts my results for the full sample including continuous variables, since the binary variables will be completely censored by the Tobit technique. The findings without control variables all turned out to be positive and significant. Since Tobit places more weight on positive values, this is not surprising.

Additionally, the differences in significance follow from the clustering at zero. The months where firms did not repurchase are as important as months with actual repurchases, since both observations explain repurchase behavior. Furthermore, the findings in the models that included control variables are equal in sign and significance, which confirms the robustness of my results. The same applies to the research on repurchases and option exercises, where the results from Tobit analysis indicate equal signs and significance as the OLS results. Table 14 reports these results. This also confirms the robustness of my results.

To perform an additional test in order to check the robustness of my findings concerning repurchase behavior in general, I remove the limitations that bounded my previous research. This test was intended to check the robustness of my findings concerning repurchase behavior in general. I had only included observations in the range of 1, 3, or 6 months from an option grant. When conducting the additional test, I removed this boundary and regressed repurchases on stock option grants and the control variables in the complete sample. I still found a positive and statistically significant result, which confirms my finding that repurchases increase after stock options are granted.

In summary, the studies of share repurchases and option grants are prone to biases. It is important to identify possible biases before drawing accurate conclusions. Therefore, I apply a 2SLS regression methodology from Sun and Hovey (2013), which I consider similar to this research. Although the instrument does not fit my study perfectly, it slightly alleviates the endogeneity problem in my study. I recognize that this evidence is not conclusive, but is still useful for understanding the nature of the endogeneity issues when drawing conclusions.

7. Conclusion

I analyze the relation between personal benefits of stock option grants and share repurchases for U.S. firms from 2006 to 2010. In doing so, I try to determine whether repurchase behavior is affected by the granting of executive stock options. I hypothesize that executives defer share repurchases before stock options are granted to obtain options with lower exercise prices and increase share repurchases after stock options are granted to increase their option value.

I find strong evidence that abnormal returns are generated surrounding actual share repurchases and that share repurchases can be used as an effective instrument to increase the profits from stock option grants. Furthermore, my findings relate the timing of share repurchases to stock option grants. In the short run, executives focus on obtaining stock options with a low exercise price and therefore reduce share repurchases. Thereafter, share repurchases increase, which caused stock prices to increase, in turn resulting in higher option value. Therefore, my findings confirm the hypothesis that executives defer share repurchases before stock options are granted and use share repurchases to boost the stock price after the grant date.

I also find evidence that repurchases increase after more valuable options are granted. This is in line with managerial timing of repurchase behavior to increase their compensation. Furthermore, my results suggest that this manipulative repurchase behavior is more likely to be driven by CEOs than by CFOs. However, my results on the exercise decision suggest that share repurchases can be explained as rational behavior in favor of firm interest. My findings suggest a positive relation between share repurchases and option exercises, regardless the timing of exercise. In combination with the negative significant relation between share repurchases and exercise value, these results can most likely be explained as a response on stock dilution as a result of option exercises. Therefore, repurchase behavior during exercise decisions is unlikely to have been driven by managers trying to increase their personal benefits.

I conduct several test to check my results for robustness and do not find very deviating results. For the 3-month sample before stock options are granted I am able to determine that causality

runs from stock option grant value to repurchase behavior. The applied instrument is not able to determine causality in other samples and therefore results should be interpreted with care. Both the results from the Tobit analysis and the results from the model without restrictions regarding included observations support the findings of the OLS analysis.

In summary, there does not seem to be a single straightforward answer to whether executives manipulate share repurchases to increase the value of their stock option grants. According to my results, repurchases decrease before option grants and increase afterwards, which suggests that executives defer share repurchases until stock options are granted. However, those findings are not reflected in the exercise decision, which is when the benefits are realized. Therefore, my results indicate that managers benefiting from stock options play a role in a firm's repurchase behavior, although they are more likely to be additional benefits than a manifestation of intentional manipulation of repurchase policy.

8. Limitations and recommendations

This section discusses the various limitations of the conducted research and proposes recommendations to overcome these limitations as well as for further research. Although I paid attention to detail in this research, I recognize some inevitable limitations.

The first limitation in my research stems from my dataset, which has two sources: the dataset with share repurchases and the ExecuComp database. The original dataset with share repurchases ranges from 2004 to 2010. However, due to the new accounting legislation requiring the expensing of stock options in the income statement at grant date, only the data from after 2006 was useful to my research. Therefore, the sample period had to be reduced by 2 years. This left 5 years of data, which should be enough for this study. However, I also lost approximately 60% of the firms from the original repurchase dataset due to the incompleteness of the ExecuComp database. The scarcity of data concerning executive compensation shrank the sample size of this research considerably.

I suggest two solutions to this issue. First, the repurchase dataset should be expanded because more recent data should currently be available. Second, I mainly used the ExecuComp database to extract executive data. However, the Thomson Reuters Insiders database also contains executive compensation data. Therefore, it should be possible to combine both datasets into one larger database, which should increase the number of firms and executives included in the research.

Furthermore, it is important to note that the literature has documented many factors that could affect repurchase behavior. This indicates that it is difficult to isolate and study one factor, since firms are likely to have several motives to initiate repurchases. Therefore, care should be taken when interpreting the results, because important variables with explanatory power may be omitted from the research. Besides, the lack of an observable firm repurchase strategy makes it even harder to draw conclusions. Consequently, further research is necessary to address endogeneity issues concerning share repurchases and to address the differences in executive motivation or repurchase behavior concerning option grants and exercises.

9. References

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10. Appendix

Table 1: Variable description. This table presents an overview of the variables included in this research. This table reports for each variable a brief definition, the source where the data is extracted from and the unit of measurement.

Name	Definition	Source	Unit
Asset tangibility	$(\text{total assets} - \text{intangible assets}) / \text{total assets}$	Compustat	ratio
Book Value of Equity	$(\text{Total assets} - \text{total liabilities}) / \text{market capitalization}$	Compustat	million
Book-to-Market value	$\text{Book value equity} / \text{market value equity}$	Compustat	ratio
CAPEX	Capital expenditures	Compustat	million
CAR	Cumulative abnormal return	CRSP	unit
Cash flow availability	$(\text{Net operating cash flow} - \text{CAPEX}) / \text{total assets}$	Compustat	million
Cash holdings	$\text{Cash} / \text{total assets}$	Compustat	million
Dilution	$(\text{shares used in calculating diluted EPS} - \text{shares used in calculating normal EPS}) / \text{total shares outstanding}$	Compustat	ratio
Exercise value	$\text{Market price} - \text{exercise price}$	CRSP / Compustat	unit
Grant date	1 if stock options are granted in current month	ExecuComp	binary
Illiquidity	Amihud measure: $(1 / \text{trading days}) * (\text{absolute return} / \text{dollar value of trading volume})$	CRSP / Compustat	ratio
Institutional ownership	$\text{Shares owned by institutional investors} / \text{total shares outstanding}$	Thomson Financial Insiders Filings	ratio
Leverage	$\text{total debt} / \text{total assets}$	Compustat	million
Market capitalization	$\text{Log}(\text{market cap})$	Compustat	ratio
Net income		Compustat	million
Option grant value	$\text{Fair value of the option grants on grant date} / \text{executives' yearly total compensation}$	ExecuComp	thousands
Options outstanding	Number of common shares outstanding	Compustat	million
Repurchase dummy	1 if shares are repurchased during the month	Hillert et al. (2016)	binary
Repurchase intensity	$\text{Number of shares repurchased during the month} / \text{number of shares outstanding at the beginning of the month}$	Hillert et al. (2016)	ratio
Return	Holding period return	CRSP	unit
Sales		Compustat	million
Stock price	Price of stock on the open market	CRSP	unit
Total assets	Total assets	Compustat	million
Total compensation	Total compensation including: salary, bonus, non-equity incentive plan compensation, grant-date fair value of option awards, grant-date fair value of stock awards, deferred compensation earnings reported as compensation and other compensation	Compustat	thousands

Table 2: Sample selection. This table presents the filters applied on the raw dataset to obtain the final dataset used in this research. Panel A shows the drop in number of firms and Panel B shows the decrease in number of firm-month observations.

Panel A: Number of firms

Sample selection	# Firms left
Repurchase data	5,298
Less: missing observations in ExecuComp database	(3,174)
Less: missing values in Annual Compensation database	(6)
Less: missing values in Compustat Capital IQ database	(4)
Less: missing values for grant dates	(114)
Less: missing values for fair value of option grants	(298)
Less: missing repurchase data	(5)
Less: missing values to construct control variables	(26)
Final sample	1,671

Panel B: Firm-month observations

Sample selection	# Firm-month observations
Observations for 1671 firms	260,183
Less: Observations not within 6 months of grant date	19,068
Less: Grant dates that are not within 6 months of another grant date	21,338
Less: grant dates without 1 month observations	0
Less: grant dates without 3 month observations	36,742
Less: grant dates without 6 month observations	43,102
	139,933
Less: control variables without 1 month observations	1,265
Less: control variables without 3 month observations	27,344
Less: control variables without 6 month observations	16,001
Final sample	95,323

Table 3: Summary statistics. This table provides summary statistics of all variables used in this research. Panel A presents a table with descriptive statistics of the variables used in this research. Panel B presents the Pearson correlation matrix. Both tables only include observations used in a regression. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables.

Panel A: Summary statistics table

	N	25th Percentile	Mean	Median	75th Percentile	Standard Deviation
<i>Repurchases:</i>						
Repurchase Dummy	139933	0.000	0.243	0.000	0.000	0.429
Repurchases	139933	0.000	0.002	0.000	0.000	0.006
<i>Executive stock option grants:</i>						
Fair value of stock option grants	139933	0.124	0.250	0.214	0.336	0.173
Exercise measure	92224	0,000	0.009	0.001	0.006	0.022
<i>Control variables:</i>						
Return	95323	-0.062	0.010	0.008	0.074	0.144
Market Capitalization	95323	6.481	7.660	7.574	8.737	1.668
Cash Flow Availability	95323	0.023	0.064	0.067	0.112	0.084
Leverage	95323	0.020	0.189	0.168	0.289	0.173
Book-to-Market	95323	0.267	0.507	0.424	0.653	0.404
Dilution	95323	0.003	0.020	0.012	0.024	0.028
Asset tangibility	95323	0.682	0.796	0.850	0.962	0.194
Cash holdings	95323	0.036	0.133	0.092	0.190	0.131
Options outstanding	95323	0.118	0.445	0.270	0.583	0.495
Institutional ownership	95323	0.742	0.835	0.857	0.950	0.182
Illiquidity	95323	0.000	0.014	0.001	0.004	0.071

Table 3: Summary statistics. (continued)

Panel B: Pearson correlation matrix

	Repurchases	Option grant value	Cash Flow Availability	Leverage	Book-to-Market ratio	Dilution	Market Capitalization	Asset tangibility	Cash holdings	Options outstanding	Institutional Ownership	Illiquidity
Repurchases	1											
Option grant value	0.0255	1										
Cash Flow Availability	0.0944	0.0353	1									
Leverage	-0.0271	-0.0412	-0.1250	1								
Book-to-Market ratio	-0.0250	-0.1390	-0.2290	-0.1060	1							
Dilution	0.0211	0.0708	0.1430	-0.0138	-0.1310	1						
Market Capitalization	0.0579	0.0879	0.1830	0.1240	-0.3060	0.0107	1					
Asset tangibility	0.0038	-0.0415	-0.1430	-0.2010	0.0054	-0.0344	-0.1720	1				
Cash holdings	-0.0198	0.1340	0.1350	-0.3180	-0.1570	0.1350	-0.2420	0.2570	1			
Options outstanding	0.0181	0.0033	0.0478	-0.0659	0.0628	0.0453	-0.3520	0.0712	-0.0174	1		
Institutional Ownership	0.0510	0.0621	0.0846	0.0612	0.0494	0.1540	0.0505	-0.1150	-0.0487	0.1960	1	
Illiquidity	-0.0442	-0.0647	-0.0791	-0.0178	0.1150	-0.0712	-0.3180	0.0520	0.0965	0.0184	-0.3240	1

Table 4: Breakdown of summary statistics. This table provides a breakdown of the samples used in this research. The samples are constructed based on duration (1 month, 3 months and 6 months) and timing (before and after grant dates). Panel A shows summary statistics for the full sample with respect to duration and Panel B, C and D for one-month, three-months and six-months duration only, respectively. Only values included in regressions are included in this table. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables.

	N		25th Percentile		Mean		Median		95th Percentile		Standard Deviation	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
<i>Panel A: full sample</i>												
<i>Repurchases:</i>												
Repurchase Dummy	73789	73789	0.000	0.000	0.238	0.248	0.000	0.000	0.000	0.000	0.426	0.432
Repurchases	73789	73789	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.005	0.006
<i>Executive stock option grants:</i>												
Fair value of stock option grants	73789	73789	0.125	0.123	0.253	0.246	0.216	0.212	0.341	0.331	0.177	0.170
<i>Control variables:</i>												
Return	50204	50204	-0.069	-0.056	-0.000	0.019	0.002	0.014	0.068	0.081	0.139	0.147
Market Capitalization	50204	50204	6,471	6,486	7,647	7,662	7,556	7,575	8,708	8,768	1,663	1,669
Cash Flow	50204	50204	0.021	0.024	0.063	0.066	0.066	0.067	0.110	0.113	0.085	0.083
Leverage	50204	50204	0.018	0.024	0.189	0.189	0.168	0.169	0.290	0.290	0.173	0.173
Book-to-Market	50204	50204	0.266	0.270	0.505	0.515	0.422	0.431	0.649	0.665	0.405	0.409
Dilution	50204	50204	0.003	0.003	0.020	0.020	0.012	0.012	0.024	0.024	0.028	0.028
Asset tangibility	50204	50204	0.681	0.682	0.796	0.796	0.850	0.850	0.962	0.963	0.194	0.194
Cash holdings	50204	50204	0.034	0.039	0.131	0.137	0.088	0.098	0.186	0.194	0.130	0.132
Options outstanding	50204	50204	0.119	0.118	0.443	0.447	0.270	0.267	0.581	0.585	0.490	0.502
Institutional ownership	50204	50204	0.740	0.748	0.834	0.838	0.856	0.860	0.952	0.950	0.185	0.178
Illiquidity	50204	50204	0.000	0.000	0.014	0.014	0.001	0.001	0.004	0.004	0.071	0.070
<i>Panel B: 1 month</i>												
<i>Repurchases:</i>												
Repurchase Dummy	17487	17487	0.000	0.000	0.202	0.252	0.000	0.000	0.000	1.000	0.401	0.434
Repurchases	17487	17487	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.005	0.007
Repurchase Dummy												
Repurchases												
<i>Executive stock option grants:</i>												
Fair value of stock option grants	17487	17487	0.119	0.120	0.247	0.248	0.212	0.213	0.336	0.336	0.175	0.174
<i>Control variables:</i>												
Return	12207	12207	-0.076	-0.038	-0.002	0.034	-0.003	0.027	0.063	0.087	0.137	0.145
Market Capitalization	12207	12207	6,465	6	7,628	8	7,533	8	8,734	9	1,680	2
Cash Flow	12207	12207	0.023	0.023	0.064	0.064	0.067	0.067	0.112	0.112	0.084	0.084
Leverage	12207	12207	0.010	0.010	0.183	0.183	0.157	0.157	0.283	0.283	0.175	0.175
Book-to-Market	12207	12207	0.264	0.264	0.503	0.503	0.422	0.422	0.656	0.656	0.405	0.405
Dilution	12207	12207	0.003	0.003	0.020	0.020	0.012	0.012	0.024	0.024	0.028	0.028
Asset tangibility	12207	12207	0.677	0.677	0.791	0.791	0.841	0.841	0.960	0.960	0.196	0.196
Cash holdings	12207	12207	0.036	0.036	0.132	0.132	0.092	0.092	0.188	0.188	0.129	0.129
Options outstanding	12207	12207	0.117	0.117	0.451	0.451	0.276	0.276	0.587	0.587	0.502	0.502
Institutional ownership	12207	12207	0.738	0.738	0.831	0.831	0.855	0.855	0.949	0.949	0.184	0.184
Illiquidity	12207	12207	0.000	0.000	0.016	0.016	0.001	0.001	0.005	0.005	0.078	0.079

Table 4: Breakdown of summary statistics. (continued)

	N		25th Percentile		Mean		Median		95th Percentile		Standard Deviation	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
<i>Panel C: 3 months</i>												
<i>Repurchases:</i>												
Repurchase Dummy	38966	38966	0.000	0.000	0.231	0.245	0.000	0.000	0.000	0.000	0.421	0.430
Repurchases	38966	38966	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.005	0.006
<i>Executive stock option grants:</i>												
Fair value of stock option grants	38966	38966	0.123	0.122	0.253	0.249	0.216	0.213	0.343	0.336	0.179	0.174
<i>Control variables:</i>												
Return	26225	26225	-0.067	-0.055	0.003	0.021	0.001	0.014	0.068	0.081	0.142	0.151
Market Capitalization	26225	26225	6,429	6,439	7,612	7,625	7,530	7,541	8,678	8,706	1,681	1,685
Cash Flow	26225	26225	0.022	0.024	0.064	0.065	0.067	0.068	0.112	0.113	0.086	0.085
Leverage	26225	26225	0.015	0.017	0.188	0.188	0.165	0.165	0.290	0.290	0.174	0.173
Book-to-Market	26225	26225	0.266	0.269	0.503	0.509	0.422	0.426	0.645	0.658	0.405	0.407
Dilution	26225	26225	0.003	0.003	0.020	0.020	0.012	0.012	0.025	0.024	0.029	0.029
Asset tangibility	26225	26225	0.685	0.685	0.797	0.797	0.851	0.851	0.963	0.963	0.194	0.193
Cash holdings	26225	26225	0.036	0.040	0.135	0.139	0.092	0.098	0.193	0.197	0.132	0.133
Options outstanding	26225	26225	0.119	0.118	0.450	0.452	0.271	0.271	0.592	0.593	0.496	0.504
Institutional ownership	26225	26225	0.740	0.746	0.834	0.837	0.856	0.860	0.953	0.951	0.186	0.181
Illiquidity	26225	26225	0.000	0.000	0.015	0.015	0.001	0.001	0.005	0.004	0.075	0.076
<i>Panel D: 6 months</i>												
<i>Repurchases:</i>												
Repurchase Dummy	57750	57750	0.000	0.000	0.246	0.249	0.000	0.000	0.000	0.000	0.430	0.433
Repurchases	57750	57750	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.005	0.006
<i>Executive stock option grants:</i>												
Fair value of stock option grants	57750	57750	0.127	0.125	0.252	0.243	0.217	0.212	0.338	0.325	0.173	0.165
<i>Control variables:</i>												
Return	39139	39139	-0.069	-0.059	-0.002	0.018	0.003	0.012	0.067	0.082	0.139	0.147
Market Capitalization	39139	39139	6,502	6,558	7,693	7,711	7,615	7,639	8,768	8,829	1,639	1,647
Cash Flow	39139	39139	0.022	0.024	0.063	0.067	0.065	0.067	0.109	0.113	0.084	0.083
Leverage	39139	39139	0.033	0.033	0.193	0.194	0.175	0.176	0.293	0.296	0.172	0.172
Book-to-Market	39139	39139	0.268	0.274	0.511	0.523	0.426	0.441	0.658	0.676	0.406	0.411
Dilution	39139	39139	0.003	0.003	0.020	0.019	0.012	0.012	0.024	0.023	0.028	0.027
Asset tangibility	39139	39139	0.682	0.682	0.796	0.796	0.853	0.853	0.962	0.963	0.194	0.194
Cash holdings	39139	39139	0.033	0.039	0.129	0.137	0.088	0.098	0.185	0.195	0.129	0.131
Options outstanding	39139	39139	0.120	0.117	0.434	0.439	0.264	0.261	0.568	0.570	0.482	0.497
Institutional ownership	39139	39139	0.745	0.756	0.838	0.844	0.858	0.862	0.954	0.952	0.182	0.173
Illiquidity	39139	39139	0.000	0.000	0.013	0.013	0.001	0.001	0.004	0.004	0.063	0.061

Table 5: Cumulative abnormal returns around actual share repurchases. This table presents the cumulative abnormal returns generated by the 1,671 firms included in the final sample for each event window. The number of observations represents the number of actual repurchases included in the CAR calculations. CARs are shown for the full sample and two sub-samples. For the sub-samples, the full sample is divided into two parts by the median value of the number of repurchases or the repurchase size. This distribution comes closest to two samples of equal observations. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	N	Median	Event Window		
			(-20, -1)	(0, 2)	(0, 20)
<i>Full Sample</i>					
CAR	4112		-0.0043*** (-2.30)	0.0019*** (3.33)	0.0033** (2.38)
<i>By number of repurchases</i>					
CAR	2.027	< 11	-0.0058** (-2.52)	0.0007 (0.00)	0.0026 (1.21)
CAR	2.085	≥ 11	-0.0029 (-1.64)	0.0030*** (4.46)	0.0039** (2.26)
<i>By repurchase size</i>					
CAR	2.050	< 6,1%	-0.0068*** (-3.23)	0.0023*** (2.80)	0.0027 (1.29)
CAR	2.062	≥ 6,1%	-0.0018 (-0.94)	0.0014* (1.89)	0.0039** (2.14)

Table 6: Share repurchases and option grant likelihood. This table presents the OLS regression of the *Repurchase dummy* on the *Grant date dummy* and control variables for different sub-samples. The sub-samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after grant dates). *Repurchase dummy_t* is 1 if a firm repurchased shares during that month. *Option grant dummy_[t+1,t+k]* is 1 in the first k observations before the grant date month. *Option grant dummy_[t-1,t-k]* is 1 in the first k observations after the grant date month. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	k = 1				k = 3				k = 6			
	Panel A: full sample											
Grant date dummy $_{[t+1,t+k]}$	-0.0190***	-0.0244***			-0.0047**	-0.0097***			0.0116***	-0.0074***		
	(-5.95)	(-6.70)			(-2.12)	(-3.80)			(5.79)	(-3.23)		
Grant date dummy $_{[t-1,t-k]}$			0.0025	0.0019			0.0077***	0.0074***			0.0242***	0.0057**
			(0.73)	(0.48)			(3.37)	(2.81)			(11.88)	(2.44)
Return		-0.1136***		-0.1129***		-0.1135***		-0.1131***		-0.1135***		-0.1131***
		(-20.71)		(-20.58)		(-20.67)		(-20.60)		(-20.67)		(-20.61)
Market Capitalization		0.0879***		0.0879***		0.0879***		0.0879***		0.0879***		0.0878***
		(101.26)		(101.25)		(101.23)		(101.22)		(101.27)		(101.08)
Cash Flow Availability		0.5824***		0.5821***		0.5826***		0.5820***		0.5825***		0.5820***
		(48.98)		(48.96)		(48.99)		(48.95)		(48.98)		(48.95)
Leverage		-0.1545***		-0.1539***		-0.1541***		-0.1540***		-0.1543***		-0.1539***
		(-24.49)		(-24.40)		(-24.42)		(-24.41)		(-24.45)		(-24.40)
Book-to-Market		0.0103***		0.0104***		0.0103***		0.0104***		0.0103***		0.0104***
		(3.91)		(3.94)		(3.90)		(3.94)		(3.90)		(3.92)
Dilution		-0.3523***		-0.3517***		-0.3510***		-0.3524***		-0.3516***		-0.3520***
		(-10.69)		(-10.67)		(-10.65)		(-10.69)		(-10.66)		(-10.67)
Asset tangibility		0.1511***		0.1511***		0.1512***		0.1510***		0.1512***		0.1510***
		(21.36)		(21.36)		(21.37)		(21.35)		(21.37)		(21.35)
Cash holdings		-0.1214***		-0.1209***		-0.1210***		-0.1210***		-0.1210***		-0.1211***
		(-13.19)		(-13.14)		(-13.15)		(-13.16)		(-13.15)		(-13.16)
Options outstanding		0.0485***		0.0485***		0.0484***		0.0486***		0.0483***		0.0486***
		(19.18)		(19.21)		(19.17)		(19.22)		(19.11)		(19.24)
Institutional ownership		-0.1172***		-0.1174***		-0.1172***		-0.1176***		-0.1169***		-0.1179***
		(-21.43)		(-21.47)		(-21.43)		(-21.51)		(-21.38)		(-21.54)
Illiquidity		0.1326***		0.1318***		0.1320***		0.1316***		0.1319***		0.1317***
		(11.94)		(11.87)		(11.89)		(11.84)		(11.88)		(11.86)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	260,183	179,291	260,183	179,291	260,183	179,291	260,183	179,291	260,183	179,291	260,183	179,291
R-squared	0.1338	0.2397	0.1337	0.2395	0.1337	0.2396	0.1337	0.2395	0.1338	0.2395	0.1341	0.2395

Table 7: Share repurchases and option grant value. This table presents the OLS regression of *Repurchases* on the *Option grant value* and control variables for different sub-samples. The sub-samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after grant dates). Only k observations of $Repurchases_t$ around grant dates are included in the research. $Option\ grant\ value_{[t+1,t+k]}$ captures k months before grant dates and similarly, $Option\ grant\ value_{[t-1,t-k]}$ captures k months after grant dates. Observations around grant dates are only included in the research if k months are available both before and after. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	k = 1				k = 3				k = 6			
	Panel A: full sample											
Option grant value $_{[t+1,t+k]}$	0.0003 (1.21)	0.0000 (0.15)			0.0000 (0.25)	-0.0005** (-2.27)			0.0006*** (4.05)	0.0004* (1.70)		
Option grant value $_{[t-1,t-k]}$			0.0011*** (3.09)	0.0012*** (2.62)			0.0013*** (5.81)	0.0011*** (3.77)			0.0015*** (7.83)	0.0011*** (4.54)
Return		-0.0012*** (-5.10)		-0.0012*** (-3.26)		-0.0016*** (-7.76)		-0.0006*** (-2.79)		-0.0015*** (-7.66)		-0.0009*** (-4.45)
Market Capitalization		0.0004*** (10.49)		0.0002*** (3.03)		0.0004*** (14.15)		0.0002*** (5.54)		0.0004*** (9.87)		0.0045*** (14.47)
Cash Flow Availability		0.0020*** (3.43)		0.0078*** (6.93)		0.0039*** (8.87)		0.0080*** (13.02)		-0.0006** (-1.99)		-0.0007** (-2.42)
Leverage		-0.0006 (-1.44)		0.0002 (0.31)		-0.0006** (-2.14)		-0.0005 (-1.46)		-0.0001 (-1.22)		-0.0000 (-0.24)
Book-to-Market		0.0000 (0.21)		-0.0006*** (-3.15)		0.0000 (0.05)		0.0000 (0.41)		-0.0016 (-1.34)		-0.0028** (-2.55)
Dilution		-0.0023 (-0.83)		-0.0055*** (-3.05)		-0.0005 (-0.30)		-0.0036** (-2.57)		-0.0016 (-1.38)		-0.0027** (-2.49)
Asset tangibility		0.0006 (1.46)		0.0019*** (3.95)		0.0005* (1.78)		0.0005 (1.61)		0.0010*** (3.63)		0.0002 (0.63)
Cash holdings		0.0006 (0.87)		-0.0024*** (-4.45)		0.0003 (0.61)		-0.0020*** (-5.50)		-0.0004 (-1.10)		-0.0004 (-1.30)
Options outstanding		0.0005*** (3.76)		0.0013*** (5.04)		0.0002* (1.91)		0.0006*** (3.81)		0.0004*** (3.70)		0.0005*** (3.47)
Institutional ownership		-0.0000 (-0.00)		0.0008* (1.79)		0.0004* (1.73)		-0.0001 (-0.31)		0.0002 (1.09)		-0.0002 (-0.90)
Illiquidity		-0.0003 (-1.02)		-0.0008 (-1.03)		-0.0001 (-0.18)		0.0002 (0.50)		0.0005 (1.38)		-0.0004 (-0.97)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	17,487	12,207	17,487	12,207	38,966	26,225	38,966	26,225	57,750	39,139	57,750	39,139
R-squared	0.1088	0.1194	0.1254	0.1479	0.0850	0.1043	0.1048	0.1451	0.0795	0.1017	0.0977	0.1302

Table 8: Share repurchases and executive-specific option grant likelihood. This table presents the OLS regression of the *Repurchase dummy* on the *Grant date dummy* and control variables for executive-specific samples. Panel A only includes CEOs in the sample, Panel B includes only CFOs in the sample and Panel C combines the previous samples. All samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after grant dates). *Repurchase dummy* $_t$ is 1 if a firm repurchased shares during that month. *Option grant dummy* $_{[t+1,t+k]}$ is 1 in the first k observations before the grant date month. *Option grant dummy* $_{[t-1,t-k]}$ is 1 in the first k observations after the grant date month. Additionally, all control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	k = 1				k = 3				k = 6			
	Panel A: CEO only		Panel B: CFO only		Panel A: CEO only		Panel B: CFO only		Panel C: All		Panel C: All	
Grant date dummy $_{[t+1,t+k]}$	-0.0167**	-0.0254***			-0.0037	-0.0167***			0.0110**	-0.0181***		
	(-2.21)	(-2.97)			(-0.72)	(-2.82)			(2.39)	(-3.45)		
Grant date dummy $_{[t-1,t-k]}$			0.0037	0.0011			0.0130**	0.0101*			0.0304***	0.0073
			(0.46)	(0.12)			(2.47)	(1.67)			(6.49)	(1.35)
Return		-0.1092***				-0.1100***				-0.1102***		
		(-8.72)				(-8.79)				(-8.81)		
Market Capitalization		0.0861***				0.0862***				0.0864***		
		(41.81)				(41.80)				(41.88)		
Cash Flow Availability		0.5549***				0.5548***				0.5547***		
		(19.92)				(19.91)				(19.91)		
Leverage		-0.1734***				-0.1729***				-0.1732***		
		(-11.56)				(-11.53)				(-11.54)		
Book-to-Market		0.0084				0.0084				0.0086		
		(1.31)				(1.31)				(1.34)		
Dilution		-0.3219***				-0.3205***				-0.3217***		
		(-4.24)				(-4.22)				(-4.23)		
Asset tangibility		0.1255***				0.1260***				0.1266***		
		(7.46)				(7.49)				(7.53)		
Cash holdings		-0.1471***				-0.1468***				-0.1469***		
		(-6.94)				(-6.92)				(-6.93)		
Options outstanding		0.0481***				0.0480***				0.0477***		
		(8.19)				(8.17)				(8.13)		
Institutional ownership		-0.1139***				-0.1135***				-0.1131***		
		(-8.74)				(-8.76)				(-8.67)		
Illiquidity		0.1174***				0.1165***				0.1163***		
		(5.30)				(5.28)				(5.26)		
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	47,356	32,955	47,356	32,955	47,356	32,955	47,356	32,955	47,356	32,955	47,356	32,955
R-squared	0.1334	0.2372	0.1335	0.2370	0.1334	0.2372	0.1335	0.2370	0.1335	0.2372	0.1342	0.2370

Table 8: Share repurchases and executive-specific option grant likelihood. (continued)

	k = 1				k = 3				k = 6			
					<i>Panel B: CFO only</i>							
Grant date dummy $[t+1,t+k]$	-0.0202*** (-2.78)	-0.0216*** (-2.60)			-0.0061 (-1.21)	-0.0092 (-1.60)			0.0047 (1.07)	-0.0126** (-2.48)		
Grant date dummy $[t-1,t+k]$			-0.0007 (-0.09)	-0.0010 (-0.12)			0.0073 (1.43)	0.0106* (1.82)			0.0255*** (5.59)	0.0133** (2.54)
Return		-0.1120*** (-8.68)		-0.1114*** (-8.63)		-0.1121*** (-8.68)		-0.1117*** (-8.65)		-0.1126*** (-8.72)		-0.1121*** (-8.68)
Market Capitalization		0.0876*** (43.48)		0.0876*** (43.48)		0.0876*** (43.47)		0.0876*** (43.48)		0.0877*** (43.53)		0.0875*** (43.39)
Cash Flow Availability		0.5901*** (21.51)		0.5899*** (21.51)		0.5902*** (21.52)		0.5896*** (21.50)		0.5899*** (21.51)		0.5895*** (21.49)
Leverage		-0.1419*** (-9.78)		-0.1415*** (-9.75)		-0.1416*** (-9.75)		-0.1415*** (-9.75)		-0.1422*** (-9.79)		-0.1409*** (-9.71)
Book-to-Market		0.0076 (1.25)		0.0077 (1.26)		0.0076 (1.25)		0.0077 (1.26)		0.0076 (1.24)		0.0076 (1.24)
Dilution		-0.4191*** (-5.47)		-0.4188*** (-5.46)		-0.4185*** (-5.46)		-0.4192*** (-5.47)		-0.4209*** (-5.49)		-0.4172*** (-5.44)
Asset tangibility		0.1736*** (10.80)		0.1736*** (10.80)		0.1737*** (10.81)		0.1735*** (10.79)		0.1738*** (10.81)		0.1735*** (10.79)
Cash holdings		-0.1194*** (-5.64)		-0.1188*** (-5.61)		-0.1190*** (-5.62)		-0.1187*** (-5.61)		-0.1190*** (-5.62)		-0.1193*** (-5.63)
Options outstanding		0.0421*** (7.52)		0.0421*** (7.52)		0.0420*** (7.51)		0.0422*** (7.53)		0.0417*** (7.45)		0.0425*** (7.58)
Institutional ownership		-0.1104*** (-8.94)		-0.1105*** (-8.95)		-0.1102*** (-8.93)		-0.1111*** (-9.00)		-0.1096*** (-8.87)		-0.1122*** (-9.08)
Illiquidity		0.1313*** (5.44)		0.1307*** (5.41)		0.1307*** (5.41)		0.1303*** (5.39)		0.1307*** (5.41)		0.1298*** (5.36)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	49,974	34,646	49,974	34,646	49,974	34,646	49,974	34,646	49,974	34,646	49,974	34,646
R-squared	0.1352	0.2406	0.1351	0.2405	0.1351	0.2405	0.1351	0.2405	0.1351	0.2406	0.1356	0.2406

Table 8: Share repurchases and executive-specific option grant likelihood. (continued)

	k = 1				k = 3				k = 6			
					<i>Panel C: CEO & CFO only</i>							
Grant date dummy $[t+1,t+k]$	-0.0185***	-0.0235***			-0.0048	-0.0128***			0.0083***	-0.0151***		
	(-3.55)	(-3.95)			(-1.34)	(-3.11)			(2.62)	(-4.16)		
Grant date dummy $[t-1,t+k]$			0.0014	-0.0001			0.0101***	0.0103**			0.0282***	0.0103***
			(0.24)	(-0.01)			(2.76)	(2.45)			(8.66)	(2.75)
Return		-0.1110***		-0.1105***		-0.1115***		-0.1107***		-0.1119***		-0.1109***
		(-12.37)		(-12.31)		(-12.41)		(-12.33)		(-12.46)		(-12.35)
Market Capitalization		0.0871***		0.0871***		0.0871***		0.0871***		0.0873***		0.0870***
		(60.71)		(60.70)		(60.70)		(60.67)		(60.79)		(60.51)
Cash Flow Availability		0.5696***		0.5694***		0.5696***		0.5692***		0.5694***		0.5690***
		(29.29)		(29.28)		(29.29)		(29.27)		(29.28)		(29.26)
Leverage		-0.1560***		-0.1555***		-0.1556***		-0.1555***		-0.1561***		-0.1552***
		(-15.03)		(-14.97)		(-14.99)		(-14.98)		(-15.03)		(-14.95)
Book-to-Market		0.0081*		0.0081*		0.0081*		0.0081*		0.0081*		0.0079*
		(1.83)		(1.85)		(1.83)		(1.84)		(1.85)		(1.80)
Dilution		-0.3740***		-0.3737***		-0.3731***		-0.3743***		-0.3750***		-0.3731***
		(-6.96)		(-6.95)		(-6.94)		(-6.97)		(-6.98)		(-6.94)
Asset tangibility		0.1531***		0.1530***		0.1533***		0.1529***		0.1537***		0.1528***
		(13.22)		(13.22)		(13.24)		(13.21)		(13.27)		(13.19)
Cash holdings		-0.1320***		-0.1315***		-0.1317***		-0.1316***		-0.1318***		-0.1319***
		(-8.86)		(-8.82)		(-8.83)		(-8.83)		(-8.84)		(-8.85)
Options outstanding		0.0447***		0.0448***		0.0446***		0.0449***		0.0443***		0.0450***
		(11.09)		(11.10)		(11.07)		(11.12)		(10.99)		(11.15)
Institutional ownership		-0.1114***		-0.1116***		-0.1111***		-0.1121***		-0.1105***		-0.1127***
		(-12.50)		(-12.52)		(-12.47)		(-12.58)		(-12.40)		(-12.63)
Illiquidity		0.1241***		0.1234***		0.1236***		0.1230***		0.1233***		0.1231***
		(7.57)		(7.53)		(7.54)		(7.50)		(7.53)		(7.50)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	97,330	67,601	97,330	67,601	97,330	67,601	97,330	67,601	97,330	67,601	97,330	67,601
R-squared	0.1324	0.2372	0.1323	0.2370	0.1323	0.2371	0.1324	0.2371	0.1324	0.2372	0.1330	0.2371

Table 9: Share repurchases and executive-specific option grant value. This table presents the OLS regression of *Repurchases* on the *Option Grant Value* and control variables for executive-specific samples. Panel A only includes CEOs in the sample, Panel B includes only CFOs in the sample and Panel C combines the previous samples. All samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after grant dates). Only k observations of $Repurchases_t$ around grant dates are included in the research. $Option\ grant\ value_{[t+1,t+k]}$ captures k months before grant dates and similarly, $Option\ grant\ value_{[t-1,t-k]}$ captures k months after grant dates. Observations around grant dates are only included in the research if k months are available both before and after. Additionally, all control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	k = 1				k = 3				k = 6			
					Panel A: CEO only							
Option grant value $_{[t+1,t+k]}$	0.0009*	0.0012			-0.0001	-0.0001			0.0004	0.0006		
	(1.70)	(1.64)			(-0.21)	(-0.32)			(1.25)	(1.39)		
Option grant value $_{[t-1,t-k]}$			0.0015*	0.0018*			0.0011**	0.0011*			0.0012***	0.0010*
			(1.88)	(1.70)			(2.15)	(1.72)			(2.86)	(1.92)
Return		-0.0012**		-0.0017***		-0.0021***		-0.0010*		-0.0016***		-0.0010**
		(-2.36)		(-2.00)		(-4.33)		(-1.76)		(-4.11)		(-2.40)
Market Capitalization		0.0003***		0.0001		0.0004***		0.0002**		0.0003***		0.0002***
		(4.41)		(0.77)		(5.82)		(2.20)		(3.80)		(3.06)
Cash Flow Availability		0.0025*		0.0070**		0.0040***		0.0080***		0.0032***		0.0065***
		(1.85)		(2.34)		(4.44)		(5.08)		(3.35)		(5.56)
Leverage		-0.0002		-0.0000		-0.0001		-0.0010		-0.0009**		-0.0009
		(-0.22)		(-0.02)		(-0.11)		(-0.95)		(-2.00)		(-1.15)
Book-to-Market		0.0000		-0.0010**		0.0002		-0.0000		-0.0002		-0.0003
		(0.13)		(-2.37)		(0.66)		(-0.05)		(-0.79)		(-1.25)
Dilution		0.0015		-0.0028		0.0024		0.0000		0.0024		-0.0021
		(0.22)		(-0.69)		(0.67)		(0.01)		(0.89)		(-0.93)
Asset tangibility		-0.0011		0.0022		0.0001		0.0002		0.0001		-0.0004
		(-0.91)		(1.59)		(0.17)		(0.29)		(0.27)		(-0.63)
Cash holdings		0.0009		-0.0034***		-0.0001		-0.0021***		-0.0009		-0.0003
		(0.51)		(-2.79)		(-0.06)		(-2.68)		(-1.00)		(-0.37)
Options outstanding		0.0005		0.0010		-0.0000		0.0003		0.0002		0.0004
		(1.55)		(1.52)		(-0.03)		(0.88)		(0.92)		(1.31)
Institutional ownership		-0.0014**		0.0014		-0.0005		-0.0002		-0.0007*		0.0001
		(-2.17)		(1.21)		(-1.20)		(-0.31)		(-1.76)		(0.16)
Illiquidity		-0.0004		0.0002		-0.0007		0.0002		-0.0005		0.0000
		(-0.49)		(0.10)		(-0.95)		(0.25)		(-0.72)		(0.04)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,151	2,211	3,151	2,211	7,559	5,119	7,694	5,201	11,763	8,035	12,183	8,296
R-squared	0.1287	0.1381	0.1340	0.1698	0.0979	0.1213	0.1090	0.1642	0.0952	0.1212	0.1052	0.1408

Table 9: Share repurchases and executive-specific option grant value. (continued)

	k = 1				k = 3				k = 6			
					<i>Panel B: CFO only</i>							
Option grant value $_{[t+1,t+k]}$	0.0006 (1.06)	0.0003 (0.33)			0.0000 (0.09)	-0.0004 (-0.73)			0.0007* (1.87)	0.0004 (0.76)		
Option grant value $_{[t-1,t+k]}$			0.0005 (0.55)	0.0002 (0.19)			0.0009* (1.83)	0.0003 (0.51)			0.0012*** (2.93)	0.0010* (1.80)
Return		-0.0016*** (-3.05)		-0.0017** (-2.14)		-0.0017*** (-3.17)		-0.0006 (-1.42)		-0.0016*** (-3.69)		-0.0006 (-1.49)
Market Capitalization		0.0003*** (3.82)		0.0002 (1.62)		0.0004*** (5.43)		0.0002*** (3.16)		0.0003*** (4.27)		0.0002** (2.50)
Cash Flow Availability		0.0018 (1.34)		0.0065*** (2.79)		0.0043*** (4.44)		0.0072*** (5.88)		0.0061*** (5.75)		0.0073*** (7.45)
Leverage		-0.0003 (-0.41)		-0.0004 (-0.30)		-0.0004 (-0.67)		-0.0005 (-0.61)		0.0003 (0.38)		-0.0003 (-0.41)
Book-to-Market		-0.0003 (-1.02)		-0.0007* (-1.78)		0.0000 (0.11)		-0.0001 (-0.26)		0.0000 (0.10)		0.0002 (0.97)
Dilution		0.0014 (0.20)		-0.0041 (-1.03)		0.0013 (0.34)		-0.0054* (-1.94)		-0.0011 (-0.39)		-0.0057** (-2.27)
Asset tangibility		0.0006 (0.64)		0.0016 (1.60)		0.0005 (0.74)		0.0008 (1.27)		0.0012* (1.88)		0.0008 (1.22)
Cash holdings		0.0003 (0.18)		-0.0023* (-1.80)		0.0004 (0.34)		-0.0020** (-2.52)		0.0001 (0.15)		-0.0012 (-1.62)
Options outstanding		0.0003 (0.93)		0.0013** (2.23)		0.0001 (0.56)		0.0005* (1.75)		0.0003 (1.37)		0.0001 (0.44)
Institutional ownership		0.0001 (0.23)		0.0004 (0.46)		0.0008 (1.53)		-0.0002 (-0.34)		0.0004 (0.70)		-0.0004 (-1.00)
Illiquidity		-0.0005 (-0.66)		0.0003 (0.21)		0.0001 (0.15)		-0.0001 (-0.09)		0.0003 (0.41)		-0.0009 (-1.09)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,366	2,375	3,366	2,375	8,125	5,488	8,048	5,467	12,635	8,533	12,382	8,439
R-squared	0.1246	0.1472	0.1185	0.1531	0.0976	0.1479	0.1240	0.1672	0.0875	0.1090	0.1004	0.1402

Table 9: Share repurchases and executive-specific option grant value. (continued)

	k = 1				k = 3				k = 6			
					<i>Panel C: CEO & CFO only</i>							
Option grant value $_{[t+1,t+k]}$	0.0007*	0.0007			-0.0000	-0.0003			0.0005**	0.0004		
	(1.86)	(1.29)			(-0.09)	(-0.87)			(2.13)	(1.28)		
Option grant value $_{[t-1,t+k]}$			0.0010*	0.0010			0.0011***	0.0008*			0.0012***	0.0009**
			(1.78)	(1.39)			(3.02)	(1.71)			(4.10)	(2.56)
Return		-0.0013***		-0.0017***		-0.0019***		-0.0008**		-0.0016***		-0.0008***
		(-3.72)		(-3.05)		(-5.25)		(-2.27)		(-5.54)		(-2.75)
Market Capitalization		0.0003***		0.0002*		0.0004***		0.0002***		0.0003***		0.0002***
		(5.92)		(1.80)		(8.05)		(3.89)		(5.90)		(3.85)
Cash Flow Availability		0.0021**		0.0067***		0.0041***		0.0075***		0.0046***		0.0068***
		(2.29)		(3.76)		(6.32)		(7.87)		(6.49)		(9.19)
Leverage		-0.0002		-0.0002		-0.0003		-0.0007		-0.0004		-0.0006
		(-0.47)		(-0.18)		(-0.79)		(-1.15)		(-0.81)		(-1.28)
Book-to-Market		-0.0001		-0.0008***		0.0001		-0.0000		-0.0001		-0.0001
		(-0.71)		(-2.98)		(0.51)		(-0.22)		(-0.50)		(-0.54)
Dilution		0.0016		-0.0032		0.0018		-0.0024		0.0005		-0.0034*
		(0.35)		(-1.18)		(0.73)		(-1.13)		(0.24)		(-1.94)
Asset tangibility		-0.0002		0.0018**		0.0004		0.0005		0.0007		0.0002
		(-0.33)		(2.28)		(0.69)		(1.05)		(1.62)		(0.40)
Cash holdings		0.0006		-0.0029***		0.0001		-0.0020***		-0.0003		-0.0007
		(0.53)		(-3.28)		(0.20)		(-3.69)		(-0.47)		(-1.31)
Options outstanding		0.0004*		0.0011***		0.0001		0.0004*		0.0002*		0.0003
		(1.88)		(2.75)		(0.58)		(1.88)		(1.75)		(1.36)
Institutional ownership		-0.0006		0.0009		0.0002		-0.0002		-0.0001		-0.0001
		(-1.37)		(1.23)		(0.45)		(-0.46)		(-0.29)		(-0.37)
Illiquidity		-0.0004		0.0003		-0.0002		0.0001		0.0000		-0.0005
		(-0.73)		(0.28)		(-0.34)		(0.10)		(0.05)		(-0.75)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	6,517	4,586	6,517	4,586	15,684	10,607	15,742	10,668	24,398	16,568	24,565	16,735
R-squared	0.1183	0.1301	0.1167	0.1492	0.0880	0.1152	0.1082	0.1466	0.0871	0.1096	0.0990	0.1352

Table 10: Repurchases and option exercise likelihood. This table presents the OLS regression of the *Repurchase dummy* on the *Option exercise dummy* and control variables for different sub-samples. The sub-samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after option exercises). *Repurchase dummy_t* is 1 if a firm repurchased shares during that month. *Option exercise dummy_[t+1,t+k]* is 1 in the first k observations before the option exercise month. *Option exercise dummy_[t-1,t-k]* is 1 in the first k observations after the option exercise month. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	k = 1				3 months				6 months			
	Panel A: full sample											
Option exercise dummy $[t+1,t+k]$	0.0309*** (8.46)	-0.0093** (-2.41)			0.0392*** (14.39)	-0.0017 (-0.58)			0.0478*** (18.54)	-0.0003 (-0.12)		
Option exercise dummy $[t-1,t-k]$			0.0539*** (14.21)	0.0118*** (2.95)			0.0571*** (20.63)	0.0196*** (6.59)			0.0643*** (24.63)	0.0242*** (8.41)
Return		-0.1129*** (-20.58)		-0.1127*** (-20.53)		-0.1129*** (-20.58)		-0.1128*** (-20.55)		-0.1129*** (-20.58)		-0.1132*** (-20.63)
Market Capitalization		0.0880*** (101.31)		0.0877*** (100.99)		0.0879*** (101.09)		0.0875*** (100.57)		0.0879*** (100.89)		0.0872*** (99.96)
Cash Flow Availability		0.5816*** (48.91)		0.5829*** (49.02)		0.5820*** (48.94)		0.5840*** (49.09)		0.5821*** (48.96)		0.5838*** (49.10)
Leverage		-0.1542*** (-24.44)		-0.1537*** (-24.36)		-0.1540*** (-24.41)		-0.1531*** (-24.26)		-0.1540*** (-24.41)		-0.1528*** (-24.22)
Book-to-Market		0.0103*** (3.89)		0.0106*** (4.00)		0.0104*** (3.92)		0.0107*** (4.06)		0.0104*** (3.93)		0.0107*** (4.04)
Dilution		-0.3506*** (-10.63)		-0.3532*** (-10.72)		-0.3514*** (-10.66)		-0.3553*** (-10.78)		-0.3517*** (-10.67)		-0.3532*** (-10.72)
Asset tangibility		0.1509*** (21.33)		0.1514*** (21.40)		0.1511*** (21.35)		0.1514*** (21.42)		0.1511*** (21.35)		0.1508*** (21.31)
Cash holdings		-0.1197*** (-12.98)		-0.1224*** (-13.28)		-0.1207*** (-13.10)		-0.1233*** (-13.38)		-0.1209*** (-13.13)		-0.1232*** (-13.38)
Options outstanding		0.0485*** (19.21)		0.0485*** (19.20)		0.0485*** (19.21)		0.0484*** (19.15)		0.0485*** (19.21)		0.0481*** (19.03)
Institutional ownership		-0.1172*** (-21.43)		-0.1176*** (-21.51)		-0.1173*** (-21.46)		-0.1182*** (-21.62)		-0.1174*** (-21.47)		-0.1181*** (-21.61)
Illiquidity		0.1317*** (11.86)		0.1320*** (11.89)		0.1318*** (11.86)		0.1327*** (11.95)		0.1318*** (11.87)		0.1326*** (11.93)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	259,775	179,291	259,775	179,291	259,775	179,291	259,775	179,291	259,775	179,291	259,775	179,291
R-squared	0.1346	0.2395	0.1341	0.2395	0.1346	0.2395	0.1354	0.2397	0.1351	0.2395	0.1361	0.2398

Table 11: Repurchases and option exercise value. This table presents the OLS regression of *Repurchases* on *Exercise value* and control variables for different sub-samples. The sub-samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after option exercises). Only k observations of $Repurchases_t$ around option exercises are included in the research. $Exercise\ value_{[t+1,t+k]}$ captures k months before option exercises and similarly, $Exercise\ value_{[t-1,t-k]}$ captures k months after option exercises. Observations around option exercises are only included in the research if k months are available both before and after. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Robust standard errors are used in this regression.

	k = 1				k = 3				k = 6			
	Panel A: full sample											
Exercise value $_{[t+1,t+k]}$	-0.0107***	-0.0119***			-0.0103***	-0.0129***			-0.0033**	-0.0110***		
	(-6.44)	(-4.82)			(-8.73)	(-8.09)			(-2.14)	(-5.39)		
Exercise value $_{[t-1,t-k]}$			-0.0096***	-0.0118***			-0.0080***	-0.0072***			-0.0031**	-0.0090***
			(-6.03)	(-4.79)			(-8.51)	(-4.94)			(-2.47)	(-5.01)
Option grant value	0.0001		0.0009*		0.0006		0.0009**		0.0005		0.0011***	
	(0.21)		(1.77)		(1.58)		(2.42)		(1.37)		(2.66)	
Return		-0.0003		0.0007		-0.0017***		0.0003		-0.0006**		-0.0002
		(-0.92)		(1.60)		(-6.05)		(0.96)		(-2.14)		(-0.62)
Market Capitalization		0.0002***		0.0000		0.0001*		0.0000		-0.0001		-0.0000
		(3.26)		(0.90)		(1.69)		(0.75)		(-1.16)		(-0.32)
Cash Flow Availability		0.0071***		0.0102***		0.0059***		0.0086***		0.0070***		0.0087***
		(7.43)		(10.11)		(8.06)		(13.27)		(8.82)		(11.62)
Leverage		0.0012*		-0.0005		0.0007		-0.0010**		-0.0003		-0.0014***
		(1.79)		(-0.78)		(1.41)		(-2.14)		(-0.51)		(-2.84)
Book-to-Market		-0.0000		-0.0001		-0.0003		0.0001		-0.0007***		-0.0005***
		(-0.12)		(-0.39)		(-1.36)		(0.54)		(-3.05)		(-2.75)
Dilution		-0.0063***		-0.0099***		-0.0059***		-0.0085***		-0.0041**		-0.0054***
		(-3.17)		(-4.35)		(-2.74)		(-6.19)		(-2.28)		(-2.93)
Asset tangibility		0.0002		0.0000		-0.0001		-0.0005		0.0009**		-0.0002
		(0.47)		(0.07)		(-0.27)		(-1.19)		(2.18)		(-0.46)
Cash holdings		-0.0005		-0.0017***		-0.0004		-0.0002		-0.0014***		-0.0001
		(-1.11)		(-3.70)		(-1.08)		(-0.44)		(-3.10)		(-0.22)
Options outstanding		0.0009***		0.0015***		0.0010***		0.0009***		0.0007***		0.0008***
		(3.16)		(4.76)		(5.31)		(4.91)		(3.62)		(4.03)
Institutional ownership		0.0021***		0.0008		0.0020***		0.0001		0.0022***		0.0005
		(3.61)		(1.44)		(4.65)		(0.31)		(5.06)		(1.15)
Illiquidity		0.0006		-0.0045**		-0.0056***		-0.0083***		-0.0045***		-0.0086***
		(0.51)		(-2.15)		(-4.53)		(-9.35)		(-5.05)		(-8.66)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	14,351	11,819	14,351	11,819	25,345	20,473	25,345	20,473	30,968	24,201	30,968	24,201
R-squared	0.1116	0.1377	0.1360	0.1844	0.0991	0.1235	0.1429	0.1595	0.0897	0.1156	0.1289	0.1557

Table 12: Assessing endogeneity. This table presents the results of the 2SLS regression analysis in the 3-month sample before options are granted. In the first stage, fitted values are estimated for the option grant value, which is therefore the dependent variable. The fitted values are included as explanatory variable in the second stage. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

Dependent variable	First stage	Second stage
	Option grant value	Repurchases
<i>3 months sample</i>		
E(Option grant value)		-0.0091* (-1.68)
ROA	-0.0118 (-0.41)	
CEO tenure	0.0021*** (4.71)	
CEO Final Year	-0.1058 (-1.17)	
Return	0.0067 (0.34)	-0.0020*** (-3.52)
Book-to-Market	-0.0391*** (-3.87)	-0.0004 (-1.09)
Market Capitalization	0.0124*** (3.93)	0.0005*** (5.10)
Cash Flow Availability	-0.0379 (-0.79)	0.0047*** (3.22)
Leverage	-0.1073*** (-4.24)	-0.0008 (-0.84)
Dilution	0.0736 (0.65)	0.0032 (0.96)
Asset tangibility	0.0897*** (3.32)	0.0019* (1.65)
Cash holdings	0.0858** (2.55)	0.0017 (1.39)
Options outstanding	-0.0021 (-0.23)	0.0002 (0.60)
Institutional ownership	0.0972*** (3.87)	0.0010 (1.07)
Illiquidity	-0.1896*** (-4.05)	-0.0013 (-1.16)
Year Fixed Effects	Yes	Yes
Month Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
N	4.671	4.671
R-squared	0.3353	0.1403

Table 13: Tobit analysis for share repurchases and option grant value. This table presents the Tobit regression of *Repurchases* on the *Option grant value* and control variables for different sub-samples. The sub-samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after grant dates). Only k observations of $Repurchases_t$ around grant dates are included in the research. $Option\ grant\ value_{[t+1,t+k]}$ captures k months before grant dates and similarly, $Option\ grant\ value_{[t-1,t-k]}$ captures k months after grant dates. Observations around grant dates are only included in the research if k months are available both before and after. The values are censored at zero. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	k = 1				k = 3				k = 6			
	Panel A: full sample											
Option grant value $_{[t+1,t+k]}$	0.0024***	-0.0009			0.0013***	-0.0023***			0.0032***	0.0008***		
	(2.79)	(-0.80)			(8.54)	(-10.37)			(25.54)	(4.38)		
Option grant value $_{[t-1,t-k]}$			0.0030***	0.0002			0.0053***	0.0031***			0.0060***	0.0025***
			(2.80)	(0.19)			(31.99)	(13.41)			(43.99)	(13.11)
Return		-0.0103***		-0.0124***		-0.0101***		-0.0080***		-0.0084***		-0.0089***
		(-6.82)		(-7.13)		(-102.25)		(-80.78)		(-91.72)		(-125.37)
Market Capitalization		0.0035***		0.0027***		0.0034***		0.0025***		0.0033***		0.0025***
		(15.31)		(12.22)		(303.71)		(208.59)		(354.11)		(274.07)
Cash Flow Availability		0.0186***		0.0392***		0.0256***		0.0478***		0.0284***		0.0382***
		(6.19)		(9.76)		(48.92)		(82.90)		(64.74)		(83.70)
Leverage		-0.0054***		-0.0050***		-0.0091***		-0.0109***		-0.0079***		-0.0091***
		(-3.13)		(-2.67)		(-34.28)		(-39.41)		(-36.19)		(-43.46)
Book-to-Market		0.0018***		-0.0007		0.0007***		0.0004***		0.0005***		0.0005***
		(2.61)		(-0.82)		(5.26)		(2.83)		(4.78)		(4.76)
Dilution		-0.0205**		-0.0231***		-0.0062***		-0.0147***		-0.0097***		-0.0131***
		(-2.00)		(-2.98)		(-4.22)		(-9.31)		(-7.38)		(-10.04)
Asset tangibility		0.0049***		0.0082***		0.0043***		0.0016***		0.0057***		0.0019***
		(3.11)		(5.01)		(35.66)		(12.75)		(57.14)		(18.65)
Cash holdings		-0.0009		-0.0082***		-0.0011***		-0.0121***		-0.0040***		-0.0073***
		(-0.38)		(-3.56)		(-3.10)		(-30.44)		(-12.18)		(-22.86)
Options outstanding		0.0043***		0.0049***		0.0021***		0.0020***		0.0029***		0.0017***
		(7.42)		(6.99)		(23.49)		(22.13)		(38.60)		(23.05)
Institutional ownership		-0.0038***		0.0010		0.0008***		-0.0042***		-0.0003***		-0.0037***
		(-2.78)		(0.67)		(6.99)		(-33.38)		(-3.19)		(-39.03)
Illiquidity		-0.0109*		-0.0084		-0.0195***		-0.0177***		-0.0112***		-0.0209***
		(-1.89)		(-1.10)		(-29.28)		(-32.87)		(-25.02)		(-43.98)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	17,487	12,207	17,487	12,207	38,966	26,225	38,966	26,225	57,750	39,139	57,750	39,139
Pseudo R2	-0.3216	-0.4506	-0.2615	-0.3640	-0.2325	-0.3622	-0.2514	-0.3564	-0.2108	-0.3270	-0.2447	-0.3344
Log-Likelihood	6659	5197	7980	6101	16826	12480	17510	13461	27057	19364	27545	20759

Table 14: Tobit analysis for share repurchases and exercise value. This table presents the Tobit regression of *Repurchases* on the *Exercise value* and control variables for different sub-samples. The sub-samples are divided on duration ($k = 1, 3$ or 6) and timing (before and after option exercises). Only k observations of $Repurchases_t$ around option exercises are included in the research. $Exercise\ value_{[t+1,t+k]}$ captures k months before option exercises and similarly, $Exercise\ value_{[t-1,t-k]}$ captures k months after option exercises. Observations around option exercises are only included in the research if k months are available both before and after. The values are censored at zero. All control variables are winsorized at the first and 99th percentile. Refer to Table 1 for description of variables. T-statistics are shown in parentheses. The number of asterisks denote significance levels of 10%, 5% and 1%, from one till three asterisks respectively. Standard errors are clustered at the firm level.

	k = 1				k = 3				k = 6			
	Panel A: full sample											
Exercise value $_{[t+1,t+k]}$	-0.0897***	-0.1024***			-0.0802***	-0.0819***			-0.0538***	-0.0697***		
	(-6.97)	(-6.02)			(-55.55)	(-43.31)			(-45.09)	(-41.59)		
Exercise value $_{[t-1,t-k]}$			-0.0952***	-0.0989***			-0.0799***	-0.0768***			-0.0487***	-0.0474***
			(-7.64)	(-5.93)			(-60.59)	(-42.66)			(-44.62)	(-29.74)
Option grant value		-0.0034***		-0.0021*	0.0000		0.0014***		-0.0004		0.0006**	
		(-2.80)		(-1.73)	(0.17)		(5.73)		(-1.56)		(2.41)	
Return		-0.0059***		-0.0046**	-0.0107***		-0.0050***		-0.0078***		-0.0074***	
		(-3.77)		(-2.57)	(-107.44)		(-51.55)		(-72.95)		(-73.09)	
Market Capitalization		0.0020***		0.0013***	0.0020***		0.0014***		0.0016***		0.0015***	
		(8.44)		(5.90)	(154.88)		(120.63)		(130.44)		(129.41)	
Cash Flow Availability		0.0422***		0.0500***	0.0341***		0.0433***		0.0378***		0.0403***	
		(9.29)		(11.17)	(56.73)		(74.81)		(64.71)		(70.86)	
Leverage		-0.0004		-0.0095***	-0.0044***		-0.0095***		-0.0091***		-0.0122***	
		(-0.20)		(-5.25)	(-14.55)		(-35.61)		(-30.72)		(-45.82)	
Book-to-Market		0.0045***		0.0031***	0.0031***		0.0029***		0.0004**		0.0002	
		(4.26)		(2.83)	(18.80)		(18.50)		(2.19)		(1.14)	
Dilution		-0.0055		-0.0251***	-0.0111***		-0.0224***		-0.0070***		-0.0078***	
		(-0.81)		(-3.38)	(-6.70)		(-14.48)		(-4.03)		(-4.73)	
Asset tangibility		-0.0009		-0.0004	-0.0010***		-0.0019***		0.0024***		-0.0005***	
		(-0.53)		(-0.25)	(-6.90)		(-14.17)		(17.47)		(-4.15)	
Cash holdings		-0.0126***		-0.0134***	-0.0091***		-0.0086***		-0.0109***		-0.0070***	
		(-5.88)		(-6.03)	(-21.86)		(-21.31)		(-25.36)		(-17.10)	
Options outstanding		0.0063***		0.0051***	0.0049***		0.0035***		0.0037***		0.0016***	
		(6.02)		(5.38)	(45.02)		(33.39)		(36.17)		(16.56)	
Institutional ownership		0.0024		0.0010	0.0035***		-0.0012***		0.0049***		0.0009***	
		(1.18)		(0.50)	(25.82)		(-9.65)		(36.66)		(7.65)	
Illiquidity		-0.1268***		-0.2550***	-0.0658***		-0.1575***		-0.0541***		-0.1496***	
		(-4.76)		(-7.72)	(-41.32)		(-38.81)		(-47.71)		(-41.81)	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	14,351	11,819	14,351	11,819	25,345	20,473	25,345	20,473	30,968	24,201	30,968	24,201
Pseudo R2	-0.2713	-0.3560	-0.2422	-0.3850	-0.2414	-0.3422	-0.2401	-0.3260	-0.2489	-0.3364	-0.2592	-0.3213
Log-Likelihood	8019	7484	9357	6531	15277	11816	17086	13647	18751	13933	19562	15743