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The buyback anomaly and the motives behind share repurchase announcements in Norway

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The buyback anomaly and the motives behind share repurchase announcements in Norway

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Master of Science in Business
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Acknowledgement

This master thesis represents the end of five years at BI Norwegian Business School. It represents the end of an era, the end of long nights studying at the library, the end of colloquium groups, and the end of exam periods. Nevertheless, it also represents a new beginning.

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Abstract

Firms announcing a repurchase of their shares often experience a period of abnormal returns; this is known as the buyback anomaly. The buyback anomaly is a persistent market anomaly that is challenging to explain (Andreou et al., 2018). Researchers like Ikenberry et al. (1995) and Peyer and Vermaelen (2009) found positive long-run abnormal returns for firms in the 48 months following share repurchase announcements.

This thesis is twofold. First, we investigate if Norwegian firms listed on Oslo Stock Exchange (OSE) from 2000-2019 experience abnormal returns following a share repurchase announcement. We employ a cross-sectional regression model using the three-factor model by Fama and French (1993) with the additional momentum factor (Carhart, 1997). We found long-term abnormal returns in the four years following the repurchase announcements. Our results suggest that Norwegian firms use share repurchase announcements to signal undervaluation to the market, and that the market is underreacting to the undervaluation signal. The underreaction might be rational, as several researchers claim that a repurchase announcement is a weak signal as it does not impose any cost for the firm.

Second, we investigate what motivates these firms to announce share repurchases. To examine the motives behind announcing share repurchases, we test the capital structure adjustment hypothesis, the substitution of cash dividends hypothesis, the excess cash distribution hypothesis and the signalling hypothesis. Our empirical findings suggest that Norwegian firms announce share repurchases to signal the market, to distribute excess cash, or to substitute cash dividends. However, it is important to note that to substitute cash dividends or to distribute excess cash, the firm would have to execute the repurchase after the announcement.

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1 Introduction

Repurchases of shares were prohibited by law in Norway until 1999. After 1999, the number of yearly share repurchases has steadily increased. To execute a repurchase, the firm needs their shareholders' approval at the general assembly, and the buyback program has to be announced publicly before the execution.

Firms announcing a repurchase of their shares often experience a period of abnormal returns; this is known as the buyback anomaly. There is a lengthy list of literature that documents the long-term abnormal stock return following a share repurchase. Ikenberry et al. (1995) analysed the effects from 1980-1990 on the U.S market, and found average abnormal buy-and-hold returns of 12,1% over the four years following the announcement. Further, Peyer and Vermaelen (2009) analysed the years 1991-2001 on the U.S market. Their results support the findings of Ikenberry et al. (1995), and they conclude that the buyback anomaly exists.

Most studies of abnormal returns are conducted on the U.S market (e.g. Grullon & Michaely, 2004; Chan et al., 2004; Andreou et al., 2018). The literature regarding abnormal returns following share repurchases on the Norwegian market is narrow, and few studies have targeted the existence of abnormal returns and associated drivers. Johannes Skjeltorp's study from 2004 investigated Norwegian firms from 1998 through 2001 and concluded that abnormal returns due to buyback programs exist in the Norwegian market. His result serves as an indication, but not as evidence, for how the market behaves today.

This master thesis is twofold. First, we examine share repurchase announcements from a more recent period to conclude whether or not abnormal returns in the Norwegian market still exist. We analyse if Norwegian firms listed on the Oslo Stock Exchange (OSE) in the period 2000-2019 experience long-term abnormal returns following a share repurchase announcement and if the long-term abnormal

returns are due to a market underreaction. Our empirical findings confirm long-term abnormal returns in the four years following the repurchase announcements for Norwegian firms. The literature proposes that different attributes of the firms affect the market reaction and abnormal returns (Ikenberry, 1995; Peyer & Vermaelen, 2009). We find support for this and show that firms with a higher level of information asymmetry and undervalued firms experience higher abnormal returns compared to firms with lower information asymmetry and firms that are not characterised as undervalued. Our results suggest that Norwegian firms use share repurchase announcements to signal undervaluation to the market, and that the market is underreacting to the undervaluation signal.

Second, we examine what motivates Norwegian firms listed on OSE to announce repurchases. We account for hypotheses for buybacks proposed in the literature such as capital structure adjustments, the substitution of cash dividends, excess cash distribution, signalling, and takeover defence. Our empirical findings suggest that Norwegian firms announce share repurchases either to signal the market, distribute excess cash or to substitute cash dividends. However, it is important to note that to substitute cash dividends, the firm would have to execute the repurchase after the announcement.

Research on this topic in Norway is scarce. We hope that our contribution could be a valuable addition to this research field and inspire further research on this topic in Norway. A more precise understanding of the Norwegian market and its market anomalies is beneficial from both a socio-economic perspective and for personal purposes.

2 Repurchases and the buyback anomaly

Buybacks in Norway were prohibited by law until 1999, when the Norwegian Public Limited Liability Companies Act (Allmennaksjeloven) of June 13, 1997, was established. After the new legislation, the number of yearly buybacks has steadily increased. In Norway, a firm can repurchase and hold up to 10% of outstanding shares (Allmennaksjeloven, 1997, § 9-2). The firm needs ⅔ of the votes at the general assembly to announce a repurchase program. The maximum face value and a price interval for the shares to be repurchased are decided at the general assembly, as well as the maximum length of a repurchase program and if the program is to be extended. The firm's holding of its shares does not initiate voting power or dividend payout.

2.1 Buyback anomaly

The buyback anomaly is a persistent market anomaly that is challenging to explain (Andreou et al., 2018). A market anomaly means that the predictability is inconsistent with maintained theories of asset pricing. Anomalies indicate either inadequacies in the underlying asset-pricing model or market inefficiencies (Schwert, 2003). The buyback anomaly is the abnormal return following a share repurchase. Ikenberry et al. (1995) and Peyer and Vermaelen (2009) provided evidence of the buyback anomaly when they found positive long-run abnormal returns for firms in the 48 months following a share repurchase announcement. Researchers have proposed multiple explanations of this phenomena, but the most mentioned theory in this research field is that mispricing drives the anomaly. When managers announce a stock repurchase, they either try to signal the undervaluation of their stocks to the market or try to time the market (Andreou et al., 2018).

The number of yearly share repurchase announcements have increased substantially in recent years. Grullon and Michaely (2004) argue that if almost every company is repurchasing shares, it seems less likely that a trading rule based

on share buybacks yields a higher return than the average. However, the anomaly still exists (Peyer & Vermaelen, 2009; Andreou et al., 2018). One possible explanation for why this puzzle remains is that executing a buyback strategy is very risky because the performance depends on when the strategy is implemented. Even if such a strategy works, it does not imply that it will work immediately if a buyback fund is started today. The time horizon is relevant for the buyback anomaly because the most considerable excess returns are discovered 3-4 years after the buyback. In other words, it requires the investors to be patient (Peyer & Vermaelen, 2009).

2.2 Market underreaction

Ikenberry et al. (1995) hypothesised that the market underreacts to repurchase announcements. They argued that the market treats announcements with scepticism, and therefore, we have incomplete reactions to the announcement of buyback programs. The incomplete reactions lead to prices adjusting slower over time. Delayed market reaction has been documented in studies on other firm actions, such as mergers and IPOs (Ritter, 1991; Agrawal et al., 1992), and is not unique for share buybacks. However, this supports the underreaction hypothesis for share buybacks.

Undervaluation is an important reason for announcing a share buyback, and firms frequently claim that repurchases are due to the market undervaluing the stock. Therefore, the stock is a good investment. However, the existence of market underreaction is not consistent with the motive stated by the firms. Either the market ignores this undervaluation signal, or managers are excessively optimistic about the stock value (Ikenberry et al., 1995). Peyer and Vermaelen (2009) claimed that the markets seem to have behaved similarly during the 25 last years, including underreacting to buyback announcements.

Furthermore, if the market efficiently and unbiased adjusts the price as a response to the announcement, announcing firms should not experience an abnormal

performance following the announcement. However, Ikenberry et al. (1995) found support for the hypothesis. They documented that the average market response to the news of an open market share repurchase is only 3,5%. In comparison, a portfolio of the same firms experienced a performance of 12.1% in the four years following the announcement. These results suggest that the observed positive price adjustment around the repurchase announcement is insufficient to correct the mispricing.

Peyer and Vermaelen (2009) tried to deepen the understanding of why markets underreact to share repurchase announcements and considered the overreaction hypothesis. According to this hypothesis, buybacks are driven by the fact that firms believe the market overreacted to bad news in the recent past. Abnormal returns in the period before the buyback should therefore be the best predictor of long-term abnormal returns. Their result showed long-term abnormal return in the 48-months following the announcement. The most significant positive long-term abnormal return is observed among the firms that experienced a high decrease in the stock price in the six months prior to the announcement. Therefore, Peyer and Vermaelen (2009) suggest that when a firm's motive is undervaluation, it is not necessarily due to proprietary information, but that they disagree with the decline in stock price.

An explanation of the underreaction in the market is that buyback announcement is a weak signal for undervaluation (Skjeltorp, 2004). Comment and Jarrell (1991) argued that an announcement serves as a weak signal because not executing the repurchase does not impose any firm costs. Moreover, the market is unable to distinguish truly undervalued firms from falsely signalling firms. They treat the signal with scepticism, and the underreaction may therefore be rational behaviour. In addition, undervaluation is not the only motive for repurchasing shares, making it reasonable not to react immediately (Dittmar, 2000; Grullon & Michaely, 2002; Mitchell & Dharmawan, 2007).

2.3 Buybacks in Norway

As mentioned, there is limited literature and research on share buybacks in Norway, and few studies have targeted the existence of abnormal returns and associated drivers. A study conducted by Johannes Skjeltorp, published in 2004, investigated buybacks and their effect on return regarding the Norwegian market. He examined Norwegian firms' announcements of repurchases and actual repurchases in the period 1998 through 2001.

Skjeltorp concluded that establishing a buyback program has value for the shareholders and yields long-term abnormal returns. The Norwegian market does not stand out on this matter compared to other markets. He also found differences in the long-term effects between firms that chose to execute their right to repurchase stocks and firms that chose not to. The former resulted in expected performance, while the latter resulted in long-term abnormal returns. He also found that the announcement of buyback programs is perceived as positive news in the market, as the stock price on average increases by 2,5%.

2.4 Motives

There is plenty of literature and hypotheses on the reasoning for announcing or performing a share repurchase. This paper will list and elaborate on the most common motives from the literature (e.g. Dittmar, 2000; Grullon & Michaely, 2002; Mitchell & Dharmawan, 2007). We will test the motives appropriate for data collection and attempt to determine whether one or more of the motives from relevant literature are plausible explanations for why firms announce share repurchases in Norway from 2000 until 2019.

2.4.1 Capital structure adjustments

The optimal capital structure hypothesis assumes the existence of an optimal capital structure and that firms use buybacks of shares to achieve the optimal relationship between debt and equity. Therefore, if the leverage is below the firm's

target leverage, the firm is more likely to announce a buyback program. Therefore, the firm's capital structure will affect the decision to announce a buyback program (Dittmar, 2000).

Miller and Modigliani (1958) argued that the proportion of debt and equity does not affect the market value of a firm. However, this requires perfect markets, complete information, and no taxes. According to Myers (2001), the composition of debt and equity matter for the market value. This is due to incomplete information, taxes, and agency costs. Kraus and Litzenberger (1973) support this and argue that increased debt can increase the firm's value through tax subsidy.

Another way for the firm to adjust the leverage ratio is to pay out cash dividends. However, if the dividend level cannot be sustained, firms are reluctant to increase the payout ratio. Therefore, share repurchases might be a better choice for adjusting the leverage ratio (Brav et al., 2003). We elaborate on this in section 2.4.2.

Dittmar (2000) and Mitchell and Dharmawan (2007) found support for the optimal capital structure hypothesis on the U.S and Australian market. However, Bagwell and Shoven (1988) and Lee et al. (2010) employed a slightly different approach regarding the variable and found no support for the hypothesis.

2.4.2 Substitution of cash dividends

Grullon and Michaely (2002) report that, in the U.S, firms repurchasing shares relative to firms initiating cash distribution has increased from 26.6% in 1972 to 82% in 2000. This result suggests that share repurchases have become the preferred way of cash distribution to shareholders in the U.S. Likewise, the number of announced repurchases have increased in Norway.

Grullon and Michaely (2002) found evidence supporting the hypothesis of firms substituting cash dividends with share repurchases. They found that multiple firms that have been paying dividends have also started to repurchase shares and that established firms distribute more of their cash through repurchases rather than

dividends. This may be due to firms adjusting the dividend policy according to what is most beneficial for the shareholders in terms of tax. This depends on the relative taxation on dividends compared to taxation on capital gains. In the U.S, the taxation on capital gains has traditionally been lower (Skjeltorp, 2004).

Moreover, Mitchell and Dharmawan (2007) also argue that whether a firm prefers share repurchase over dividends is decided through the marginal tax rate of the principal shareholders. Shareholders with high marginal tax will prefer capital gains and deferred tax over dividend payout and immediate tax. On the other side, the results of Brav et al. (2003) suggests that the relative taxation of dividends and capital gains is unimportant when choosing between announcing buybacks and paying dividends. Due to the Norwegian tax law, dividends can be transferred with deferred tax through a holding firm or Aksjesparekonto.

Unsustainable cash flows is another factor moving cash distributions from dividend payments to share repurchases. Increased dividends reflect higher expected permanent cash flows, and this expectation might cause negative effects if dividend payments are reduced. Therefore, firms tend to smooth the dividends. Share buybacks allow the firms to distribute the excess cash without increasing the dividend payouts (Brav et al., 2003).

2.4.3 Excess cash distribution

The hypothesis of excess cash distribution as a motive for announcing a share repurchase is closely linked with the substitution of cash dividends hypothesis. When a firm's capital exceeds its investment opportunities, it can either distribute the excess capital to its shareholders or retain it. Distribution to shareholders can happen through share buybacks or increased dividends. As mentioned, share buyback is often preferred over increased dividends because the firm does not entail the risk of decreasing the payout ratio in the future (Dittmar, 2000).

The tax difference between capital gains and dividend income might also contribute to choosing share buybacks rather than dividends when distributing

excess cash, as we elaborated in section 2.4.2. Furthermore, when the firm lacks investment opportunities and does not pay out the excess cash, there is an incentive to invest the excess cash in projects with negative present value (Mitchell & Dharmawan, 2007). Thus, share buybacks can be a tool to prevent poor investments and excessively spending.

Studies on the U.S market found the distribution of excess capital as one of the primary reasons why firms repurchase shares (Dittmar, 2000; Bagwell & Shoven, 1988). However, Lee et al. (2010) did not find evidence to support the hypothesis on the European market.

2.4.4 Signalling

Signalling is the most frequently mentioned explanation for why firms announce buyback programs and can be a tool to signal that the firm is undervalued (Ikenberry et al. 1995). Since there is asymmetric information between the market and the management, buybacks can serve as a strong signal. Several announcements are argued by underpricing, and the share buyback is equivalent to unexpected increases in the payout ratio. However, unexpected increases in the payout ratio are considered a stronger signal due to the riskiness (Skjeltorp, 2004). As discussed in section 2.4.2, most firms do not want to entail this risk.

If insiders believe that the stock is undervalued, the firm may announce a repurchase program as a signal to the market to buy shares and acquire them at bargain prices. The positive stock price reaction at the announcement should correct the misvaluation (Vermaelen, 1981). Ikenberry et al. (1995) considered the positive abnormal return surrounding share repurchase announcements consistent with the underpricing motive. Moreover, the poor abnormal share performance leading up to the announcement is also consistent with the motive (Vermaelen, 1981). Peyer and Vermaelen (2009) support this and argue that the long-term abnormal returns are a correction of an overreaction to bad news. In this case, the firm signals a disagreement with the stock price rather than a signal based on private information. The studies based on the U.S market find signalling as one of

the primary reasons why firms repurchase shares, and evidence has been found on the European market as well (Lee et al., 2010).

2.4.5 Takeover defence

In fear of being acquired, a defence method can be to repurchase shares. The repurchase removes shareholders with the lowest valuations, consequently reducing a takeover's attractiveness (Bagwell, 1991). Given that the buyback gives a positive reaction in the market, the lowest price possible to pay to take over the firm increases (Dittmar, 2000). Skjeltorp (2004) argues that a repurchase increases ownership concentration, which reduces the likelihood of a takeover. Moreover, repurchases can result in less free cash, reducing the potential benefits to an acquirer (Billett & Xue, 2007).

Dittmar (2000) supports the hypothesis and found that firms repurchase shares as a defence against takeover attempts in the years that correspond with peak merger periods. Furthermore, Billett and Xue (2007) modelled takeover probability and examined how the threat affects the firm's decision to repurchase. They found that the firm's repurchase activity increases when facing a high takeover probability.

3 Data collection and variables

3.1 Data collection

We have collected data on repurchase announcements and stock returns from 2000 until 2019. The Norwegian firms listed on the main list of the Oslo Stock Exchange (OSE) are the basis of our sample. We exclude repurchase announcements corresponding with missing data on the firm from our analysis.

The historical stock data is collected using Microsoft Excel's built-in stock history function. Excel receives data from Refinitiv. Repurchase announcements in Norway are, by law, required to be registered in Foretaksregisteret before the firm

can execute the repurchase. Foretaksregisteret is a part of Brønnøysundregisteret. We collect the dates of the repurchase announcements from this register.

We collect the Fama-French factors and momentum from Bernt Arne Ødegaard's website (2019). The factor portfolios from his data are calculated the same way as Fama and French (1993). We also collect the monthly risk-free rates from his website.

3.2 Variables for testing the buyback anomaly

Although the Fama-French factors and momentum are obtained from Bernt Arne Ødegaard's website (2019), we will briefly elaborate on how they are constructed.

SMB and HML are constructed similarly to Fama and French (1993). First, two portfolios of shares sorted by market share are created: one portfolio consisting of the 10% smallest shares, and the other consisting of the 10% largest shares. Second, three portfolios sorted by book-to-market are created. The first portfolio consists of firms below the 30th percentile, the second portfolio consists of firms between the 30th and 70th percentiles, and the last portfolio consists of firms above the 70th percentile. Firms with high book-to-market have shares considered as value shares, and those with low book-to-market have shares considered as growth shares.

This yields six portfolios; big-growth, big-neutral, big-value, small-growth, small-neutral, and small-value. Finally, the variables are computed the following way:

Small-Minus-Big

SMB = ⅓ (Small Value + Small Neutral + Small Growth) – ⅓ (Big Value + Big Neutral + Big Growth)

High-Minus-Low

HML = ½ (Small Value + Big Value) – ½ (Small Growth + Big Growth)

The extension to the three-factor model, the MOM-variable, is calculated following the method of Kenneth R. French. The calculation is similar to Carhart's (1997), but French includes a sort of size. The average return on two high prior return portfolios minus the average return on two low prior return portfolios is calculated. It is constructed by the two size portfolios used when calculating SMB and HML and three new portfolios. The three new portfolios are sorted by the prior 2-12 monthly returns, with breakpoints below the 30th being low, between the 30th and 70th being medium, and above the 70th percentiles being high. These portfolios, combined with the size portfolios, yields six portfolios; small-high, small-medium, small-low, big-high, big-medium, and big-low. Finally, the variable is computed the following way:

Momentum

MOM = 1/2 (Small High + Big High) - 1/2 (Small Low + Big Low)

3.3 Variables for testing buyback motives

This section describes how we construct variables to test the motives for announcing share buybacks from section 2.4. We will test the capital structure hypothesis, substitution of cash dividends hypothesis, excess cash distribution hypothesis, and the signalling hypothesis. We cannot test the takeover defence hypothesis due to the difficulty of obtaining accurate data. Consequently, it is challenging to construct a credible variable that measures the possibility of a takeover.

Capital structure adjustments hypothesis variable

We follow Dittmar's (2000) method when constructing the capital structure adjustment variable. She defines leverage as net debt relative to the book value of equity, where net debt is the total book value of debt net of cash and cash equivalents.

The target leverage ratio is estimated by the average leverage ratio of the industry and is the proxy for the optimal capital structure. We apply the average leverage of

the industry rather than the average leverage of the entire market because of the different characteristics of each industry that might affect the leverage. The industry's strong influence on a firm's leverage ratio has been reported by several researchers, which supports the use of industry averages as a proxy for the optimal capital structure (Bowen et al., 1982; Bradley et al., 1984, as cited in Mitchell & Dharmawan, 2007).

The final variable is the difference between a firm's leverage ratio and the target leverage ratio in the year before the repurchase announcement. Negative values might imply that the capital structure is not optimal.

Capital structure adjustment variable: $\frac{NetDebt_t}{Equity_t} - \frac{NetDebt_{Industry,t}}{Equity_{Industry,t}}$

Substitution of cash dividends hypothesis variable

The substitution of cash dividends hypothesis is challenging to test. Grullon and Ikenberry (2000) propose that repurchases and dividend payouts are motivated by similar factors. Except for the critical difference in tax treatment, cash dividends and share repurchases are economic equivalents for a reasonably priced firm. As discussed in section 2.4.2, the Norwegian tax law has treated dividends and capital gains equally since the tax reform in 2004-2006. Therefore, the tax difference between the two cash distribution methods is minimal or not existing. If they are economic equivalents, comparing dividend payout ratios to repurchase rates might not provide any helpful information regarding the motive for repurchasing.

For this reason, we follow Mitchell and Dharmawan (2007) to investigate whether firms announce repurchases as a substitute for cash dividends. We compare the average of the recent three-year dividend yield relative to the industry average. The dividend yield is the estimate for the dividend level, and we compare it against the industry to remove any differences in dividend practice between industries. Mitchell and Dharmawan (2007) argue that the three-year horizon is reasonable because firms with dividend history are more likely to announce a share buyback.

If the substitution of cash dividends hypothesis holds, the variable should negatively correlate with repurchase announcements.

Dividend yield: $\frac{DividendPaid_t}{Market\ value_t}$

Substitution of cash dividends variable: $\frac{Dividend\ Yield_{firm,\,t}}{Dividend\ Yield_{industry,\,t}}$

Excess cash distribution hypothesis variable

We want to investigate whether firms that possess excess cash are more likely to announce a share repurchase. Mitchell and Dharmawan (2007) measure excess cash by cash and cash equivalents relative to total assets. Total cash is applied due to being more consistent with agency costs resulting from a build-up of total cash rather than operating cash.

We follow the method of Mitchell and Dharmawan (2007), but we adjust the time horizon. Mitchell and Dharmawan (2007) used the cash balance immediately before the buyback, but we will employ the cash balance in the fiscal year before the announcement. The reasoning is that we examine motives concerning announcements. If the hypothesis holds, firms announce share buybacks when the closing balance reports a high level of cash relative to total assets. The general assembly decides whether or not to announce a share repurchase. It is reasonable to assume that the cash balance immediately before the general assembly is not notably more relevant than the cash balance reported in the prior fiscal year.

If the buyback program is announced after an extraordinary general meeting, this argument is not valid. However, in section 4.1, we show that most buyback programs are announced around April, May, and June, which are the months most firms conduct their general assembly in Norway.

The excess cash distribution hypothesis holds if a higher cash to assets ratio increases the likelihood of announcing a share buyback.

Excess cash distribution variable: $Cash\ to\ Assets_t = \frac{Cash\ \&\ Cash\ Equivalents_t}{Total\ assets_t}$

Signalling hypothesis variable

We follow the method of Mitchell and Dharmawan (2007) when investigating whether or not firms announce buyback programs to signal undervaluation. They use the abnormal return of the firm and compare it against the average abnormal return in the industry one year before the announcement. The reasoning behind the time horizon is that the majority of the reduction in stock performance is surrounding the year leading up to the repurchase (Ikenberry et al., 1995; Dittmar, 2000).

We calculate the abnormal return by subtracting the expected return from the actual return. The expected return is calculated using the Fama-French model. We calculate yearly betas for each firm by dividing the covariance between the firm and OBX's return divided by the variance of OBX's return. The HML- and SMB-betas are calculated by regressing the return of the portfolio. The independent variables are defined in section 5.1. Negative values may imply that the share price is undervalued.

Expected return:

$$r_{i,t} = r_{f,t} + \beta_{1,i}(r_{m,t} - r_{f,t}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}MOM_t + \varepsilon_{i,t}$$

Signalling hypothesis variable:

$$Abnormal\ return_{firm,\,t} - Abnormal\ return_{industry,\,t}$$

4 Descriptive statistics

4.1 Repurchase announcements

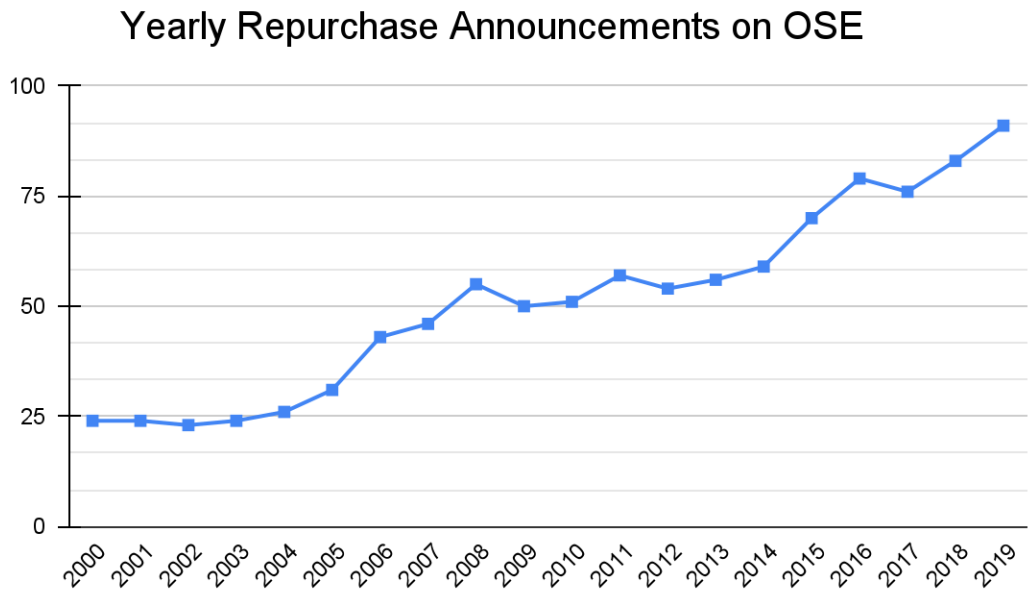

Figure 1: A graphic representation of the yearly number of repurchase announcements made by Norwegian firms listed on OSE in the period 2000-2019.

Figure 1 displays the positive trend in repurchase announcements since the new legislation in 1999. The number of yearly repurchase announcements on OSE has increased by 279% from 2000 to 2019, with 24 announcements in 2000 and 91 announcements in 2019. Average yearly announcements in the first five years were approximately 24, compared to an average of approximately 80 in the last five years. Most buybacks were announced in April, May, and June (950) compared to the rest of the year (72), because most firms conduct their general assembly in these months.

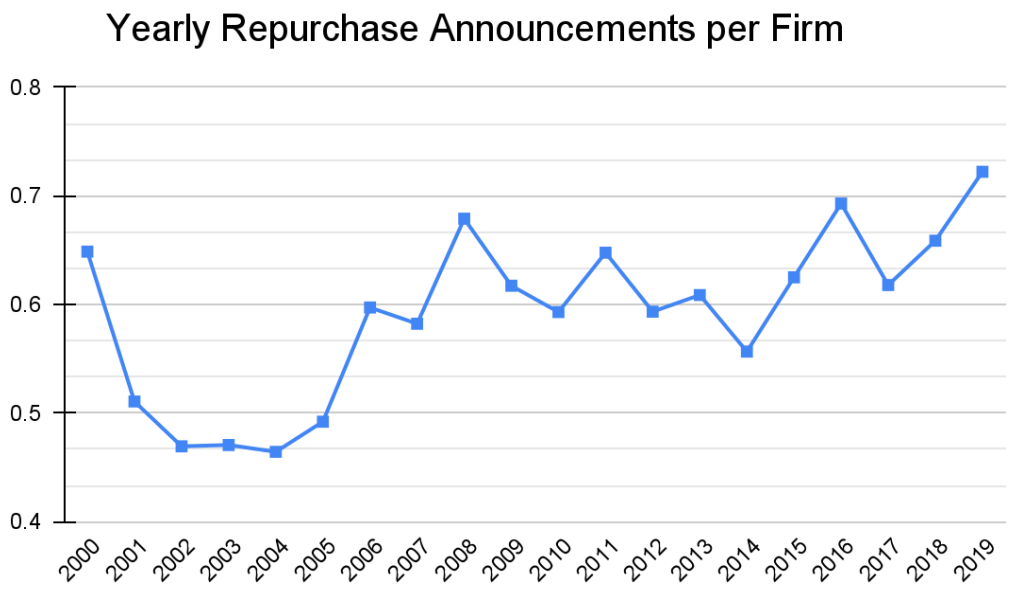

Figure 2: A graphic representation of the yearly number of repurchase announcements made per Norwegian firm listed on OSE in the period 2000-2019.

From Figure 2 we see that there is an increase in yearly announcement repurchases made by each Norwegian firm listed at OSE at that time. However, the yearly increase is lower than the yearly increase presented in Figure 1. This is because the number of firms on OSE has increased throughout the years.

Overview of announcements

Announcements from 2000-2015	693
Announcements in total (2000-2019)	1,022
No. of firms	127

4.2 Motives

Descriptive statistics for motive variables

Table 1: Rounded descriptive statistics for the variables used to analyse the motives for repurchase announcements. We remove outliers before calculating the descriptive statistics; see appendix part 9.1. We construct the variables so that they reflect the time horizon described in section 3.3. Announcement =1 indicates a repurchase announcement.

	Announcement	Mean	Median	St. dev	Min	Max
Dividend yield to industry dividend yield	**1**	0.8933	0.90	0.43	0.03	2.44
	0	0.9739	0.57	0.93	0.00	4.05
Leverage ratio to industry leverage ratio	**1**	0.1000	0.00	1.81	-8.95	22.99
	0	0.0500	-0.03	2.05	-14.67	22.99
Abnormal return one year prior compared to industry	**1**	0.0049	0.00	0.14	-0.49	1.79
	0	0.0062	0.00	0.19	-4.85	7.49
Cash to assets ratio	**1**	0.1584	0.10	0.18	0.00	0.10
	0	0.1814	0.10	0.21	0.00	0.10

The "Dividend yield to industry dividend yield" variable is the variable constructed to determine if substitution of cash dividends is a motive behind share repurchases in Norway. On average, the firms have a lower dividend yield relative to the industry in the years prior to an announcement. This supports the theory that firms repurchase shares as a substitute for cash dividends.

The variable "Leverage ratio to industry leverage ratio" represents the capital structure adjustment hypothesis. It reflects the leverage ratio of the firm relative to the industry in the year prior to the repurchase announcement. The hypothesis states that firms repurchase shares to obtain an optimal capital structure by acquiring more debt. A negative value should increase the likelihood of a repurchase announcement, according to this hypothesis. The descriptive statistic tells us that the firms, on average, have higher values corresponding to the months of the announcements. This does not support the hypothesis that capital structure adjustment motivates firms to announce share repurchases in Norway.

The variable "Abnormal return one year prior compared to industry" represents the signalling hypothesis and negative values imply that the firm has a lower abnormal return than the industry average. A lower abnormal return than the industry average indicates undervaluation. We want to investigate if undervaluation increases the likelihood of announcing repurchases. The average abnormal return one year prior to an announcement is closer to the industry average than the average abnormal return prior to non-announcement years. In turn, abnormal returns are lower prior to announcements. This indicates signalling as a motive for repurchase announcements.

The variable "Cash to assets ratio" is used to investigate the excess cash distribution hypothesis. We want to determine if there is a greater likelihood of announcing a share repurchase if the firms have high cash to assets ratios. From Table 1, we see that the average cash to assets is higher for firms corresponding to the years not followed by an announcement. This indicates that excess cash distribution might not be a valid motive to announce share repurchases in Norway.

5 Methodology

5.1 Investigating the buyback anomaly

To confirm whether or not firms have long-run abnormal returns after announcing a share buyback, we will partly replicate the methodology of Ikenberry et al. (1995) and Peyer and Vermaelen (2009). They use the three-factor model by Fama and French (1993). In addition, Peyer and Vermaelen included momentum as a fourth factor. This is known as the Carhart (1997) four-factor model. We compute abnormal returns with Ibbotson's (1975) RATS method, which adjusts for risk changes in event time. We will consider long-run abnormal returns between 1 and 48 months after announcing the open market repurchase program.

The Fama and French three-factor model is an asset pricing model and expands the capital asset pricing model (CAPM). CAPM describes the relationship

between market risk and expected return on assets and can be modified with the risk premium on the left-hand side:

$$R_{i,t} - R_{f,} = R_{f,t} + \beta_j (R_{m,t} - R_{f,t})$$

The left-hand side variable $R_{i,t} - R_{f,t}$ is the risk premium of asset i in period t, and $R_{m,t} - R_{f,t}$ is the market premium in period t.

In addition to account for market risk like CAPM, Fama and French three-factor model include size and value risk based on the fact that companies with higher value and smaller size outperform the overall market:

$$R_{i,t} - R_{f,t} = b_j(R_{m,t} - R_{f,t}) + c_j SMB_t + d_j HML_t$$

SMB accounts for size, and HML accounts for value as described in section 3.2. The remaining variables are the same as described for CAPM. By adjusting for this outperforming tendency, the three-factor model aims to explain stock market deviations from CAPM. The advantage of using this method in our research is that changes in equity risk from before to after the buyback announcement are better attributed, such as leverage changes. The reason is that month-by-month after the buyback, the loadings of each factor are allowed to change. Admittedly only in the cross-sectional average, not for each firm (Fama & French, 1993).

Such as in the three factor-model, Carhart (1997) also adjusts for risk regarding size and value. In addition, he adjusts for the tendency for a stock to continue in a given direction:

$$R_{i,t} - R_{f,t} = b_j(R_{m,t} - R_{f,t}) + c_j SMB_t + d_j HML_t + e_j MOM_t$$

MOM accounts for the tendency, and the remaining variables are the same as in CAPM and the three-factor model. Carhart (1997) found significant evidence for momentum in stock returns with the four-factor model, and therefore, adjusting for this tendency might lead to more accurate measurements of portfolio returns.

The following cross-sectional regression is run each event month *j*until the 48th month after the announcement, where $j = 0$ is the event month in which the buyback is announced:

$$R_{i,t} - R_{f,t} = a_j + b_j(R_{m,t} - R_{f,t}) + c_j SMB_t + d_j HML_t + e_j MOM_t + \varepsilon_{i,t}$$

Where a_j is the estimated monthly average abnormal return for each event month.

$R_{i,t}$	Monthly return on security i in the calendar month t
$R_{f,t}$	Risk-free rate
$R_{m,t}$	Return on the equally weighted OSEBX-index
SMB_t	Small minus big share size portfolio
HML_t	High minus low book-to-market portfolio
MOM_t	Momentum factor

We collected a total of 1,022 buyback announcements in the period from 2000-2019. When removing the announcements not meeting our criteria, we ended up with 693 buyback announcements. The buyback announcements excluded were announcements made before the firm was listed on OSE and announcements made too close to the company's listing dates. We also exclude announcements from 2016 until 2019 because we want to examine the long-term abnormal return. We will apply this method to all Norwegian firms listed on OSE meeting these criterias.

5.1.1 Portfolios

In addition to investigating whether the anomaly regarding buyback announcements exists, we will create different portfolios based on different attributes of the firms and examine how these attributes affect the market reaction and abnormal returns. These attributes could be partial explanations of the motives behind announcing repurchases. The reasoning is that abnormal returns following buyback announcements vary with the level of complication associated with stock valuation and information asymmetry (Andreou et al., 2018).

Announcements classified by the firm's book-to-market ratio

Following Ikenberry et al. (1995), we identify the announcing firms likely to be undervalued. A buyback announcement is an important signal to a less informed market, and we will investigate whether abnormal returns are higher in cases more clearly motivated by undervaluation. Similar to Ikenberry et al. (1995), the valuation portfolios will be created by dividing the firms into five quintiles based on the book-to-market ratio in the year prior to the announcement. The rationale is that repurchases by companies with book value higher than market value are more likely to be driven by undervaluation. We will compare the firms with the 20% lowest book-to-market ratio to the undervalued firms, which are the firms with the 20% highest book-to-market ratio.

Announcements classified by the firm's prior return

Peyer and Vermaelen (2009) found that firms experience higher long-term abnormal returns if the repurchase follows a critical decline in stock prices in the six months prior to the announcement. They argue that the long-term abnormal returns are a correction of an overreaction to bad news by the market in the prior six months. By classifying firms based on the return prior to the announcement, we can identify firms undervalued by the market. We create portfolios based on prior return using five quintiles and compare the firms with the 20% lowest prior return to the firms with the 20% highest prior return.

Announcements classified by the size of the firm

Larger firms announce, in general, buyback programs more frequently than smaller firms. It is, therefore, interesting to see whether the market reaction depends on the size of the firms. The information asymmetry is also more prominent between management and shareholders in smaller firms than larger firms, indicating a higher possibility of undervaluing smaller firms. This might yield an expectation of greater reactions when smaller firms announce buyback programs. The size portfolios are created by five quintiles based on market capitalisation in the year prior to the announcement. We then compare the abnormal returns of the 20% smallest firms to the abnormal returns of the 20% largest firms.

Multiple announcements

Ikenberry et al. (1995) examined the robustness of their findings by exploring the issue of multiple announcements. They wanted to examine whether multiple returns were affecting their results. They found that firms making repeat repurchase announcements did show strong performance. Still, they concluded that repeat repurchase announcements could not explain the abnormal performance observed overall. We create two portfolios of firms, one with firms that announced less than six times and one with firms that announced more than ten times in the 15 years studied. We do so to examine whether there are differences between the two groups and how and if that could affect our overall results.

5.2 Analysing the motives

To investigate the motives behind announcing a repurchase, we want to see if we can use specific characteristics of the firm to predict whether or not they are likely to announce a repurchase. The variables used to analyse the motives behind the share repurchase announcements are described in section 3.3. We employ the following model:

$$Pr(Announcement_{i,t} = 1) = F(\beta_0 + \beta_1 DividendYield_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 PriorAR_{i,t} + \beta_4 CashtoAssets_{i,t} + \beta_n Control\,Variables_{i,t})$$

Like Mitchell and Dharmawan (2007), we employ a logit model on our panel data to test the motives. There are advantages of using a logit model as opposed to an ordinary least squares model in this case (Stock & Watson, 2015, 443). A logit model will ensure that no probabilities exceed 1 or surpass 0, which are nonsensical predictions. Issues with non-normality and heteroskedasticity are not present in logit models because the model uses maximum likelihood estimation and not minimisation of residuals.

The announcement dummy will be our binary dependent variable, Y. We want to model the probability that Y = 1, given the value of the regressors. The logit model uses maximum likelihood estimation to estimate the coefficient values that maximise the likelihood of drawing the observed data (Stock & Watson, 2015, 446). The maximum likelihood estimators are the values of the parameters that best describe the entire distribution of the data.

The logit model is a random-effects model. We performed a Hausman test to test whether fixed-effects or random-effects is the correct choice for our model; the test is included in section 9.3.1 in the appendix. We were not able to reject the null hypothesis that the random-effects estimator is fully efficient. We were, therefore, not able to justify using fixed-effects in our model. Random effects are individual-level effects that are unrelated to the variables in the model.

We report odds ratios for our logit model. The odds ratio is a measure of the connection between exposure and an outcome. The interpretation of a coefficient value of 1 is that an increase in the independent value of one unit would make it one time more likely for the event to occur (DeMaris, 1993). In other words, a coefficient value of 1 would not affect the likelihood of an event occurring. A coefficient value above 1 increases the likelihood of an event to occur, while a coefficient value below 1 decreases the likelihood.

We introduce the control variables Size, Growth, Year, Industry, and Year*Industry in the logit model. A control variable is not the object of interest. A control variable is a regressor included to hold constant factors that could, if neglected, lead the estimation to suffer from omitted variable bias (Stock & Watson, 2015, 280). The idea is to include a variable that controls for an omitted factor that determines the dependent variable.

We include the control variables Size and Growth to control for financial constraints (Andreou et al., 2018). The reasoning for including Year as a control variable is simple; we know from the descriptive statistics that the number of yearly announcements increases. Therefore, we want to control for the effect of the years in which the announcement was made. We include Industry as a control variable because it is a constant variable, and we are curious to see whether there are industrial differences. The interaction term Industry*Year is introduced to control for the marginal effect of the industry depending on the year, and the marginal effect of the year depending on the industry.

Regression with panel data allows for controlling for some types of omitted variables without actually observing them (Stock & Watson, 2015, 397). By using panel data, we can study changes in the dependent variable over time. Panel data is data for n different entities across T different periods. A balanced panel includes all observations for the entities across all periods (Stock & Watson, 2015, 397). Our dataset lacks observations for the periods before the n firms are listed on OSE, which means we have an unbalanced panel.

6 Results

6.1 The buyback anomaly

The results we present are the cumulative abnormal returns for the whole sample and groups of firms tested. We present the results in detail in the following sections. The regression is performed after dropping various observations due to nonsensical values. This is further elaborated on in the appendix section 9.1, where we present the dropped observations, the rationale, and the number of observations dropped.

6.1.1 All announcing firms

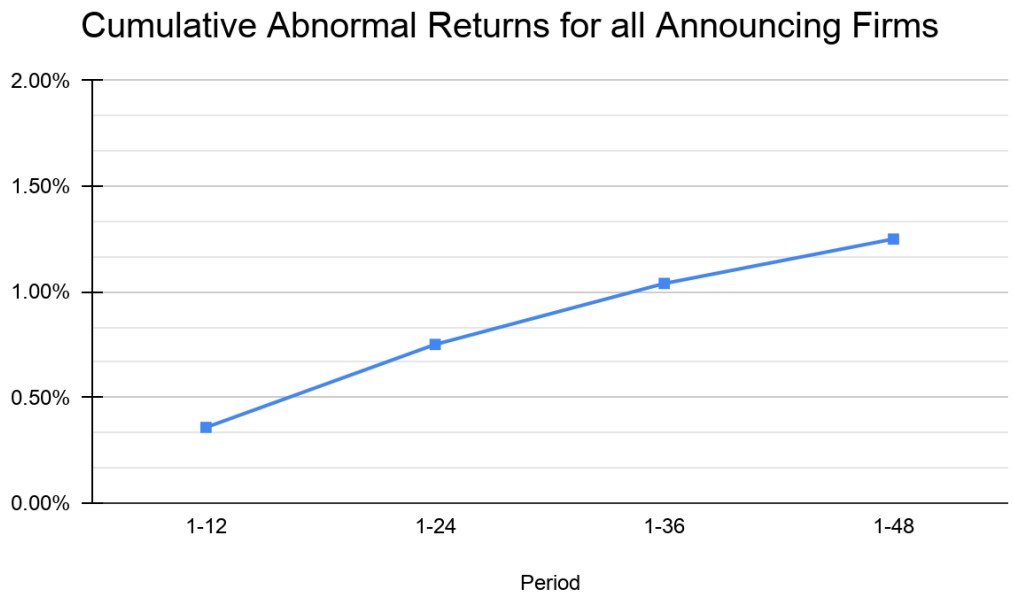

Figure 3*:* A graphical presentation of the results reported in Table 2. The cumulative average abnormal returns (CAR) are calculated using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. The figure shows CARs for all announcing firms in the period from 2000-2015.

The estimated intercept from the regression analysis represents the monthly average abnormal returns for each event month. We are considering the abnormal

returns 1-48 months after the announcement. Cumulative abnormal returns are calculated by aggregating the abnormal returns starting from month 1 and ending at month 48.

Cumulative abnormal returns for all firms

Table 2: The table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. The reported CARs are in the months following the share repurchases and the table reports for the entire sample. The sample period is 2000 to 2015. ***, **, and * represent 1%, 5% and 10% significance level respectively.

Months	CAR	T-statistic
1-12	0.359%	10.60***
1-24	0.751%	15.96***
1-36	1.040%	18.34***
1-48	1.250%	19.08***
Obs	693	

We see that firms listed on OSE experience positive abnormal returns in the periods following a repurchase announcement. The results are statistically significant at the 0.01 level. The positive cumulative abnormal returns support Skjeltorp's (2004) findings and suggest that the buyback anomaly still exists on the Norwegian market.

From Figure 3, we see that the abnormal return is slightly higher in the first periods of the regression and that the graph declines towards the last 12 months of the 4-year period. The decline is in contrast to the findings of Peyer and Vermaelen (2009), who found that the largest excess returns are discovered 3-4 years after the buyback.

To further investigate the regression results, we include the announcements from 2015-2019. As mentioned in part 5.1, we had to omit the announcements from 2016-2019 to study the long-term effect of repurchase announcements. The results are reported in Table 3.

Cumulative abnormal returns for all firms 2000-2019

Table 3: The table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. The reported CARs are in the months following the share repurchases. The sample period is 2000 to 2019. A total of 1,022 announcements are included in the first month of this 36-month regression. The number of announcements drops each month, and the regression for the 36th month after the announcement has 772 observations. ***, **, and * represent 1%, 5% and 10% significance level respectively.

Months	CAR	T-statistic
1-12	0.290%	11.57***
1-24	0.578%	16.10***
1-36	0.813%	18.26***
Obs	1,022 (772)	

From the results reported in Table 3, we see that the whole sample has a lower cumulative abnormal return when including the announcements from 2016-2019. The results are statistically significant at the 0.01 level, but they are difficult to interpret. As mentioned in section 4.1, the number of yearly announcements are steadily increasing. One explanation for these results could be that the number of announcements in total affects the abnormal returns. As mentioned earlier, Grullon and Michaely (2004) argue that if almost every company is repurchasing shares, it seems less likely that a trading rule based on share buybacks yields a higher return than the average.

6.1.2 Short term analysis

The short-term effects of the announcements are investigated by measuring abnormal returns at different points surrounding the months of the announcements. We measure cumulative abnormal returns three months before the announcement, three months after the announcement month, and six to eight months after the announcement. In the announcement month, we measure the abnormal return.

Short term cumulative abnormal returns

Table 4: The table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. Event month is the month of announcement. The sample period is 2000 to 2015. ***, **, and * represent 1%, 5% and 10% significance level respectively.

Period	CAR	T-statistic
Three months before	0.108%	6.35***
Event month	-0.006%	-0.55
Three months after	0.062%	3.79***
Six to eight months after	0.102%	5.59***
Obs	693	

There is a negative, close to zero, abnormal return in the announcement month. This might indicate an underreaction to the announcement. However, these results are not significant at any level under 0.10. Furthermore, cumulative abnormal returns are higher at six to eight months than cumulative abnormal returns three months after the announcements. These results are significant at the 0.01 level. This indicates support for the underreaction hypothesis (Ikenberry et al., 1995) and that the market has a delayed response to the announcement. Nevertheless, such a conclusion requires further analysis, and extended analysis will be presented in the following sections.

It is also relevant to mention that cumulative abnormal returns are higher three months before the announcement than three months after and six to eight months after. This does not indicate support for underpricing as a motive. Poor share performance prior to the announcement could indicate underpricing (Vermaelen, 1981), which is not the case according to these results. However, extended analysis is needed before concluding regarding the underpricing motive.

6.1.3 Announcements classified by the firms' book-to-market ratio

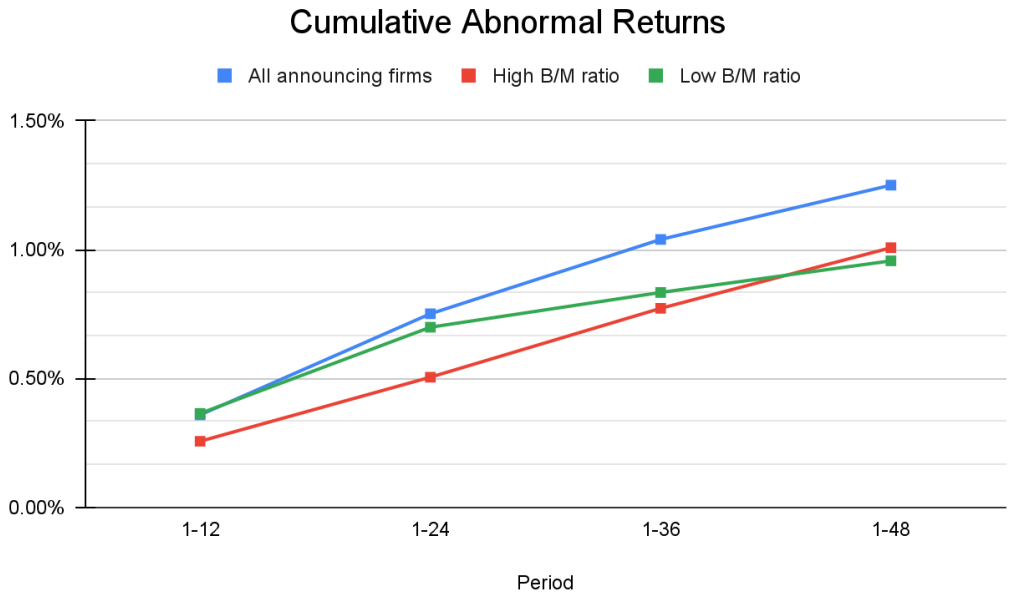

Figure 4*:* A graphical presentation of the results reported in Table 5. The cumulative average abnormal returns (CAR) are calculated using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. The figure shows CARs for the high and low book-to-market ratio groups in the month before the announcement compared to CARs for all announcing firms in the sample period.

Number of announcements made by each group

Group	1	2	3	4	5
No.	106	122	135	119	111

We split the announcements into five groups based on the book-to-market ratio in the year before the announcement for the whole period. Group 1 has the lowest book-to-market ratio, while group 5 has the highest book-to-market ratio.

Cumulative abnormal returns for firms classified by book-to-market ratio

Table 5: The table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. We classify the firms by their book-to-market ratio and report the results for the group with the highest and lowest yearly book-to-market ratios. The reported CARs are in the months following the share repurchases. The sample period is 2000 to 2015. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test and + indicates significance in a one-tail test.

Months	High book-to-market ratio		Low book-to-market ratio		Difference
	CAR	T-statistics	CAR	T-statistics	z-test
1-12	0.256%	3.17***	0.3643%	3.79***	-9.40***+++
1-24	0.505%	4.54***	0.699%	5.33***	-12.33***+++
1-36	0.772%	5.72***	0.834%	5.31***	-3.25***+++
1-48	1.008%	6.43***	0.957%	4.90***	2.22**++
Obs	111		106		

Ikenberry et al. (1995) hypothesised that firms with a high book-to-market ratio are undervalued and should experience higher abnormal returns following a buyback announcement. Our results for the entire 48-month period support their theory. Until the 36th month, low book-to-market shares outperform high book-to-market shares, but high book-to-market shares experience higher abnormal returns long-term. The results are statistically significant at the 0.01 level. The difference between the two groups for the 1-48th month period is significant at the 0.05 level.

6.1.4 Announcements classified by the firms' prior return

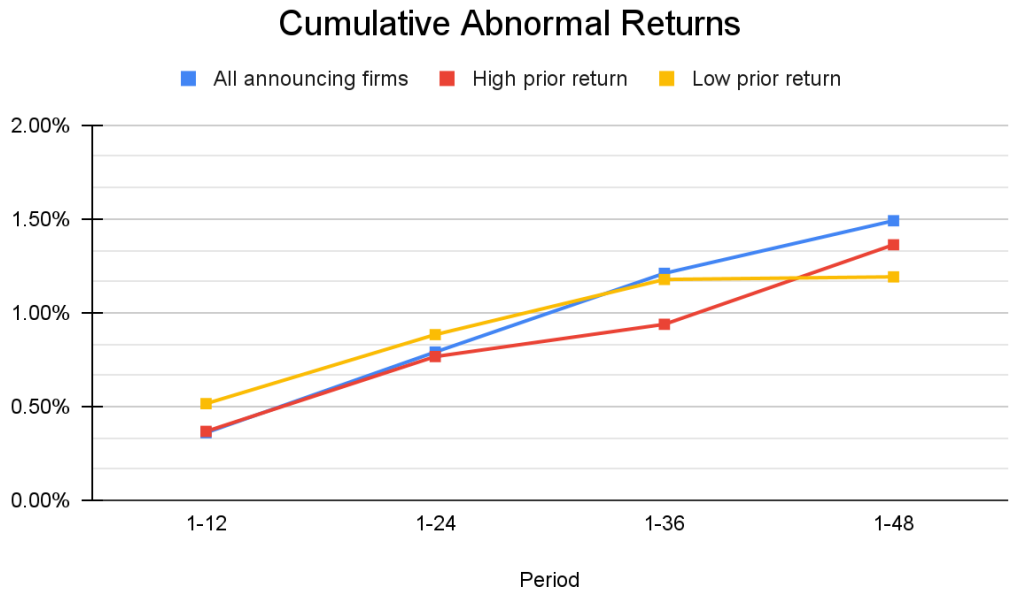

Figure 5: A graphical presentation of the results reported in Table 6. The cumulative average abnormal returns (CAR) are calculated using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. The figure shows CARs for the groups of high and low prior return in the six months before the announcement compared to CARs for all announcing firms in the sample period.

Number of announcements made by each group

Group	1	2	3	4	5
No.	137	131	130	131	124

We divide the announcements into five groups based on the firms' cumulative return six months prior to the announcement. Forty announcements are excluded due to missing data before the announcement.

Cumulative abnormal returns for firms classified by prior return

Table 6: The table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. We classify the firms by their six-month return prior to the announcement and report the results for the groups with the highest and lowest prior return. The reported CARs are in the months following the share repurchases. The sample period is 2000 to 2015. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test and + indicates significance in a one-tail test

Months	High prior return		Low prior return		Difference
	CAR	T-statistics	CAR	T-statistics	z-test
1-12	0.367%	4.79***	0.515%	5.36***	13.85***+++
1-24	0.766%	7.17***	0.883%	6.61***	7.85***+++
1-36	0.938%	7.12***	1.177%	7.25***	13.09***+++
1-48	1.362%	8.93***	1.191%	6.48***	-8.17***+++
Obs	124		137		

As presented in Table 6, we see that the group with low returns six months prior to the announcement has higher cumulative abnormal returns compared to the group with a high prior return. However, this is only the case up to month 36. After 36 months, the cumulative abnormal return of the group with a high prior return passes the cumulative abnormal return of the group with a low prior return. The results for both groups are statistically significant at the 0.01 level. The results support the overreaction hypothesis (Peyer & Vermaelen, 2009) and indicate a correction of an overreaction to bad news prior to the announcement. Therefore, the results suggest that the firms announce buybacks when disagreeing with the decline in stock price rather than because of inside information.

6.1.5 Announcements classified by the size of the firm

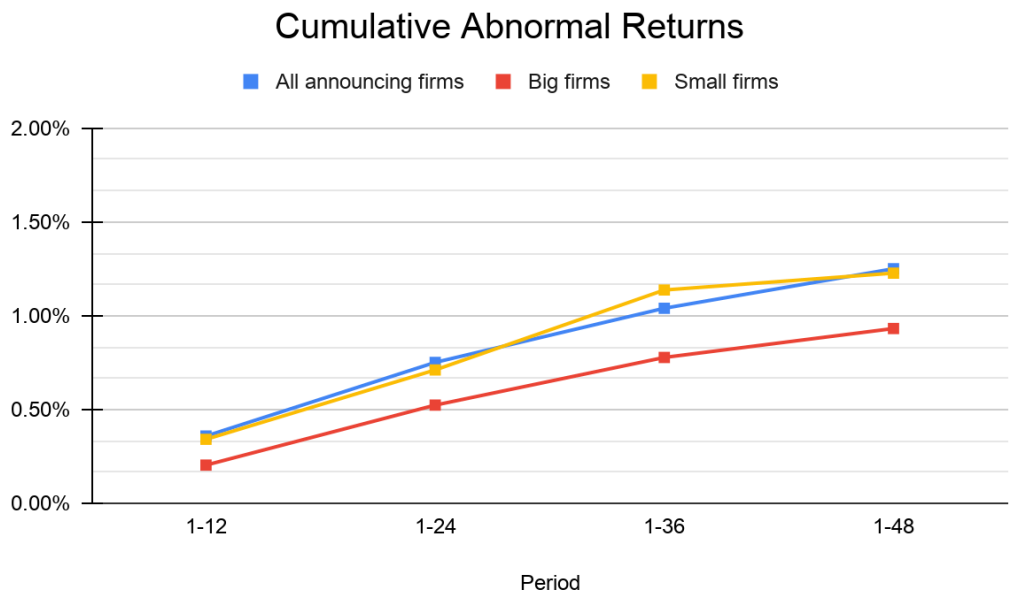

Figure 6: A graphical presentation of the results reported in Table 8. The cumulative average abnormal returns (CAR) are calculated using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. The figure shows CARs for the small and big firms compared to CARs for all announcing firms in the sample period. The size of the firms is determined by the market value in the month before the announcement.

We split the announcements into five groups based on the size of the firm. The size is determined by the market value of the firm in the month before the announcement. Group 1 has the lowest market values, while group 5 has the highest market values. The announcements are relatively evenly distributed across the five groups. Fifteen announcements are excluded due to missing market values.

Number of announcements made by each group

Group	1	2	3	4	5
No.	103	143	125	152	155

Cumulative abnormal returns for firms classified by size

Table 8: The table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. We classify the firms by their size and report the results of the largest and smallest firms. The reported CARs are in the months following the share repurchases. The size of the firms is determined by the market value in the month before the announcement. The sample period is 2000 to 2015. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test and + indicates significance in a one-tail test

Months	Big firms		Small firms		Difference
	CAR	T-statistics	CAR	T-statistics	z-test
1-12	0.204%	4.00***	0.341%	2.84***	-10.96***+++
1-24	0.523%	7.15***	0.711%	4.37***	-10.99***+++
1-36	0.778%	8.59***	1.137%	5.83***	-17.51***+++
1-48	0.932%	8.86***	1.227%	5.48***	-12.49***+++
Obs	155		103		

In Figure 6 we observe that the largest firms experience lower abnormal returns than the whole sample during the four years after the announcement. The small firms experience cumulative abnormal returns almost identical to the whole sample. The large firms in our sample have lower cumulative abnormal returns than the small firms and the whole sample.

According to Ikenberry et al. (1995), the firm's size can be viewed as a proxy for information asymmetry, in the sense that a smaller firm will have higher information symmetry. According to the signalling hypothesis, firms with high information asymmetry are prone to be undervalued. Our results support the signalling hypothesis as described by Ikenberry et al. (1995). We see that the small firms experience higher cumulative abnormal returns than the larger firms, suggesting that the larger firms were less undervalued than the small firms. The results are statistically significant at the 0.01 level for all groups and periods, except the results for the first period of the small firm group, which is significant at the 0.01 level.

6.1.6 Multiple announcements

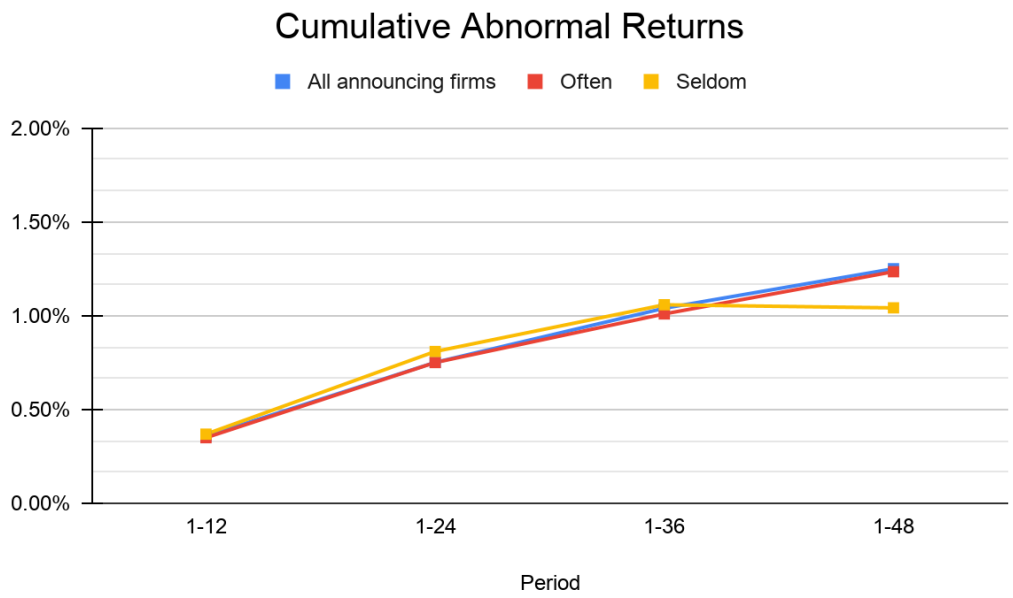

Figure 7: A graphical presentation of the results reported in Table 9. The cumulative average abnormal returns (CAR) are calculated using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. The figure shows CARs for the firms that often announce repurchases and the group that seldom announce repurchases compared to CARs for all announcing firms in the sample period.

As mentioned, there are strict rules for announcing buybacks in Norway. It can only be done by the general assembly, and a meeting of the general assembly usually occurs once a year. Several firms announce buybacks almost every year, especially from 2010 and onwards. To further investigate the cumulative abnormal returns following a buyback announcement, we split the firms into three groups. The first group often announces buybacks, the second group announces buybacks from time to time, and the last group seldom announces buybacks from 2000-2015.

Number of announcements made by each group

Group	More than 10 announcements	6 to 10 announcements in the period	Less than 6 announcements
No.	318	296	79

The group that seldom announces buybacks consists of 24 firms that announced buybacks less than six times in the period of interest. The group that often announces buybacks consists of 68 firms that announced buybacks more than ten times in the same period. We apply the same regression model to these groups to compare them to each other and to the whole sample.

Cumulative abnormal returns - multiple announcements

Table 9: The table reports cumulative average abnormal returns (CAR) in percent using Ibbotson's (1975) RATS method across time combined with Fama-French (1993) three-factor model with momentum. We report the results for the firms with more than 10 announcements in the period and the results for the firms with less than 6 announcements in the period. Firms with more than 10 announcements comprise 46% of the whole sample. Firms with less than 6 announcements comprise 11% of the whole sample. The reported CARs are in the months following the share repurchases. The sample period is 2000 to 2015. ***, **, and * represent 1%, 5% and 10% significance level respectively. For the difference z-test, * indicates significance in a two-tail test and + indicates significance in a one-tail test.

Months	More than 10 announcements		Less than 6 announcements		Difference
	CAR	T-statistics	CAR	T-statistics	z-test
1-12	0.350%	7.69***	0.369%	3.34***	1.50+
1-24	0.751%	11.77***	0.809%	5.60***	3.53***+++
1-36	1.010%	13.29***	1.058%	6.09***	2.43**++
1-48	1.235%	14.17***	1.042%	4.83***	-8.00***+++
Obs	318		79		

As shown in Figure 7, the two groups perform almost identical up to 24 months after announcements. In the last 12-month period, the group that announces buybacks often performs better than the group that rarely announces buybacks. The group that announces buybacks often performs approximately identical to the whole sample consisting of 217 firms.

We perform this analysis to examine whether the number of announcements affects our overall results for the whole sample. We have seen that the increase in abnormal returns is less between 36-48 months after the announcement than in the

previous periods for all announcing firms. This effect is more apparent in the group with less than six announcements between 2000-2015. Jagannathan and Stephens (2003) find evidence that infrequent repurchases are greeted more favourably than frequent purchases, while Ikenberry et al. (1995) found that repeat repurchase announcements did show strong performance. We, however, find little evidence to support either of these results, and our results are ambiguous. The group that announces seldom have lower cumulative abnormal returns long-term. It might be that repeat purchase announcements to some degree affect our overall results after 36 months. The results are statistically significant at the 0.01 level.

6.2 Motives

In this section, we present the results of testing the various motives behind repurchase announcements. The analyses presented in this part are performed after dropping various observations due to nonsensical values. This is further elaborated on in the appendix part 9.1, where we present which observations are dropped, the rationale, and the number of observations dropped.

The motives are not mutually exclusive, and if several motives are significant, firms may announce repurchases for multiple reasons. Thus, it is more important to understand the set of hypotheses that explain a firm's motives rather than distinguish them. For example, the excess cash hypothesis and substitution of cash dividends hypothesis are closely related, as pointed out in section 2.4. Moreover, firms may desire to distribute excess cash, but only during periods when the firm can take advantage of stock price undervaluation (Dittmar, 2000). These are just examples, and the list is not comprehensive.

Our analysis aims to determine if any of the variables constructed can predict whether or not a firm is likely to announce a repurchase. We analyse the motivation behind an announcement. The regression is run on the complete sample, which includes buyback announcements from 2000 until 2019. We introduce four control variables in our logit model, Size, Growth, Year, and

Industry. We also include the interaction variable between Year and Industry. The regression results are presented in Table 10.

Motives for announcing share repurchases

Table 10: This table reports logit regression results for the total sample. The announcement dummy is the binary dependent variable Y. The regression models the probability that Y = 1, given the value of the regressors. The variable "Dividend yield to industry dividend yield" is constructed to test the substitution of cash dividends hypothesis. The variable "Leverage ratio to industry leverage ratio" is constructed to test the capital structure adjustment hypothesis. The variable "Abnormal return one year prior compared to the industry" is constructed to test the signalling hypothesis. The variable "Cash to assets ratio" is constructed to test the excess cash distribution hypothesis. The construction of the variables is described in section 3.3. The coefficients are reported in odds ratios. Odds ratios are a measure of the connection between the exposure and an outcome. Model 1 contains the variables constructed to test each hypothesis. In model 2, we include Size as a control variable. Model 3 includes Size and Growth as control variables. Model 4 includes Size, Growth and Year as control variables. Model 5 includes Size, Growth, Year and Industry as control variables in addition to their interaction term. Model 5 includes Size, Growth, Year and Industry as control variables in addition to the interaction term between Year and Industry. Significance levels and z-statistics are reported in parentheses below their respective coefficients. ***, **, and * represent 1%, 5% and 10% significance level, respectively. The sample period is 2000 to 2019.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Dividend yield to industry dividend yield	0.732 (-2.59***)	0.737 (-2.55***)	0.735 (-2.59***)	0.736 (-2.64***)	0.736 (-2.64***)	0.731 (-2.69***)
Leverage ratio to industry leverage ratio	1.028 (0.78)	1.027 (0.74)	1.026 (0.72)	1.033 (0.87)	1.033 (0.87)	1.035 (0.94)
Abnormal return one year prior compared to industry	0.082 (-3.62***)	0.078 (-3.67***)	0.078 (-3.66***)	0.078 (-3.66***)	0.078 (-3.65***)	0.077 (-3.68***)
Cash to assets ratio	1.746 (1.08)	1.996 (1.33)	1.979 (1.32)	2.220 (1.56)	2.221 (1.56)	2.328 (1.66*)
Size		1.071 (1.36)	1.073 (1.40)	1.058 (1.13)	1.058 (1.14)	1.062 (1.22)
Growth			0.978 (-0.18)	0.983 (-0.14)	0.983 (-0.14)	0.978 (-0.18)

Year				1.022 (1.82*)	1.022 (1.82*)	1.006 (0.31)
Industry					1.000 (-0.03)	0.011 (-0.89)
Year*Industry						1.002 (0.89)
AIC	2,729.91	2,730.06	2730.695	2729.378	2731.376	2732.587
BIC	2,770.08	2,776.93	2784.258	2789.636	2798.33	2806.235
LR	20.77	22.62	23.98	27.30	27.30	28.09
p	0.0004	0.0004	0.0005	0.0003	0.0006	0.0009
Obs.	5,975	5,975	5,975	5,975	5,975	5,975

We perform a test of the likelihood ratio (LR) to test the model's adequacy. The LR compares the probability of observing the sample for estimated parameter values with the probability of observing the sample with all parameters equal to zero. We also report the Akaike Information Criterion (AIC) and the Bayesian Information Criteria (BIC). Their estimates are both meant to determine the best model based on the goodness of fit (Stock & Watson, 2015, 594). The lower the estimates of AIC and BIC, the better the goodness of fit. Model 1 with no control variables has the best goodness of fit of the five models based on the AIC and BIC estimates.

6.2.1 Substitution of cash dividends

The cash dividend coefficient is significant at the 0.01 level and is one out of three variables that significantly explain share buyback announcements in Norway. The coefficient suggests that when the dividend yield relative to the industry's dividend yield increases by one unit, the likelihood of the firms announcing a share repurchase decreases. For example, the coefficient in Model 5 suggests that an increase of one unit in dividend yield relative to the industry is associated with a decreased likelihood of buyback announcements by a factor of 0.736.

The results support the substitution of cash dividends hypothesis and align with the results of Grullon and Michaely (2002). Moreover, the results significantly explain the substitution of cash dividends as a motive for announcements in the Norwegian market. However, it is crucial to note that we do not investigate the substitution of cash dividends as a motive for actually repurchasing shares, like Grullon and Michaely (2002), but as a motive for announcing a buyback program. The result suggests that a reduced dividend level increases the likelihood of announcing a buyback program, not the likelihood of actually repurchasing. It is important to note that cash dividend substitution would not be a valid motive behind a share repurchase announcement if the firm does not execute the repurchase after the announcement.

Another relevant aspect when considering these results is that the hypothesis, in general, has low level of support in the research field. Grullon and Michaely (2002) found evidence in the U.S market over the period 1972-2000, but Dittmar (2000) and Wansley et al. (1989) concluded that repurchases do not substitute dividends in the U.S market over the period 1977-1996 and 1983-1985. Lee et al. (2010) concluded the same regarding the European market from 1990-2005 and Mitchell and Dharmawan (2007) regarding the Australian market from 1996-2001. However, it might be the case that this hypothesis is valid for the Norwegian market. These results should be interpreted carefully considering the low level of research on the Norwegian market.

6.2.2 Signalling

We test the hypothesis proposed by Mitchell and Dharmawan (2007): the lower the share performance, compared to the industry, the greater the likelihood of a firm announcing a share repurchase. The announcement of a share repurchase is the management signalling to the market that the firm is undervalued. The signalling variable is the second variable that significantly explains share buyback announcements in Norway, and it is significant at the 0.01 level.

The coefficient of the abnormal return compared to the industry is around 0.08, which confirms the hypothesis. An increase in abnormal return compared to the industry reduces the likelihood of an announcement by a factor of 0.08. In other words, if the share performs better than the industry average, there is a lower likelihood of the firm announcing a share repurchase.

Support for the signalling hypothesis has been found for many markets and periods. For example, Mitchell and Dharmawan (2007) found signalling of undervaluation as one of the most influential incentives for share repurchases on the Australian market. The same applies to the U.S market (Dittmar, 2000) and the European market (Lee et al., 2010).

6.2.3 Capital structure adjustment

By introducing the leverage ratio relative to the industry ratio, we test the theory that firms with lower leverage relative to the optimal leverage announce buyback programs. The variable coefficient is just above 1, which means that an increase in the leverage ratio relative to the industry would slightly increase the firm's likelihood of announcing a share repurchase. If the results supported the hypothesis, then an increase in the leverage ratio to the industry should decrease the likelihood of a buyback announcement. The leverage ratio coefficient is not significant in our model. Our results, therefore, do not support the theory that firms announce repurchases to obtain optimal capital structure. It is also important to note that an announcement of a share repurchase would not be sufficient to alter the capital structure. For capital structure adjustments to be a valid motive behind share repurchase announcements, the firm would have to execute the repurchase after the announcement.

6.2.4 Excess cash distribution

Researchers like Dittmar (2000) and Mitchell and Dharmawan (2007) found evidence that supports the excess cash distribution hypothesis. In short, repurchasing shares is an appropriate method to distribute excess cash, cash that exceeds the firm's investment opportunities, to the shareholders.

From Table 10, we see that the coefficient is between 1.7 and 2.4, increasing with the introduction of the first four control variables. The coefficient tells us that an increase of one unit in cash to assets ratio would make an announcement of a share repurchase approximately two times more likely. However, the coefficient of the cash to assets variable is not statistically significant in Model 1 to Model 5. When introducing all four control variables, including the interaction term controlling for the marginal effect of the industry depending on the year, and the marginal effect of the year depending on the industry, the variable is significant at the 0.1 level. Therefore, the results of Model 6 support the findings of Dittmar (2000) and Mitchell and Dharmawan (2007). When interpreting the results for this hypothesis, it is also important to note that the firm would have to execute the repurchase for excess cash distribution to be the motive behind the repurchase announcement.

Cash dividends and excess cash distribution are closely linked, as dividends payouts are a way for the firm to distribute excess cash. Therefore, a significant variable for the substitution of cash dividends hypothesis supports the excess cash distribution hypothesis and a significant variable for the excess cash distribution hypothesis supports the substitution of cash dividends hypothesis. This is the case for Model 6 as these results suggest that firms announce repurchases as a substitution for cash dividends in addition to suggesting that firms announce repurchases to distribute excess cash.

The variable is not significant before introducing all four control variables, including the interaction term between Year and Industry. It is therefore important to note that the variable used in our model might not be an appropriate measure

for excess cash. Further studies are needed to verify if the distribution of excess cash is a plausible motive for announcing share repurchases in Norway.

6.3 Limitations

There are limitations to our analysis that need addressing. The interpretation of the linear regression results depends on whether the chosen characteristics of the firms are appropriate proxies for information asymmetry and undervaluation. It is striking that the high and low book-to-market portfolios perform more similarly than previous researchers have found. We found that firms with low book-to-market value have higher cumulative abnormal returns following a share repurchase announcement than firms with high book-to-market value the first three years after the announcement. Still, firms with a high book-to-market ratio outperform firms with low book-to-market ratios long term. It could be sample-specific, as Schwert (2003) found that many of the well-known anomalies in finance literature did not hold up in different sample periods. It could also be country-specific as most research is done on the US market.

As we have mentioned throughout the thesis, it is difficult to determine whether the variables constructed to analyse the motives are proper measures for the various motives. To the best of our abilities and knowledge, we have included variables previously used by researchers in this field. Still, these researchers (e.g. Mitchell & Dharmawan, 2007) emphasise the uncertainty on how these variables reflect the motives we are testing. We introduce five control variables in our logit model, to control for omitted factors that could determine the probability of a repurchase announcement. Still, we cannot know if there are systematic differences between the firms announcing the repurchase announcements that we have not controlled for.

Lastly, we want to emphasise that we only explore repurchase announcements, not executed repurchases. There might be differences in the abnormal return following an actual repurchase than an announcement with no following repurchase.

Therefore, our results might not reflect the true long-term cumulative abnormal return following a repurchase announcement because there might be cases of actual repurchases that affect the cumulative abnormal return.

7 Conclusion

There is a positive trend in yearly repurchase announcements on OSE, and the associated long-term positive abnormal return is still present. The statistically significant regression results suggest that Norwegian firms announcing a share repurchase experience long-term cumulative abnormal returns in the following 4-year period.

To further explore the buyback anomaly in Norway, we classify the firms by their difficulty to value. According to our results, firms with low prior return experience higher abnormal returns following a share repurchase announcement than firms with high prior returns. We also found that firms with high book-to-market ratios in the year before the announcement slightly outperform firms with low book-to-market ratios long-term. Our results support Ikenberry et al. (1995) and Peyer and Vermaelen (2009), suggesting that the firms either signal undervaluation and/or disagree with the decline in the stock price.

The firm's size can be viewed as a proxy for information asymmetry, in the sense that a smaller firm will have a higher degree of information asymmetry (Ikenberry et al., 1995). Our results show that small firms outperform larger firms following a repurchase announcement. Firms with high information asymmetry are prone to be undervalued. Our results, therefore, support the theory that firms announce repurchases to signal undervaluation to the market. The results also suggest that undervalued firms experience larger abnormal returns following a repurchase announcement due to market underreaction.

The analysis of the motives behind share repurchase announcements supports the theories that Norwegian firms announce share repurchases either to signal the

market, distribute excess cash or to substitute cash dividends. It is important to note that it would require the firm to execute the repurchase after the announcement if the firm were to substitute cash dividends or distribute excess cash. In other words, the only motive that we can confirm to be a valid motive behind share repurchase announcements in Norway is signalling. The result makes sense, considering that an announcement with no subsequent execution could only serve as a signal to the market. However, we cannot exclude the possibility that Norwegian firms announce and execute share repurchases to substitute cash dividends or to distribute excess cash.

To sum up, our results suggest that firms use share repurchase announcements as a signal of undervaluation to the market. In the following 4-year period after the announcement, the Norwegian firms experienced abnormal returns. This suggests that there is an underreaction in the market to the news of undervaluation. As Skjeltorp (2004) and Comment and Jarrell (1991) argued, a buyback announcement is a weak signal for undervaluation because it does not impose any cost for the firm. The market treats the signal with scepticism because the market cannot distinguish truly undervalued firms from falsely signalling firms. As we have mentioned, other motives could underlie a share repurchase announcement, implying that the underreaction is rational behaviour.

There is an increasing number of firms listed on OSE that announce share repurchases yearly. The strict Norwegian law on share repurchases might be the reason behind this yearly increase. To execute a repurchase, the firm needs their shareholders' approval at the general assembly. The buyback program has to be announced publicly before the execution. The strict rules could potentially result in more firms announcing share repurchases without a specific motive, only to expand their future possibilities of making financial decisions. There is a possibility that the increasing number of firms announcing and executing share repurchases, in time, will reduce, or even eliminate, the buyback anomaly. As Grullon and Michaely (2004) argued, if almost every company is repurchasing

shares, it seems less likely that a trading rule based on share buybacks yields higher return than the average.

7.1 Implications for further research

There are many possibilities to provide further insight into share repurchases in Norway and the associated abnormal returns. As there is an increasing number of yearly repurchase announcements on OSE, more research could lead to valuable guidance for practitioners and managers.

It would be valuable to compare our findings on share repurchase announcements to executed share repurchases. A comparison would require extensive data collection. Skjeltorp (2004) found differences in the long-term effect between firms that chose to execute their right to repurchase stocks and firms that chose not to. The former resulted in expected performance, while the latter resulted in long-term abnormal returns. We found no later research confirming if this is still the case for the Norwegian market.

Research regarding the variables used to determine the motives would increase the prospect of determining what motivates firms to announce or execute a share repurchase. An assessment of whether or not the variables constructed are proper measures of the theories is needed to provide reliable results. Future research could also compare motives stated by the managers and boards to the motives that appear likely from financial data.

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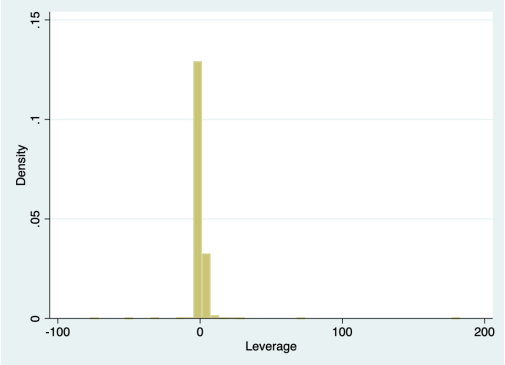
9 Appendix

9.1 Dropped observations

Variable	Drop if:	No. dropped	Reason
Announcements	Only for the linear regression model: Later than 2015	329	*Not able to complete long-term analysis on announcements after 2015*
Leverage	Larger than 15 or smaller than -1.5	486	*Unlikely values of leverage*
Market value	= 0	10,080	*Missing values*
Excess return	Larger than 4	4	*Outliers*
Signalling	Below -5 or larger than 10	12	*Outliers*
Capital structure	Below -25 or larger than 25	54	*Outliers*

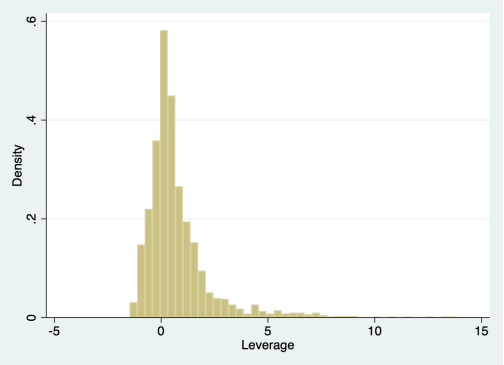
9.1.1 Histogram of dropped observations

Before dropping observations

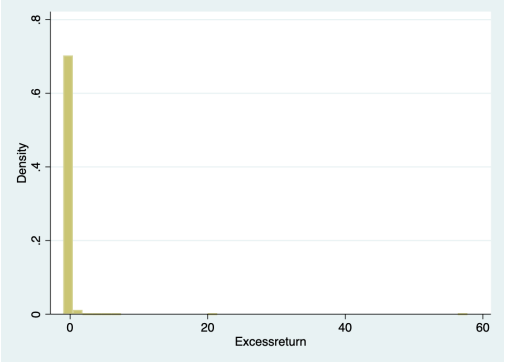


Leverage

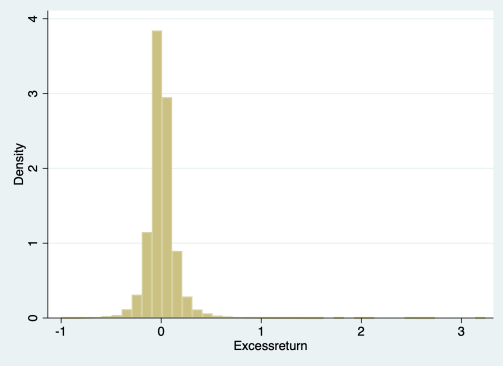
After dropping observations



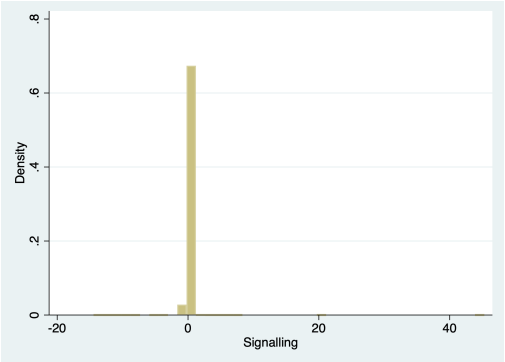
Leverage



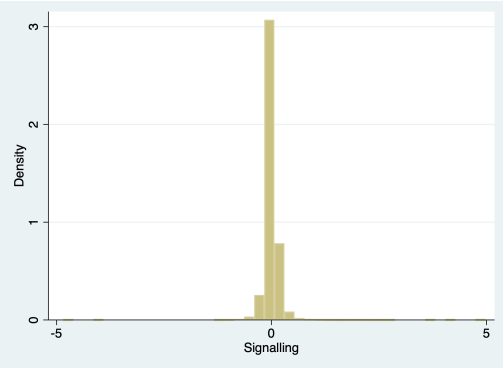
Excess return



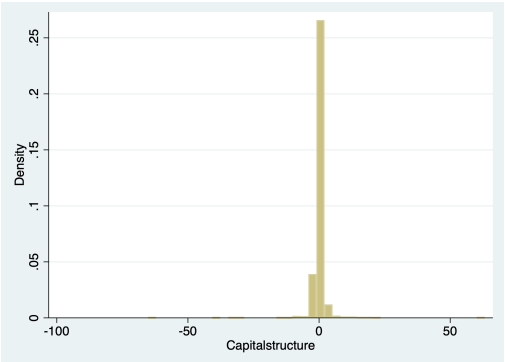
Excess return



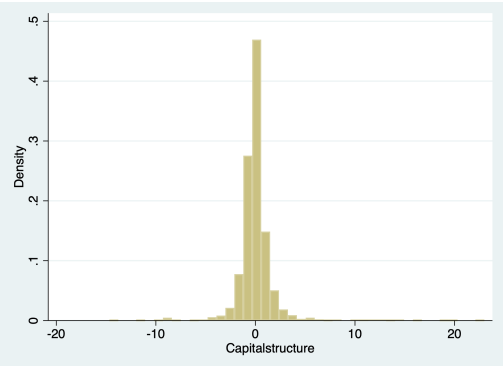
Signalling



Signalling



Capital structure variable

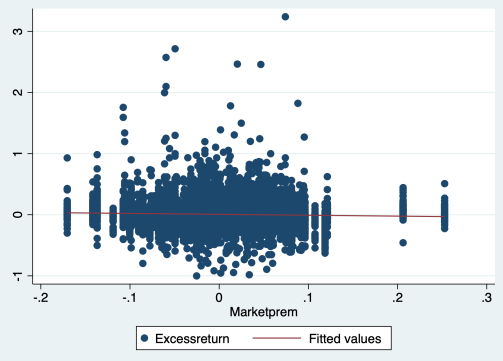


Capital structure variable

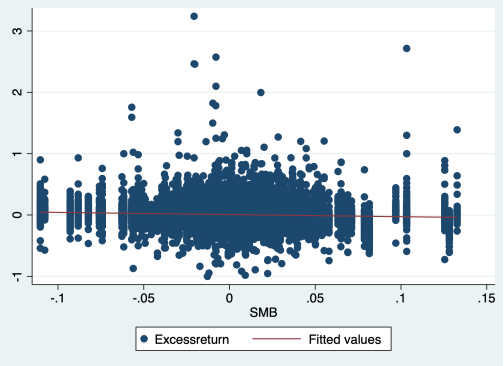
9.2 The linear regression model

9.2.1 Linearity

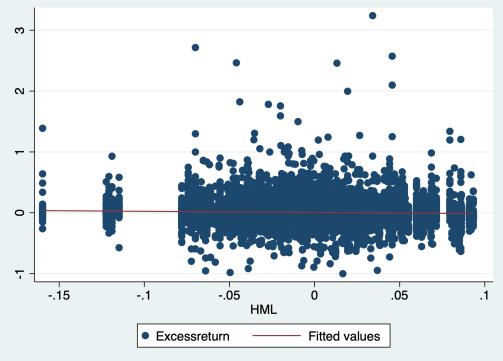
A linear regression model assumes that there is a linear relationship between the dependent and the independent variables. Scatter plots can detect such a relationship. Looking at the scatter plots below, we can confirm a linear relationship between the dependent and the independent variables.



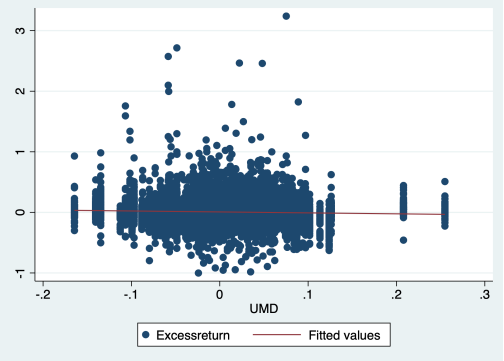
Relationship between the dependent variable and the independent variable Market Premium



Relationship between the dependent variable and the independent variable SMB



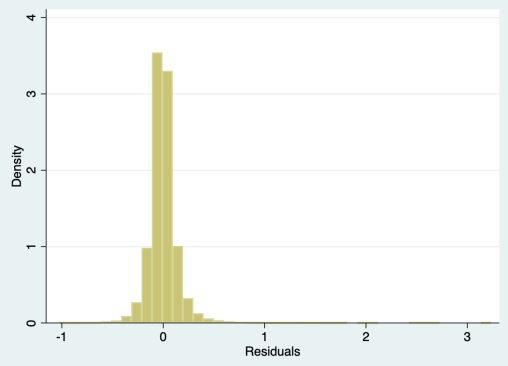
Relationship between the dependent variable and the independent variable HML

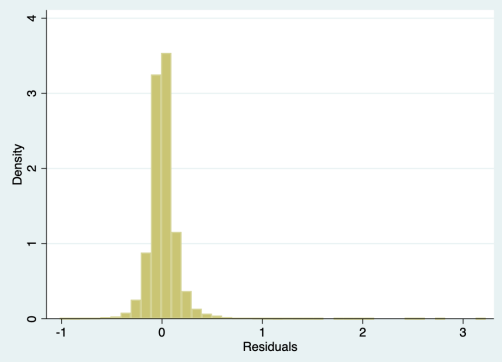


Relationship between the dependent variable and the independent variable MOM (momentum)

9.2.2 Multivariate normality

We want to check and verify that the residuals between the observed and predicted values are normally distributed. We create a variable of the residuals and display the distribution using a histogram. First, we perform the test for a regression not restricted to announcements. Second, we perform the same test for a regression restricted to the first event month.





No restrictions *Restricted to the first event month*

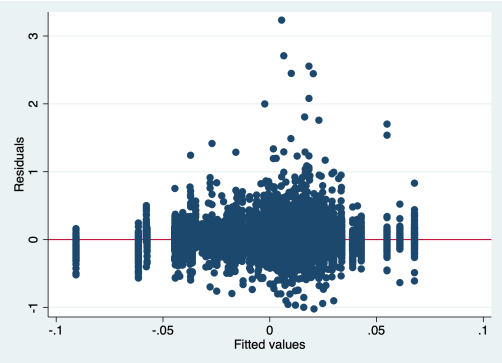
As we can see from this histogram, the residuals are normally distributed, and consequently, multivariate normality is present in the model.

9.2.3 Homoscedasticity

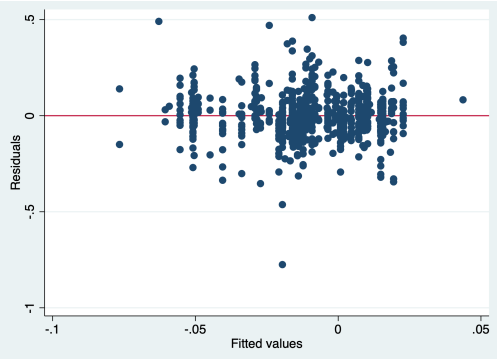
To confirm that the assumption of homoscedasticity is confirmed, we check for heteroscedasticity. We perform a Breusch-Pagan/Cook-Weisberg test on our linear regression. As we perform multiple linear regressions on the same dataset, we first perform the test for a regression performed on the entire dataset, not restricted to announcements. After that, we perform the same test where we perform the first monthly regression for all announcements.

	chi2(1)	**Prob>chi2**
Full dataset	0.84	0.3581
Month 1 all announcements	2.39	0.1224

Full dataset



Month 1 all announcements



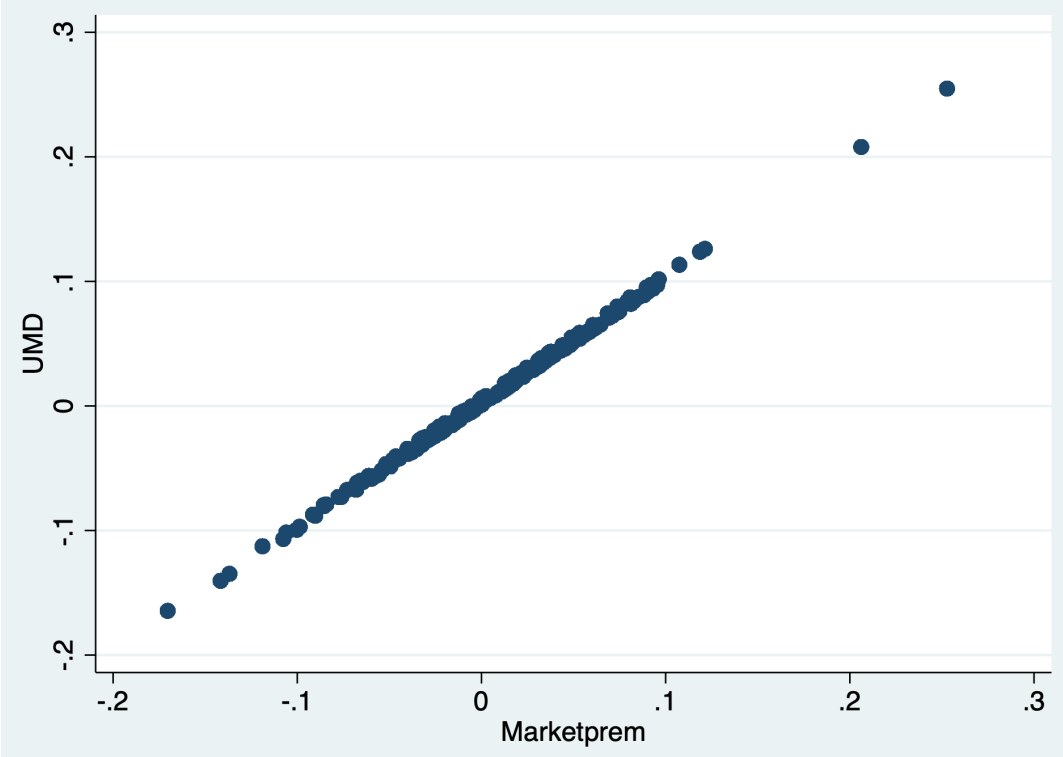
In neither one of our tests we can confirm that heteroskedasticity is present. Therefore, we assume homoscedasticity.

9.2.4 Multicollinearity

Multicollinearity occurs when the independent variables are highly correlated with each other. We report the correlation coefficients between the independent variables in the correlation matrix below.

	Market prem.	**SMB**	**HML**	**MOM**
Market prem.	1.0			
SMB	0.0962	1.0		
HML	-0.0754	0.0135	1.0	
MOM	**0.9995**	0.0990	-0.0720	1.0

We see that market premium and UMD are variables that highly correlate with each other. This linear relationship is detectable in the scatter plot below



9.3 The logit model

9.3.1 Hausman test for random-effects vs fixed-effects

	Fixed	Random	Difference	Standard error
Cash to assets	0.0378921	0.5573726	-0.5194805	0.678836
Abnormal return	-2.593358	-2.501497	-0.0918619	0.1838324
Dividend yield	-0.3744887	-0.3116903	-0.0627984	0.138287
Leverage	-0.0138036	0.0276933	-0.0414968	0.0252849

Prob>chi2 = 0.4419

The Hausman test assumes that the random-effects estimator is fully efficient under the null hypothesis. The corresponding high p-value (>5) means that we can not reject the null hypothesis. Therefore, we have to assume that random-effects is the correct choice for our model.

9.3.2 Multicollinearity

Multicollinearity occurs when the independent variables are highly correlated with each other. We report the correlation coefficients between the independent variables in the correlation matrix below.

	Cash to assets	Abnormal return	Dividend yield	Leverage	Industry	Year
Cash to assets	1.0					
Abnormal return	0.0278	1.0				
Dividend yield	0.0983	-0.0005	1.0			
Leverage	-0.1425	-0.0428	0.0909	1.0		
Industry	0.0398	0.0529	-0.0088	-0.0294	1.0	
Year	-0.1060	-0.0095	0.0015	0.0011	0.0745	1.0

None of the independent variables have a high correlation with one another. Therefore we have no violation of the assumption of no multicollinearity in this model.

9.4 Preliminary thesis

Introduction

Firms repurchasing their own shares often experience a period of abnormal returns, this is known as the buyback anomaly. There is a lengthy list of literature that documents the long-term abnormal stock return as a buyback anomaly. For example, Ikenberry, Lakonishok & Vermaelen (1995), who analysed effects in the period 1980-1990 on the U.S market, found average abnormal buy-and-hold returns of 12,1% over the four years following the announcement. Further, Peyer and Vermaelen (2009) analysed the years 1991-2001 on the U.S market. Their results support the findings of abnormal returns, and conclude that the buyback anomaly still exists. However, similar to the mentioned studies, most studies of abnormal returns are conducted on the U.S market (e.g. Grullon and Michaely, 2004; Chan, Ikenberry and Lee, 2004; Acharya and Pedersen, 2005).

The literature regarding the Norwegian market and abnormal return is narrow, and few studies have targeted the existence of abnormal returns and associated drivers. Johannes Skjeltorp's study from 2004 investigated Norwegian firms in the period from 1998 through 2001 and concluded that abnormal returns due to buyback programs exist in the Norwegian market. In this thesis we will examine buybacks from a more recent time period to conclude whether abnormal returns in the Norwegian market still exist. We will replicate the methodology from Androu et al. (2018). They follow Peyer and Vermaelen (2009) and use the three-factor model by Fama and French (1993), combined with the four-factor model by Carhart (1997). In addition, we will examine potential drivers for these anomalies. In order to conduct this examination we will account for hypotheses for buybacks proposed in the literature.

Motivation for study

Share buybacks have become increasingly popular in the U.S. from the late 1900. This is due to the fact that regulations changed to allow firms to conduct open market share repurchase. In Norway, open-market share buybacks were allowed from the 1st of January 1999 (Aksjeloven, 1997).

The research question is interesting for a number of reasons. Firstly, there is little research on this subject concerning the Norwegian market. There is reason to believe that the amount of share buybacks and the results of these buybacks is different in Norway, compared to the U.S. In the U.S., there are no requirements of announcing open-market buyback purchases. Buybacks of stocks are virtually unregulated (Palladino, 2019). In Norway, all trades must be disclosed the day after the repurchase, so all repurchases are observable to the rest of the market (Skjeltorp, 2004).

Secondly, the reasons for announcing a share repurchase is interesting. Our literature review will review some plausible motives behind buybacks, and our analysis will hopefully reveal which motives seem to be ones that result in firms buying back their shares. As there are multiple motives behind buying back shares, we are interested in how this affects the share prices in the future, specifically if there are abnormal returns on the share in the time following the purchase. This paper will increase our understanding of the buyback anomaly in Norway.

Research question

Our research question is as follows: What drives share repurchases in Norway? Does the buyback anomaly exist in Norway, and what could be the underlying reasons for the abnormal return?

Repurchases and the buyback anomaly

In Norway, a firm can repurchase and hold up to 10% of outstanding shares (Børs, n.d.). The firms need ⅔ of the votes at the general assembly to announce a repurchase program. The general assembly also decides maximum face value and a price interval for the shares to be repurchased. The maximum length of a repurchase program, and an extension of the program can only be decided by a new vote by the general assembly. The firm's holding of its own shares does not initiate voting power or dividend payout.

Market underreaction

The underreaction hypothesis states that the market treats repurchase announcements with skepticism, and therefore, there are incomplete reactions to the announcement of buyback programs. This leads to prices adjusting slower over time (Ikenberry et al., 1995).

Further, Ikenberry et al. (1995) stated that the average market response to the news of an open market share repurchase is only 3,5%. This seems inconsistent with the undervaluation stated by the managers. Either the market ignores the signaling or the managers are overly optimistic.

Buyback anomaly

The buyback anomaly is a persistent stock market anomaly. A market anomaly means that the predictability is inconsistent with maintained theories of asset pricing (Schwert, 2003). Ikenberry et al. (1995) and Grullon and Ikenberry (2000) found positive long-run abnormal returns for firms in the 48 months following share repurchase announcements. Different explanations have been proposed, but the most mentioned theory in research is that mispricing drives the anomaly. When managers announce a stock repurchase, they either try to signal the undervaluation of their stocks to the market, or they try to time the market (Andreou et al., 2018).

Research methods

Our thesis will be based on both literature reviews and qualitative research. To investigate the motives for buybacks, we will assess existing research to find plausible motives which we then will test. To confirm whether or not the buyback anomaly exists in Norway, we will gather qualitative data and perform a regression analysis.

Literature review

Motives for buybacks

There is plenty of literature and hypotheses on reasons for share buybacks, and this paper will list and elaborate on the most common motives from the literature (e.g Skjeltorp, 2004; Ikenberry et al, 1995; Grullon and Michaely, 2004). The motives appropriate for data collection will be tested against the buyback anomaly to see whether one or more of the motives are drivers for abnormal returns.

Signaling

A motive for repurchasing shares can be the desire to signal that the stock price is undervalued compared to the actual values of the firm. Since there is asymmetric information between the market and the management, buybacks can serve as a strong signal. Several announcements are argued by underpricing and this is equivalent with unexpected increases in the payout ratio. On the other hand, the latter one is considered to be a stronger signal due to the risk it entails for the management (Skjeltorp, 2004).

Capital structure adjustments

This hypothesis assumes that there exists an optimal capital structure, and firms use buybacks of stocks to achieve the optimal relationship between leverage and equity. Therefore, if the leverage is below the target leverage of the firm, the firm is more likely to repurchase shares.

Takeover defense

In fear of being acquired, a defense method can be to repurchase stocks. Given that the buyback gives a positive reaction in the market, the lowest price possible to pay in order to take over the firm increases. This hypothesis states that firms at a higher risk of being taken over are more likely to repurchase stocks.

Excess cash distribution

When the capital of a firm exceeds its investment opportunities, the firm can choose to either distribute the excess capital to its shareholders or retain the capital. Distribution to shareholders can happen through share buybacks or increased dividends. In these cases, share buyback is often preferred because as with signaling, the firm does not entail the risk of having to decrease the payout ratio in the future (Dittmar, 2000).

Substitution of cash dividends

A firm may adjust their dividend policy according to what is most beneficial for the shareholders in terms of tax. This depends on the relative taxation on dividend compared to taxation on capital gains. In the U.S, the taxation on capital gains has traditionally been lower and has been argued as an important matter for why the amount of share buybacks has increased (Skjeltorp, 2004).

According to Mitchell and Dharmawan (2007), whether a firm prefers share repurchase over dividends is decided through the marginal tax rate of the main shareholders. Shareholders with high marginal tax will prefer capital gains and deferred tax, over dividend payout and immediate tax. On the other side, due to the Norwegian tax law, dividends can be transferred with deferred tax through a holding firm.

Buybacks in Norway

Buybacks in Norway were prohibited by law until 1999 when the Norwegian Public Limited Liability Companies Act of June 13, 1997 was established. After

the new legislation, buybacks have been increasing over time. However, the literature and research on share buybacks in Norway is still narrow and few studies have targeted the existence of abnormal returns and associated drivers. A study conducted by Johannes Skjertorp, published in 2004, investigated buybacks and effects on return regarding the Norwegian market. He examined Norwegian firms' announcements of repurchases and actual repurchases in the period 1998 through 2001.

He concluded that establishment of a buyback program has value for the shareholders and yields long-term abnormal returns. The Norwegian market does not stand out on this matter compared to other markets. He also found that there are differences in the long-term effects between firms that chose to execute their right to repurchase stocks and firms that chose not to. The first one resulted in expected performance while the latter one resulted in long-term abnormal returns. He also found that the announcement of buyback programs is perceived as positive news in the market, as the stock price on average increases by 2,5%.

Regression analysis

To confirm whether or not firms have long-run abnormal returns after announcing a share buyback, we will replicate the methodology from Androu et al. (2018). They follow Peyer and Vermaelen (2009) and use the three-factor model by Fama and French (1993). Momentum is added as a fourth factor, which is known as the Carhart (1997) four-factor model. The abnormal returns are computed with Ibbotson's (1975) RATS method, which adjusts for risk changes in event time. Like Androu et al. (2018), we will consider long-run abnormal returns between 1 and 48 months after the announcement of the open market repurchase program.
The following cross-sectional regression is run each event month until 48th month after the announcement:

$$R_{i,t} - R_{f,t} = a_j + b_j(R_{m,t} - R_{f,t}) + c_j SMB_t + d_j HML_t + e_j MOM_t + \varepsilon_{i,t}$$

The three factor-model aims to explain stock market deviations from the capital asset pricing model (Fama & French, 1993). The advantage of this method is that changes in equity risk from before to after the buyback is better attributed. For example changes in leverage. The reason is that month-by-month after the buyback, the loadings of each factor are allowed to change. Admittedly only in the cross-sectional average, and not for each firm.

$R_{i,t}$	Monthly return on security i in the calendar month t
$R_{f,t}$	Risk-free rate
$R_{m,t}$	Return on the equally weighted OSEBX-index
SMB_t	Small minus big share size portfolio
HML_t	High minus low book-to-market portfolio
MOM_t	Momentum factor

In order to construct the variables SMB and HML, and similar to Fama and French (1993), we will first have two portfolios with shares sorted by market share. One portfolio consisting of the 10% smallest shares and the other consisting of the 10% largest shares. Second, we will have three groups sorted by book-to-market. One portfolio consisting of the firms below the 30th percentile, the second consisting of firms between the 30th and 70th percentiles and the last one consisting of the firms above the 70th percentile. Firms with high book-to-market have shares considered as value shares and those with low book-to-market have shares considered as growth shares.

This yields six portfolios; big-growth (BG), big-neutral (BN), big-value (BV), small-growth (SG), small-neutral (SN), and small-value (SV). Finally, the variables are computed the following way (Fama and French, 1993):

SMB	⅓ (Small Value + Small Neutral + Small Growth) – ⅓ (Big Value + Big Neutral + Big Growth)
HML	½ (Small Value + Big Value) – ½ (Small Growth + Big Growth).

The extension to the three factor-model, the MOM-variable, is the average return on two high prior return portfolios minus the average return on two low prior return portfolios. It is constructed by the two size portfolios used when calculating SMB and HML and three new portfolios. The latter ones are sorted by the prior 2-12 monthly returns with breakpoints below the 30th being low, between the 30th and 70th being medium, and above the 70th percentiles being high. This, combined with the size portfolios, yields six portfolios; small high, small medium, small low, big high, big medium, and big low. Finally, the variable is computed the following way (Carhart, 1997):

MOM	1/2 (Small High + Big High) - 1/2 (Small Low + Big Low)

Variables for buyback motives

We will not construct variables and test all of the mentioned motives for share buybacks, due to the difficulty of attaining decent data. Therefore, we will only test the hypotheses that can be credible quantified into our model.

Capital structure adjustments hypothesis variable

When constructing this variable, we will use the method of Dittmar (2000). The target leverage ratio will be estimated by the median leverage ratio of the industry, and is the proxy for the optimal capital structure. We apply the median leverage of the industry, by contrast to the entire market, because of the different

characteristics of each industry that might affect the leverage. The variable will then be constructed by the difference between a firm's leverage ratio in the year prior to the repurchase and the target leverage ratio.

$$\frac{NetDebt}{Equity} - \frac{NetDebt_{Industry}}{Equity_{Industry}}$$

If the hypothesis holds, the variable will have negative values.

Substitution of cash dividends hypothesis variable

The substitution of cash dividends hypothesis is challenging to test. Grullon and Ikenberry (2000) proposes that repurchases and dividend payouts are motivated by similar factors. If that is the case, comparing dividend payout ratios to repurchase rates might not provide any useful information regarding the motive for repurchasing.

For a firm that is fairly priced, cash dividends and share repurchases are economic equivalents (Ikenberry et al., 1995). The only difference would be handling of tax. If the substitution of cash dividends is a motive of buybacks in Norway, we can assume that only a fair priced firm would perform a buyback with this motive. Our hypothesis is therefore that in cases where the buyback anomaly does not exist, the motive for the share repurchase is substitution of cash dividends. To test this theory, we will use the results from our four-factor model regression.

Excess cash distribution hypothesis variable

Mitchell and Dharmanwan (2007) captured cash surplus in two measures. Firstly, we use total cash balance immediately before the buyback relative to the total assets of the firm. Total cash, by contrast to operating cash, is applied due to being more consistent with the view of agency costs that result from a build up of total cash rather than operating cash. Second, we use the current ratio of total assets over total debt at the balance date prior to the buyback (CR). The shortage of

growth opportunities is presented as a proxy, assets-in-place, which is the book value of shareholders equity relative to market value of equity. Combining the measures of cash surplus and assets-in-place yield the interaction variable FCF-Cash or FCF-CR.

Signalling hypothesis variable

Mitchel and Dharmawan (2007) use the abnormal return, computed by using the average return in the industry, one year prior to the buyback. The abnormal return of the firm will be compared against the median abnormal return in the industry.

$$Return\ of\ Firm\ -\ Return\ of\ Industry$$

The greater the underpricing, the greater values will the variable have. Negative values may imply that the share price is not undervalued.

Data collection

We will collect data on repurchase announcements and stock returns from 2005 until 2019. The firms listed on the main list of the OSE will be the basis. The financial data necessary for calculating the variables used in the regression will be collected from a suitable database. We will need data on stock returns in a period of 48 months after the repurchase announcement. Repurchase announcements after 2015 will therefore be excluded. To follow Andreou et al. (2018), we will only include firms that have at least 36 months of stock return data prior to the announcement.

Daily returns and the factor portfolios necessary to construct the HML-, SMB- and MOM-variable will be collected from Bernt Arne Ødegaard's website (2019). He is a Professor of Finance at the University of Stavanger and publishes data from OSE and calculates, among others, useful data for asset pricing investigation. The factor portfolios from his data are calculated the same way as Fama and French

(1993) and Carhart (1997). The monthly risk-free rate will also be collected from the respective website.

Progression plan

Month	Progress
January	Hand in the preliminary thesis. Prepare for data collection.
February	Collect and structure data. Prepare the data to test the hypotheses and start analyzing the results. Schedule a meeting with our supervisor.
March	Finalize theory and methodology.
April	Start with the analyzing part. We should have a draft of this part at the end of the month. Schedule a meeting with our supervisor.
May	Finalize the analysing part, and at the minimum have a draft of discussion and conclusion.
June	Finalize the thesis. Proofread, review and hand in.