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What are the Implications of Dividend Changes?

An Empirical Study of Dividend Signaling in the Norwegian Stock Market

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Abstract

The purpose of this thesis is to investigate the dividend signaling theory's relevance at the Oslo Stock Exchange in the period from 2006 to 2018. First, we analyze the short-term effects of dividend changes, measured by the abnormal stock returns around the dividend declaration day. Second, we investigate the long-term effects of dividend changes by regressing future earnings changes on dividend changes and a set of control variables.

We find significant abnormal stock returns when firms announce dividend increases, which are followed by superior changes in earnings the following year after the declaration day, being robust to several controls for expected earnings, including past earnings, returns, and matching. When split by firm size, the superior change in earnings the following year is only significant for smaller firms. However, the increase in earnings is just temporary, as we find no permanent increases in earnings for horizons up to two and three years. When applying alternative accounting measures of earnings, the dividend changes' ability to predict earnings disappears even for the first year. Unchanged dividends contain limited information content both for the short- and long-term, whereas dividend decreases provide mixed results. While presenting partly support for the dividend signaling theory, this explanation does not provide a fully satisfying answer as to why Norwegian listed firms pay dividends. Evidently, firms have different incentives to pay dividends, and the signaling theory is only one of several viable explanations to the "dividend puzzle".

Keywords: Dividends, Signaling Theory, Market Reactions, Information Content, Oslo Stock Exchange

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This partnership came together through our shared interest in the stock market which has led to countless valuable discussions between the two of us during our studies. The work with this thesis has challenged us to put our theoretical and practical knowledge about finance to test, as well as skills learned in econometrics and programming courses.

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1. Introduction

1.1 Background

Dividends are one of the most observable corporate governance components and have received extensive attention in the academic literature, yet there is no consensus as to why the phenomenon of dividend payments exists. The American economist Fisher Black presented the following confession in his famous article "The Dividend Puzzle":

"The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don't fit together" (Black, 1976, p. 5).

Despite being described as an unsolved "puzzle", the concept of dividends is straightforward: to distribute wealth from the firm to the shareholders, often as cash payments. The paradox is, however, that the shareholders already own the company, which muddles the seemingly uncomplicated picture. Why still pay dividends, then? And what do they signal? If anything? Knowing that firms all over the world distribute dividends, there must be some loose pieces out there. This thinking encouraged us to dig into one of the mysterious, unsolved problems in finance.

While some theories argue that investors simply prefer to receive a check with cash over stock returns,[1] recent studies have dedicated extensive attention to the dividend signaling theory (e.g., Benartzi, Michaely, & Thaler, 1997; Brav, Graham, Harvey, & Michaely, 2005; Ham, Kaplan, & Leary, 2018[2]). In short, this concept suggests that dividend payouts are used as an instrument to convey information to the market about future earnings. That is, dividend increases imply that management is so confident regarding future earnings levels that the new level of dividends will be sustained over time.

Baker, Mukherjee, and Paskelian (2006) surveyed managers of firms at the Oslo Stock Exchange (OSE) and provided evidence in support of the dividend signaling explanation: *"For firms in general, the evidence suggests that dividend policy plays a possible role as a signaling mechanism"* (Baker et al., 2006, p. 175). Beyond this survey and the study of Capstaff,

[1] This theory, known as the "bird-in-the-hand" theory, is described in section 2.1.6.
[2] Note that Ham et al. (2018) published a revised version of their paper in 2019. Our thesis is primarily based on the initial paper from 2018.

Klæboe, and Marshall (2004), there is limited empirical research on the relevance of the dividend signaling theory for firms listed at the Oslo Stock Exchange. Thus, we aim to extend the existing literature by testing the dividend signaling explanation in the Norwegian stock market.

Our master thesis is inspired, among others, by the work of Capstaff et al. (2004), Andres, Betzer, van den Bongard, Haesner, and Theissen (2012), and Ham et al. (2018). The two first-mentioned studies provide insight into share price reactions in the wake of dividend changes, while the latter paper examines the long-term signaling effects of dividends. Thus, they lay the foundation of this thesis with regards to methodology and formulation of research questions.

1.2 Hypotheses

The main objective of this master thesis is to investigate the dividend signaling theory and its validity in the Norwegian stock market. This paper comprises two research questions, hypotheses 1 and 2, in which we examine the short-term and long-term outcomes of the dividend signaling theory, respectively. The short-term effects are measured by share price reactions, while the long-term consequences are measured by changes in earnings. As proposed by Capstaff et al. (2004), we define hypothesis 1 as the "first stage" and hypothesis 2 as the "second stage" of the dividend signaling theory.

1.2.1 Hypothesis 1: Short-Term Effects of Dividend Changes

H_0: Share prices are not affected by dividend announcements (i.e., no new information to the market).

1.2.2 Hypothesis 2: Long-Term Effects of Dividend Changes

H_0: Positive (negative) dividend announcements are not followed by permanent higher (lower) earnings.

1.3 Structure

The paper contains seven chapters which are structured as follows; in chapter 2 we start by presenting the most prominent theories as to why firms pay dividends, followed by a literature review of recent academic research on dividends with focus on agency- and signaling-based theories. Chapter 3 offers a review of the tax systems in Norway and the U.S., while chapter 4 describes how the data used in this thesis is collected and structured. Furthermore, we present the methodologies which are applied in the first and second stage of the dividend signaling theory in chapter 5, and chapter 6 shows the empirical results of our hypotheses. Lastly, we provide concluding remarks in chapter 7.

2. Theoretical Framework

2.1 The "Dividend Puzzle"

Although Dutch East India Company paid dividends back in the 17^{th} century (Gelderblom, de Jong, & Jonker, 2013), research on firm distributions started in earnest in the 1950s. Lintner (1956), who conducted a study on American companies, designed the foundation of the modern understanding of dividend policy (Brav et al., 2005). John Lintner's paper emphasizes that managers only raise dividends when they are confident that earnings have permanently increased. This signaling effect has ever since Lintner (1956) been heavily discussed and is one of the most prominent explanations as to why corporate dividends exist. Nevertheless, firms' incentives to pay dividends are disputed as the literature is contradicting.

2.1.1 Dividend Irrelevance Theory

Miller and Modigliani's (1961) contributions in the famous paper "*Dividend Policy, Growth, and the Valuation of Shares"* are linked to the relevance of dividend policy. The Miller and Modigliani (MM) irrelevance preposition suggests, under certain circumstances, that neither capital structure nor dividend policy affects firm value. When companies are to decide a mix of leverage and dividend payout strategy, Miller and Modigliani (1961) highlight that companies are slicing an already fixed pie into different pieces (DeAngelo & DeAngelo, 2006). Thus, firm value and subsequent shareholder wealth are solely decided by companies' investment strategy and ability to generate earnings, not capital structure or dividend distributions.

The rationale behind the irrelevance of dividend strategy is that dividends will be equally offset by a corresponding decrease in the share price. Higher dividend payout in any period is equivalent to raising additional external capital in the future, in order to maintain desired investment levels (Miller & Modigliani, 1961). A firm's value will remain the same regardless of dividend payments, as rational investors do not care whether returns stem from dividends or stock appreciation. If investors were expecting higher dividends, they might sell a fraction of their shares to construct the expected cash flow. Conversely, if dividends turn out to be higher than anticipated, investors might reinvest some of their excess cash into new shares, accordingly. The inferences drawn are, however, derived from the assumption of perfect capital markets; tax neutrality, no transaction costs, no agency costs, rational investors, and symmetric market rationality. Notwithstanding the implausible assumptions, the MM dividend preposition is still an essential part of modern dividend theory.

In the wake of Miller and Modigliani's discouraging hypothesis, Black (1976) offers, when considering market imperfections, some possible explanations as to why corporations still pay dividends. Fisher Black points out, among others, that investors may be utterly irrational in believing that non-dividend stocks should not be held. Nonetheless, Black (1976) also argues that investors are aware of dividend taxation and may prefer low-dividend stocks. Thus, he portrayed dividends as the "unsolved puzzle".

2.1.2 Tax Distortions

As emphasized by Black (1976), taxes can affect the attractiveness of dividends compared to capital gains when taxed differently. When dividends are taxed more heavily than capital gains, a company should, in theory, defer from paying any dividends and instead distribute cash to the owners through share repurchases to maximize shareholder value. By shifting the dividend policy this way, firms can transform dividends into capital gains and thus return more value to shareholders. Miller and Modigliani (1961) acknowledged the imperfection of a substantial personal tax advantage to capital gains and argued that in a case where taxes matter, firms that pay dividends should trade at a discount. Historically, taxes on capital gains have not exceeded taxes on dividends, which in turn signify that taxes usually do not offer any endorsements in favor of paying dividends (Damodaran, 2014).

A study by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000) finds no conclusive evidence on the effect of taxes on dividend policies across different countries. There is also little evidence linking tax to signaling models. As an example, Amihud and Murgia (1997) show that stocks in Germany and the U.S. react similarly to dividend announcements, although there was, at the time, a tax advantage to dividends in Germany and a disadvantage in the U.S. Brav et al. (2005) and Baker et al. (2006) found that American and Norwegian managers do not prioritize tax considerations when deciding dividend policy. Thus, there is modest support for the tax-preference explanation.

2.1.3 Clientele and Catering Theory

Another branch of the tax effect on dividend policy is the clientele effect, originally mentioned by Miller and Modigliani (1961). The clientele effect suggests that investors will be attracted to firms that have dividend policies consistent with their preferences. Important factors for the clientele effect include different tax advantages between different entities[3] and different tax rates between low- and high-income earners.

Closely related to the clientele argument, Baker and Wurgler (2004a) came up with the catering theory of dividends, which also relaxes the market efficiency assumption. This theory asserts that firms' propensity to pay dividends is driven by investor sentiment. Managers cater to shareholders by paying dividends when desired, i.e., when investors put a stock price premium on dividend companies. A stock price premium occurs when investors are willing to pay for specific firm characteristics despite not necessarily increasing the fundamental value of the company (Baker, Greenwood, & Wurgler, 2009). Investors simply put a high stock price on dividend firms relatively to non-paying firms. On the contrary, if the investor sentiment is placing a discount on dividend companies, managers may cater to shareholders by avoiding such distributions. Hence, this theory expounds that managers are maximizing the share price by utilizing time-varying mispricing affiliated with dividends (Baker & Wurgler, 2004a).

Although fundamental similarities, the clientele and catering explanation differ as the latter concentrates more on the global level of demand for dividends, that is, aggregated investor sentiment in lieu of individual preferences (Baker & Wurgler, 2004b). Both theories, however, do not in isolation provide fully satisfying evidence for the motivation of paying dividends. Hence, we need to extend our theoretical foundation by presenting alternative propositions.

2.1.4 Signaling Theory

In contrast to MM's irrelevance theory, there is evidence that the information content in a firm's dividend policy may affect the value of the stock. In economics, the signaling theory describes a situation where one party (the agent) credibly conveys information to another party (the principal) to reduce information asymmetry (Spence, 1973). In our case, the dividend signaling theory assumes that a change in the dividend proposed by the board may communicate new information to the market about future business prospects, which cannot be expressed credibly otherwise. The dividend signaling explanation says that a change in the

[3] E.g., pension funds are in some jurisdictions tax-exempt.

proposed dividend can communicate a change in future economic profitability, and thus affect the value of the stock.

To clarify how corporate financial managers communicate through dividend policy, Lintner (1956), Baker, Farrelly, and Edelman (1985), Baker and Powell (2000), and Brav et al. (2005) conducted surveys of managers' views on dividend policy in the United States through the last decades. Their findings are surprisingly consistent through different periods and mainly confirm that managers signal important information through dividend announcements. Among the similarities, the studies found that managers set dividends that are tied to long-term sustainable earnings, the dividends are smoothed[4] from year to year, and the managers are reluctant to cut dividends unless the firm faces significant continuous losses. In contrast to Lintner's era, Brav et al. (2005) found that managers put less emphasis on increasing dividends in tandem with earnings and that keeping a target payout ratio is no longer the highest priority. Besides, repurchases are used more extensively than in the 1950s (Brav et al., 2005).

Baker et al. (2006) surveyed managers of Norwegian firms listed on the OSE about dividend policy and asked the same questions as Baker and Powell (2000) and Baker, Veit, and Powell (2001) on U.S. listed firms. Thus, the researchers were able to compare the results directly, although with varying periods and sector compositions. Baker et al. (2006) found that in all three surveys, three factors were ranked among the five most important in influencing dividend policy: (i) level of current earnings, (ii) stability of earnings, and (iii) expected future earnings. However, there were also many substantial differences between the markets. Norwegian firms ranked legal rules and constraints as the sixth most important factor in influencing dividend policy among the 22 questions, in contrast to much lower rankings by managers of U.S. listed firms. Baker et al. (2006) attribute the latter to Norway's centralized government control and stricter regulatory standards of businesses which ensure shareholders' rights. Moreover, the firms listed on the OSE put significantly less emphasis on the pattern of past dividends, the worry of affecting the stock price, the needs of current shareholders, and the concern that a dividend change may provide a false signal to investors. The evidence from Baker et al. (2006) expresses some support for the signaling explanation for Norwegian firms, while the results

[4] Dividend smoothing takes place when dividends are stable over time instead of being a function of annual, perhaps volatile, earnings.

are unclear to whether the managers believe investors use dividend announcements as a tool to value stocks.

Easterbrook (1984) criticizes the dividend signal theory and points to the fact that firms can simply issue disclosures of their prospects as an alternative to the more expensive and unclear signal of dividends. Investors may question the credibility of these statements, but Easterbrook emphasizes that these statements can be controlled by consultants, auditors, or lawyers who will face reputable damage for verifying a false claim. Also, managers may ultimately be subject to suit charges for false claims or omission of material facts. However, we highlight that dividends had a tax disadvantage relative to capital gains in the U.S. at the time of Easterbrook's study. Thus, his criticism may not be as relevant either to the U.S. market after 2003 nor the Norwegian market.[5]

2.1.5 Agency Theory

Agency costs offer another conceivable reason as to why dividends are so widespread among corporations. If one assumes that managers are not perfect agents for their owners, agency costs may be substantial to the owners, both in terms of bonding, monitoring, and losses from slippage (Easterbrook, 1984). As such, agency costs occur when managers and owners have conflicting interests. Put differently; managers may want to pursue their own interests which are not necessarily congruent to those of the investors. Risk appetite is often highlighted in this context; while managers have tied up a substantial part of personal wealth in the company, investors have the option to diversify, and consequently being less averse to risk (Brealey, Myers, & Allen, 2014). This contradiction may encourage managers to build up slack and large cash balances in order to reduce idiosyncratic risk of the company, contrary to investors who might see excess cash as rather value-destroying. Conflicts of interest between managers and owners are typically prevailing when the firm generates considerable amounts of free cash flow (Jensen, 1986).

Jensen (1986) sheds light on the potential issue of high agency costs due to substantial free cash flow. He suggests that paying dividends or repurchasing stock is more value-accretive than deploying the cash into low-return projects. Dividends transfer resources from companies to shareholders, which leave the firms leaner so that the managers are forced to invest in

[5] See chapter 3 about taxes.

projects that yield the highest returns for their shareholders. Also, less cash surplus may reduce the risk of wasting money on gratuitous perks and other less value-enhancing prospects. In other words, dividend distributions can reduce agency costs by being a sharpening corporate governance mechanism. Jensen (1986) claims that significant stock price declines associated with dividend cuts are consistent with the theory of high agency costs of free cash flow.

Denis and Osobov (2008) investigated firms' motivation for paying dividends in six countries and found support for the agency-based theory. Notably, they highlighted the life-cycle hypothesis which depicts a trade-off between flotation cost savings and agency costs of retaining surplus cash. When companies mature, the propensity to pay dividends may increase due to higher expected agency costs of substantial free cash flow (Denis & Osobov, 2008). This view is consistent with the elderly findings of Grullon, Michaely, and Swaminathan (2002) who presented the analogous "maturity hypothesis"; as firms advance in the life-cycle, firms boost dividends due to lack of growth opportunities. Such an increase has implications on at least two stages. First, it means that the idiosyncratic risk of the company is reduced, which is entirely positive. Second, it may also indicate that the firm's profitability is declining. According to Grullon et al. (2002), positive share price reactions to dividend increases may imply that investors favor agency considerations over declining profitability.

2.1.6 "Bird in the Hand" Theory

The "bird in the hand" theory, developed by Gordon (1960) and Lintner (1962), was initially presented as a counterbalance to the dividend irrelevance theorem. This theorem is based on the assumption of market imperfections, consistent with the vast majority of theories that support dividend distributions. The basic principle is simple; investors prefer dividends to capital gains as the latter is associated with higher uncertainty. Stock appreciation might or might not materialize irrespective of firms' decision to retain earnings. If true, it means that investors are merely risk averse. As such, this inference was later acknowledged as the "bird in the hand" theory because it is presumably better to have a bird in the hand rather than two in the bush (Bunge & Wendelken, 2009).

Furthermore, Gordon and Lintner claimed that the irrelevance prepositions of Miller and Modigliani were wrong in not taking into consideration the dividends' effect on the cost of capital. In the wake of the "bird in the hand" theory, they argued that lower payouts were equivalent to increased cost of capital. In response, Miller and Modigliani (1961) referred to the theory as a fallacy as most of the investors will reinvest their dividends, either in the same firm or in a firm with similar risk characteristics.

Although simple, the "bird in the hand" theory has gained considerable attention in academic research. In line with the view of Gordon (1960) and Lintner (1962), Al-Malkawi (2007) also points out that dividends are appreciated differently than retained earnings if there is information symmetry. However, this conjecture has been extensively criticized, as demonstrated by Miller and Modigliani (1961), and has a lack of empirical support (Hussainey, Mgbame, & Chijoke-Mgbame, 2011).

2.1.7 Efficient Market Hypothesis

The efficient market hypothesis (EMH) is pivotal in the debate of whether dividend announcements affect the firm value. Since the early 1970s, the EMH is one of the most well-researched hypotheses in economic literature, yet there is no consensus as to whether it holds (Sewell, 2012). Under the EMH, a market is adequately efficient if the share prices reflect all information available. The markets tend, however, not necessarily to be fully efficient. Fama (1969) proposed three forms of market efficiency: weak, semi-strong, and strong. In the weak form, stock prices reflect only historical price data, whereas semi-strong markets require that stock prices reflect not only past prices but also other public information available (Brealey et al., 2014). Hence, semi-strong markets indicate that stock prices will react immediately to new public information. The strong market efficiency implies that all information, public as well as insider information, is discounted in stock prices. The latter form is regarded as an unrealistic view of reality (Fama, 1969).

In our study, the EMH's implications are related to how the share price will adjust in the aftermath of dividend announcements. The market may systematically overestimate or underestimate relevant information, which can lead to firms with abnormal returns over time (Petit, 1972). Conversely, dividend announcements, for instance, should be reflected immediately in semi-strong efficient environments if they provide any new information to the market, whereas all potential effects should have been already reflected in a strong form efficient market. If the strong form applies, signaling theory does not hold because it does not make any sense to signal if all information is already embedded in the share price.

2.2 Literature Review

2.2.1 Are Dividends Disappearing?

After the millennium shift, some empirical studies have questioned dividends' remarkable standing amid investors. Fama and French (2001) addressed this topic when they reported a sizeable decline in the number of companies distributing dividends in the U.S. Amihud and Li (2006) argue that the "disappearing dividend" is a consequence of increasing holdings by well-informed institutional investors, which curtail firms' propensity to use dividends as a costly signal. Such decline in dividends may offer support to theories viewing dividends as something rather worthless, in line with Brav et al.'s (2005) conclusive remarks failing to answer why dividends and share repurchases even exist. However, recent literature by Denis and Osobov (2008) claims that this plunge in dividends is driven by newly listed firms that are unable to implement dividends when expected, and that the distributions in absolute terms are on the rise as aggregated dividends in six of the largest capital markets have not dropped.[6] The "reappearing dividend" is later supported by Michaely and Moin (2017) stating that, since 2000, the proportion of dividend-paying firms has been increasing. Hence, there is evidence that dividends are still highly relevant to investors.

The following sections (2.2.2 and 2.2.3) will review the two theories which have received the most empirical support in recent academic literature: agency theories and signaling theories.

2.2.2 Evidence of Agency Theory

Recent literature has put increased focus on agency-based perspectives when aiming to solve the "dividend puzzle". As such, (i) ownership structure, (ii) shareholder protection, and (iii) organizational setup are among the leading "pieces" being discussed. Michaely and Roberts (2012) compare privately and publicly held firms in the U.K. and show that the latter group of companies smooths dividends significantly more than the private ones. The paper of Michaely and Roberts further points toward information asymmetry and agency conflicts as, at least partly, explanations for why public listed companies tend to smooth dividends. Consequently, private firms with concentrated shareholder bases, and thereby negligible agency conflicts,

[6] Denis and Osobov (2008) conducted the study in the following six countries: the U.S., Canada, U.K., Germany, France, and Japan.

have relatively lower payouts and dividends seem to be more correlated to earnings (Michaely & Roberts, 2012). These findings are consistent with those of Leary and Michaely (2011) who document that American companies, in which agency costs are high, apply dividend smoothing more frequently. Higher agency costs may appear in old firms, low-market-to-book firms, and firms with weak governance. Moreover, Bodnaruk and Östberg (2012) extend the literature by providing support to the perception that shareholder composition affects dividend policy; smaller shareholder bases entail lower payouts.

Despite only examining privately held Norwegian firms, Berzins, Bøhren, and Stacescu (2018) shed light on differences in payout policy between firms with majority shareholders owning about 50% of the shares, to those having some 95% of the shares. Interestingly, they highlight that the average payout level is 50% higher for the first group, suggesting that marginal majority owners employ voluntary dividends to build trust and reduce agency conflicts (Berzins et al., 2018). Similar to the Norwegian study, Burns, McTier, and Minnick (2015) examine whether dividends are used as a substitute for mitigating agency costs in European countries. They establish evidence to the concept that companies in weak investor protected jurisdictions may pay higher dividends in order to uphold a friendly relationship with the minority shareholders. This is consistent with the shareholder protection approach of Alzarahni and Lasfer (2012), finding that firms in strongly regulated markets appear to pay lower dividends than firms in weak shareholder protection countries when dividends are subject to "double taxation"[7]. The researchers explain this anomaly by specifying that protected shareholders weigh tax costs of dividends versus the gain of mitigating agency costs, while shareholders with less protection welcome whatever dividend they can obtain despite high tax costs (Alzarahni & Lasfer, 2012). The overall findings may indicate that companies implement dividends to reduce agency conflicts and maintain trust as well as reputation between shareholder groups.

Jordan, Liu, and Wu (2013) put attention on organizational structure when it comes to shaping dividend policy. Their main discovery is that conglomerates on average pay more dividends than pure plays because the entities in conglomerates can offer bridge financing to one another. The findings imply that retaining cash flow to maintain financial slack is a crucial consideration when companies make dividend decisions (Jordan et al., 2013). In sum, this

[7] Double taxation: when dividends are taxed at the firm level and then at the personal level.

study adds to the literature which introduces different types of agency costs as a rationale for why some firms pay dividends, and others do not. However, it seems evident that modern agency theory does not offer all the loose pieces to the "dividend puzzle".

2.2.3 Evidence of Dividend Signaling Theory

Together with agency-based theories, the dividend signaling theory is still a heavily debated explanation of why firms pay dividends. As described in section 1.2, the dividend signaling effect can be broken down into two stages (Capstaff et al., 2004). The first stage is that dividend changes convey information to the market, measured by the initial stock reaction on the announcement day. The second stage is whether dividend changes are followed by permanent changes in economic profitability[8].

To test the first stage of the dividend signaling theory, one can investigate whether stocks generate significant, abnormal returns when the firms announce dividend changes. Pettit (1972) found that the market reacts significantly to announcements of changes in dividends. Furthermore, he discovered a large anticipation effect with abnormal returns prior to the dividend announcement, which may be due to factors such as significantly improved earnings that are correlated to dividend changes. On the Oslo Stock Exchange, Capstaff et al. (2004) found support for the first stage with significant abnormal returns associated with announcements of dividend changes in the sample period from 1993 to 1998. Their results are robust to two different models of dividend expectations, one "naïve model" where the expected dividend is the same as last year, and a second model based on analysts' forecasts. Furthermore, their results are robust to the impact of earnings announcements.

The evidence of the second stage of the dividend signaling theory is less conclusive than the first stage. For U.S. firms listed between 1979 and 1991, Benartzi et al. (1997) recognized that firms that increase dividends have experienced significant earnings increases in the previous year and the current year, but found no unexpected earnings[9] the following year, which indicates that there is no significant information content of future earnings in dividend announcements. However, the firms that increase dividends have some positive excess returns in the following three years. Consistent with Lintner's model, Benartzi et al. (1997) confirmed

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[8] Various measures are used to reflect the underlying profitability, e.g., cash flow, reported earnings, and adjusted earnings.
[9] The study refers to «unexpected earnings» as a significant change in earnings which cannot be explained by other factors than a dividend change.

that firms that increase dividends are less likely to experience a decline in future earnings. Their results indicate that the increase in earnings is fairly permanent.

Arguably, the prevailing view among researches is that dividends do not contain information about future earnings (DeAngelo, DeAngelo, & Skinner, 2008). As an example, Grullon, Michaely, Benartzi, and Thaler (2005) cast doubt over the second stage of the dividend signaling theory when they claim that dividend changes are uncorrelated with future earnings changes after controlling for non-linearities in the earnings process. However, a recent paper by Ham et al. (2018) challenges this view with robust evidence of dividend changes predicting unexpected future earnings up to three subsequent years for U.S. listed firms in the period 1972-2015. The study of Ham et al. (2018) is robust to several proxies to expected earnings, such as the non-linear relation between the size of the dividend and the market reaction. Importantly, Ham et al. (2018) control for several factors which may affect the results.[10]

In the Norwegian market for the period 1994-2002, Capstaff et al. (2004) report somewhat mixed evidence of permanent changes in cash flow following dividend changes. Their results indicate that managers of Norwegian companies do not use dividend changes solely to signal permanent cash flow increases. In some instances, a dividend change may convey information about current or recent performance, but not the management’s view of future earnings. However, the market correctly discriminates between dividend announcements indicating permanent cash flow increases as opposed to the alternative future cash flow profiles (Capstaff et al., 2004). The problem was that empirical tests were not able to distinguish between these alternative interpretations, according to Allen and Michaely (2003) and Capstaff et al. (2004). The mixed results of Capstaff et al. (2004) may be a consequence of empirical evidence indicating that dividends are better described as lagging rather than leading earnings (Miller, 1987), and that a change in dividend may signal a change in the firm’s risk (Grullon et al., 2002). In the Scandinavian markets, Liljeblom, Mollah, and Rotter (2015) studied whether dividends signal future earnings in the period 1969-2010 and found strong support in Sweden and some support in Norway.[11]

[10] Ham et al. (2018) control for (i) endogenous investment and asset write-downs, which often accompany dividend changes, and thus create a wedge between the accounting earnings and the underlying economic profitability, (ii) a control group with matched samples of non-changers of dividends (Benartzi et al., 1997), and (iii) analysts’ earnings forecasts.

[11] Liljeblom et al. (2015) carefully applied methodologies to address problems of endogeneity, non-stationarity, and autocorrelation. According to Liljeblom et al. (2015), most prior studies on the relationship between dividends and earnings have used OLS estimation, which may lead to spurious results if the variables are non-stationary.

While most research has focused on changes in earnings following dividend announcements, two recent empirical studies show that dividends signal safer (less volatile), rather than higher, future earnings (Lee & Mauck, 2016; Michaely, Rossi, & Weber, 2018). Other recent studies have focused exclusively on dividend reductions; Jensen, Lundstrum, and Miller (2010) demonstrated that earnings rebound following a dividend reduction. Still, the share price drops following the dividend cut, which Jensen et al. (2010) attribute to the loss in value of the firm's real options. Baker, Mendel, and Wurgler (2016) used the theory of loss aversion to create a model where past dividends are reference points for future dividends, and the model proved to be consistent with market reactions to dividend cuts.

To sum up, the conflicting conclusions in academic research concerning the connection between dividend changes and future earnings may be a result of different methodologies and research designs.

2.3 Summary

As described in section 2.1.1 to 2.1.6, the myths regarding dividend payouts are heavily debated among researchers and other industry professionals. Yet it seems to be no consensus whether firms should even pay dividends and why many tend to do so. Initially, we laid the foundation of this chapter by presenting the famous contributions of Miller and Modigliani, which were followed by a brief introduction of potential tax distortions. Furthermore, contrasting theories as to why corporations pay dividends were presented. Clientele effects, catering, signaling, agency, and the "bird in the hand" theory propose somewhat different approaches to understand why companies pay dividends despite obvious drawbacks. In recent literature, particularly signaling theory and agency theory have been widely examined through various methods and retain arguably the most relevance and credibility.[12] Nevertheless, it is safe to presume that no theory separately provides satisfactory answers as to why firms pay dividends since the explanation is dependent on factors that vary largely between individual firms. To conclude, it should not come as a surprise that Brealey et al. (2014) list the "dividend puzzle" as one of ten unsolved problems in finance.

[12] See section 2.2.2 and 2.2.3.

3. Taxes

Tax has ever since its introduction to the capital markets been deemed as one of the most eminent market imperfections. Depending on the jurisdiction, tax rules may hamper or stimulate investors' appetite for dividend payments. Thus, it is valuable to scrutinize local taxation rules in order to identify any potential tax distortions. The objective of this chapter is twofold: First, we aim to provide an overview of the Norwegian tax system, before and after the tax reform in 2006. Second, as most dividend research is derived from the United States, we will also outline the U.S. institutional framework and compare it to the Norwegian scheme.

3.1 The Norwegian Tax System

3.1.1 The Norwegian Tax System Before 2006

The Norwegian tax design post World War II was characterized by social democratic principles in terms of high tax rates and special tax deductions. Tax reforms in 1987 and 1992, however, marked an end of this thinking by the introduction of a market-oriented tax model (Christensen, 2018). The purpose of these reforms was to reduce distortions and ensure an efficient allocation of capital in the Norwegian economy. In 1992, the Norwegian Government coined a framework based on the principles of reduced tax rates, tax symmetry for deficits and profits, and tax neutrality across different types of income (Klette, 2010).

In order to mitigate double taxation, the new scheme meant that dividends were taxed on companies' hands with 28% tax, while investors received a deduction equal to the income tax of 28%.[13] This course of action entailed that dividends were only taxed at the corporate level (Skatteetaten, 2003). Likewise, capital gains were also exempt from double taxation with the implementation of the RISK[14] method, which secured that investors could adjust capital gains with an amount based on the company's taxed capital every year. The tax effects on dividends and capital gains are illustrated in table 1.

[13] In Norwegian: "Godtgjørelsesmetoden".
[14] RISK: Regulering av Inngangsverdi med Skattlagt Kapital.

Table 1: Example of Tax on Dividends and Capital Gains Before 2006

	Dividends	Capital gains
Net income before tax	100	100
Company tax rate	28%	28%
Net income after tax	72	72
For distribution	72	72
Personal capital income tax	28%	28%
Dividend deduction rate	28%	
RISK adjustment		28%
Distribution to shareholders	**72**	**72**

Source: Sandvik (2007). The example assumes that the conditions for dividend deduction and risk adjustment are upheld.

3.1.2 The Norwegian Tax Reform of 2006

Despite offering stimulus to the Norwegian economy during the 90s, the reform of 1992 provided at least one indisputable drawback. Due to substantial differences in marginal tax on labor income and capital income, the incentive to camouflage labor income as capital income was massive (Christensen, 2018). This loophole was the main motivation for the newest tax reform implemented in 2006 (Thoresen, 2009). Thus the shareholder model[15] replaced both the deduction method for dividends and the RISK method for capital gains (Klette, 2010). Since then, dividends and capital gains are being taxed with an equal rate[16] after the deduction for risk-free return[17] is subtracted. This deduction is calculated by multiplying the basis for deduction for risk-free return[18] with the risk-free interest rate[19]:

*Deduction for risk-free return = Basis for deduction for risk-free return * Risk-free interest rate*

The intention of the formula above is to guarantee that only returns in excess of risk-free investments are being taxed. The risk-free interest rate is calculated by the Directorate of Taxes based on the three-month interest rates for treasury bills (Skatteetaten, n.d.). With the arrival of the shareholder model, capital income is now subject to double taxation, i.e., it is taxed both at the corporate level and the personal level:

[15] In Norwegian: “Aksjonærmodellen”.
[16] 22% in 2019.
[17] In Norwegian: “Skjermingsfradrag”.
[18] The basis for deduction for risk-free return is defined as the acquisition costs of shares plus any unused deduction for risk-free return from previous years. This is called “skjermingsgrunnlag” in Norwegian.
[19] In Norwegian: “Skjermingsrente”.

Table 2: Example of Tax on Dividends and Capital Gains After 2006

	Dividends	Capital gains
Net income before tax	100	100
Company tax rate	22%	22%
Net income after tax	78	78
For distribution	78	78
Personal capital income tax[20]	31.68%	31.68%
Deduction for risk-free return[21]	8	8
Distribution to shareholders	**78 – (78–8) * 0.3168 = 55.82**	**78 – (78–8) * 0.3168 = 55.82**

Source: Inspired by Jeng and Valderhaug (2009).

Although the input variables vary when calculating the deduction for risk-free return, the general trend is that investors' personal capital income is taxed more heavily after the reform in 2006. Dividends and capital gains belonging to other firms are, however, tax-exempt in order to prevent that they are taxed multiple times before being distributed to individual investors.[22] I.M. Skaugen's preliminary results report for 2005 portrays how the tax reform affected the firms' dividend policy ahead of the coming transition:

"Due to the changes in the Norwegian tax legislation it would be unfavorable for the Norwegian personal shareholders to have dividend declared at the ordinary general meeting of the company in 2006 with subsequent payment. Therefore the Board decided to propose an extraordinary dividend distribution in December 2005 related to the full calendar year 2005, rather than in 2006, as would be normal course of business." (I.M. Skaugen, 2006, p. 8).

With the introduction of the share savings account[23] in 2017, retail investors (i.e., personal taxpayers) could choose to defer taxes on realized capital gains, while dividends had to be taxed on an ongoing basis, such that capital gains were favorable over dividends from a pure tax perspective. However, taking effect from 2019, tax on dividends may also be deferred, indicating that the Norwegian tax legislation is fairly neutral when it comes to dividends versus capital gains (Skatteetaten, n.d.).

[20] Despite a nominal tax rate of 22%, the effective tax rate, as of 2019, is 31.68% (22% * 1.44) due to an adjustment factor of 1.44 aiming to maintain tax symmetry in the wake of lower corporate tax. See: Regjeringen (2018).
[21] 1000 * 0.8% = 8. The basis for deduction for risk-free return is in the example assumed to be 1000, while 0.8% is the risk-free interest rate for 2018.
[22] This scheme is called "fritaksmodellen" in Norwegian.
[23] In Norwegian: "Aksjesparekonto".

3.2 The U.S. Tax System

During the 20th century in the U.S., dividends were taxed as ordinary income while capital gains were taxed at a significantly lower rate since the inception of tax on capital gains in 1954 (Damodaran, 2003). In 1986, the Tax Reform Act (TRA) implemented a 28% tax on both dividends and capital gains, but this neutrality lasted only for six years when capital gains once again became superior to dividends. Despite a historical distortion toward capital gains, Damodaran (2003) stresses that marginal tax rates differ to a large extent among individual investors. For example, some poorer and older investors may have a marginal tax rate close to 0%, while wealthy investors may witness marginal tax rates above 35%. Differences in personal tax rates are creating a somewhat obscure overview of the tax reality.

In May 2003, the U.S. Congress passed "The Jobs and Growth Tax Relief Reconciliation Act of 2003" (JGTRAA) which proposed a preliminary halt on the tax discriminations by making dividends count as capital gains in lieu of normal income (Cato Institute, 2006). Initially, the majority of the tax cuts in the reconciliation act were intended to expire after 2010, but JGTRAA was practically sustained by the Fiscal Cliff Tax Deal in 2012 (Tax Foundation, 2013). This means that the current U.S. tax code is providing equal treatment to qualified dividends and long-term capital gains, and ordinary dividends and short-term capital gains, respectively (Kurt, 2018). Investments held less than a year qualify as ordinary dividends or short-term capital gains and are being taxed to one's ordinary income tax rate. If an investment is held for at least a year, it will be classified as a qualified dividend or long-term capital gains. Depending on the investor's tax bracket, taxes on long-term investments range from 0% to 20% (Frankel, 2017). Altogether, current tax legislation separates short-term holdings and long-term holdings, but it is fairly neutral for dividends versus capital gains.

3.3 A Comparison of the Tax Frameworks in Norway and the United States

Although the Tax Cuts and Jobs Act (TCJA) reduced the American corporate tax substantially in 2017 from 35% to 21% (Tax Foundation, 2018), both the Norwegian and the U.S. tax system are classical frameworks in the sense that dividends are subject to double taxation. Dividends are first taxed at the corporate level before they are distributed to investors and taxed additionally in most cases. Another similarity is that today's legislation offers close to neutral taxation on dividends versus capital gains, which implies that investor preferences should, in theory, not be affected by tax motives. However, the U.S. framework's neutrality is not necessarily straight-forward as is it nuanced by different marginal tax rates and the amount of time the investments are held. These two components are not present in the Norwegian scheme.

As mentioned in section 3.2, the institutional framework in the U.S. has historically been designed such that share repurchases, and hence capital gains, have been advantageous to dividends. Therefore, it is worth noticing that many international studies prior to 2003 are based on the premise that dividends are taxed more heavily than capital gains. The Norwegian system has, on the other hand, treated dividends and capital gains roughly equal. Moreover, due to lower personal taxes (maximum 20%) on qualified dividends in the U.S., one can argue that investors' appetite for dividends might be greater overseas. In sum, the existing tax frameworks of the two countries differ in some respects, but they are both established on the principles of double taxation and tax neutrality.

4. Data

Chapter 4 comprises three sections, all of which are related to our data sets. We start with an overview by presenting the data we have applied in our study. Subsequently, we elaborate in detail the dividend sample's selection process. The last section of this chapter is summarizing the final dividend sample using descriptive statistics.

4.1 Data Collection

This study is based on data from Norwegian listed companies in the period 2006 to 2018. Although firms paid dividends before 2006, we find it applicable to set this year as a starting point for at least three reasons: Firstly, there are no major tax changes within this time frame which ensures that widely different tax regimes do not overlap, and thereby create unnecessary noise.[24] Secondly, the early 2000s represent an increased use of electronic trading (Oslo Børs, n.d.), which has in general contributed to higher liquidity and less noise in the share price movements. Eventually, in 2005, the Bloomberg database made it possible to collect historical analyst consensus on earnings per share (EPS) and dividend per share (DPS). This feature plays a decisive role when applying the analyst model[25].

The dividend announcement sample is the most comprehensive data set applied in this study. It was created by assistance from the Amadeus database at the Norwegian School of Economics and the Bloomberg terminal. The former database provided a comprehensive list of historical dividend payments, while the latter source served as an essential supplement by providing declaration dates, ex-dates, record dates, payable dates, and dividend types. Declaration dates and dividend types were of particular interest as they showed announcement dates and whether there was a regular cash dividend, respectively. The information was then merged and aligned into one data set, which initially comprised 1604 dividend announcements at the Oslo Stock Exchange.[26] After a cleansing process described in section 4.2, the sample was reduced to 517 dividend announcements. This process involved to cross-check any

[24] See section 3.1.
[25] See section 5.1.4 for details of the analyst model
[26] Announcements with an omitted/suspended dividend are included.

dividend announcement during the thirteen-year period against Newsweb[27] to quality control all events.

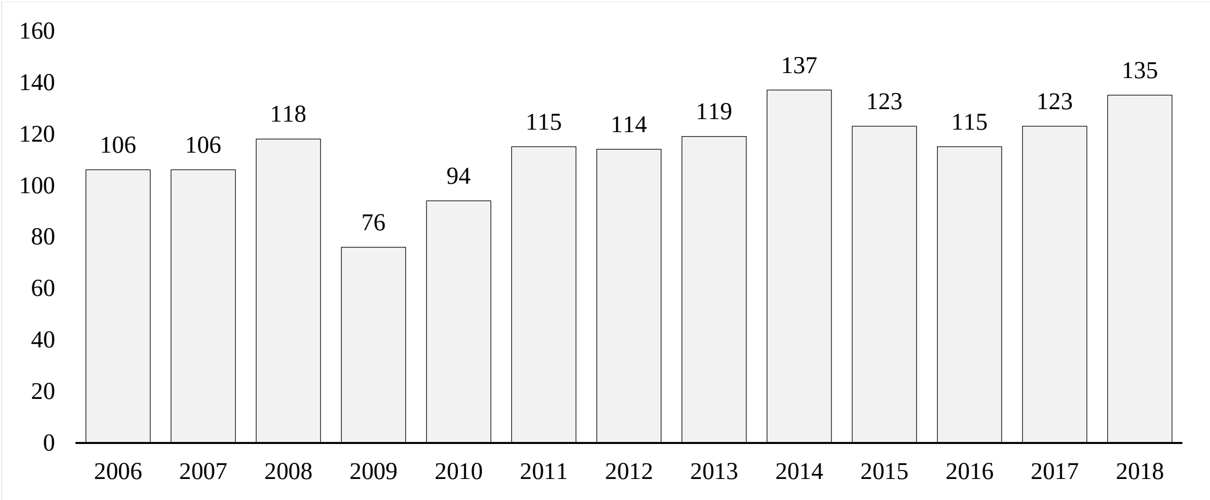
To calculate abnormal returns in the estimation window,[28] we collected daily closing prices, adjusted for dividends, splits, reverse splits, and mergers & acquisitions (M&A) on relevant stocks from Bloomberg (2019). These total return observations were seen in context to the market index, represented by the Oslo Benchmark Index (OSEBX). This index is the leading indicator for the Norwegian stock market and reflects a representative selection of all listed companies (Oslo Børs, n.d.). Hence, the OSEBX was used as a proxy when estimating the market portfolio in the market model.[29] Daily closing prices for the OSEBX were obtained from the Oslo Stock Exchange. Data exclusively used for the second stage of the dividend signaling theory, such as historical earnings, cash flows from operations, and gross profits were also derived from the Bloomberg database. Thus, this database, which we assess as reliable and accurate, served as our primary data source.

4.2 Sample Selection

Figure 1 depicts the complete distribution of regular cash dividends from 2006 to 2018. During this period the number of dividend payments has been relatively stable, averaging 114[30] payments a year. The financial crisis led to only 76 dividends payments in 2009, in contrast to the preliminary peak in 2014 recording 137 cash dividends. Of the 1481 cash dividends, 1047 events are classified as an annual event, of which positive dividend announcements, i.e., a nominal increase in the dividend year-over-year, occur most frequently (654 events). However, announcements when firms reduce their dividends (204 events) are not unusual, nor are unchanged dividends (189 events).

[27] Newsweb is the web service provider of stock exchange announcements from the Oslo Stock Exchange.
[28] See section 5.1.2.
[29] See section 5.1.1.
[30] Authors' calculations.

Figure 1: Regular Cash Dividends on the Oslo Stock Exchange (2006-2018)



Own calculations based on data from Bloomberg (2019).

The total sample, including annual dividend omissions/suspensions (123 events) and non-annual dividends (434), comprises 1604 events in total. Persistent with relevant literature[31], the initial sample is cut significantly by six prescribed criteria. The rationales behind the reduction are threefold; i) confine the sample to annual dividends, ii) mitigate bias in the event study, and iii) remove incomplete observations. To eliminate survivorship bias, we include firms that were not listed in the whole sample period (Capstaff et al., 2004).

Following the **first criterion**, we have limited this study to annual dividends as semi-annual dividends and quarterly dividends are often equal to the preceding payment and may convey less information to the market (Andres et al., 2012; Balachandran, Krishnamurti, & Vidanapathirana, 2012).[32] For instance, oil companies like Aker BP and Equinor currently keep dividends per share constant for all quarterly payments during a fiscal year.[33]

The **second criterion**, “Adequate liquidity”, and **third criterion**, “Minimum trading-days”, are established to ensure that the analysis contains announcements with calculable cumulative abnormal returns. Amihud and Murgia (1997) and Dasilas and Leventis (2010) addressed the problem of including low-volume stocks[34] because of the potential source of bias. Consistent with these studies, we have limited the sample to “actively traded shares” by establishing a

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[31] E.g., Capstaff et al. (2004), Amihud and Li (2006), Dasilas and Leventis (2010), and Andres et al. (2012).
[32] American studies focus on quarterly dividends as annual dividends are not common in the U.S. (e.g., Aharony & Dotan, 1994; Benartzi et al., 1997; Amihud & Li, 2006).
[33] 52% of all quarterly dividends were unchanged quarter over quarter in the initial sample.
[34] Stocks that might be dominated by noise due to sporadic trading and wide spread between the highest bidder and lowest seller.

liquidity constraint saying that a share's annual median turnover[35] must be at least NOK 100,000 in the year where a dividend is declared.

To clear away any dividend announcement surrounded by other significant events during its estimation window, the **fourth criterion**, "No material events", dampens the endogeneity problem by excluding announcements in which share price reactions are likely to be explained by other factors than the dividend announcement itself (Capstaff et al., 2004; Amihud & Li, 2006; Andres et al., 2012).

The **fifth criterion**, "Only regular cash dividends", restricts our sample to regular cash dividends because other types of dividends, such as extraordinary ones, may provide other information to the market (Amihud & Li, 2006). Finally, when firms have two share classes listed, e.g., A-shares and B-shares, the **sixth criterion** excludes the least liquid share class as both share classes should react similarly to dividend announcements if both classes have rights to receive dividends (Andres et al., 2012). Thus, the dividend announcements must fulfill the following criteria to be included in the final sample:

Table 3: Summary of the Selection Criteria

No	Criterion	Description
1	**Only annual dividends**	Excluded: Semi-annual and quarterly dividends are excluded (Andres et al., 2012).
2	**Adequate liquidity**	A share's annual median turnover must be at least NOK 100,000 in the year where a dividend is declared.
3	**Minimum trading-days**	A share must be traded at least 200 of 250 days prior to the announcement (e.g., Dasilas & Leventis, 2010), and at least nine of the eleven days in the event window.
4	**No material events**	Excluded: Dividend announcements with M&A (e.g., Amihud & Li, 2006), equity offerings (Capstaff et al., 2004), restructurings (Andres et al., 2012), and other events that adjust prices (Amihud & Li, 2006)[36].
5	**Only regular cash dividends**	Excluded: Dividend announcements with stock dividends (e.g., Dasilas & Leventis, 2010), extraordinary dividends (Amihud & Li, 2006), and extraordinary and ordinary dividends combined.
6	**Only one share class per firm**	Excluded: The least liquid share if multiple share classes (Andres et al., 2012).

The remaining dividend announcements are then placed into either of the two categories: "Analyst coverage" or "No analyst coverage". This distinction allows us to form an analyst

[35] Turnover is defined as the total value a stock is traded during a single trading day.
[36] Such as changes in management and significant contract announcements.

model, aiming to exploit dividends surprises.[37] Around 90% of all dividends were disclosed simultaneous to earnings announcements, often affiliated with the presentation of the fourth quarter results, while financial analysts covered 446 (86%) out of 517 firm-year observations. Furthermore, the dividend announcements are categorized to one of the following three portfolios depending on the information content:[38]

1. **Dividend increase:[39]** A dividend when the announced amount is higher than last year's:

$$D_{i,(y)} > D_{i,(y-1)} \tag{1}$$

2. **Unchanged dividend:** A dividend when the announced amount is equal to last year's:

$$D_{i,(y)} = D_{i,(y-1)} \tag{2}$$

3. **Dividend decrease[40]:** A dividend when the announced amount is lower than last year's:

$$D_{i,(y)} < D_{i,(y-1)} \tag{3}$$

It is worth emphasizing that the distribution from the classifications above conforms to the naïve model. The naïve expectation model (outlined in section 5.1.4) assumes that the expected dividend, $E(D_{i,(y)})$, is equal to last year's dividend, $D_{i,(y-1)}$, while the analyst model is based on analyst consensus' dividend expectations. That is, an annual change in dividend per share, e.g., from NOK 1 to NOK 2, is classified as an unchanged dividend announcement if the market expected it to increase by NOK 1. Thus, only the unexpected component of the dividend change is considered in the analyst model (Andres et al., 2012).

[37] See section 5.1.4.
[38] The changes in dividends are calculated using the dividends' respective currency. A dividend change is defined relative to the previous year's level (Balachandran et al., 2012).
[39] An initiation of a regular dividend, e.g., from NOK 0 to NOK 5, counts as a dividend increase.
[40] A suspension of a regular dividend, e.g., from NOK 5 to NOK 0, counts as a dividend decrease.

4.3 Descriptive Statistics

To maintain consistency throughout our analysis, the final sample of dividend announcements is applied on both hypotheses; i.e., the first and second stage of the signaling theory.[41] Table 4 summarizes how the initial sample of 1604 dividends was trimmed to 517 final observations:

Table 4: Data Cleansing

	No. of announcements	Criterion
Initial sample	1604	
Not annual dividend	434	1
Lack of trading	371	2, 3
Material event	186	4
Extraordinary dividend	59	5
Dual share class	37	6
Final sample	517	

Most of the excluded dividend announcements were removed as they were not classified as an annual dividend, but rather semi-annual, quarterly, or irregular. Moreover, 371 announcements did not satisfy at least one of the two criteria related to trading and liquidity, of which small savings banks constituted most of the removals. Another 186 dividends were declared jointly with a material event, particularly important contract announcements and M&A. In total 1087 dividend announcements were taken out as they breached at least one of the six criteria.

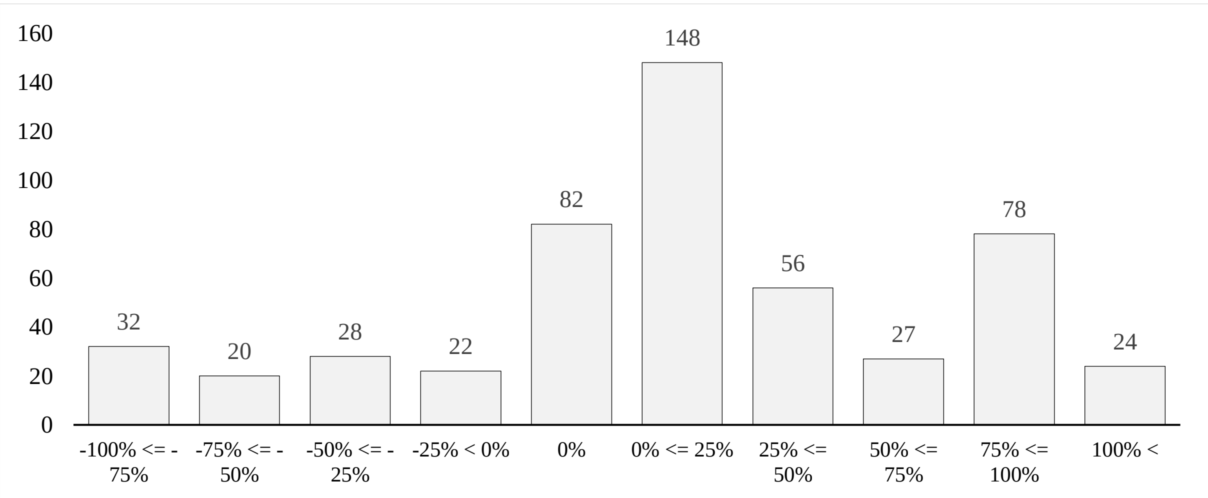
[41] Note that the matched sample analysis uses an extended sample in order to obtain a meaningful sample size. See section 5.2.5.

Table 5: Dividend Distribution by Year and Outcome

Year	Increases	Unchanged	Decreases
2006	29	4	10
2007	27	8	6
2008	25	4	8
2009	7	1	22
2010	26	6	2
2011	34	3	4
2012	17	3	17
2013	23	10	7
2014	27	10	3
2015	26	5	10
2016	21	10	7
2017	41	6	2
2018	30	12	4
Sum	333	82	102

Table 5 displays the final sample broken down by years and the outcome of the announcements. During the sample period, companies tend to raise dividends frequently. 333 (64%) of the dividend declarations in the sample are an increase from last year's dividend, measured in nominal terms. Another 82 (16%) events kept the annual dividend neutral compared to the preceding year, while the remaining 102 (20%) firm-year announcements cut dividends. Interestingly, Andres et al.'s (2012) study in the German market from 1996 to 2006 identified 56% dividend increases, 24% maintained dividends, and 10% dividend cuts in its total sample. These sample deviations might be a result of markets, ownership structures, different time frames, and chiefly, the extraordinary years of 2008-2012 embraced by financial turmoil.

Figure 2: Distribution of Dividend Changes



The average increase in dividend is 48%[42] while the average decrease reduces the dividend by -38%, compared to the median values of 25% and -33%, respectively. The noteworthy deviation between the average increase and the median increase is mainly explained by the 24 outliers seeing an increase of over 100% year of year. To exemplify, Norway Royal Salmon increased its dividend by 492% in 2017. Besides, 2017 stands in contrast to 2009 which was limited to only seven dividend increases, whereas the number of dividend cuts experienced a record high tally of 22 observations. Despite the lack of dividend increases in the wake of the financial crisis, 2010 and 2011 demonstrate that the firms are willing to restore dividends as the economy is recovering. Conversely, the European debt crisis' peak in 2011 might have dampened firms' propensity to pay dividends in the year thereafter; 2012 counted 17 dividend increases and 17 dividend reductions, enough to be the second worst year in the sample.

Table 6: Dividend Distribution by Industry

Sector	Increases	Unchanged	Decreases	Sum	% of sample	No. of firms
Communications	20	6	1	27	5%	4
Consumer Dis.	13	10	6	29	6%	10
Consumer Staples	48	11	14	73	14%	14
Energy	31	12	13	56	11%	16
Financials	107	14	39	160	31%	28
Health Care	2	0	1	3	1%	3
Industrials	48	12	16	76	15%	22
Materials	22	4	3	29	6%	5
Technology	39	8	8	55	11%	15
Utilities	3	5	1	9	2%	1
Sum	333	82	102	517	100%	118

Table 6 presents the sample's industry composition[43]. The sector distribution indicates that nearly one-third of the announcements are related to financial firms. The financial sector herein comprises insurance companies, conventional banks, investment banks, and savings banks, as well as investment companies and real estate firms. Excluding real estate, the sample's weight on financials (23%) is in line with OSEBX's financial exposure of approximately 21%[44]. The energy sector is, however, somewhat underrepresented compared to the index as many of the oil and gas companies distribute quarterly dividends. In total, the sample contains 118 unique firms with 517 disclosed dividends during the last 13 years.

[42] Excluding initiations and re-initiations of dividends.
[43] The Bloomberg Industry Classification Standard (BICS) is used to group the firms into their respective sectors. Level 1 of the BICS classification standard comprises the ten macro sectors displayed in table 6.
[44] Note: In terms of market cap, not number of companies.

5. Methodology

The varying empirical results of the dividend signaling theory show that the methodology must be carefully designed to test the theory properly (see section 2.2.3). Firstly, we test the first stage of the dividend signaling theory to see whether there are significant abnormal returns following dividend announcements on the Oslo Stock Exchange, using the naïve dividend model and the analyst model. Secondly, we test the second stage of whether increases (decreases) in dividends are followed by permanent higher (lower) earnings.

While many previous studies have used fiscal year earnings data to measure the long-term effect of dividend changes (e.g., Benartzi et al., 1997; Nissim & Ziv, 2001; Capstaff et al., 2004; Grullon et al., 2005), we instead use earnings data for the following twelve months (four quarters) after the dividend change.[45] This method is inspired by the recent findings of Ham et al. (2018), who claim that the use of fiscal year data can falsely reject the hypothesis that dividends contain information about future earnings.

To test our hypotheses, we use an event study approach which allows us to measure the impact of a specific event (MacKinlay, 1997), in this case, dividend announcements, on the value of the firm (hypothesis 1) and level of subsequent earnings (hypothesis 2). This methodology is described in more detail in Appendix B. The remainder of this chapter is structured as follows: Section 5.1 outlines the methodology used for the first stage, while section 5.2 expounds the methodology applied in the second stage.

5.1 Testing the Short-Term Effects of Dividend Changes

To test the first stage of the dividend signaling theory (whether dividend changes convey information to the market), we ultimately want to compute the cumulative average abnormal returns (CAAR) in the event window. The event window is the last five trading days before the event and the five trading days following the event denoted as *(-5, 5)*. In order to compute the CAAR, we estimate (i) the expected returns, (ii) the abnormal returns (AR), and (iii) the cumulative abnormal returns (CAR) in the event window. We also need a measure of the expected dividend. The following subsections describe the procedure of calculating average

[45] See Appendix B1.2 for an illustration of the difference between the event study methodology and the fiscal year approach.

abnormal returns (AAR) and CAAR, their statistical significance, and the expected dividend adopting the naïve model and the analyst model.

5.1.1 Estimating the Normal Returns

There are several statistical and economic models to determine the normal return of a stock. Among the statistical models, three of the most popular models are the constant mean return model, the market model, and multifactor models, which are all based on empirical evidence and statistical assumptions (MacKinlay, 1997). On the other hand, economic models are based on economic theories, like the Capital Asset Pricing Model (CAPM).

For our study, we will use the market model for several reasons: Firstly, since a portion of a stock return is related to the variation of the market return (beta), the market model reduces the variance of the abnormal return compared to the constant mean return model. Secondly, the gains from employing a multifactor model in event studies are limited unless there are common characteristics in the sample that create bias (MacKinlay, 1997). Lastly, evidence points to deviations from the CAPM due to the restrictions imposed by the model, which can be easily avoided by using the market model (MacKinlay, 1997).

The market model assumes a stable, linear relation between the market return and the stock return (MacKinlay, 1997). For any security i, the market model is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{4}$$

where $E(\varepsilon_{it} = 0)$ and $var(\varepsilon_{it}) = \sigma^2_{\varepsilon_i}$. The constant α is the intercept and the constant β is the slope of the regression which corresponds to the beta of the stock.

The market model is sensitive to our choice of estimation window, return interval, benchmark index, and potential adjustments. The estimation window for the regression estimates represent a trade-off as a longer estimation window provides more data, but firms can change over time. On the other hand, shorter estimation periods can be more affected by firm-specific events. Consistent with Capstaff et al. (2004), the estimation window includes 250 trading-days running from t = -261 to t = -11 (t = 0 is the announcement date).[46] The return interval

[46] Andres et al. (2012) and Dasilas and Leventis (2010) used 120 daily returns (-121, -2) and 200 daily returns (-220, -21) in the estimation window, respectively.

can be either daily, weekly, or monthly. Daily returns yield more data points, but the estimate can be noisy in less liquid stocks. Provided the liquidity measure (at least NOK 100,000 median turnover), we find it reasonable to use daily return intervals in the estimation period.

The benchmark index should ideally be a weighted average of all stocks in the market. As outlined in section 4.1, we use the OSEBX as a proxy, which is an investable and free float-adjusted index for the Oslo Stock Exchange. To summarize, we use the following inputs when computing the betas:

Table 7: Beta Estimation Inputs

Input	**Specification**
Estimation window	250 days (-261, -11)
Return interval	Daily
Benchmark index	OSEBX

5.1.2 Estimating the Abnormal Returns

The sample abnormal return ($\widehat{AR_{it}}$) for stock *i* at time *t* in the event window is defined as the difference between the realized return (R_{it}) and the expected return in the market model ($\hat{\alpha}_i + \widehat{\beta_i} R_{mt}$):

$$\widehat{AR}_{it} = R_{it} - \hat{\alpha}_i - \widehat{\beta_i} R_{mt} \tag{5}$$

Hence, the average abnormal return ($\widehat{AAR}$) in the event window from T_1 to T_2 for all firms can be denoted as follows:

$$\widehat{AAR}(T_1, T_2) = \frac{1}{N} \sum_{i=1}^{N} \widehat{AR}_{it} \tag{6}$$

The abnormal return ($\widehat{AR}$) for stock *i* is aggregated to a cumulative abnormal return which is specified as:

$$\widehat{CAR}_i(T_1, T_2) = \sum_{t=T_1}^{T_2} \widehat{AR}_{it} \tag{7}$$

The cumulative average abnormal return ($\widehat{CAAR}$) at time *t* can be calculated as the average cumulative abnormal return for stock *i* ($\widehat{CAR}_i$) throughout the event window (T_1, T_2):

$$\widehat{CAAR}(T_1,T_2) = \frac{1}{N}\sum_{i=1}^{N}\widehat{CAR}_i(T_1,T_2) \tag{8}$$

With respect to the first hypothesis (i.e., stage one), the average abnormal return on the announcement date ($t = 0$) and the cumulative average abnormal return in the event window ($T_1, T_2 = -5, 5$) are of the most interest as we need to consider the results on an aggregated level.

5.1.3 Statistical Significance of the Abnormal Returns

To test whether the average abnormal returns and the cumulative average abnormal returns are statistically significant, one must calculate the variance of the abnormal returns. As the variance is unknown, an appropriate estimator ought to be used (MacKinlay, 1997). One approach is the portfolio return approach in which the variance is estimated by a time series of abnormal returns (in the estimation window). However, this method understates the true variance of the event-period if there is reasonable to assume that the event period is associated with more variability (Kothari & Warner, 2004).

In our study, both earnings releases and dividend announcements might be factors which cause the event-period variance to exceed other time frames. Therefore, in line with the work of Andres et al. (2012), we adopt a cross-sectional approach to estimate the variance in order to allow for changing variance as a part of the null hypothesis (MacKinlay, 1997). This approach relies on the assumption that the abnormal returns are contemporaneously uncorrelated in the cross-section (MacKinlay, 1997). In 1980, Brown and Warner demonstrated that cross-sectional t-tests are robust to event-induced variance increase.

Using the cross-sectional t-test, ${\sigma^2}_{\widehat{AAR}_t}$ is the estimated variance of the average abnormal returns across firms at time *t* (Collins & Dent, 1984):

$${\sigma^2}_{\widehat{AAR}_t} = \frac{1}{N-1}\sum_{i=1}^{N}\left(\widehat{AR}_{i,t} - \widehat{AAR}_t\right)^2 \tag{9}$$

and the test statistic for testing H_0: AAR = 0 is given by:

$$t_{\widehat{AAR}_t} = \sqrt{N}\frac{\widehat{AAR}_t}{\sigma_{\widehat{AAR}_t}} \tag{10}$$

For the cumulative average abnormal returns, $\sigma^2{}_{\widehat{CAAR}}$ is the estimated variance across the sample:

$$\sigma^2{}_{\widehat{CAAR}} = \frac{1}{N-1}\sum_{i=1}^{N}\left(\widehat{CAR_\iota} - \widehat{CAAR}\right)^2 \qquad (11)$$

and the test statistic for testing H_0: CAAR = 0 is given by:

$$t_{\widehat{CAAR}} = \sqrt{N}\frac{\widehat{CAAR}}{\sigma_{\widehat{CAAR}}} \qquad (12)$$

5.1.4 Expected Dividend

A measure of the expected dividend is required to measure the impact of unexpected dividend announcements on stock returns. The events are grouped into either positive, neutral, or negative if the dividend is higher, equal to, or lower than expectations, respectively. Similar to other studies (e.g., Capstaff et al., 2004; Dasilas and Leventis, 2010), we first apply the naïve model of Aharony and Swary (1980) which assumes that this year's dividend proposal is equal to last year's dividend. However, as the naïve model does not account for expected changes, we test whether the results are robust to analysts' forecasts by using the analyst model.

The Naïve Model

The rationale behind the naïve model is that managers do not change dividends unless they expect a significant change in future prospects of the firm (Aharony & Swary, 1980). The model assumes that investors expect this year's dividend to be equal to last year's, and changes are interpreted as a revision in the management's expectations. The model is specified as follows:

$$E\left(D_{i,(y)}\right) = D_{i,(y-1)} \qquad (13)$$

where $E\left(D_{i,(y)}\right)$ is the expected dividend per share for firm *i* in year *y* and $D_{i,(y-1)}$ is the dividend per share last year. Based on the model, the dividends are grouped into dividend increases, unchanged dividends, and dividend decreases.

The Analyst Model

Unlike the naïve model, which is utilizing absolute changes in dividends, the analyst model aims to examine the actual unexpected component of dividend changes (Andres et al., 2012). Investors' expectations are influenced by information throughout the year which should be incorporated in analysts' estimates providing more up-to-date forecasts. Thus, it is reasonable to anticipate that the expected dividend is equal to the consensus estimate:

$$E\left(D_{i,(y)}\right) = \overline{AF}_{i,(y)} \qquad (13)$$

where $\overline{AF}$ is the average analyst forecast.

The analyst model implies that the sample is reallocated into new portfolios of increased, neutral, and decreased dividends. To be classified as an increase, the reported dividend should now be higher than the average analyst forecast. Dividends that are within (+/-) 5% of the analyst forecast are defined as unchanged dividends because the average analyst forecasts may consist of rounding errors and several decimals (Andres et al., 2012). Although such analyst models are common in the earnings literature, Capstaff et al. (2004) and Andres et al. (2012) are two of very few studies that have applied the analyst model in the dividend literature. According to Andres et al. (2012), the lack of historical consensus data may be the main reason as to why the use of the analyst model is currently limited.

5.2 Testing the Long-Term Effects of Dividend Changes[47]

The method for testing stage two (whether dividend changes are followed by permanent changes in earnings) is a replication to that of Ham et al. (2018). This recent study challenges the current consensus of modest long-term[48] signaling effects of dividend changes in the U.S. As the Norwegian capital markets differ, among others, in terms of dividend intervals[49], ownership structures, and market size, we check if this consent holds for the Norwegian stock market by adopting the altered method of Ham et al. (2018).[50] As such, we regress future

[47] See Appendix A for variable definitions.
[48] In our study, we define "long-term" as the following three years after the dividend declaration. Therefore, we will not focus on earnings changes beyond three years after the event.
[49] U.S. listed firms usually pay quarterly dividends while Norwegian listed firms often pay annual dividends.
[50] Firms classified as "financials" are not included in the sample as their profit and loss statements (P&L) do not correspond to the other listed firms. The exclusion of financials is in line with the method of Ham et al. (2018).

earnings changes, $\Delta E_{(y+n)}$, on the dividend change, $\Delta DIV_{(y)}$, while controlling for expected earnings using a series of control variables, leaving us with the following model specification:

$$\Delta E_{i,(y+n)} = \beta_0 + \beta_1 \Delta DIV_{i,(y)} + \sum \beta_j \, Controls + \varepsilon \qquad (14)$$

5.2.1 Earnings Change

The dependent variable, denoted as $\Delta E_{i,(y+n)}$, is the change in net income.[51] As net income may fluctuate substantially from one year to another, we apply alternative definitions of earnings to disentangle noise from the underlying economic profitability. By using gross profits and operating cash flows, the results are less prone to irregular asset write-downs and other impairments. To compute the earnings change for $\Delta E_{i,(y+1)}$[52], we use the difference between the sums of the four quarterly earnings announced before the dividend change and four consecutive quarters after the dividend change (Ham et al., 2018). Earnings announced the same day as dividends are classified as the prior quarter's earnings. The market value of equity is used as a deflator[53] (Benartzi et al., 1997; Ham et al., 2018), meaning that all earnings data are divided by the market value of equity one year before the dividend announcement.[54] Thus, similar to previous studies, we measure the annual change in earnings yield (E/P):

$$\Delta E_{i,(y+n)} = \frac{Earnings_{i,(y+n)} - Earnings_{i,(y+n-1)}}{Market\ Cap_{i,(y-1)}} \qquad (15)$$

5.2.2 Dividend Change

The dividend change, ΔDIV, is simply the annual change in dividends from one year to the next year in nominal terms, conforming to the naïve expectation model presented in section

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[51] Ham et al. (2018) use income before extraordinary items (IBQ), which (to our knowledge) is not available for OSE-listed firms.
[52] For $\Delta E_{i,(y+2)}$, the earnings change is calculated as the difference between the sum of the earnings in quarter 5 to 8 and quarter 1 to 4 following the dividend declaration, scaled by the market cap one year before the dividend declaration. Similarly, $\Delta E_{i,(y+3)}$ is the sum of quarter 9 to 12 minus the sum of quarter 5 to 8 scaled by the market cap one year before the dividend declaration.
[53] An alternative deflator is the book value of equity. The results of Ham et al. (2018) are unaffected by the choice of deflator.
[54] We stress that the deflator ($Market\ Cap$) remains constant for each event, i.e., the deflator does not change from y+1 to y+2 and y+3. Thus, the earnings yields are comparable over time.

5.1.4.[55] This coefficient is our variable of interest in the regression model and is calculated as follows:

$$\Delta DIV_{i,(y)} = \frac{DIV_{i,(y)} - DIV_{i,(y-1)}}{DIV_{i,(y-1)}} \tag{16}$$

5.2.3 Control Variables

In this section, we present the control variables proposed by previous literature which are attributed to all model specifications for the second stage of the dividend signaling theory. The variables are included to control for expected earnings changes in the absence of a dividend change (Ham et al., 2018).

Past Earnings Levels

To construct controls for expected earnings, we start by incorporating the four past quarterly earnings levels[56] as four independent control variables because these might provide information about future earnings levels. Alike the dependent variable (i.e., change in earnings following a dividend announcement), the earnings level declared *n* quarters before the dividend announcement, $E_{i,(q-n)}$, is scaled by the market capitalization of the firm one year before the dividend announcement (Ham et al., 2018):

$$E_{i,(q-n)} = \frac{Earnings_{i,(q-n)}}{Market\ Cap_{i,(y-1)}} \tag{17}$$

Past Quarterly Earnings Changes

With the same rationale as the past earnings levels, we control for the last four quarterly earnings changes, $\Delta E_{i,(q-n)}$. The change in earnings is defined as the difference between the earnings *n* quarters before the dividend announcement less the corresponding earnings for the same quarter in the preceding year, scaled by the market capitalization (Ham et al., 2018):

$$\Delta E_{i,(q-n)} = \frac{Earnings_{i,(q-n)} - Earnings_{i,(q-n-4)}}{Market\ Cap_{i,(y-1)}} \tag{18}$$

[55] We winsorize dividend changes at +200% in order to reduce their influence in the model specification (Ham et al., 2018).
[56] Earnings levels correspond to the reported earnings scaled by the market value of equity.

Non-linear Functions of Past Annual Earnings Levels and Changes

Grullon et al. (2005) argue that the regression results are prone to the method of controlling for mean reversion in earnings (Ham et al., 2018). Consistent with previous studies, we include six non-linear functions of past annual earnings changes and levels to control for non-linearity in mean reversion (Fama & French, 2000; Grullon et al., 2005; Ham et al., 2018). The earnings level is defined as the sum of the last four quarters prior to the dividend announcement, while the earnings change is the sum of the corresponding quarters' earnings changes. Three non-linear functions are assigned each for the earnings level and change (Ham et al., 2018):[57]

i. If the earnings level (earnings change) is negative, the variable is multiplied by one.
ii. If the earnings level (earnings change) is positive, the variable is squared.
iii. If the earnings level (earnings change) is negative, the variable is squared.

Returns before the Dividend Announcement

As a final control, we include returns over the 240 trading days prior to the dividend announcement. These returns are presumed to reflect information regarding future earnings (Ball & Brown, 1968) and are calculated as the difference between the daily compounded returns from firm *i* and the market portfolio[58] *m* over the same interval *j* to *k* (Ham et al., 2018):

$$Ret_{i,(j,k)} = \left[\frac{Price_{i,(k)}}{Price_{i,(j)}} - 1\right] - \left[\frac{Price_{m,(k)}}{Price_{m,(j)}} - 1\right] \tag{19}$$

5.2.4 Statistical Significance

To test whether the explanatory variable, ΔDIV, is statistically significant, we calculate the t-statistic, $t_{\Delta DIV}$, by dividing the coefficient by the standard error of ΔDIV (Helbæk, 2011):

$$t_{\Delta DIV} = \frac{\Delta DIV}{\sigma_{\Delta DIV}} \tag{20}$$

We report significant values for the independent variables for the 0.1(*), 0.05(**), and 0.01(***) levels using the t-distribution. The results are calculated with R using the linear model (lm) and summary functions to report tests of statistical significance.

[57] We do not include a variable that is multiplied by one when the earnings level (earnings change) is positive, *"because it will be multi-colinear with the four quarterly earnings change and levels variables"* (Ham et al., 2018, p. 15).
[58] Consistent with the first stage, OSEBX is the market portfolio benchmark.

5.2.5 Matched Sample Analysis

Ham et al. (2018) argue that if past earnings changes' effects on future earnings changes are a function of variation in specific characteristics like industry, firm size, or time, dividend changes' ability to predict future earnings may be a result of these heterogeneous effects. To control for this potential issue of unwanted variables, we also conduct a matched sample analysis by constructing two separate models. We match dividend increases and decreases to an unchanged dividend from a firm within the same industry and year based on the closest propensity score. The propensity score, proposed by Rosenbaum and Rubin (1983), should reflect the likeliness that a firm increases (decreases) its dividend, and is estimated by running logistic regression with a binomial dependent variable equal to one if the firm increases (decreases) its dividend and zero otherwise (Agresti, 2013). The covariates are the four past earnings levels and changes prior to the dividend announcement (Ham et al., 2018). Those coefficient estimates are then used to compute the propensity score. In order to reduce bias (i.e., poor matches), we impose a propensity score restriction meaning that the unchanged dividend must have a propensity score which cannot deviate by more than 15% and 30% from its matched increase and decrease, respectively.[59] Following Ham et al. (2018), we perform the matching with replacement.[60]

To obtain a meaningful sample size, we extend our sample by including the dividend observations that were removed in stage one due to material events (criterion 2) and lack of liquidity/trading (criterion 3 and 4) as they do not violate the concept of matching.[61] However, outliers with earnings levels above 25% in a single quarter prior to the dividend announcement are excluded. This gives us 115 unchanged dividends which are matched with 159 dividend increases and 36 dividends decreases.[62]

When the increases and decreases are matched with a comparable control group of unchanged dividends, we then compare earnings levels and changes before and after the dividend declaration to detect any potential divergence in earnings between the two groups. If there are significant differences in the aftermath of an increase or decrease, it may be supportive of the

[59] Ideally, in a larger sample, both deviation criteria should have been tighter. We allow larger deviation for the matched decreases due to the lack of dividend reductions in our sample.
[60] Matching with replacement means that an unchanged dividend can be used as a control for multiple observations. As our sample of unchanged dividends is limited, we find it appropriate to use replacement.
[61] Financial firms are still omitted.
[62] See Appendix E2 for a complete list of all matched pairs.

information content explanation of dividends (i.e., dividend signaling). Thus, we conduct paired sample t-tests by comparing the average difference in the mean between the matched pairs: [63]

$$H_0: \mu_d = 0$$

where μ_d is the expected average difference in earnings level (change), with test statistic (Helbæk, 2011):

$$t_{\mu_d} = \frac{\bar{X}_d - \mu_d}{\frac{\sigma_d}{\sqrt{n}}} \tag{21}$$

where $\bar{X}_d$ is the actual average difference in earnings level (change) with n observations (degrees of freedom = n-1) and standard deviation equal to σ_d.

[63] That is, the difference in average earnings levels and changes between the treatment group (increases/decreases) and the control group (unchanged).

6. Empirical Results

In this chapter, we present the empirical results of the two hypotheses that are tested in this study. Firstly, we start by investigating the short-term effects of the dividend announcements; effectively named the first stage of the dividend signaling theory. The interim findings are based on share price reactions utilizing the naïve model, as described in section 6.1.1. In order to evaluate the validity of the results, we apply the alternative analyst model in section 6.1.2. The tests in section 6.1.3 control for earnings information, while we present several robustness tests in section 6.1.4. Secondly, the second stage, which focuses on dividends' medium- to long-term signaling effects on earnings, is presented in section 6.2. Section 6.2.1 introduces the main model specification, 6.2.2 provides robustness tests for alternative earnings measures and firm size, while the matched sample analysis is reported in section 6.2.3.

6.1 Analyzing the Short-Term Effects of Dividend Changes[64]

6.1.1 The Naïve Model

Table 8: Dividend Increases in the Naïve Model, n = 333[65]

Days around AD[66]	AAR	T-value	CAAR	T-value
-5	0.02%	0.22	0.02%	0.07
-4	0.00%	0.00	0.01%	0.03
-3	0.00%	0.00	0.01%	0.02
-2	0.21%	2.10**	0.23%	1.35
-1	0.35%	3.25***	0.58%	3.26***
0	0.44%	2.12**	1.02%	3.87***
1	0.06%	0.49	1.08%	3.62***
2	-0.02%	-0.21	1.05%	3.26***
3	-0.04%	-0.43	1.01%	2.93***
4	-0.03%	-0.28	0.99%	2.73***
5	0.21%	2.12**	1.20%	3.14***

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01.* .

Applying the naïve model on the portfolio consisting of dividend increases, we observe that the average abnormal return is highest on the declaration day with an AAR of 0.44%, being statistically significant at the 5% level (t-value of 2.12). This implies that an increase in

[64] The t-values presented in section 6.1 are derived from the cross-sectional approach described in section 5.1.3. Although this method provides somewhat stricter t-statistic compared to a standard t-test, the significant results presented in section 6.1 (short-term effects) would generally be the same regardless of which t-test we had used.
[65] The tables presented in section 6.1 are similar to those of Capstaff et al. (2004).
[66] AD: Announcement date.

dividends provides positive news to the market. However, we also report significant positive returns the two days prior to the declaration dates; a significant $AAR_{(-1)}$ of 0.35% suggests that investors tend to position themselves ahead of dividend increases or that these investors are insiders.

Following the cumulative average abnormal returns, we note that the effect on share prices is small after the event, except for the last event day. The $CAAR_{(-5,\,-5)}$ of 1.20% is significant at the 1% level (t-value of 3.14).

Table 9: Unchanged Dividends in the Naïve Model, n = 82

Days around AD	AAR	T-value	CAAR	T-value
-5	0.01%	0.06	0.01%	0.06
-4	-0.16%	-0.82	-0.15%	-0.79
-3	0.01%	0.07	-0.14%	-0.67
-2	-0.14%	-0.84	-0.28%	-1.04
-1	-0.16%	-0.77	-0.44%	-1.41
0	0.22%	0.62	-0.22%	-0.48
1	0.19%	0.88	-0.03%	-0.07
2	0.39%	1.88*	0.36%	0.66
3	-0.02%	-0.11	0.34%	0.58
4	-0.03%	-0.18	0.31%	0.56
5	0.01%	0.05	0.32%	0.58

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

For the neutral dividend announcements, we cannot identify any significant average abnormal returns. Despite a slightly positive $CAAR_{(-5,\,5)}$ at the end of the event window, the results' lack of statistical significance and small magnitude of share price reaction imply that unchanged dividends hardly convey any new information to the market. Thus, hypothesis 1 for neutral dividends cannot be rejected in the naïve model. A possible explanation to this sub-conclusion, consistent with signaling theory, is that an unchanged dividend signals that the firm is currently in a steady-state environment with neutral earnings outlook.

Table 10: Dividend Decreases in the Naïve Model, n = 102

Days around AD	AAR	T-value	CAAR	T-value
-5	-0.29%	-1.16	-0.29%	-1.17
-4	0.45%	1.69*	0.15%	0.46
-3	-0.05%	-0.23	0.11%	0.31
-2	-0.12%	-0.51	-0.01%	-0.03
-1	-0.03%	-0.12	-0.04%	-0.11
0	-0.78%	-1.64	-0.82%	-1.48
1	-0.32%	-1.09	-1.14%	-1.92*
2	0.25%	0.97	-0.90%	-1.38
3	-0.09%	-0.45	-0.98%	-1.51
4	-0.22%	-1.11	-1.21%	-1.80*
5	-0.19%	-0.79	-1.40%	-2.01**

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

There is a common perception among managers that a cut in dividends is poorly appreciated in the financial markets (Brav et al., 2005). Table 10 supports the idea to some degree with negative AAR of -0.78% on the declaration day, but this is not significant at the 10% level. In contrast to the positive dividend changes, it appears that investors are generally unable to predict the (negative) outcomes, with an insignificant $CAAR_{(-5, -1)}$ prior to the announcement. Furthermore, no single event day for dividend reductions are significantly different from zero at the 5% level, but the CAAR $_{(-5, 5)}$ is significant with a t-value of 2.01. In contrast to dividend increases, the market is not responding rapidly to the new information, as the CAAR tend to decrease further the following trading days after the declaration date. The cumulative results suggest that on average, a dividend cut is regarded negatively, although some of the reductions may be used to exploit profitable investment opportunities by the firms.

Figure 3: Cumulative Average Abnormal Returns (CAAR) in the Naïve Model

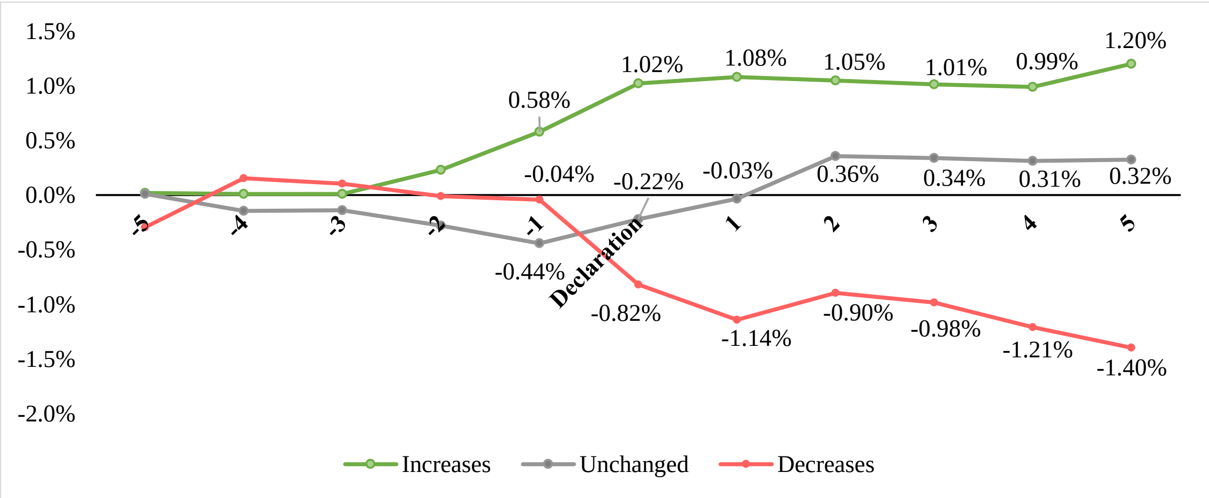


Figure 3 illustrates the cumulative average abnormal returns for the three portfolios in the event window using the naïve model. Investors tend to front-run the positive dividend announcements. This effect, however, may be somewhat related to earnings releases as 90% of the dividend announcements in the sample are declared analogous to earnings announcements. Therefore, we apply two different approaches in section 6.1.3 to isolate the effect of dividend announcements.

The results from the naïve model suggest that dividend increases provide new information to the market, unchanged dividends do not, while the results from dividend decreases are mixed. There are significant cumulative average abnormal returns in the event window both for positive and negative changes in dividends, which imply that hypothesis 1 for positive and negative outcomes are rejected. These findings are generally in line with those of Capstaff et al. (2004), although their results were significant at the 1% level. Before controlling for earnings announcements and dividend surprises (the analyst model), Andres et al. (2012) reported similar findings from the German market with $AAR_{(0)}$ at 0.70% and -0.86% for positive and negative announcements, respectively.

6.1.2 The Analyst Model

As the naïve model may not thoroughly reflect actual dividend expectations, we employ the analyst model in order to reexamine the preliminary results. The dividend announcements are now classified relative to the analyst forecasts into positive, neutral, and negative changes. This procedure may provide more realistic dividend expectations compared to the naïve model as the analyst forecasts seemingly distinguish between the expected and unexpected information content in dividend changes (Capstaff et al., 2004; Andres et al., 2012).

Because not all firms are covered by financial institutions, our initial sample of 517 events is now reduced to 446 dividend announcements, comprising 200 positive dividends, 115 neutral dividends (max +/-5% deviation from forecast)[67], and 131 negative dividends. The naïve model included 333 positive dividends of which 285 were classified in the analyst model as either positive, neutral, or negative dividends. Interestingly, only 166 (58%) of the 285 were defined as a positive dividend in the analyst model, implying that the market already expected

[67] Analyst consensus estimates constitutes an average of several estimates, and thus the estimate will rarely be exactly equal to the actual dividend proposal. The -5% to 5% deviation captures dividend declarations that are close to the analysts' estimates, which we consider as neutral.

many of the increases in the naïve model. Moreover, 18 of the 200 dividend increases in the analyst model were, in fact, a decrease in nominal terms (i.e., dividends being reduced less than expected by financial analysts).

Table 11: Dividend Increases in the Analyst Model, n = 200

Days around AD	AAR	T-value	CAAR	T-value
-5	0.05%	0.44	0.05%	0.31
-4	0.07%	0.61	0.11%	0.70
-3	0.02%	0.16	0.14%	0.67
-2	0.03%	0.25	0.17%	0.75
-1	0.23%	1.84*	0.40%	1.74*
0	0.97%	3.77***	1.37%	4.20***
1	0.10%	0.68	1.47%	4.17***
2	-0.04%	-0.31	1.42%	3.71***
3	-0.01%	-0.08	1.42%	3.43***
4	0.05%	0.36	1.47%	3.36***
5	0.05%	0.42	1.51%	3.34***

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

For positive dividend surprises, the analyst model paints a similar picture as the naïve model with a positive CAAR prior to the declaration day and a large positive return on the declaration day. However, the AAR on declaration day is now significant at the 1% level. This may be because some dividend increases are widely expected by the market and analysts prior to the declaration date, and these dividend increases are not included in the analyst model as opposed to the naïve model. The $CAAR_{(-5,-5)}$ of 1.51% is significant at the 1% level (t-value 3.34).

Table 12: Unchanged Dividends in the Analyst Model, n = 115

Days around AD	AAR	T-value	CAAR	T-value
-5	0.09%	0.68	0.09%	0.70
-4	0.02%	0.16	0.11%	0.70
-3	-0.07%	-0.52	0.04%	0.21
-2	0.19%	1.61	0.23%	1.14
-1	0.21%	1.24	0.43%	1.68*
0	-0.07%	-0.20	0.36%	0.89
1	0.11%	0.52	0.47%	0.95
2	0.15%	1.02	0.62%	1.16
3	0.09%	0.64	0.71%	1.28
4	-0.21%	-1.56	0.50%	0.90
5	-0.10%	-0.72	0.40%	0.69

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

In the analyst model, the neutral dividends show no significant AARs, and the $CAAR_{(-5,-5)}$ of 0.40% is not significant at the 10% level (t-value of 0.69). Hypothesis 1 for neutral dividends cannot be rejected neither for the naïve model nor for the analyst model. These conclusions are expected as dividends in line with expectations should not trigger any significant share price reactions.

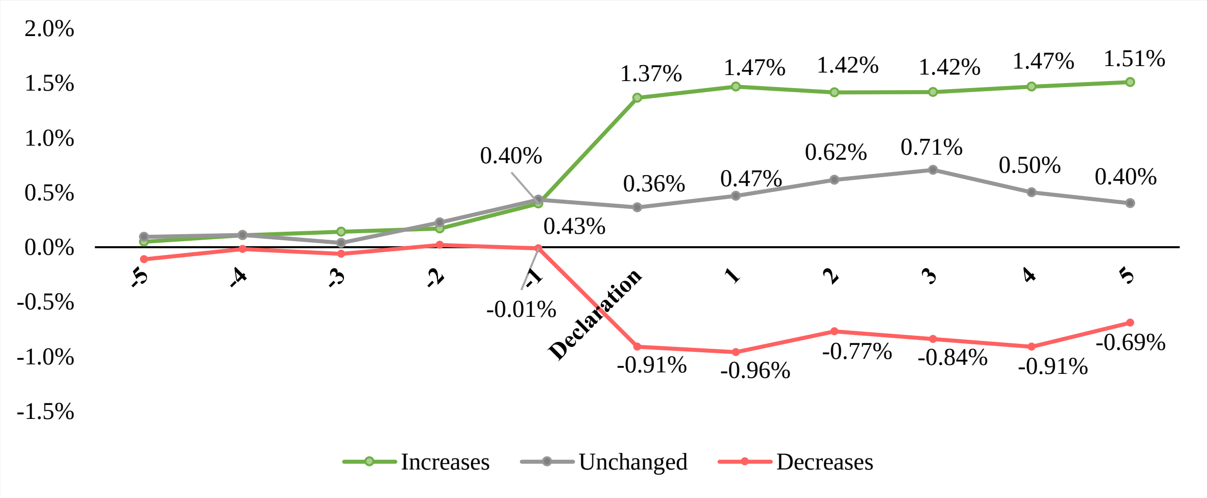
Table 13: Dividend Decreases in the Analyst Model, n = 131

Days around AD	AAR	T-value	CAAR	T-value
-5	-0.10%	-0.61	-0.11%	-0.64
-4	0.09%	0.43	-0.02%	-0.08
-3	-0.03%	-0.18	-0.06%	-0.19
-2	0.07%	0.34	0.02%	0.09
-1	-0.02%	-0.10	-0.01%	0.01
0	-0.94%	-2.57**	-0.91%	-2.07**
1	-0.07%	-0.32	-0.96%	-2.03**
2	0.28%	1.35	-0.77%	-1.34
3	-0.11%	-0.69	-0.84%	-1.55
4	-0.07%	-0.41	-0.91%	-1.62
5	0.22%	1.06	-0.69%	-1.16

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

In contrast to the naïve model, the analyst model provides significant negative AAR on declaration day at the 5% level with a negative return of -0.94%. However, the $CAAR_{(-5, -5)}$ of -0.69% is no longer significant with a p-value of 0.25 (t-value -1.16). The analyst model suggests that the market treats negative dividend announcement as negative news based on the $AAR_{(0)}$, while the $CAAR_{(-5,5)}$ shows somewhat conflicting results with no significant negative return.

Figure 4: Cumulative Average Abnormal Returns (CAAR) in the Analyst Model



Unlike the naïve model, there are relatively small changes in CAAR for all three portfolios following the declaration day. The results from the analyst model support the semi-strong form of the EMH, as the new information is rapidly priced into the stocks with little or no abnormal returns in the subsequent days.

6.1.3 Disentangling Dividends from Earnings Announcement Information

The Augmented Analyst Model

An abiding issue when investigating the effects of dividend announcements is that the vast majority of such events are released jointly with earnings announcements (Capstaff et al., 2004; Andres et al., 2012). In the sample applied in the naïve model, 90% of the events were announced concurrently with earnings releases. To isolate the effect of dividend announcements we propose an alternative specification: The model, named as the "augmented analyst model", is derived from the same principles as the standardized analyst model, but differs as it only includes announcements in which reported earnings per share (EPS) are relatively close to the estimated EPS provided by the analysts' consensus forecasts.[68] Knowing that the estimates may be somewhat inaccurate, we set +/- 25% consensus deviation from the reported EPS as a threshold which entails that the sample now is lowered to 60 dividend increases, 49 neutral dividends, and 60 dividend reductions. The +/-25% criterion ensures that

[68] We use adjusted (e.g., for one-offs) numbers for both estimated and reported EPS. Dividend changes which are not coinciding with earnings releases are not included in the augmented analyst model.

the greatest EPS misses, which may affect share prices dramatically on the reporting date, are removed while maintaining an acceptable sample size.

Although reported EPS may not capture the full effect of earnings surprises, as other factors such as cash generation and forward-looking statements may provide additional information to the market, we assess reported EPS as the best proxy when controlling for earnings announcements. This is consistent with Andreas et al. (2012) who also intended to disentangle the effect of dividend announcements by including the difference between actual and estimated EPS as a control variable.

Table 14: $AAR_{(0)}$ and $CAAR_{(5\text{-},5)}$ When Reported EPS in Line with Expectations

Analyst Model	Increases	Unchanged	Decreases
N	60	49	60
$AAR_{(0)}$	0.95%	-0.34%	-0.49%
t-value	2.19**	-0.58	-1.57
$CAAR_{(-5, 5)}$	1.92%	0.41%	-0.76%
t-value	2.66**	0.41	-1.23

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

The path of the average abnormal returns is similar to those of the naïve model and the analyst model. Negative announcements are still associated with negative abnormal returns (but not significant), while neutral announcements do not convey any information. More interestingly, the augmented analyst model substantiates that dividend increases have the most signaling power as it shows significant $AAR_{(0)}$ and $CAAR_{(-5,5)}$ at the 5% level.

Absence of Earnings Announcements

There were 53 dividend announcements in the original sample of 517 events that did not conform to earnings announcements. Most of these events were either communicated by i) a specific notice on Newsweb, ii) through the annual report, or iii) with the summons of the annual general meeting (AGM). Alike the study of Capstaff et al. (2004), we exploit this sub-sample by conducting another test with the same objective as the augmented analyst model; to disentangle the effect of the dividend announcements. When only including the events in which earnings announcements were absent, there were 34 (64%) increases, 8 (15%) neutrals, and 11 (21%) decreases as defined by the naïve model. Although somewhat tiny, the sample's distribution is identical to the original sample.

Table 15: $AAR_{(0)}$ and $CAAR_{(-5,5)}$ When No Earnings Announcement

Naïve Model	Increases	Unchanged	Decreases
N	34	8	11
$AAR_{(0)}$	1.09%	0.48%	-0.66%
t-value	1.85*	0.79	-0.74
$CAAR_{(-5, 5)}$	1.32%	0.08%	-0.02%
t-value	1.02	0.08	-0.01

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

The AAR of 1.09% on the announcement for positive dividend news (significant at 10%) indicates that dividend increases are appreciated in the market regardless of earnings releases, whereas neutral and negative dividend declarations provide less signaling power. Despite the small number of events, the results from the non-overlapping sub-samples tested in section 6.1.3 support, at least for positive dividend changes, our main results from the naïve model and the analyst model. However, we cannot rule out the possibility that earnings information partly explains the abnormal returns in the event window, especially for negative dividend changes.

6.1.4 Robustness Tests

To check the robustness of the results given by the analyst model, we conduct separate t-tests on four sub-samples with different properties; i) without omitted, initiated, and re-initiated dividends, ii) without outliers, iii) split by years, and iv) split by firm size.

Table 16: Robustness Tests

Analyst Model	Increases	Unchanged	Decreases
Panel A: $AAR_{(0)}$ and $CAAR_{(-5,5)}$ without omitted, initiated, and re-initiated dividends			
N	183	115	103
$AAR_{(0)}$	0.75%	-0.07%	-0.55%
t-value	3.03***	-0.20	-1.50
$CAAR_{(-5, 5)}$	1.52%	0.40%	-0.47%
t-value	3.25***	0.69	-0.73
Panel B: $AAR_{(0)}$ and $CAAR_{(-5,5)}$ without outliers (threshold: +/- 50% changes)			
N	123	115	94
$AAR_{(0)}$	1.09%	-0.07%	-0.49%
t-value	4.00***	-0.20	-1.29
$CAAR_{(-5, 5)}$	2.44%	0.40%	-0.30%
t-value	4.54***	0.69	-0.46

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Despite insignificant negative dividend announcements in Panel A and B, the robustness tests in table 16 confirm the findings in the analyst model with strong share price reactions for dividend increases. When removing dividend increases larger than 50%[69] (in panel B), the $AAR_{(0)}$ and its statistical significance increase compared to the regular analyst model. This may imply that smaller dividend increases possess more signaling power than larger dividend changes (Ham et al., 2018). Huge dividend changes year over year might be a result of firms that are operating in cyclical industries. Conversely, the $AAR_{(0)}$ for dividend cuts is no longer significant, which may signify that sizeable dividend cuts and omissions trigger most of the negative share price reactions.

Table 17: Split by Years

Analyst Model	**Increases**	**Unchanged**	**Decreases**
Years 2006 – 2009			
N	49	23	45
$AAR_{(0)}$	0.42%	-0.53%	-0.19%
$CAAR_{(-5, 5)}$	0.48%	0.05%	-0.26%
Years 2010 – 2013			
N	82	20	37
$AAR_{(0)}$	1.55%***	0.39%	-1.08%
$CAAR_{(-5, 5)}$	1.97%***	0.27%	-1.53%*
Years 2014 – 2018			
N	69	72	49
$AAR_{(0)}$	0.68%*	-0.05%	-1.53%***
$CAAR_{(-5, 5)}$	1.80%**	0.55%	-0.43%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

We divide the sample into three sub-periods to investigate whether our results differ throughout the economic cycle. The first sub-sample ranging from 2006 to 2009 reflects a period with substantial financial turmoil, the years of 2010 to 2013 constitute economic recovery, while the latter sub-sample from 2014 to 2018 show in general upward trending markets and reduced volatility, albeit a sharp downturn in the oil price. The lack of significant results in the first time frame may indicate that the financial turbulence on average eclipsed firm-specific news. As the economies recovered from 2010 and beyond, positive dividend surprises again attained significant attention. Moreover, the $AAR_{(0)}$ for dividend reductions after 2013 is significant at the 1% level, meaning the investors badly appreciate dividend cuts during an economic upturn.

[69] As well as initations and re-initations of dividends.

Table 18: Split by Firm Size

Analyst Model	Increases	Unchanged	Decreases
Small Cap			
N	54	32	39
$AAR_{(0)}$	1.49%***	1.32%**	-0.78%
$CAAR_{(-5, 5)}$	2.01%*	2.29%**	-0.72%
Mid Cap			
N	77	42	59
$AAR_{(0)}$	1.03%***	-0.06%	-0.54%
$CAAR_{(-5, 5)}$	2.00%***	0.65%	0.05%
Large Cap			
N	69	41	33
$AAR_{(0)}$	0.51%	-1.16%**	-1.85%*
$CAAR_{(-5, 5)}$	0.66%	-1.32%*	-1.95%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01. Definitions: Small Cap firms = market capitalization less than NOK 2.5bn. Mid Cap firms = market capitalization between NOK 2.5bn and NOK 10bn. Large Cap firms = market capitalization above NOK 10bn.*

When examining firm size, we show that small cap firms, unlike other sub-samples, have significant positive $AAR_{(0)}$ for both positive and neutral dividend news at the 5% level. Small cap firms have stronger AAR on announcement day, consistent with earlier findings in the U.S. (Eddy & Seifert, 1988; Sig Yoon & Starks, 1995; Amihud & Li, 2006). This stands in contrast to large firms in which the AAR_0 for dividend increases is insignificant, while for dividend decreases it is significant different from zero at the 10% level. Surprisingly, large companies tend to be punished harder when announcing negative, and even neutral, dividend information content. Furthermore, we notice that small cap and mid cap firms mostly drive the positive AAR on the announcement date for dividend increases. A possible explanation may be that smaller firms typically face higher information asymmetry (Atiase, 1985; Diamond and Verrecchia, 1991) and thus use dividend as a signaling mechanism to a higher degree than large cap firms.

6.1.5 Summary and Implications

Table 19: Model Summary

Naive Model	**Increases**	**Unchanged**	**Decreases**
N	333	82	102
$AAR_{(0)}$	0.44%	0.22%	-0.78%
t-value	2.12**	0.62	-1.64
$CAAR_{(-5,5)}$	1.20%	0.32%	-1.40%
t-value	3.14***	0.58	-2.01**
Analyst Model			
N	200	115	131
$AAR_{(0)}$	0.97%	-0.07%	-0.94%
t-value	3.77***	-0.20	-2.57**
$CAAR_{(-5,5)}$	1.51%	0.40%	-0.69%
t-value	3.34***	0.69	-1.16
Augmented Analyst Model			
N	60	49	60
$AAR_{(0)}$	0.95%	-0.34%	-0.49%
t-value	2.19**	-0.58	-1.57
$CAAR_{(-5,5)}$	1.92%	0.41%	-0.76%
t-value	2.66**	0.41	-1.23
No Earnings Model			
N	34	8	11
$AAR_{(0)}$	1.09%	0.48%	-0.66%
t-value	1.85*	0.79	-0.74
$CAAR_{(-5,5)}$	1.32%	0.08%	-0.02%
t-value	1.02	0.08	-0.01

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table 19 sums up the results from the different models. The naïve model shows significant $AAR_{(0)}$ for positive dividend changes, while $CAAR_{(-5,5)}$ was significant for both positive and negative news. These inferences are strongly confirmed by the analyst model, which additionally identifies negative AAR on the announcement day for dividend reductions. As the analyst forecasts may reflect actual dividend expectations, we propose to apply the analyst model in lieu of the naïve model when reliable estimates are available; only 58% of the dividend increases in the naïve model were, in fact, positive surprises (i.e., DPS reported above expectations).

When controlling for earnings information, we utilize two sub-samples which provide a tad less support for the results implying that earnings releases might be somewhat confounding (at least for dividend reductions). We note, however, that these sample sizes are limited, and that the overall results point toward rejection of the null hypothesis for positive dividend changes. Furthermore, the robustness tests with the removal of outliers, initiations, re-initiations, and suspensions of dividends, substantiate the results for dividend increases (but not decreases) in the analyst model. In general, the dividend increases are robust to various sub-samples while the outcome of negative dividend announcements is mixed.

We demonstrate that different time horizons affect the strength of our results. The absence of any significant results in 2006 to 2009 might prove that firms' dividend policy is less important when there is financial turmoil present. Additionally, the split by firm size provides insightful differences among small, mid, and large cap firms. Small cap firms have significant $AAR_{(0)}$ for both increases and unchanged dividends. One plausible explanation is that small companies have on average less trust in the financial markets so that even dividends in line with expectations are well appreciated. Hence, we argue that differences amidst firm size could be a product of higher information asymmetry for smaller firms, while larger companies do not need to use dividends as a signaling mechanism.

Similar to Andres et al. (2012), our results are more accurate for the analyst model than the naïve model when looking at the $AAR_{(0)}$. The conclusions from the German study of significant AARs on the announcement day for positive and negative dividends surprises (i.e., the analyst model) conform to the findings of this study. On the other hand, Capstaff et al.'s (2004) research on the Oslo Stock Exchange presents somewhat contradictory results; while it shows stronger results in favor of rejection of the null hypothesis (for increases and cuts) in the naïve model, we find that the analyst model provides more significant results. These differences are likely a result of different sample periods as Capstaff et al. (2004) investigated dividend announcements between 1993 and 1998, whereas our sample covers the period from 2006 to 2018.

6.1.6 Limitations

This section addresses potential limitations of our first study. Firstly, the sample may be prone to selection bias, which occurs when using nonrandomly selected samples (Heckman, 1979). This possible caveat exists as we established six criteria which reduced the initial sample size drastically, implying that there might be some skewness related to firm size, industry, and time, which in turn curtails the external validity. Lack of external validity means that the results can barely be generalized to and across different measures and times (Calder, Phillips, & Tybout, 1982). As specified in the fourth chapter, our final sample has a shortage of oil and gas related firms compared to the benchmark index. This divergence is a result of a limited pool of oil companies with annual dividends, and a sector classification which groups some oilfield services companies as “Industrials”. Therefore, we must view the results from the first stage carefully in a broader context.

In section 6.1.3, we stressed the potential source of bias from earnings announcement information as 464 of the 517 firm-year observations were coinciding with earnings releases. Despite the efforts of disentangling dividend information from earnings information, we are not able to fully control for earnings releases mainly due to lack of data. Moreover, there is no guarantee that the market model estimates the expected and abnormal returns accurately, while the Bloomberg data can be inaccurate in some instances. Notably, an analyst consensus estimate might be biased if it is the average of only one or two industry analysts, indicating that the market expectations of dividends do not necessarily conform to the analyst estimate.

6.2 Analyzing the Long-Term Effects of Dividend Changes

Table 20 reports the descriptive statistics for the empirical model used to address the second stage of the dividend signaling theory. ΔDIV is simply the dividend change, $E_{(y+n)}$ refers to the earnings yield n years after (before) the dividend change, and the return variables, $Ret_{(j,k)}$, are controls for past stock returns. Column 2 to 4 address the variables' mean values for positive, neutral, and negative dividend changes. From the descriptive statistics, we see average positive stock returns in the 240 days prior to the announcement date for dividend increases and likewise mostly negative stock returns for the firms that cut dividends. Notably, $E_{(y+1)}$ increases modestly following a dividend increase (from 9.15% to 9.55%), while $E_{(y+1)}$ is negative following a dividend cut (-0.38%).

Table 20: Descriptive Statistics

	ΔDIV>0	**ΔDIV=0**	**ΔDIV<0**
N	**165**	**57**	**44**
Variable	**Mean**	**Mean**	**Mean**
ΔDIV	51.51%	0.00%	-59.56%
$E_{(y-2)}$	6.22%	1.32%	9.01%
$E_{(y-1)}$	9.15%	4.15%	2.64%
$E_{(y+1)}$	9.55%	3.06%	-0.38%
$E_{(y+2)}$	9.64%	3.36%	7.80%
$E_{(y+3)}$	8.22%	8.57%	4.97%
$Ret_{(-2,-20)}$	1.32%	0.41%	-1.12%
$Ret_{(-21,-40)}$	1.14%	1.52%	2.09%
$Ret_{(-41,-60)}$	1.52%	1.19%	-3.79%
$Ret_{(-61,-120)}$	1.23%	-1.46%	-5.79%
$Ret_{(-121,-240)}$	8.04%	-0.91%	-10.46%

In section 6.2.1, we present the empirical results from the main model specification[70] in which we test whether dividends convey information about future earnings. Like Ham et al. (2018), we limit our analysis to the earnings changes in the preceding three years after a dividend declaration. In section 6.2.2 and 6.2.3 we conduct two tests with alternative measures of earnings as well as a matching analysis to verify the results derived from the main regression model. Section 6.2.4 offers a summary of the overall results.

[70] See Appendix E1.1 for a fully detailed model specification of all linear and non-linear control variables.

6.2.1 Regressing Earnings Changes on Dividend Changes

Table 21: Dividend Changes and Future Earnings Changes

	(1)	(2)	(3)
	$\Delta E_{(y+1)}$	$\Delta E_{(y+2)}$	$\Delta E_{(y+3)}$
ΔDIV	0.038***	0.004	0.002
	(0.012)	(0.014)	(0.016)
$Ret_{(-2, -20)}$	0.213***	0.063	0.080
	(0.071)	(0.086)	(0.099)
$Ret_{(-21, -40)}$	0.315***	0.200***	0.145*
	(0.062)	(0.072)	(0.086)
$Ret_{(-41, -60)}$	0.034	-0.008	-0.046
	(0.044)	(0.050)	(0.059)
$Ret_{(-61, -120)}$	0.110***	0.116**	-0.009
	(0.040)	(0.045)	(0.057)
$Ret_{(-121, -240)}$	0.107***	0.101***	0.097***
	(0.024)	(0.028)	(0.034)
$E_{(q-4)}$	0.519	0.256	0.034
	(0.368)	(0.459)	(0.546)
$E_{(q-3)}$	1.297***	-0.720	-1.809***
	(0.368)	(0.484)	(0.639)
$E_{(q-2)}$	-0.010	1.281***	0.336
	(0.336)	(0.389)	(0.463)
$E_{(q-1)}$	0.673***	0.718***	1.138***
	(0.235)	(0.268)	(0.324)
$\Delta E_{(q-4)}$	-1.268***	-1.645***	-0.199
	(0.335)	(0.398)	(0.474)
$\Delta E_{(q-3)}$	0.415*	0.135	0.492
	(0.236)	(0.299)	(0.359)
$\Delta E_{(q-2)}$	0.017	-1.290***	-0.496
	(0.301)	(0.380)	(0.439)
$\Delta E_{(q-1)}$	-0.140	-0.964***	-0.412
	(0.205)	(0.241)	(0.285)
Intercept	-0.014	-0.003	-0.001
	(0.012)	(0.014)	(0.017)
Non-linear Controls	Included	Included	Included
Observations	266	233	205
R^2	0.631	0.473	0.335
Adjusted R^2	0.601	0.423	0.263
Residual Std. Error	0.083 (df = 245)	0.090 (df = 212)	0.101 (df = 184)
F Statistic	20.990*** (df = 20; 245)	9.514*** (df = 20; 212)	4.644*** (df = 20; 184)

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01. The standard deviation is reported in the parentheses.*

To test whether dividends contain information about future earnings levels, we regress future earnings changes on dividend changes and a series of control variables (Ham et al., 2018). Earnings changes are defined as the change in net income[71], while dividend changes are calculated following the naïve expectation model. In the regression reported in table 21, the dividend change, denoted as ΔDIV, is our variable of interest. The independent variables earnings levels, $E_{(q-t)}$, and earnings changes, $\Delta E_{(q-t)}$, are included to control for expected earnings changes when dividend changes are absent, while the non-linear functions and the return variables, $Ret_{(-j, -t)}$, are intended to ensure sufficient controls for variation in expected earnings changes (Ham et al., 2018).

In the first column, we report the regression results when using the change in earnings the first year after the dividend announcement as the dependent variable (Ham et al., 2018). The dividend change coefficient is significant (at the 1% level) and shows that an average increase in dividends of 10% corresponds to an average increase in earnings the following year equivalent to 0.38% of the firm's market capitalization[72]. Thus, the regression model indicates that dividend changes convey information about the next year's earnings level: A change in dividends is followed by a change in earnings in the same direction as the dividend change. This finding is consistent with Ham et al. (2018) who report a significant dividend change coefficient with a magnitude of 0.023 in the U.S. market.

In the second and third column, we estimate the persistence of future earnings by studying the earnings changes two and three years after the dividend announcement, respectively. In contrast to the findings for the first year, the dividend changes seem to have limited signaling power on future earnings in time horizons longer than one year; neither of the two dividend change coefficients are significant. The small magnitude also implies that the earnings may be mean reverting[73] over time.

These findings for longer time horizons are not consistent to those of Nassim and Ziv (2001) and Ham et al. (2018) who reveal significant information content up to two and three years, respectively. Despite this discrepancy, most other studies also fail to detect long-horizon information content of dividend announcements (Ham et al., 2018). Ham et al. (2018) argue

[71] Ham et al. (2018) used earnings before extraordinary items as a proxy for earnings. When we apply EPS adjusted for off gains and losses, we find similar results as reported in table 21. See Appendix E1.2.
[72] The firm's market cap one year before the dividend declaration is used as a constant deflator. See section 5.2.1.
[73] Mean reversion: The earnings level will tend to revert to the average earnings level over time.

that the choice of methodology plays a decisive role as to whether one identifies long-term information content of dividend announcements. Additionally, it is also prudent to assume that determinants such as the choice of stock market, sample period, and sample selection should be carefully reviewed in this context.

6.2.2 Robustness Tests

Alternative Earnings Measures

We have thus far used net income as a proxy for earnings. The caveat of entirely relying on reported net income is that this measure is not adjusted for any one-off gains and losses. In relatively short horizons those nonrecurring effects may muddle the underlying economic profitability. To check if the results hold for alternative measures of earnings that are less affected by unregular accounting items, we replace all earnings variables with gross profits and then with cash flows from operations (Ham et al., 2018). The gross profit is calculated as the difference between revenues and cost of goods sold (COGS) and is described as "*the cleanest accounting measure of true economic profitability*" (Novy-Marx, 2013, p. 5). The operational cash flow is simply derived from the cash flow statement.

Table 22: Alternative Earnings Measures

	(1) $\Delta GP_{(y+1)}$	(2) $\Delta GP_{(y+2)}$	(3) $\Delta GP_{(y+3)}$	(4) $\Delta OpCF_{(y+1)}$	(5) $\Delta OpCF_{(y+2)}$	(6) $\Delta OpCF_{(y+3)}$
ΔDIV	-0.018	-0.042	0.027	0.008	0.003	-0.011
	(0.017)	(0.039)	(0.061)	(0.013)	(0.020)	(0.023)
Intercept	0.022	0.031	0.006	0.008	0.001	0.068***
	(0.014)	(0.035)	(0.048)	(0.011)	(0.016)	(0.019)
Linear Controls	Included	Included	Included	Included	Included	Included
Non-linear Controls	Included	Included	Included	Included	Included	Included
Observations	74	61	47	259	224	200
R^2	0.717	0.653	0.651	0.607	0.685	0.428
Adjusted R^2	0.626	0.508	0.434	0.574	0.654	0.365

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01. The sample using gross profits as dependent variable is somewhat limited due to lack of data. GP = Gross Profit. OpCF = Operational Cash Flow.*

In column 1 to 3, we set gross profits (GP) as the dependent variable and replace all independent earnings variables with gross profits. When we regress the equation applied in the net income model on gross profits, the information content of dividends diminishes substantially as the dividend change coefficient in the first column is no longer significant. The signs of the estimates further suggest that earnings changes in year one and two are on average negatively correlated with the dividend change. In contrast, Ham et al. (2018) reported a highly significant and positive relationship between dividend changes and gross profits in the following year.

In column 4 to 6, cash flows from operations (OpCF) are used as a proxy for future earnings. The overall results from the subsequent models do not provide any evidence for the second stage of the dividend signaling theory. Insignificant dividend coefficients with small magnitude imply that the dividends retain poor information content regarding future cash flow generation. In general, these robustness tests suggest that the findings in our main model specification are not robust to alternative measures of earnings.

Split by Firm Size

In section 6.1.4, we discovered that only smaller firms provide significant abnormal returns for positive dividend surprises while large cap firms did not. To investigate whether this apparent difference has implications for future earnings, we split the sample into small and large cap firms.[74] The results are presented in table 23 below.

Table 23: Small Cap and Large Cap Firms

	(1) **Small $\Delta E_{(y+1)}$**	**(2)** **Small $\Delta E_{(y+2)}$**	**(3)** **Small $\Delta E_{(y+3)}$**	**(4)** **Large $\Delta E_{(y+1)}$**	**(5)** **Large $\Delta E_{(y+2)}$**	**(6)** **Large $\Delta E_{(y+3)}$**
ΔDIV	0.053***	0.018	0.018	0.008	-0.029	-0.034
	(0.015)	(0.018)	(0.022)	(0.018)	(0.020)	(0.021)
Intercept	-0.010	-0.011	-0.052	-0.008	0.013	0.032**
	(0.023)	(0.027)	(0.036)	(0.011)	(0.013)	(0.013)
Linear Controls	Included	Included	Included	Included	Included	Included
Non-linear Controls	Included	Included	Included	Included	Included	Included
Observations	165	142	128	101	91	77
R^2	0.605	0.543	0.337	0.856	0.619	0.692
Adjusted R^2	0.550	0.468	0.213	0.820	0.510	0.583

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01. Small = Small Cap, Large = Large Cap.*

In line with the robustness test from stage one where only small cap firms provided significant $AAR_{(0)}$, we see the same pattern for stage two. A positive dividend change has a stronger and more significant impact on earnings the following year for smaller firms with a coefficient of 0.053 (significant at the 1% level), while large cap firms yield no significant results.

[74] Small (large) cap are defined as firms with less (more) than NOK 10bn market cap one year prior to the declaration day.

6.2.3 Matched Sample Analysis

If the impact of past earnings changes on future earnings changes is associated with variations in firm size, industry, or over time, the dividend changes' ability to predict future earnings changes may be a product of such heterogeneous effects (Ham et al., 2018). We, therefore, conduct a matched sample analysis to address this potential caveat. In this alternative approach, we match dividend increases (decreases) to unchanged dividends within the same industry and declaration year based on a propensity score. The unchanged dividend declaration with the closest propensity score is assigned to the increase (decrease). This score, intended to reflect the probability of an increase (decrease) in dividend, is a function of the past four earnings changes and levels prior to the dividend announcement.[75] Due to a limited pool of relevant unchanged dividends, the sample is now reduced to 159 matched increases and 36 decreases.

Matching Increases with Unchanged Dividends

Table 24: Matching Increases with Unchanged Dividends

	N	ΔDIV=0	ΔDIV>0	Difference	T-stat	P-value
$\Delta E_{(y-1)}$	159	1.79%	2.45%	-0.66%	-1.35	0.18
$\Delta E_{(y+1)}$	159	-3.61%	1.65%	-5.26%	-3.75	0.00***
$\Delta E_{(y+2)}$	159	0.56%	-2.67%	3.24%	2.65	0.01**
$\Delta E_{(y+3)}$	159	-1.60%	-1.83%	0.24%	0.12	0.90
$E_{(y-1)}$	159	7.85%	7.78%	0.06%	0.12	0.91
$E_{(y+1)}$	159	4.09%	9.49%	-5.41%	-4.64	0.00***
$E_{(y+2)}$	159	4.56%	7.31%	-2.74%	-2.70	0.01**
$E_{(y+3)}$	159	3.31%	5.13%	-1.82%	-1.12	0.27

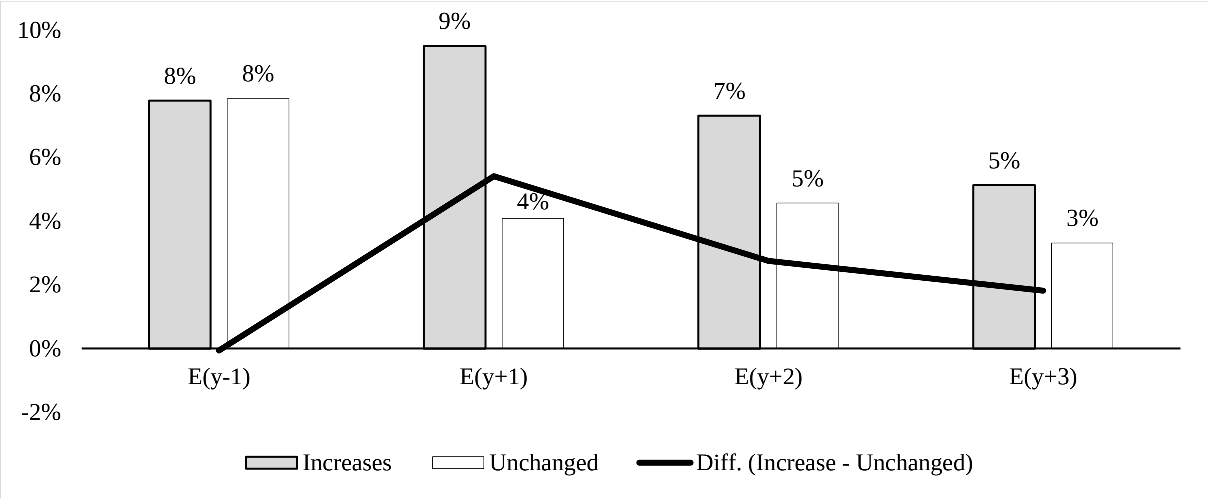
**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01.*

In table 24 and figure 5 we report the results when matching dividend increases with unchanged dividends. The matching procedure ensures that the average difference in earnings level and change in the year prior to the declaration are insignificant between the two groups. The average earnings level before the announcement, (E_{y-1}), was 7.78% and 7.85% for increases and neutrals (control group), respectively. This conformity, however, vanishes in the first year after the declaration as the average difference in earnings levels and changes are significant at the 1% level, providing support to the results in the main regression model (table 21). In year two and three after to the dividend declaration, the difference in earnings changes

[75] See section 5.2.4.

and levels between the matched pairs narrow, indicating some mean reversion in earnings and that the superior profits may not persist.

Figure 5: Earnings Levels for Matched Increases and Unchanged Dividends



This matching model suggests that the dividend increases contain meaningful information regarding the next year's earnings level, i.e., firms that increase dividends have on average significantly higher earnings, at least in the four quarters, following the dividend announcement than comparable firms that keep dividends unchanged. Interestingly, the control group experiences on average lower earnings levels after the dividend declaration, along with increased volatility in quarterly earnings changes and levels compared to the dividend increasing firms.[76] While we find significantly higher earnings and lower earnings volatility for those firms that are increasing dividends, Michaely et al. (2018) report that dividends only signal safer profits, not higher profits.

[76] See Appendix E4 for a visualization of the earnings changes and levels.

Matching Decreases with Unchanged Dividends

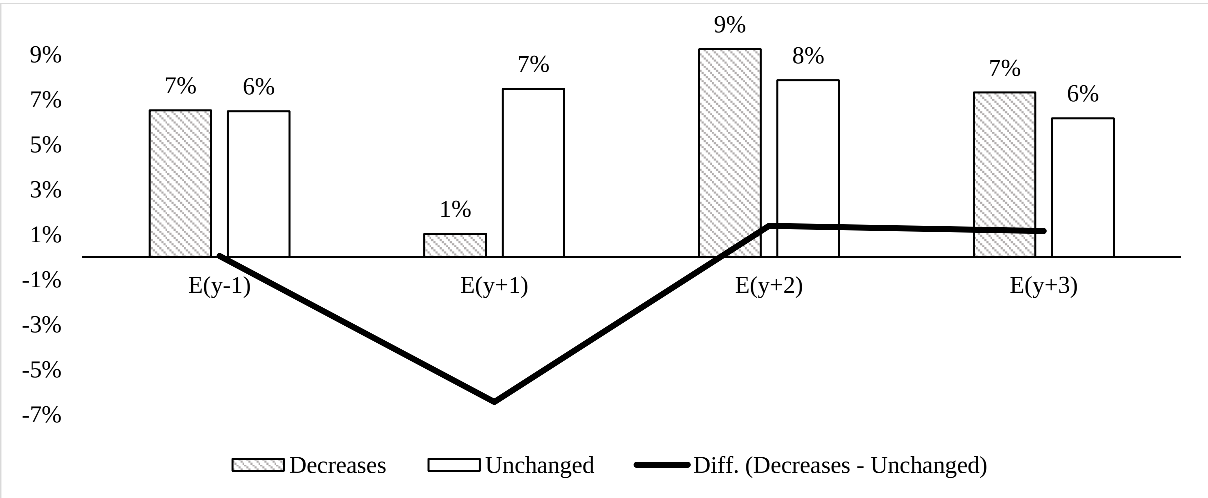
Table 25: Matching Decreases with Unchanged Dividends

	N	ΔDIV=0	ΔDIV<0	Difference	T-stat	P-value
$\Delta E_{(y-1)}$	36	-3.34%	-4.68%	1.35%	1.14	0.26
$\Delta E_{(y+1)}$	36	0.99%	-6.36%	7.35%	4.77	0.00***
$\Delta E_{(y+2)}$	36	0.56%	6.90%	-6.34%	-3.03	0.00***
$\Delta E_{(y+3)}$	36	-1.70%	-1.48%	-0.22%	-0.08	0.93
$E_{(y-1)}$	36	6.48%	6.53%	-0.04%	-0.04	0.97
$E_{(y+1)}$	36	7.48%	1.03%	6.45%	4.21	0.00***
$E_{(y+2)}$	36	7.86%	9.24%	-1.38%	-0.65	0.52
$E_{(y+3)}$	36	6.16%	7.31%	-1.15%	-0.83	0.41

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01.*

There are very few dividend reductions that fit at least one unchanged dividend on industry, time, and propensity score, meaning that the external validity of the model with matched dividend decreases is limited. We also note that 13 of the 36 matches are firms operating in either the shipping or oil and gas industry. Therefore, we argue that the results of this model can hardly be generalized over time or to other sector compositions. Nevertheless, we present the dividend cuts and their respective unchanged matches in table 25 and figure 6.

Figure 6: Earnings Levels for Matched Decreases and Unchanged Dividends



The average earnings levels and changes in the year prior the dividend announcements are, in essence, the same for the treatment group (decreases) and the control group (unchanged). This correspondence in earnings does not persist the year after the dividend announcement as the dividend reducing firms suffer from a substantial decline in profitability, while the unchanged control group is on average able to maintain last year's earnings. These differences are, however, temporary as the firms with dividend decreases regain past earnings levels in year two and three. The rebound in earnings following a dividend reduction is in line with the findings of Jensen et al. (2010). However, provided the small sample size and lack of persistence in lower earnings for the dividend decreasing firms, this model does not support a rejection of our second hypothesis (i.e., dividend decreases are not followed by permanent lower earnings). Despite this failure, dividend decreases may hold information regarding next year's earnings, which could imply that they are not only a function of the past.

6.2.4 Summary and Implications

The purpose of section 6.2 is to shed light on dividends' information content on future earnings in the Norwegian stock market. We employ two different approaches; a regression of future earnings changes on dividend changes, and a matched sample analysis. The regression analysis reports mixed results as it demonstrates that dividend changes convey information about next year's earnings, but the signaling content for longer horizons is absent. When using alternative accounting measures of earnings which are not prone to one-off gains/losses, the dividend changes' ability to predict earnings disappears even for the first year (next four quarters) after the dividend declaration. One plausible reason for the lack of support is that the management focuses on improving net income, as DPS is often a function of EPS and variable remuneration may be tied to earnings, while gross profits and operational cash flows are less exposed to incentives and creative accounting.

The matched sample analysis supports the initial findings, at least for dividend increases, as dividend increasing firms tend to outperform[77] comparable firms that keep dividends unchanged. This effect of higher earnings yield is, however, not long-standing as both approaches provide evidence of mean reverting earnings. Hence, we report limited evidence of permanent higher earnings for dividend increases. For the matched dividend cuts, we find significant differences in the level of earnings in the year following the declaration date, but due to the limited sample size and only temporary differences, we find little or no evidence for rejection of the second hypothesis for dividend decreases.

The restricted persistence of higher (lower) earnings for dividend increasing (decreasing) firms may imply that, despite great (bad) confidence about future earnings prospects, management is not able foresee the future beyond the next year. Consistent with the first stage, the results are only robust to firms with a market value of equity below NOK 10bn, indicating

[77] In earnings levels and changes in the first year after the dividend declaration.

that large cap firms may not use dividends as a signaling mechanism to the financial markets. As most of the large companies are mature and possess considerable cash balances, our results may suggest that those firms pay dividends to reduce agency costs[78] instead of signaling.

While Ham et al. (2018) show that dividend changes convey information concerning future earnings for up to three years, our results add to the existing literature that addresses poor information content of dividends.[79] However, as shown in the first (section 6.1) and the second part (section 6.2) of this thesis, unexpected dividend increases are well appreciated in the market and may signal temporary higher earnings, in contrast to dividend cuts which are harder to interpret. In general, we cannot reject the null hypothesis[80] for the second stage of the dividend signaling theory.

6.2.5 Limitations

Ham et al. (2018) addressed the choice of research design as a critical pitfall when testing whether dividends signify information about future earnings. Despite replicating established methodology, we are not immune to sources of bias in our model specifications. Lack of appropriate controls for expected earnings changes in the regression may affect our results materially. Furthermore, we stress that the regression model does not demonstrate a causal relationship, but rather a correlation between dividend changes and future earnings changes, i.e., a dividend change could be associated with future earnings changes, but it cannot explain why the earnings changes materialize.

In the second stage of the dividend signaling theory, we test dividends' signaling content on earnings up to three years. When looking at the second and third year after the dividend announcement, some firms might have reconsidered their future earnings prospects in the meantime. Those revisions could lead to new dividend adjustments in year two and three which signal future earnings rather than the initial dividend change in our base year.

The lack of data is another issue that limits our second study. Sufficient data on gross profits and earnings adjusted for one-off gains/losses were particularly demanding to collect and may be the reason as to why the results of the alternative earnings models differ from the main

[78] See section 2.1.5 about the life-cycle hypothesis.
[79] E.g., DeAngelo, DeAngelo, and Skinner (1996), Benartzi et al. (1997), and Grullon et al. (2005).
[80] H_0: Positive (negative) dividend announcements are not followed by permanent higher (lower) earnings.

model specification reported in section 6.2.1. We also notice that the absence of the financial sector might affect the outcome of our results. Consequently, we cannot extrapolate the findings to this excluded industry, nor to other sector compositions, due to the limited external validity as specified in stage one.

Finally, we performed a matched sample analysis to examine the regression results' validity. This statistical approach controls for undesired variables by utilizing a control group of unchanged dividend observations. However, although estimating a propensity score to match pairs of positive (negative) dividends to neutral ones, the sector classification is relatively broad meaning that some matches might be inherently different in terms of characteristics as firm size, capital structure, and operational activities.[81] Likewise, the shortage of relevant unchanged dividends narrows the scope of this matching procedure.

[81] The sector classification is presented in section 4.3.

7. Conclusion

The dividend signaling theory is arguably still relevant today as market participants pay close attention to what dividend changes may communicate about future business prospects. In this thesis, we examine the dividend signaling theory in two stages and find some evidence that positive dividend surprises provide information about future earnings up to one year after the declaration day.

The first stage investigates the short-term share price reactions to dividend announcements. Using the naïve model, we find evidence of positive $AAR_{(0)}$ when firms announce a dividend increase, while unchanged dividends and dividend decreases experience no significant $AAR_{(0)}$. To control for expected changes in dividends, we apply the analyst model which yields significant positive (negative) $AAR_{(0)}$ for positive (negative) dividend surprises. The results of positive dividends are robust to outliers, initiated, re-initiated, and suspended dividends, while the negative dividend surprises are no longer significant under these robustness tests.

When we split our sample into different periods, the results are mixed for both positive and negative surprises, suggesting that the overall results are sensitive to the chosen sample period. Moreover, only small and mid cap stocks have significant $AAR_{(0)}$ for positive dividend surprises. Interestingly, neutral dividend announcements yield significant *positive* $AAR_{(0)}$ for small cap firms, while large cap firms have significant *negative* $AAR_{(0)}$ when the dividend is in line with consensus estimates. In sum, we report more robust results for positive dividend surprises and more pronounced results when applying the analyst model.

In the second stage of the dividend signaling theory, we provide evidence that dividend increases indicate, at least in part, higher earnings the following year. However, dividend decreases do not have any significant information content for future earnings (see Appendix E1.3). The findings in the second stage are in line with the results from the first stage, where positive dividend changes gave the most distinct results, and the findings are highly significant for smaller firms while insignificant for large cap firms. However, unlike Ham et al. (2018), we do not find any significant results with alternative earnings measures, nor do we find any significant, unexpected future earnings two and three years after the dividend change. These differences may arise due to differences between the Norwegian and U.S. stock markets. To conclude, our results are broadly in line with consensus that dividend changes contain no or little information about future earnings.

7.1 Further Research

Our results raise several questions for further research. Firstly, the findings in both stages indicate that the dividend signaling theory is mainly applicable to small cap and mid cap firms for OSE listed companies. Consequently, large cap firms appear to not use dividend changes as a means to communicate future business prospects while the opposite seems to be true for smaller firms. Although our results cannot be interpreted causally, the findings raise the question of whether managers of smaller listed firms, who typically face greater information asymmetry, consciously use positive dividend changes to signal increases in future earnings. On the other hand, large cap firms might tend to use dividends to reduce agency costs in line with agency theory. Baker et al. (2006) surveyed managers of OSE listed firms and found that future earnings were an important factor for dividend policy, but this study did not distinguish between small and large cap firms.

Secondly, our study covers an economic period (2006-2018) which has mostly been associated with rising stock prices. However, in the first stage, the robustness tests' lack of significant abnormal returns during the financial crisis raises the question as to whether the signaling content of dividends differs over time and varies with the general economic situation. Thus, we propose to exploit a sample with a longer horizon to investigate potential differences over economic cycles and tax regimes.

Finally, in the second stage, the regression results show significant unexpected earnings changes only in the first year following the dividend declarations, consistent with the matched sample analysis which mostly identifies significant differences in earnings between the treatment group (increase/decrease) and the control group (unchanged) immediately after the announcements. This coincidence supports the concept of mean reversion in earnings, which is not analyzed in detail in this thesis. Therefore, we leave the study of mean reverting earnings following dividends changes open to further research.

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Appendices

Appendix A: Variable List

Table A1.1: Variable List for the Second Stage

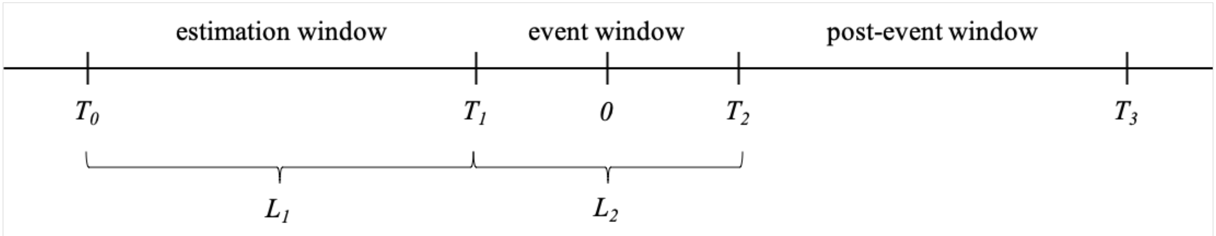
Dividend Variables	
Name	**Definition**
ΔDIV	Yearly change in dividend calculated as: $(DPS_{(y0)} – DPS_{(y-1)}) / DPS_{(y-1)}$
Earnings and Return Variables	
Name	**Definition**
$E_{(y+1)}$	Sum of next four quarterly earnings: $E_{(q+1)} + E_{(q+2)} + E_{(q+3)} + E_{(q+4)}$
$E_{(y-1)}$	Sum of past four quarterly earnings: $E_{(q+1)} + E_{(q+2)} + E_{(q+3)} + E_{(q+4)}$
$\Delta E_{(y+n)}$	Sum of next four quarterly earnings changes: $\Delta E_{(q+1)} + \Delta E_{(q+2)} + \Delta E_{(q+3)} + \Delta E_{(q+4)}$
$\Delta E_{(y-n)}$	Sum of past four quarterly earnings changes: $\Delta E_{(q-1)} + \Delta E_{(q-2)} + \Delta E_{(q-3)} + \Delta E_{(q-4)}$
GP	Gross Profit. Collected from Bloomberg. The naming convention follows that of the earnings variables
OpCF	Operational Cash Flow. Collected from Bloomberg. The naming convention follows that of the earnings variables
$Ret_{(-j,+k)}$	Stock return from day j to k prior to the declaration date, less the return of OSEBX over the same period
PSE	Positive Squared Earnings. $(E_{(y-1)})^2$
PSΔE	Positive Squared Changes in Earnings. $(\Delta E_{(y-n)})^2$
$NE_{(q-1,q-4)}$	Interaction with $E_{(y-1)}$ equal to one if the variable is negative
NΔE	Interaction with $\Delta E_{(y-1)}$ equal to one if the variable is negative
NSE	Interaction with $(E_{(y-1)})^2$ equal to one if the variable is negative
NSΔE	Interaction with $(\Delta E_{(y-1)})^2$ equal to one if the variable is negative

Source: Inspired by Ham et al. (2018).

Appendix B: Event Study Methodology

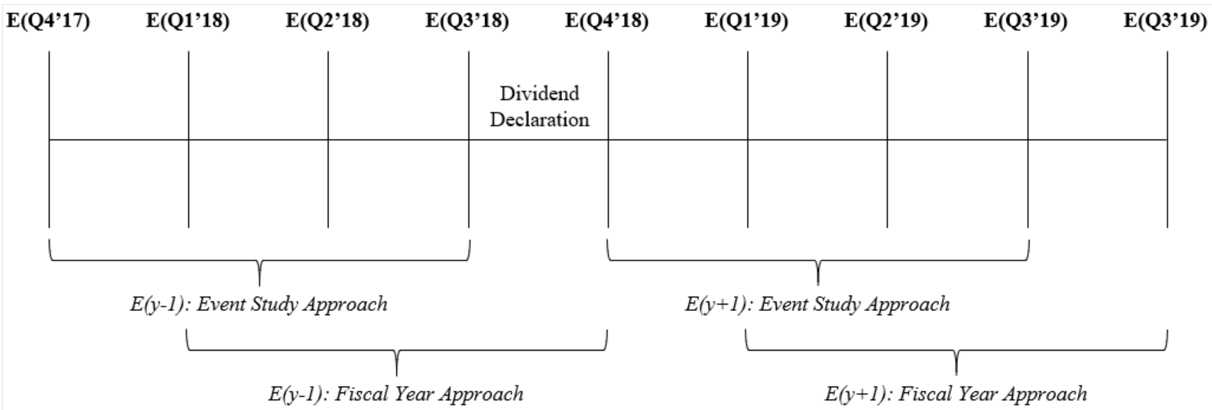
To test our hypotheses, we use an event study approach (Eckbo, 2008) which allows us to measure the impact of a specific event (in this case, dividend announcement) on the value of the firm (MacKinlay, 1997). The rationale for using this approach is that we expect the new information to be reflected immediately in the stock price. As illustrated below in figure B1.1, the event window approach includes an estimation window (L_1), an event window (L_2), and a post-event window. L_1 is the estimation window from T_0 to T_1 and L_2 is the event window (from T_1 to T_2). T_2 to T_3 is the post-event window. Since the estimation window does not overlap the event window, our estimation of the normal return is not influenced by the returns around the event date.

Figure B1.1: Illustration of the Event Study Methodology



Source: Inspired by MacKinlay (1997).

Figure B1.2: Example of Event Study Methodology vs Fiscal Year Approach When a Dividend is Declared Between the Third and Fourth Quarter in 2018



Source: Ham et al. (2018). Note that most of the firms in our study announced their dividends concurrent with Q4 earnings, meaning that the methods illustrated above will be coinciding.

Appendix C: Dividend Sample

Table C1.1: Complete List of the Final Dividend Sample, n = 517

ID	Ticker	Year	Outcome	ID	Ticker	Year	Outcome	ID	Ticker	Year	Outcome
1	AFG	2012	Increase	174	GRO	2008	Increase	347	PROTCT	2013	Increase
2	AFG	2013	Increase	175	GRO	2009	Decrease	348	PROTCT	2014	Increase
3	AFG	2015	Increase	176	GRO	2010	Unchanged	349	PROTCT	2015	Increase
4	AIK	2006	Increase	177	GRO	2011	Unchanged	350	PROTCT	2016	Increase
5	AIK	2007	Decrease	178	GRO	2012	Decrease	351	PROTCT	2017	Unchanged
6	AIK	2008	Increase	179	GRO	2013	Increase	352	PRS	2007	Increase
7	AIK	2011	Increase	180	GRO	2014	Unchanged	353	RENO	2016	Increase
8	AKA	2010	Increase	181	GRO	2015	Decrease	354	SADG	2006	Increase
9	AKA	2011	Increase	182	GSF	2010	Increase	355	SADG	2010	Decrease
10	AKA	2012	Increase	183	GSF	2011	Increase	356	SADG	2017	Increase
11	AKA	2014	Increase	184	GSF	2015	Increase	357	SADG	2018	Increase
12	AKBM	2006	Decrease	185	GSF	2016	Unchanged	358	SALM	2009	Decrease
13	AKER	2006	Increase	186	HELG	2017	Increase	359	SALM	2010	Increase
14	AKER	2007	Increase	187	HELG	2018	Increase	360	SALM	2011	Increase
15	AKER	2008	Decrease	188	HEX	2010	Increase	361	SALM	2014	Increase
16	AKER	2009	Decrease	189	HEX	2012	Decrease	362	SALM	2015	Increase
17	AKER	2010	Increase	190	HEX	2013	Increase	363	SALM	2016	Unchanged
18	AKER	2011	Increase	191	HEX	2014	Increase	364	SALM	2017	Increase
19	AKER	2013	Increase	192	HEX	2015	Increase	365	SALM	2018	Increase
20	AKER	2014	Increase	193	HEX	2018	Increase	366	SBANK	2017	Increase
21	AKER	2015	Decrease	194	HFISK	2007	Unchanged	367	SBANK	2018	Decrease
22	AKER	2017	Increase	195	HFISK	2015	Increase	368	SBO	2014	Increase
23	AKSO	2016	Decrease	196	HFISK	2016	Increase	369	SBO	2015	Increase
24	ARCUS	2018	Increase	197	HIDDN	2006	Increase	370	SBO	2016	Increase
25	ASC	2006	Increase	198	HIDDN	2008	Decrease	371	SBO	2017	Increase
26	ASC	2007	Increase	199	HIDDN	2009	Decrease	372	SBVG	2017	Increase
27	ASC	2008	Increase	200	HIDDN	2011	Increase	373	SBVG	2018	Increase
28	ASC	2009	Decrease	201	HNB	2008	Increase	374	SCHA	2006	Increase
29	ASC	2010	Increase	202	HNB	2009	Decrease	375	SCHA	2008	Increase
30	ASC	2011	Increase	203	HNB	2010	Unchanged	376	SCHA	2010	Increase
31	ASC	2012	Decrease	204	HNB	2012	Unchanged	377	SCHA	2011	Increase
32	ASC	2013	Unchanged	205	HNB	2013	Unchanged	378	SCHA	2012	Increase
33	ASC	2014	Unchanged	206	HNB	2014	Unchanged	379	SCHA	2013	Unchanged
34	ASC	2016	Increase	207	HNB	2015	Unchanged	380	SCHA	2014	Unchanged
35	ASC	2017	Decrease	208	HNB	2016	Increase	381	SCHA	2015	Unchanged
36	ASC	2018	Unchanged	209	HNB	2017	Increase	382	SCHA	2016	Unchanged
37	ATEA	2009	Increase	210	IMSK	2007	Decrease	383	SCHA	2017	Unchanged
38	ATEA	2010	Increase	211	INC	2006	Increase	384	SCHA	2018	Unchanged
39	ATEA	2011	Increase	212	INC	2010	Increase	385	SFR	2012	Increase
40	ATEA	2012	Increase	213	INM	2006	Decrease	386	SIOFF	2014	Increase
41	ATEA	2013	Increase	214	INM	2007	Increase	387	SIT	2010	Increase
42	ATEA	2015	Increase	215	INM	2008	Increase	388	SOFF	2006	Increase
43	ATEA	2016	Unchanged	216	INM	2009	Decrease	389	SOFF	2008	Unchanged

44	ATEA	2017	Unchanged	217	INM	2010	Increase	390	SOFF	2012	Decrease
45	ATEA	2018	Unchanged	218	INM	2011	Decrease	391	SOFF	2013	Increase
46	ATG	2006	Increase	219	ITE	2006	Increase	392	SOFF	2015	Decrease
47	AUSS	2008	Increase	220	ITE	2007	Increase	393	SOLON	2017	Increase
48	AUSS	2009	Decrease	221	ITE	2008	Unchanged	394	SOLON	2018	Increase
49	AUSS	2011	Increase	222	ITE	2009	Decrease	395	SOR	2017	Increase
50	AUSS	2012	Decrease	223	ITE	2018	Increase	396	SOR	2018	Unchanged
51	AUSS	2013	Increase	224	JSHIP	2007	Decrease	397	SPOG	2006	Decrease
52	AUSS	2014	Increase	225	JSHIP	2008	Increase	398	SPOG	2010	Increase
53	AUSS	2015	Increase	226	JSHIP	2009	Decrease	399	SPOG	2011	Increase
54	AUSS	2016	Increase	227	KID	2017	Increase	400	SPOG	2013	Increase
55	AUSS	2017	Increase	228	KIT	2016	Increase	401	SPOG	2014	Unchanged
56	AUSS	2018	Increase	229	KOA	2007	Decrease	402	SPOG	2015	Increase
57	AVM	2011	Increase	230	KOG	2006	Increase	403	SPOG	2016	Decrease
58	AVM	2012	Increase	231	KOG	2008	Increase	404	SPOG	2017	Increase
59	B2H	2017	Increase	232	KOG	2009	Increase	405	SPOG	2018	Increase
60	B2H	2018	Increase	233	KOG	2010	Increase	406	SPU	2014	Increase
61	BAKKA	2011	Increase	234	KOG	2011	Increase	407	SPU	2015	Increase
62	BAKKA	2012	Decrease	235	KOG	2013	Unchanged	408	SPU	2018	Increase
63	BAKKA	2013	Increase	236	KOM	2006	Increase	409	SRBANK	2006	Increase
64	BAKKA	2014	Increase	237	KOM	2007	Increase	410	SRBANK	2007	Decrease
65	BAKKA	2015	Increase	238	LSG	2006	Increase	411	SRBANK	2008	Increase
66	BAKKA	2016	Increase	239	LSG	2008	Decrease	412	SRBANK	2009	Decrease
67	BAKKA	2017	Increase	240	LSG	2009	Increase	413	SRBANK	2010	Increase
68	BAKKA	2018	Increase	241	LSG	2010	Increase	414	SRBANK	2011	Increase
69	BEL	2006	Decrease	242	LSG	2011	Increase	415	SRBANK	2013	Increase
70	BEL	2007	Increase	243	LSG	2012	Decrease	416	SRBANK	2015	Increase
71	BEL	2008	Increase	244	LSG	2013	Unchanged	417	SRBANK	2016	Decrease
72	BJORGE	2006	Unchanged	245	LSG	2014	Increase	418	SRBANK	2017	Increase
73	BON	2006	Decrease	246	LSG	2015	Increase	419	SRBANK	2018	Increase
74	BON	2008	Increase	247	LSG	2016	Unchanged	420	SSC	2011	Decrease
75	BON	2009	Decrease	248	LSG	2017	Increase	421	SSC	2018	Increase
76	BON	2010	Unchanged	249	LSG	2018	Increase	422	SSO	2016	Increase
77	BON	2011	Unchanged	250	MEDI	2017	Increase	423	SSO	2018	Increase
78	BON	2012	Decrease	251	MGN	2015	Decrease	424	STB	2006	Decrease
79	BON	2013	Increase	252	MING	2006	Increase	425	STB	2007	Decrease
80	BON	2014	Unchanged	253	MING	2007	Increase	426	STB	2008	Decrease
81	BON	2015	Decrease	254	MING	2008	Unchanged	427	STB	2009	Decrease
82	BON	2017	Unchanged	255	MING	2011	Increase	428	STB	2011	Increase
83	BON	2018	Unchanged	256	MING	2013	Decrease	429	STB	2012	Decrease
84	BOUVET	2017	Increase	257	MING	2014	Increase	430	STB	2018	Increase
85	BOUVET	2018	Increase	258	MING	2015	Increase	431	STRONG	2014	Increase
86	BRG	2014	Increase	259	MING	2016	Unchanged	432	STRONG	2015	Increase
87	BRG	2015	Increase	260	MING	2017	Increase	433	STRONG	2016	Increase
88	BRG	2016	Increase	261	MING	2018	Increase	434	STRONG	2017	Increase
89	BRG	2017	Increase	262	MIS	2011	Increase	435	STXEUR	2006	Increase
90	BRG	2018	Increase	263	MORG	2006	Increase	436	STXEUR	2007	Increase
91	BWG	2007	Increase	264	MORG	2007	Unchanged	437	SUBC	2007	Increase

92	BWG	2008	Decrease	265	MORG	2008	Increase	438	SUBC	2009	Increase
93	BWG	2009	Decrease	266	MORG	2009	Decrease	439	SUBC	2010	Increase
94	BWG	2011	Increase	267	MORG	2010	Decrease	440	SUBC	2012	Increase
95	BWG	2014	Increase	268	MORG	2011	Increase	441	SUBC	2013	Unchanged
96	CEQ	2007	Increase	269	MORG	2012	Decrease	442	SUBC	2014	Unchanged
97	CEQ	2009	Decrease	270	MORG	2013	Increase	443	SUBC	2015	Decrease
98	CEQ	2010	Increase	271	MORG	2014	Decrease	444	SUBC	2017	Increase
99	CEQ	2011	Increase	272	MORG	2015	Increase	445	SUO	2007	Increase
100	CEQ	2012	Decrease	273	MORG	2016	Decrease	446	SUO	2008	Increase
101	CEQ	2013	Decrease	274	MORG	2017	Increase	447	SVEG	2011	Increase
102	CEQ	2014	Increase	275	MORG	2018	Unchanged	448	SVEG	2012	Decrease
103	COP	2010	Increase	276	NGT	2010	Increase	449	SVEG	2013	Increase
104	COP	2011	Decrease	277	NGT	2014	Increase	450	SVEG	2014	Increase
105	COP	2012	Increase	278	NHY	2006	Increase	451	SVEG	2015	Increase
106	DAT	2016	Unchanged	279	NHY	2007	Increase	452	SVEG	2016	Decrease
107	DAT	2017	Unchanged	280	NHY	2009	Decrease	453	SVEG	2017	Increase
108	DAT	2018	Unchanged	281	NHY	2010	Increase	454	SVEG	2018	Decrease
109	DDASA	2010	Unchanged	282	NHY	2011	Increase	455	TAA	2006	Increase
110	DDASA	2015	Decrease	283	NHY	2012	Unchanged	456	TAA	2007	Increase
111	DEEP	2007	Increase	284	NHY	2013	Unchanged	457	TAA	2008	Increase
112	DEEP	2008	Increase	285	NHY	2014	Unchanged	458	TAA	2009	Increase
113	DNB	2006	Increase	286	NHY	2017	Increase	459	TEL	2006	Increase
114	DNB	2007	Increase	287	NHY	2018	Increase	460	TEL	2007	Increase
115	DNB	2008	Increase	288	NOD	2012	Decrease	461	TEL	2008	Increase
116	DNB	2009	Decrease	289	NONG	2007	Unchanged	462	TEL	2009	Decrease
117	DNB	2010	Increase	290	NONG	2008	Decrease	463	TEL	2010	Increase
118	DNB	2011	Increase	291	NONG	2010	Increase	464	TEL	2011	Increase
119	DNB	2012	Decrease	292	NONG	2011	Decrease	465	TEL	2012	Increase
120	DNB	2013	Increase	293	NONG	2012	Decrease	466	TEL	2013	Increase
121	DNB	2014	Increase	294	NONG	2013	Decrease	467	TEL	2014	Increase
122	DNB	2015	Increase	295	NONG	2014	Increase	468	TEL	2015	Increase
123	DNB	2016	Increase	296	NONG	2015	Increase	469	TEL	2016	Increase
124	DNB	2017	Increase	297	NONG	2016	Increase	470	TEL	2017	Increase
125	DNB	2018	Increase	298	NONG	2017	Increase	471	TEL	2018	Increase
126	DOF	2006	Increase	299	NONG	2018	Increase	472	TGS	2012	Increase
127	DOF	2007	Unchanged	300	NORGAN	2007	Increase	473	TGS	2013	Increase
128	DOF	2008	Increase	301	NPRO	2011	Increase	474	TGS	2015	Unchanged
129	EKO	2006	Unchanged	302	NPRO	2013	Unchanged	475	TOM	2006	Increase
130	EKO	2007	Unchanged	303	NPRO	2014	Decrease	476	TOM	2007	Increase
131	EKO	2008	Unchanged	304	NRC	2017	Increase	477	TOM	2008	Increase
132	EKO	2009	Decrease	305	NRC	2018	Increase	478	TOM	2009	Increase
133	EKO	2010	Increase	306	NRS	2015	Decrease	479	TOM	2010	Increase
134	EKO	2011	Increase	307	NRS	2016	Increase	480	TOM	2011	Increase
135	EKO	2012	Decrease	308	NRS	2017	Increase	481	TOM	2013	Increase
136	EKO	2013	Decrease	309	NRS	2018	Decrease	482	TOM	2014	Increase
137	EKO	2014	Unchanged	310	NSG	2006	Increase	483	TOM	2015	Increase
138	EKO	2015	Decrease	311	NSG	2007	Unchanged	484	TOM	2016	Increase
139	EKO	2016	Unchanged	312	ODF	2006	Decrease	485	TOM	2017	Increase

140	EKO	2017	Increase	313	ODF	2007	Unchanged	486	TOTG	2015	Increase
141	EKO	2018	Unchanged	314	ODF	2008	Decrease	487	TOTG	2017	Increase
142	ELT	2012	Increase	315	ODF	2018	Unchanged	488	TRE	2018	Unchanged
143	ELT	2013	Unchanged	316	ODL	2015	Decrease	489	TTS	2013	Decrease
144	ELT	2014	Unchanged	317	OLT	2006	Decrease	490	VEI	2006	Increase
145	ENTRA	2016	Increase	318	OLT	2007	Increase	491	VEI	2007	Increase
146	EPR	2018	Increase	319	OLT	2011	Increase	492	VEI	2008	Increase
147	EQNR	2011	Increase	320	OLT	2012	Unchanged	493	VEI	2009	Decrease
148	EQNR	2012	Increase	321	OLT	2014	Increase	494	VEI	2010	Unchanged
149	EQNR	2013	Increase	322	OLT	2015	Increase	495	VEI	2011	Unchanged
150	EQNR	2014	Increase	323	OLT	2016	Increase	496	VEI	2013	Decrease
151	EVRY	2006	Increase	324	OLT	2017	Increase	497	VEI	2017	Increase
152	EVRY	2007	Increase	325	OLT	2018	Increase	498	VIS	2006	Increase
153	EVRY	2008	Increase	326	ORK	2008	Increase	499	VME	2006	Unchanged
154	EVRY	2009	Decrease	327	ORK	2009	Unchanged	500	WEIFA	2016	Decrease
155	EVRY	2012	Increase	328	ORK	2010	Unchanged	501	WEIFA	2017	Increase
156	EVRY	2014	Increase	329	ORK	2013	Unchanged	502	XXL	2016	Unchanged
157	EXPERT	2006	Unchanged	330	ORK	2015	Unchanged	503	XXL	2017	Unchanged
158	EXPERT	2007	Increase	331	ORK	2016	Unchanged	504	XXL	2018	Unchanged
159	FAR	2006	Decrease	332	ORK	2017	Increase	505	YAR	2006	Increase
160	FAR	2007	Unchanged	333	ORK	2018	Unchanged	506	YAR	2007	Increase
161	FAR	2008	Increase	334	OTELLO	2010	Increase	507	YAR	2008	Increase
162	FAR	2011	Increase	335	OTELLO	2011	Increase	508	YAR	2009	Increase
163	FAR	2013	Decrease	336	OTELLO	2012	Increase	509	YAR	2011	Increase
164	FAR	2015	Unchanged	337	OTELLO	2013	Increase	510	YAR	2012	Increase
165	FAR	2016	Decrease	338	OTELLO	2014	Increase	511	YAR	2013	Increase
166	GAS	2007	Increase	339	OTELLO	2015	Increase	512	YAR	2014	Decrease
167	GAS	2008	Decrease	340	PARB	2017	Increase	513	YAR	2016	Increase
168	GJF	2012	Decrease	341	PARB	2018	Increase	514	YAR	2017	Decrease
169	GJF	2013	Increase	342	PFI	2006	Increase	515	ZAL	2016	Increase
170	GJF	2017	Increase	343	PGS	2012	Increase	516	ZAL	2017	Increase
171	GJF	2018	Increase	344	PGS	2013	Increase	517	ZAL	2018	Decrease
172	GRO	2006	Decrease	345	PGS	2014	Increase				
173	GRO	2007	Increase	346	PRON	2012	Increase				

Appendix D: Short-Term Effects

D1: Visualization of Average Abnormal Returns

Figure D1.1: Average Abnormal Return (AAR) in the Event Window Using the Naïve Model

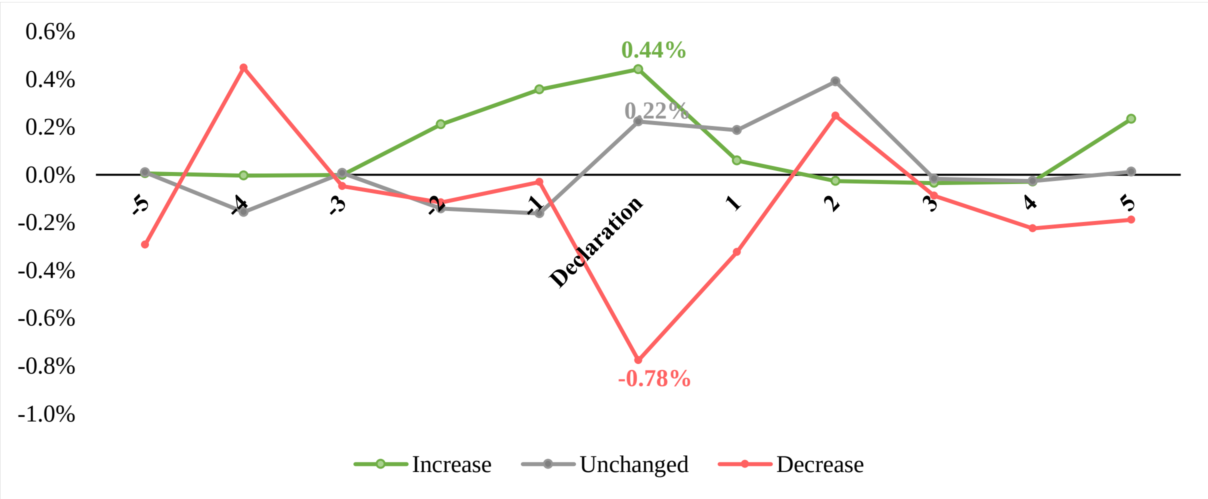
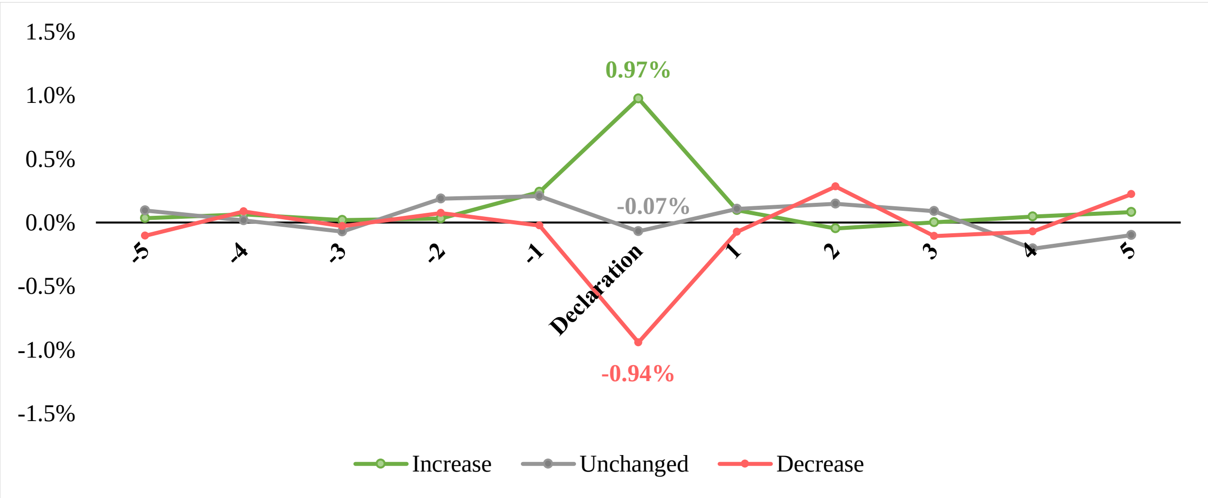


Figure D1.2: Average Abnormal Return (AAR) in the Event Window Using the Analyst Model



D2: Results from Robustness Tests

Table D2.1: The Augmented Analyst Model

	Increases (n = 60)		Unchanged (n = 49)		Decreases (n = 60)	
Days around AD	AAR	CAAR	AAR	CAAR	AAR	CAAR
-5	0.21%	0.21%	0.18%	0.18%	-0.11%	-0.11%
-4	-0.11%	0.11%	0.05%	0.23%	0.40%**	0.29%
-3	0.32%	0.42%	-0.30%	-0.06%	-0.41%***	-0.12%
-2	-0.14%	0.28%	0.22%	0.16%	0.37%*	0.25%
-1	0.30%	0.58%	0.15%	0.31%	-0.07%	0.18%
0	0.95%**	1.53%***	-0.34%	-0.03%	-0.49%	-0.31%
1	0.21%	1.73%***	0.62%*	0.59%	-0.27%	-0.58%
2	0.16%	1.90%***	0.31%	0.91%	-0.37%*	-0.95%*
3	-0.02%	1.88%***	0.17%	1.08%	0.25%	-0.70%
4	0.07%	1.94%***	-0.28%	0.80%	-0.03%	-0.73%
5	-0.02%	1.92%**	-0.40%**	0.41%	-0.03%	-0.76%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.2: The Naïve Model in the Absence of Earnings Announcements

	Increases (n = 34)		Unchanged (n = 8)		Decreases (n = 11)	
Days around AD	AAR	CAAR	AAR	CAAR	AAR	CAAR
-5	0.09%	0.09%	-0.15%	-0.15%	-0.67%	-0.67%
-4	-0.40%	-0.30%	-1.19%	-1.34%	0.12%	-0.54%
-3	-0.02%	-0.32%	0.07%	-1.27%	-0.34%	-0.88%*
-2	0.25%	-0.08%	0.76%	-0.51%	-0.33%	-1.21%
-1	-0.05%	-0.13%	-0.75%	-1.27%	1.81%	0.59%
0	1.09%*	0.99%	0.48%	-0.79%	-0.66%	-0.07%
1	-0.12%	0.87%	-0.61%	-1.40%	-0.91%	-0.98%
2	-0.07%	0.80%	-0.06%	-1.46%	0.11%	-0.87%
3	-0.56%*	0.23%	0.16%	-1.31%	1.18%*	0.30%
4	0.46%	0.69%	-0.43%	-1.74%	-0.11%	0.19%
5	0.80%*	1.32%	1.82%	0.08%	-0.22%	-0.02%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.3: The Analyst Model Without Omitted, Initiated, and Re-Initiated Dividends

	Increases (n = 183)		Unchanged (n = 115)		Decreases (n = 103)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	0.04%	0.04%	0.09%	0.09%	-0.14%	-0.14%
-4	0.01%	0.06%	0.02%	0.11%	-0.05%	-0.19%
-3	0.09%	0.14%	-0.07%	0.04%	-0.08%	-0.27%
-2	0.02%	0.16%	0.19%	0.23%	0.26%	-0.01%
-1	0.22%*	0.38%	0.21%	0.43%*	-0.03%	-0.05%
0	0.75%***	1.13%***	-0.07%	0.36%	-0.55%	-0.59%
1	0.14%	1.27%***	0.11%	0.47%	-0.13%	-0.72%
2	0.02%	1.29%***	0.15%	0.62%	0.21%	-0.51%
3	0.06%	1.35%***	0.09%	0.71%	-0.24%	-0.74%
4	0.13%	1.48%***	-0.21%	0.50%	0.06%	-0.68%
5	0.04%	1.52%***	-0.10%	0.40%	0.21%	-0.47%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.4: The Analyst Model Without Outliers (Max/Min +/- 50% Dividend Changes)

	Increases (n = 123)		Unchanged (n = 115)		Decreases (n = 94)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	0.15%	0.15%	0.09%	0.09%	-0.08%	-0.08%
-4	0.03%	0.18%	0.02%	0.11%	-0.11%	-0.19%
-3	0.06%	0.24%	-0.07%	0.04%	-0.10%	-0.30%
-2	0.14%	0.38%	0.19%	0.23%	0.39%	0.10%
-1	0.28%*	0.67%**	0.21%	0.43%	-0.05%	0.05%
0	1.09%***	1.73%***	-0.07%	0.36%	-0.49%	-0.44%
1	0.43%**	2.16%***	0.11%	0.47%	0.02%	-0.42%
2	0.07%	2.23%***	0.15%	0.62%	0.08%	-0.34%
3	0.11%	2.34%***	0.09%	0.71%	-0.23%	-0.57%
4	0.03%	2.37%***	-0.21%	0.50%	0.05%	-0.52%
5	0.07%	2.44%***	-0.10%	0.40%	0.21%	-0.30%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.5: The Analyst Model in the Period 2006-2009

	Increases (n = 49)		Unchanged (n = 23)		Decreases (n = 45)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	-0.22%	-0.22%	0.34%	0.34%	-0.04%	-0.04%
-4	0.36%	0.14%	-0.26%	0.08%	0.09%	0.05%
-3	-0.14%	0.00%	0.01%	0.09%	0.08%	0.13%
-2	0.14%	0.14%	-0.23%	-0.14%	0.17%	0.30%
-1	0.33%	0.47%	0.72%	0.58%	-0.33%	-0.03%
0	0.42%	0.88%	-0.53%	0.06%	-0.19%	-0.22%
1	-0.26%	0.62%	0.19%	0.24%	0.03%	-0.19%
2	0.02%	0.64%	0.23%	0.47%	0.18%	-0.01%
3	0.14%	0.78%	0.33%	0.80%	-0.48%	-0.49%
4	-0.25%	0.53%	-0.39%	0.41%	-0.45%	-0.94%
5	-0.05%	0.48%	-0.36%	0.05%	0.69%	-0.26%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.6: The Analyst Model in the Period 2010-2013

	Increases (n = 82)		Unchanged (n = 23)		Decreases (n = 45)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	0.18%	0.18%	-0.28%	-0.28%	0.25%	0.25%
-4	-0.14%	0.04%	0.24%	-0.04%	-0.13%	0.12%
-3	0.09%	0.13%	-0.57%	-0.61%	-0.32%*	-0.20%
-2	-0.07%	0.06%	0.58%	-0.03%	-0.10%	-0.29%
-1	0.14%	0.20%	-0.14%	-0.17%	-0.10%	-0.39%
0	1.55%***	1.76%***	0.39%	0.22%	-1.08%	-1.47%*
1	0.15%	1.90%***	0.20%	0.42%	-0.02%	-1.49%*
2	0.09%	1.99%***	0.42%	0.83%	0.04%	-1.45%*
3	0.04%	2.03%***	-0.05%	0.78%	0.13%	-1.32%
4	-0.12%	1.91%***	-0.36%	0.42%	0.18%	-1.14%
5	0.06%	1.97%***	-0.15%	0.27%	-0.39%	-1.53%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.7: The Analyst Model in Period the 2014-2018

	Increases (n = 69)		Unchanged (n = 72)		Decreases (n = 49)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	0.05%	0.05%	0.12%	0.12%	-0.43%	-0.43%
-4	0.10%	0.14%	0.04%	0.16%	0.24%	-0.18%
-3	0.05%	0.19%	0.04%	0.21%	0.09%	-0.09%
-2	0.08%	0.27%	0.21%	0.41%	0.11%	0.02%
-1	0.30%	0.56%	0.14%	0.55%	0.31%	0.33%
0	0.68%	1.25%	-0.05%	0.50%	-1.53%	-1.19%
1	0.29%	1.54%	0.06%	0.56%	-0.21%	-1.40%
2	-0.25%	1.29%	0.05%	0.60%	0.56%	-0.84%
3	-0.14%	1.14%	0.05%	0.66%	0.06%	-0.78%
4	0.45%	1.60%	-0.10%	0.55%	0.09%	-0.69%
5	0.20%	1.80%	0.00%	0.55%	0.26%	-0.43%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.8: The Analyst Model with Small Cap Firms

	Increases (n = 54)		Unchanged (n = 32)		Decreases (n = 39)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	-0.25%	-0.25%	0.07%	0.07%	0.14%	0.14%
-4	0.10%	-0.15%	0.32%	0.39%	-0.11%	0.03%
-3	0.05%	-0.10%	-0.17%	0.22%	-0.11%	-0.07%
-2	-0.03%	-0.13%	0.20%	0.42%	-0.21%	-0.28%
-1	0.33%	0.21%	0.33%*	0.75%	0.06%	-0.22%
0	1.49%***	1.70%***	1.32%**	2.07%***	-0.78%	-1.01%
1	-0.17%	1.53%**	-0.07%	2.00%**	-0.29%	-1.29%
2	-0.23%	1.30%*	0.07%	2.07%**	0.10%	-1.19%
3	-0.14%	1.16%	-0.05%	2.02%**	0.10%	-1.10%
4	0.40%	1.56%*	-0.22%	1.80%*	0.00%	-1.10%
5	0.45%	2.01%*	0.49%	2.29%**	0.38%	-0.72%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.9: The Analyst Model with Mid Cap Firms

	Increases (n = 77)		Unchanged (n = 42)		Decreases (n = 59)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	0.11%	0.11%	0.22%	0.22%	-0.13%	-0.13%
-4	0.07%	0.18%	-0.18%	0.04%	0.25%	0.11%
-3	0.13%	0.31%	-0.10%	-0.06%	0.11%	0.22%
-2	-0.04%	0.27%	0.25%	0.19%	0.29%	0.51%
-1	0.59%***	0.86%***	-0.02%	0.17%	-0.18%	0.33%
0	1.03%***	1.89%***	-0.06%	0.11%	-0.54%	-0.20%
1	0.20%	2.09%***	0.59%	0.70%	-0.15%	-0.36%
2	0.01%	2.11%***	0.29%	0.99%	0.25%	-0.11%
3	0.21%	2.32%***	0.10%	1.10%	-0.29%	-0.40%
4	-0.15%	2.16%****	-0.14%	0.96%	0.10%	-0.30%
5	-0.16%	2.00%***	-0.31%	0.65%	0.35%	0.05%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Table D2.10: The Analyst Model with Large Cap Firms

	Increases (n = 69)		Unchanged (n = 41)		Decreases (n = 33)	
Days around AD	**AAR**	**CAAR**	**AAR**	**CAAR**	**AAR**	**CAAR**
-5	0.17%	0.17%	-0.02%	-0.02%	-0.34%	-0.34%
-4	0.02%	0.20%	-0.02%	-0.04%	0.03%	-0.31%
-3	-0.13%	0.07%	0.04%	0.00%	-0.18%	-0.49%
-2	0.16%	0.23%	0.11%	0.11%	0.02%	-0.47%
-1	-0.22%	0.01%	0.34%	0.45%	0.16%	-0.32%
0	0.51%	0.52%	-1.16%	-0.71%	-1.85%**	-2.17%**
1	0.19%	0.71%	-0.25%	-0.96%	0.32%	-1.85%
2	0.03%	0.74%	0.06%	-0.91%	0.56%	-1.28%
3	-0.12%	0.62%	0.19%	-0.72%	-0.01%	-1.30%
4	-0.01%	0.60%	-0.26%	-0.98%	-0.46%	-1.76%
5	0.06%	0.66%	-0.34%**	-1.32%*	-0.19%	-1.95%

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01*

Appendix E: Long-Term Effects

E1: Regression Results

Table E1.1: Regressing Future Earnings Changes on Dividend Changes and Controls (All Variables Displayed)

	(1)	(2)	(3)
	$\Delta E_{(y+1)}$	$\Delta E_{(y+2)}$	$\Delta E_{(y+3)}$
ΔDIV	0.038***	0.004	0.002
	(0.012)	(0.014)	(0.016)
$Ret_{(-2, -20)}$	0.213***	0.063	0.080
	(0.071)	(0.086)	(0.099)
$Ret_{(-21, -40)}$	0.315***	0.200***	0.145*
	(0.062)	(0.072)	(0.086)
$Ret_{(-41, -60)}$	0.034	-0.008	-0.046
	(0.044)	(0.050)	(0.059)
$Ret_{(-61, -120)}$	0.110***	0.116**	-0.009
	(0.040)	(0.045)	(0.057)
$Ret_{(-121, -240)}$	0.107***	0.101***	0.097***
	(0.024)	(0.028)	(0.034)
$E_{(q-4)}$	0.519	0.256	0.034
	(0.368)	(0.459)	(0.546)
$E_{(q-3)}$	1.297***	-0.720	-1.809***
	(0.368)	(0.484)	(0.639)
$E_{(q-2)}$	-0.010	1.281***	0.336
	(0.336)	(0.389)	(0.463)
$E_{(q-1)}$	0.673***	0.718***	1.138***
	(0.235)	(0.268)	(0.324)
$\Delta E_{(q-4)}$	-1.268***	-1.645***	-0.199
	(0.335)	(0.398)	(0.474)
$\Delta E_{(q-3)}$	0.415*	0.135	0.492
	(0.236)	(0.299)	(0.359)
$\Delta E_{(q-2)}$	0.017	-1.290***	-0.496
	(0.301)	(0.380)	(0.439)
$\Delta E_{(q-1)}$	-0.140	-0.964***	-0.412
	(0.205)	(0.241)	(0.285)
$NE_{(q-1, q-4)}$	-0.325	-4.083***	-2.764
	(0.586)	(1.134)	(1.849)
$PSE_{(q-1, q-4)}$	-5.166***	-1.503**	-0.495
	(0.585)	(0.668)	(0.831)
$NSE_{(q-1, q-4)}$	-1.638	-31.377***	-22.704
	(1.633)	(6.780)	(17.082)
$N\Delta E_{(q-1, q-4)}$	0.084	0.207	-0.400

	(0.425)	(0.508)	(0.593)
$PS\Delta E_{(q-1, q-4)}$	0.617***	1.079***	0.247
	(0.214)	(0.253)	(0.297)
$NS\Delta E_{(q-1, q-4)}$	1.763	-2.312	-1.428
	(1.604)	(1.964)	(2.271)
Intercept	-0.014	-0.003	-0.001
	(0.012)	(0.014)	(0.017)
Observations	266	233	205
R^2	0.631	0.473	0.335
Adjusted R^2	0.601	0.423	0.263
Residual Std. Error	0.083 (df = 245)	0.090 (df = 212)	0.101 (df = 184)
F Statistic	20.990*** (df = 20; 245)	9.514*** (df = 20; 212)	4.644*** (df = 20; 184)

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01.*
Abbreviations: N = negative, P = positive, S = squared.

Table E1.2: Regressing Future Adjusted Earnings Changes on Dividend Changes and Controls

	(1)	**(2)**	**(3)**
	$\mathbf{\Delta E_{(y+1)}}$	$\mathbf{\Delta E_{(y+2)}}$	$\mathbf{\Delta E_{(y+3)}}$
ΔDIV	0.026**	-0.003	0.026
	(0.012)	(0.016)	(0.018)
Intercept	0.008	0.011	0.013
	(0.009)	(0.012)	(0.013)
Linear Controls	Included	Included	Included
Non-linear Controls	Included	Included	Included
Observations	185	160	140
R^2	0.501	0.521	0.424
Adjusted R^2	0.441	0.452	0.327

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01.*

To check whether our results are robust to adjusted earnings, we use the main specification in stage 2 and substitute earnings (scaled by market cap) with adjusted EPS (scaled by share price). The alternative earnings measure reduces the sample, but our main findings are confirmed with significant earnings increases the following year after positive dividend changes (significant at the 5% level). Note that the adjusted EPS leads to an equally strong coefficient in y+3 as in y+1, but this is not significant due to a higher standard deviation.

Table E1.3: Split by Positive and Negative Dividend Changes

	(1) $\Delta E_{(y+1)}$	(2) $\Delta E_{(y+2)}$	(3) $\Delta E_{(y+3)}$
PΔDIV	0.064***	0.015	0.008
	(0.015)	(0.018)	(0.022)
NΔDIV	-0.019	-0.020	-0.008
	(0.024)	(0.028)	(0.032)
Intercept	-0.022*	-0.006	-0.002
	(0.012)	(0.014)	(0.017)
Linear Controls	Included	Included	Included
Non-linear Controls	Included	Included	Included
Observations	266	233	205
R^2	0.642	0.475	0.336
Adjusted R^2	0.611	0.423	0.260

**p-value < 0.1, **p-value < 0.05, ***p-value < 0.01.*

In the first stage, the positive dividend changes gave the most robust and significant results. To separate the effect of positive and negative dividend changes, two separate variables are calculated. PΔDIV is the dividend change with an interaction equal to one if the dividend change is positive and zero otherwise. Similarly, NΔDIV is the dividend change with an interaction equal to one if the dividend change is negative and zero otherwise. Positive dividend changes provide highly significant information about earnings the following year (t-value of 4.189), while negative dividend changes do not provide any significant information about future earnings. Thus, it appears that the results of this regression are consistent with abnormal share price returns identified in stage one.

E2: Complete List of Matched Pairs

Table E2.1: Dividend Increases Matched with Unchanged Dividends

ID	Year	Increase	Unchanged	ID	Year	Increase	Unchanged
1	2007	AFG	ODF	81	2011	KOG	VEI
2	2010	AFG	VEI	82	2006	KOM	EXPERT
3	2011	AFG	VEI	83	2007	KOM	EKO
4	2012	AFG	KOG	84	2012	KVAER	RISH
5	2013	AFG	KOG	85	2007	LSG	HFISK
6	2015	AFK	HNB	86	2010	LSG	ORK
7	2008	AKA	IMSK	87	2015	LSG	ORK
8	2010	AKA	DDASA	88	2016	MULTI	KOG
9	2011	AKA	GRO	89	2014	NGT	SCHA
10	2012	AKA	RISH	90	2011	NHY	BIND
11	2014	AKA	FAR	91	2010	NOD	ITE
12	2007	AKER	FAR	92	2008	NORMAN	ITE
13	2013	AKER	SUBC	93	2010	NPEL	ORK
14	2014	AKER	EIOF	94	2018	NRC	KOG
15	2010	ATEA	ITE	95	2016	NRS	GSF
16	2011	ATEA	NOD	96	2018	NTS	ORK
17	2015	ATEA	DAT	97	2007	OLT	SST
18	2010	AUSS	ORK	98	2007	ORK	HFISK
19	2013	AUSS	LSG	99	2008	ORK	HFISK
20	2014	AUSS	ORK	100	2010	OTELLO	ITE
21	2015	AUSS	ORK	101	2011	OTELLO	NOD
22	2016	AUSS	LSG	102	2013	OTELLO	BOUVET
23	2013	BAKKA	LSG	103	2013	PGS	SUBC
24	2015	BAKKA	ORK	104	2014	PGS	EIOF
25	2016	BAKKA	ORK	105	2018	POL	SCHA
26	2007	BEL	ODF	106	2007	PRS	DOF
27	2012	BIND	NHY	107	2016	RENO	KOG
28	2007	BON	EIOF	108	2006	RIC	EXPERT
29	2008	BON	SOFF	109	2007	RIE	HFISK
30	2013	BON	SUBC	110	2010	RIE	ORK
31	2006	BOR	SST	111	2011	RISH	GRO
32	2011	BOUVET	NOD	112	2013	RISH	EIOF
33	2016	BOUVET	DAT	113	2010	SALM	ORK
34	2017	BOUVET	DAT	114	2015	SALM	ORK
35	2018	BOUVET	ATEA	115	2018	SALM	ORK
36	2014	BRG	NHY	116	2012	SFR	RISH
37	2016	BRG	NHY	117	2007	SOFF	FAR
38	2007	CEQ	HFISK	118	2013	SOFF	EIOF
39	2010	CEQ	ORK	119	2014	SOFF	EIOF
40	2010	COP	ORK	120	2013	SPU	SUBC
41	2008	COV	ITE	121	2014	SPU	EIOF
42	2007	DDASA	FAR	122	2018	SPU	SUBC
43	2008	DEEP	IMSK	123	2012	STRANS	KOG
44	2017	EKO	XXL	124	2013	STRANS	ELT

45	2016	EPR	LSG	125	2016	STRONG	DAT
46	2018	EPR	ORK	126	2017	STRONG	ATEA
47	2010	EQNR	GRO	127	2007	STXEUR	ODF
48	2011	EQNR	GRO	128	2006	SUO	VME
49	2013	EQNR	SUBC	129	2008	SUO	ITE
50	2014	EQNR	FAR	130	2006	TAA	VME
51	2006	EVRY	VME	131	2008	TAA	ITE
52	2008	EVRY	ITE	132	2013	TEL	SCHA
53	2012	FAR	RISH	133	2014	TEL	SCHA
54	2011	FOP	GRO	134	2015	TEL	SCHA
55	2012	GOD	KOG	135	2017	TEL	SCHA
56	2013	GOD	ELT	136	2018	TEL	SCHA
57	2007	GRO	EIOF	137	2012	TGS	RISH
58	2008	GRO	SOFF	138	2013	TGS	SUBC
59	2013	GRO	SUBC	139	2014	TGS	EIOF
60	2008	HAVI	SOFF	140	2008	TIDE	KOM
61	2010	HEX	VEI	141	2007	TOM	ODF
62	2013	HEX	KOG	142	2008	TOM	SOLV
63	2014	HEX	SOLV	143	2012	TOM	KOG
64	2016	HFISK	LSG	144	2013	TOM	KOG
65	2006	HIDDN	VME	145	2014	TOM	SOLV
66	2008	HNB	AFK	146	2016	TOM	KOG
67	2010	INC	VEI	147	2018	TOM	KOG
68	2010	INFRA	AFK	148	2007	VEI	ODF
69	2012	INFRA	HNB	149	2012	VEI	KOG
70	2008	INM	ITE	150	2014	VEI	STRANS
71	2010	INM	ITE	151	2016	VEI	KOG
72	2006	ITE	VME	152	2018	VEI	KOG
73	2016	ITE	DAT	153	2006	VIS	VME
74	2017	ITE	ATEA	154	2015	WEIFA	ORK
75	2018	ITE	ATEA	155	2011	YAR	BIND
76	2015	KIT	DAT	156	2012	YAR	NHY
77	2016	KIT	DAT	157	2016	YAR	NHY
78	2017	KIT	DAT	158	2016	ZAL	EKO
79	2007	KOG	ODF	159	2017	ZAL	XXL
80	2010	KOG	VEI				

Table E2.2: Dividend Decreases Matched with Unchanged Dividends

ID	Year	Decrease	Unchanged
1	2015	AKER	TGS
2	2009	AKVA	ORK
3	2009	AUSS	ORK
4	2012	BAKKA	ORK
5	2015	BON	TGS
6	2010	BOUVET	ITE
7	2015	BOUVET	DAT
8	2012	BWG	OLT
9	2009	CEQ	ORK
10	2010	FAR	DDASA
11	2012	FOP	RISH
12	2014	GOD	SOLV
13	2012	GRO	RISH
14	2015	GRO	TGS
15	2011	HEX	VEI
16	2012	HEX	KOG
17	2016	HEX	KOG
18	2008	HIDDN	ITE
19	2007	IMSK	FAR
20	2007	JSHIP	SOLV
21	2008	KOA	EKO
22	2008	LSG	NTS
23	2013	NGT	SCHA
24	2008	ODF	SOLV
25	2006	OLT	SST
26	2015	POL	SCHA
27	2008	RIE	HFISK
28	2012	RIE	ORK
29	2013	RIE	LSG
30	2010	RISH	DDASA
31	2012	SOFF	RISH
32	2007	TIDE	FOS
33	2011	TIDE	GYL
34	2013	VEI	KOG
35	2007	WILS	SOLV
36	2018	ZAL	XXL

E3: Quarterly Tables

Table E3.1: Matching Increases with Unchanged Dividends (Quarterly Figures)

	N	ΔDIV=0	ΔDIV>0	Difference	T-stat	P-value
$\Delta E_{(q-4)}$	159	-0.04%	0.51%	-0.55%	-2.11	0.04
$\Delta E_{(q-3)}$	159	-0.19%	0.38%	-0.57%	-1.67	0.10
$\Delta E_{(q-2)}$	159	0.71%	0.63%	0.08%	0.49	0.63
$\Delta E_{(q-1)}$	159	1.31%	0.93%	0.38%	1.59	0.11
$\Delta E_{(q+1)}$	159	-0.48%	0.49%	-0.97%	-2.77	0.01
$\Delta E_{(q+2)}$	159	-0.72%	0.79%	-1.50%	-1.80	0.07
$\Delta E_{(q+3)}$	159	-0.83%	0.25%	-1.07%	-2.47	0.01
$\Delta E_{(q+4)}$	159	-1.60%	0.11%	-1.71%	-2.84	0.01
$\Delta E_{(q+5)}$	159	0.68%	-0.48%	1.16%	2.31	0.02
$\Delta E_{(q+6)}$	159	-0.25%	-0.74%	0.49%	1.54	0.13
$\Delta E_{(q+7)}$	159	0.71%	-0.68%	1.39%	2.51	0.01
$\Delta E_{(q+8)}$	159	-0.64%	-0.55%	-0.09%	-0.11	0.92
$\Delta E_{(q+9)}$	159	-0.18%	-0.40%	0.22%	0.55	0.58
$\Delta E_{(q+10)}$	159	-0.08%	-0.47%	0.40%	1.01	0.32
$\Delta E_{(q+11)}$	159	-1.07%	0.27%	-1.34%	-1.03	0.30
$\Delta E_{(q+12)}$	159	-0.05%	-1.22%	1.17%	1.48	0.14
$E_{(q-4)}$	159	1.57%	1.46%	0.11%	0.40	0.69
$E_{(q-3)}$	159	2.16%	1.95%	0.21%	0.76	0.45
$E_{(q-2)}$	159	1.98%	2.10%	-0.12%	-0.71	0.48
$E_{(q-1)}$	159	2.14%	2.28%	-0.14%	-0.57	0.57
$E_{(q+1)}$	159	1.09%	1.95%	-0.86%	-2.48	0.01
$E_{(q+2)}$	159	1.41%	2.74%	-1.32%	-1.71	0.09
$E_{(q+3)}$	159	1.13%	2.35%	-1.23%	-3.03	0.00
$E_{(q+4)}$	159	0.48%	2.38%	-1.90%	-3.56	0.00
$E_{(q+5)}$	159	1.79%	1.61%	0.18%	0.47	0.64
$E_{(q+6)}$	159	1.17%	2.03%	-0.85%	-3.11	0.00
$E_{(q+7)}$	159	1.77%	1.67%	0.10%	0.16	0.87
$E_{(q+8)}$	159	-0.23%	1.73%	-1.96%	-3.02	0.00
$E_{(q+9)}$	159	1.70%	1.45%	0.25%	0.80	0.43
$E_{(q+10)}$	159	1.10%	1.44%	-0.34%	-0.83	0.41
$E_{(q+11)}$	159	0.76%	1.91%	-1.15%	-0.84	0.40
$E_{(q+12)}$	159	-0.31%	0.39%	-0.69%	-0.80	0.42

Table E3.2: Matching Decreases with Unchanged Dividends (Quarterly Figures)

	N	ΔDIV=0	ΔDIV<0	Difference	T-stat	P-value
$\Delta E_{(q-4)}$	36	0.51%	-0.72%	1.24%	1.28	0.21
$\Delta E_{(q-3)}$	36	-1.48%	-0.78%	-0.69%	-0.61	0.55
$\Delta E_{(q-2)}$	36	-1.32%	-1.92%	0.59%	0.58	0.57
$\Delta E_{(q-1)}$	36	-1.05%	-1.26%	0.21%	0.15	0.88
$\Delta E_{(q+1)}$	36	-0.40%	-0.25%	-0.15%	-0.21	0.84
$\Delta E_{(q+2)}$	36	-0.19%	-1.64%	1.44%	0.74	0.47
$\Delta E_{(q+3)}$	36	1.04%	-1.36%	2.40%	1.07	0.29
$\Delta E_{(q+4)}$	36	0.55%	0.40%	0.15%	0.05	0.96
$\Delta E_{(q+5)}$	36	-1.72%	0.41%	-2.13%	-1.93	0.06
$\Delta E_{(q+6)}$	36	-1.39%	2.22%	-3.62%	-2.61	0.01
$\Delta E_{(q+7)}$	36	2.56%	6.99%	-4.43%	-0.87	0.39
$\Delta E_{(q+8)}$	36	0.63%	-2.55%	3.18%	0.68	0.50
$\Delta E_{(q+9)}$	36	2.10%	1.33%	0.77%	0.76	0.45
$\Delta E_{(q+10)}$	36	0.59%	-1.61%	2.20%	2.06	0.05
$\Delta E_{(q+11)}$	36	-2.01%	-1.33%	-0.68%	-0.25	0.80
$\Delta E_{(q+12)}$	36	-1.05%	0.15%	-1.20%	-0.73	0.47
$E_{(q-4)}$	36	2.14%	2.09%	0.05%	0.11	0.91
$E_{(q-3)}$	36	2.01%	1.78%	0.23%	0.39	0.70
$E_{(q-2)}$	36	1.32%	1.26%	0.06%	0.08	0.94
$E_{(q-1)}$	36	1.01%	1.40%	-0.38%	-0.35	0.73
$E_{(q+1)}$	36	1.74%	1.89%	-0.15%	-0.21	0.83
$E_{(q+2)}$	36	1.81%	0.26%	1.56%	0.84	0.41
$E_{(q+3)}$	36	2.36%	0.08%	2.28%	1.00	0.32
$E_{(q+4)}$	36	1.56%	1.71%	-0.15%	-0.05	0.96
$E_{(q+5)}$	36	0.08%	2.00%	-1.92%	-1.94	0.06
$E_{(q+6)}$	36	0.42%	3.43%	-3.01%	-2.44	0.02
$E_{(q+7)}$	36	4.92%	3.15%	1.76%	0.73	0.47
$E_{(q+8)}$	36	2.36%	-0.02%	2.38%	0.94	0.35
$E_{(q+9)}$	36	1.95%	3.22%	-1.27%	-1.93	0.06
$E_{(q+10)}$	36	1.01%	1.90%	-0.88%	-0.95	0.35
$E_{(q+11)}$	36	2.91%	1.86%	1.04%	0.79	0.43
$E_{(q+12)}$	36	1.31%	0.33%	0.98%	0.47	0.64

E4: Visualization of Quarterly Earnings Levels and Changes

Figure E4.1: Quarterly Earnings Levels (Increases vs Unchanged)

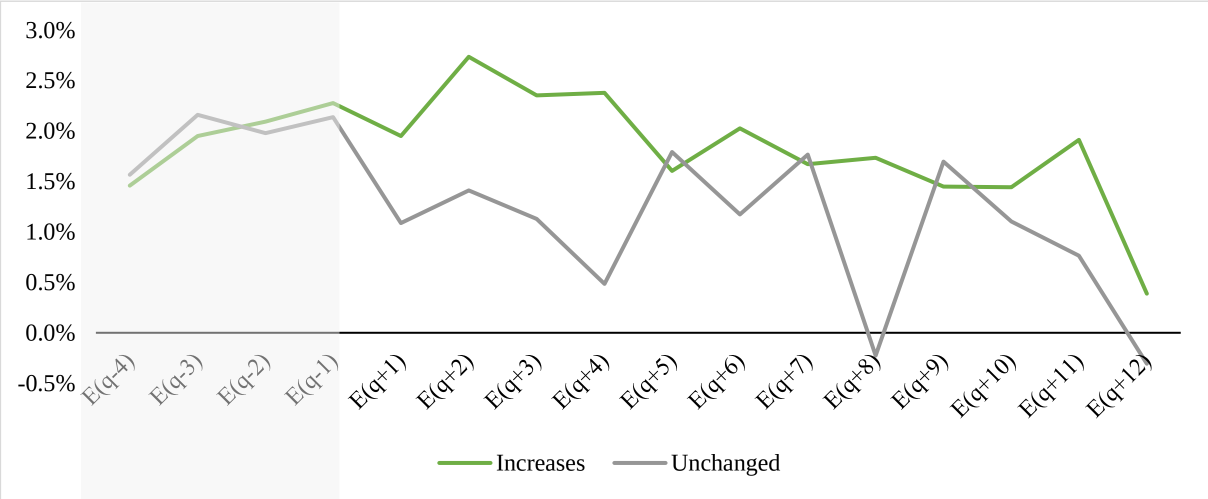


Figure E4.2: Quarterly Earnings Levels (Increases vs Unchanged)

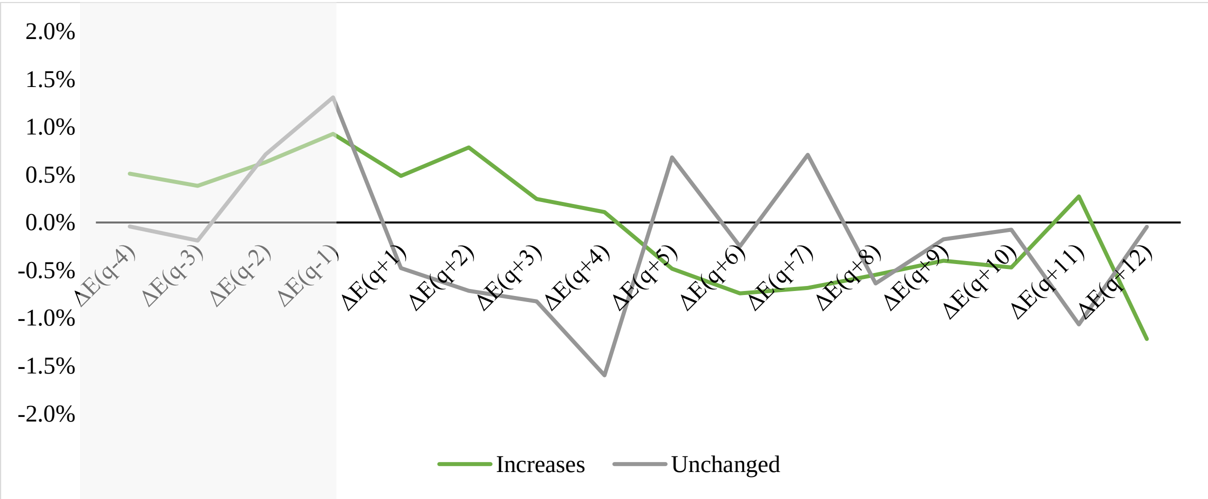


Figure E4.3: Quarterly Earnings Levels (Decreases vs Unchanged)

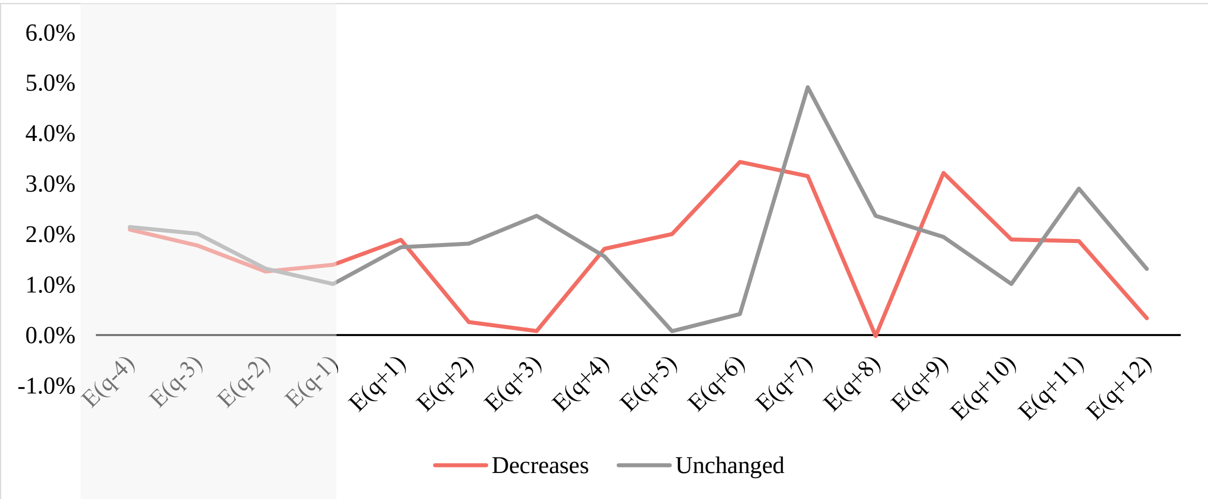


Figure E4.4: Quarterly Earnings Changes (Decreases vs Unchanged)