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Employee stock options and company performance on the Oslo Stock Exchange


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Master Thesis
BI Norwegian Business School

# Employee stock options and company performance on the Oslo Stock Exchange

An investigation of how the largest companies listed on the Oslo Stock Exchange granted employee stock options in the period 2009 to 2019, and the effect granting employee stock options has on long-term performance.

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**Abstract**

This paper investigates the usage of employee stock options for the largest companies listed on the Oslo Stock Exchange in the period 2009 to 2019, and the effect granting employee stock options has on long-term performance. We find evidence that granting employee stock options positively affects accounting-based performance four and five years after the grant. The positive effect is particularly strong when employee stock options are granted at-the-money, and the effect is most prominent four years after grant. The effect is curvilinear, and we locate both the relative value and number of employee stock options that optimizes performance, though the findings suggest granting extreme values that are beyond the observed praxis.

We further find that companies granted options out-of-the-money below optimal levels, making the praxis inefficient. Consequently, our findings indicate that practitioners should consider granting more employee stock options at-the-money with higher value to enhance long-term performance. The findings from this study are in line with international literature, and we provide, to the best of our knowledge, the first evidence of employee stock options having a positive effect on long-term performance in a Norwegian context.

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## 1. INTRODUCTION

Equity ownership in the form of employee stock options (ESOs) is argued to be an effective tool for aligning the interests of employees with shareholders' while providing a causal link between compensation and performance. Consequently, many firms listed on the Oslo Stock Exchange have incorporated this practice in the search for improved performance. The usage of options increased during the 1990's up to a peak in 2002 when nearly 60% of the companies on the Oslo Stock Exchange used ESOs as a part of their compensation package. The subsequent period experienced a steady decrease in usage to around 50% (Skogseth, 2015). During this period, ESOs was the most applied form of incentive and equity compensation.

Internationally the research on ESOs is manifold with varying findings, though most studies conclude that granting ESOs increases company performance. For instance, Jones and Kato (1995), Ya-Ting (2003), Cin and Smith (2012), and Ding and Chea (2021) found a positive effect of granting ESOs on performance in an Asian context. A similar relationship was reported for companies listed in the US (Frye, 2004; Morgan & Poulsen, 2001; Smith & Swan, 2008). Contrastingly, granting ESOs has seemingly no significant effect on long-term performance for companies listed in France (Triki & Ureche-Rangau, 2012). Tian (2004) argues that the use of ESOs only improves performance up to an inflection point, where additional grants become counterproductive, forming an inverted U-shaped relationship between granting ESOs and performance. The recurring arguments for granting ESOs include reduction of the agent-principal problem, improving motivation, retention, and attraction, as well as having a positive cash effect.

The research in a Norwegian context is nevertheless deficient, to the best of our knowledge, with no significant findings. Furthermore, the research and theory on how employee stock options plans (ESOP) should be designed are limited, making the process challenging for practitioners and the practice grounded in anecdotal evidence. Therefore, the purpose in this study is twofold. The first is to determine if granting ESOs positively affects long-term performance for companies listed on the Oslo Stock Exchange. The second is to delineate the

granting praxis from 2009 to 2019 and provide practitioners with input regarding the design process in order to optimize the use of ESOs for companies listed on the Oslo Stock Exchange.

Using data from a sample of 89 firms in the time period 2009 to 2019, we found significant evidence of enhanced accounting-based performance four and five years after granting ESOs, measured in both relative number and value granted to employees. The relationship after four years follows an inverted U-shaped pattern, where additional ESOs decrease the marginal effect up to an inflection point. Conversely, after five years, the correlation is U-shaped, where lower levels of ESOs are associated with negative performance and higher levels improve performance exponentially. We further find a significant inverted U-shaped relationship between the relative value of ESOs granted and market-based performance three years after grant, indicating that the effect materializes sooner when market measures are emphasized. The performance effect is further determined by whether the options are granted in-, at-, or out-of-the-money.

We further depict the granting praxis's in the different sectors on the Oslo Stock Exchange, providing practitioners with a benchmark of the usage during the period. The relative number and value of ESOs that optimize a grant are investigated for the different granting practices. However, the optimal predicted relative value to grant is outside the scope of our model. Lastly, we found that granting options at-the-money provides the highest predicted performance.

Therefore, our paper's contribution to the current literature is twofold: Firstly, to the best of our knowledge, we report the first evidence of ESOs having a positive impact on performance for companies listed on the Oslo Stock Exchange. Secondly, we provide practitioners with an overview of the granting praxis's in different sectors during the previous decade that can be used in the design process and find the optimal granting level for the different granting practices.

### 1.1 Research questions

The first objective is to determine if the argued correlation between granting ESOs and performance exists in a Norwegian context. Our first hypothesis is that granting ESOs have a positive impact on both accounting- and market-based measures of performance in the years succeeding the grant, forming our first research question:

*Does granting employee stock options positively affect long-term performance for companies listed on the Oslo Stock Exchange?*

The research question is answered by conducting regression analysis to explain changes in both accounting- and market-based measures of performance using company relative measures of options granted and additional control variables. We analyze the performance in the five years following the grant.

Our second objective is to provide insights that can make the use of employee stock options plans (ESOPs) more efficient, i.e., providing more value to all stakeholders. We foresee that ESOs are used frequently as part of employee remuneration and that the use differs drastically among companies and industries. Our second research question is therefore:

*How did companies at the Oslo Stock Exchange use employee stock options from 2009 to 2019, and how should the employee stock options plans be designed in the future to optimize the effect on performance?*

The research question is answered by describing the praxis of the companies granting ESOs: how much they grant, how often, on what terms, and how ESOPs differ between sectors, in addition to finding the optimal relative number and fair value of options to grant, in order to optimize performance.

# 2. PREVIOUS LITERATURE

## 2.1 Why use options?

The rationale for granting ESOs is manifold, and the argued benefits address different common company challenges, such as liquidity, retention and attraction of employees, motivation, and the agent-principal problem. Combining these benefits is argued to enhance a company's performance over time compared to competitors.

### *2.1.1 Agent-principal theory*

Firstly, ESOs are aimed at reducing the inherent agent-principal problem that exists in a company. This problem is two sided: first due to the conflicting interests of the principal, here the shareholders, and the agents acting on their behalf, the employees, where the latter may pursue self-serving courses of action as opposed to maximizing shareholder value. Second owing to the difficulty of surveilling the agent (Eisenhardt, 1989). ESOs addresses the surveillance problem by aligning the interest of the agents with the principal, incentivizing employees to act in a manner that increases share value, consistent with the goals of the principal (Brandes et al., 2003; Ding & Chea, 2021; Jensen & Meckling, 1976). However, this assumes that the employees' effort can affect the share price, which is arguably not the case for most employees (Core & Guay, 2001; Hall & Murphy, 2003; Kedia & Mozumdar, 2002). Furthermore, if this assumption is met, the amount of options granted usually amounts to a relatively small stake in the company, meaning that the payout from increasing efforts, and thus the share price, is often small (Core & Guay, 2001; Hall & Murphy, 2003).

### *2.1.2 Motivation*

Closely linked to the discussed alignment of incentives is the motivational aspect of the rationale, arguing that granting ESOs improves employees' motivation to increase company value and thus work performance (Brandes et al., 2003; Frye, 2004; Gillan, 2001; Sesil & Kroumova, 2005). For example, Kruse et al. (2010) reported that 77% of their 41,000 respondents stated that being offered ESOs improved motivation "to a great or very great extent." That being argued, the motivational effect depends on the employee's perceived

ability to impact the share price, proxied by both firm size and hierarchical level; the actual share price, where out-of-the-money options can have a demotivating effect; and the company's growth opportunity, affecting the probability of an increased future share price (Brandes et al., 2003; Gillan, 2001; Hall & Murphy, 2003). Further, a declining share price does not necessarily indicate bad performance but may instead be a result from external factors, such as oil prices and the global economy, making it an inadequate measure of employee performance. Consequently, granting ESOs can have a demotivating effect on employees.

### *2.1.3 Retention and attraction*

Secondly, ESOs are argued to positively affect the retention of key employees and the attraction of new people (Core & Guay, 2001; Kedia & Mozumdar, 2002; Oyer & Schaefer, 2005). Attracting and retaining talented workers is crucial and increasingly challenging, particularly for knowledge organizations, due to many occupations' specialized and professional nature. In addition to losing key knowledge to competitors, the costs associated with replacing employees can be substantial (Brandes et al., 2003). Granting ESOs may retain employees by creating an incentive to stay due to the vesting period, as this increases the cost of leaving for the employee. This argument particularly holds if the employee possesses in-the-money options, where the exercise price is below the current share price, that are not fully vested or when the options are forfeited when leaving the company. Conversely, if the options are out-of-the-money or unlikely to generate future earnings, the retaining effect diminishes (Brandes et al., 2003). Furthermore, ESOs are commonly preferred compared to other incentive types and other stock programs, making the company attractive compared to non-granting peers, particularly for optimistic and entrepreneurial employees (Hall & Murphy, 2003). Nowadays, most executives assume options to be a part of the compensation package, making it more of a hygiene factor than a motivational target (Brandes et al., 2003). It is further argued that ESOs only targets top management and a few key personnel (Hall & Murphy, 2003; Oyer & Scheafer, 2005).

### *2.1.4 Options' cash effect*

Equity-settled stock options take a considerably less toll on liquidity compared to traditional cash-settled compensation since they do not require any cash payments when granted (Hall & Murphy, 2003). As a result, the company can either issue new shares when an ESO is exercised by an employee, resulting in no cash outlays related to the ESO, or purchase the shares in the market with cash. Therefore, granting stock options is particularly favorable for financially constrained companies with low or negative cash flows unable to attract and retain employees with cash compensation (Core & Guay, 2001; Oyer & Schaefer, 2005). Thus, companies substitute regular cash compensation in the present with equity-settled compensation in the future. This postpones company outlays and reduces the current outflows of cash, which is particularly beneficial for immature companies. Moreover, the company will also have a positive cash effect from the exercise paid by the employees.

## 2.2 Critique

### *2.2.1 Share dilution*

Share dilution is the predominant concern of shareholders regarding ESOs (Gillan, 2001). Granting ESOs can cause substantial share dilution if done over time since companies commonly issue new shares to settle their obligation. The new shares issued ultimately reduce the current shareholder's ownership of the company. The rationale for granting ESOs must thus be that the benefits associated with granting ESOs generate more value for shareholders than the cost of dilution.

### *2.2.2 Share price manipulation*

Granting ESOs may provide the grantees with a short-term incentive to negatively affect the share price before the grant date. Closer to settlement, grantees might seek to increase the share price through earnings manipulation, release information, and choose investments that benefit the short-term share price, generating a higher option valuation (Yermack, 1997).

### *2.2.3 Individual valuations of stock options*

The cost of granting stock options is larger for the grantor than the grantee due to the valuation of these options does not account for the undiversified and risk-averse employee, unable to sell, trade og hedge the options freely (Hall & Murphy, 2003). Applying a certainty-equivalent approach finds employees to value newly granted options with an exercise price equal to the market price at only half the company's cost (Hall & Murphy, 2002).

### *2.2.4 Repricing previously granted stocks*

Repricing previously granted stock options refers to the process of changing the terms and conditions of the options, such as lowering the exercise price, modifying the maturity, or entirely replacing them. This process typically occurs after a notable decline in share price resulting in valueless options in order to prolong the previously discussed benefits of the options (Chance et al., 2000). Not only do stock options have no downside for employees, as they cannot lose money on receiving options, they can also guarantee a payout through repricing, though repricing is not a common practice for Norwegian companies (Pedersen, 2006). Consequently, stock options can be an asymmetric incentive where both good and bad performance is rewarded. Furthermore, shareholders are not given the same opportunity of repricing, and repricing gives employees a relative benefit compared to common shareholders considering that both parties have experienced the same declining share price (Gillan, 2001).

## 2.3 Empirical research

### *2.3.1 Effect on performance*

The effect of ESOs on performance has been researched extensively in various international and industrial contexts through the years with diverging conclusions. In a Norwegian context, on the other hand, the research is limited, and there have, to our knowledge, been no significant findings of ESOs having a significant impact on performance.

Jones and Kato (1995) reported that ESOs and bonuses increased productivity, measured by value-added per employee, by 4-5% in Japan three to four years after announcement. Ya-Ting (2003) reported similar results in Taiwan,

whereas, in South Korea, Cin and Smith (2012) found that a 1% increase in ESOs resulted in a 2,6% increase in productivity the following year. Furthermore, Logue and Yates (2001) stated that the average difference in productivity between ESO-companies and non-ESO-companies equals 6,2% and that productivity increases by 4,4% after implementation of ESO. Finally, Fang et al. (2015) found that the return on equity (ROE) for companies with ESOs in China was significantly higher than matching firms one to two years after the grant. Particularly for firms that are likely to benefit from incentivizing employees, ESOs increase motivation, and thus performance.

Additionally, the authors reported that the announcement of implementations of ESOs had a positive short-term effect on the companies' share price, similarly to the findings of Yermack (1997), Morgan and Poulsen (2001), Triki and Ureche-Rangau (2012), among others. These findings promote the view that investors deem ESOs as performance-enhancing, at least close to the granting date.

The positive effect is further found in the US, where Frye (2004) and Smith and Swan (2008) concluded that both accounting- and market-based performance, measured by return on assets (ROA) and Tobin's Q, increased significantly after ESOs were granted. In a more recently conducted study, Ding and Chea (2021) documented that ESOs had a significantly positive effect on multiple performance measures two to four years after grant, with improvements in ROA and Tobin's Q amounting to 10 times the cost of the ESOs adoption.

Hochberg and Lindsey (2010) found that ESOs specifically for non-executive employees had a positive impact on ROA and that the effect was more present in companies with few employees and higher growth opportunities. Similarly, Lai (2010) argues that small companies have a greater effect on ESOs in particular due to small businesses attracting more talent. Kroumova and Sesil (2005), on the other hand, reported that ESOs promote superior performance across all size categories.

Sanders and Hambrick (2007) concluded that granting ESOs to CEOs leads to extreme company performance in the three years succeeding the grant with both big gains and losses, where the latter is more common, suggesting that ESOs affect performance by encouraging risk-taking behavior. In addition, Kedia and Mozumdar (2002) found that options outstanding increased stock market performance at a diminishing rate only when sources of abnormal returns were controlled for, such as the market's inability to evaluate the true cost of options and growth opportunities. The findings further suggest that the market deems ESOs as performance-enhancing, and thus positively affects market performance.

Contrastingly, Triki and Ureche-Rangau (2012) researched the use of ESOs in French companies without finding a significant impact on ROA or ROE in the three years following the grant, supporting the previous inconclusive findings in the French context. Furthermore, Liljeblom et al. (2011) found that the scope of options granted, value and number, negatively correlated with the market-measure Tobin's Q, suggesting that poorer performing companies grant stock options with greater scope. Guedri and Hollandts (2008) found an inverted U-shape relationship between employee ownership and performance in France, indicating that employee ownership is beneficial up to a certain inflection point where the benefit diminishes.

For companies listed on the Oslo Stock Exchange, we have only come across four master's theses researching the relationship between ESOs and performance - all without significant findings, where three of them reported a negative relationship (Berle, 2007; Falkenberg & Fjelkårstad, 2003; Marín & Aasmundrud, 2014; Nyhuus & Bredesen, 2014).

### *2.3.2 Designing employee stock options*

Designing ESOPs is challenging and time consuming and is commonly not given sufficient attention. The research is limited, with few suggestions about the optimal number and value to grant. Furthermore, the recommendations regarding exercise price are diverse, including granting both in- and at-the-money.

The number of options granted stipulates a tradeoff between the general interests of the employees and shareholders, where the former want to maximize the number of shares granted, while it is in the interest of the current shareholders to keep dilution at a minimum. The research of Guedri and Hollandts (2008) further found that neither the number nor value of options granted had a positive long-term effect on either accounting- or market-based measures of performance. This implies that shareholders are better off from not approving ESOPs proposed by management. On the other hand, Tian (2004) argued that increasing the number of options granted improved market performance up to an inflection point, where additional grants became counterproductive, and that the motivating effect depends on the given exercise price of the options. Current shareholders are thus found to be rewarded in the form of enhanced performance at a diminishing rate for allowing dilution.

The exercise price defines the threshold of which performance is measured and determines the likelihood of the recipient to profit (Hall & Murphy, 2000). Furthermore, it is an essential determinant for the value of an option, and thus the effect of an ESOP, making it a central design aspect. Also, here a tradeoff arises. The company prefers to keep costs associated with ESOs at a minimum in order to maximize profits for their shareholders, while employees are interested in receiving the highest value possible. Thus, a low exercise price is preferred by employees. Hall and Murphy (2000) found that the perceived value for the recipient of an ESO is about half of the calculated value. The reasoning for this perception includes lack of knowledge about ESOs and discounted value that decreases the present value. Thus, they promoted setting the exercise price equal to the share price at grant to maximize the perceived value and consequently the incentivizing effect, particularly in the case of risk-averse recipients. Conversely, Tian (2013) later promoted setting the exercise price equal to the average share price, called Asian options, to reduce the volatility and optimize the perceived value for the grantee, also emphasizing risk-averse employees.

On the other hand, Dittmann et al. (2017) found that the exercise price should be in-the-money when granting options to executives, with an exercise price

55,4% below the share price at grant, arguing that this optimizes the incentive for the recipient. Furthermore, options granted in-the-money are argued more favorable for a realistic manager than an overconfident manager, and they should, therefore, be granted options in-the-money and at-the-money, respectively (Palmon & Venezia, 2009). Brandes et al. (2003) promote a more general model for effective stock option design, emphasizing the importance of company-specific constraints when determining the terms of the options.

Lastly, Liljeblom et al. (2011) argues that poorly performing firms tend to grant ESOs with a broader scope, both measuring the number of options granted and their value. Poor performance reduces the probability of the options being exercised in the future, and the increased scope compensates for this by increasing the potential payoff.

## 3. DATA & METHODOLOGY

### 3.1 Data selection

Our starting point was a dataset provided by the European Federation of Employee Ownership (EFES) containing data regarding employee ownership, such as ESO, for the 96 largest companies listed on the Oslo Stock Exchange. Based on this dataset, we looked at annual reports for all companies granting ESOs in the period 2009 to 2019. Using data from multiple years enables us to investigate the change in ESOs granted, and is thus beneficial for answering our research questions. Earlier years were not included due to time constraints and the increasing unavailability of financial reports the further back we looked. Data for 2020 is not included due to unavailability during our research.

Thereafter we extracted all disclosed input values used in calculating the fair value of the options in the annual report, i.e. vesting period, share price at grant, exercise price, risk-free interest rate, volatility and dividend yield, as well as the number of options granted, for the 44 companies that granted stock options during this period. Retrieving this information was very time-consuming as it included examining close to 480 annual reports and extracting the values manually. Using these values, the fair value was calculated for all options granted using the Black-Scholes-Merton method to get a consistent dataset (Black & Scholes, 1973; Merton, 1973). Therefore, only options where the value

can be calculated using the Black-Scholes-Merton method is included in our research, which is the most common praxis. This excludes more exotic options that are purchased or include performance criteria or a lock-up period.

The input variables are used to describe the usage in the different industries, categorized according to the Industry Classification Benchmark (ICB), consisting of 10 sectors. In the case of undisclosed input values or multiple grant dates during the year, and thus differing exercise prices, we included the fair value calculated by the company if disclosed since we were unable to replicate the calculation. Two companies were excluded in total since the input values were reported in intervals that made the calculation of fair value unfeasible, in addition to not disclosing the fair value. Additionally, five companies were excluded due to insufficient financial data caused by late listing, delisting, or mergers.

The remaining financial data were extracted from Refinitiv and verified by randomly checking against annual reports and Proff.no without dissimilarities. All financial data were converted to NOK in Refinitiv to assure usage of the same exchange rate. Our final dataset consists of financial data regarding 89 companies over 11 years when this was available, and shorter periods when not, totaling 868 observations on performance. The number of observations is considered sufficient for this analysis. See the list of included companies and variables in appendix 1.

### 3.2 Methodology

The data used in our research concerns 89 companies from 2009 to 2019 and is organized as panel data. Consequently, our dataset consists of several time-dependent observations per company, and we suspect that each company has its specific characteristics that may affect the independent variables. Thus, one company's residuals and constant terms should not be correlated with that of other companies (Adkins & Hill, 2011). To test this assumption a Hausman-test was run, where the null hypothesis, that the individual effects are sufficiently modeled by a random-effects model, was rejected with a p-value of zero, further indicating the use of a fixed-effects model (Adkins & Hill, 2011). Fixed-effects

models enable the exploration of the correlation within an entity over time, beneficial for the purposes of this thesis and in line with previous research (Frye, 2004; Triki & Ureche-Rangau, 2012). There are also cases in the literature where random-effects models are used on similar datasets (Sanders & Hambrick, 2007**)**. Therefore, we include a random-effects model as part of our robustness testing. The significance level in our regression analysis is 5%.

Further, companies may have residuals that are not independent in time, which causes heteroscedasticity. We, therefore, use robust standard errors clustered by company to obtain unbiased standard errors that accounts for individual heterogeneity (Adkins & Hill, 2011).

The robustness of our model is tested by regressing on different proxies for performance, i.e., return on equity (ROE) and market capitalization. We further ran our main regression models after excluding 15% of our observations randomly to test the sensitivity of our sample. In addition, a random-effects model was run against all dependent variables in our main models. The significance level of the variables changes with the models, as expected based on our reasoning for applying a fixed-effect model, whereas the tendency of the coefficients, in general, remain similar. Any discrepancies between the results of our main fixed-effects models and the robustness tests are addressed when results are presented in chapter 5.

We test if granting ESOs positively affect long-term performance using the following regression equation with our panel data:

$$(1) \quad Performance_{it} = \beta_0 + \beta_1 INDEP_{it-j} + \beta_2 INDEP^2_{it-j} + \beta_3 ITM_{it-j} \times INDEP_{it-ij} + \beta_4 ATM_{it-j} \times INDEP_{it-j} + \beta_5 CTRL_{it} + \varepsilon_{it}$$

where $Performance_{it}$ is either an accounting- or market-based performance measure for company *i* in year *t*, $INDEP_{it-j}$ is the applied independent variable measuring the scope of ESOs granted in year *t* lagged *j* years, $INDEP^2_{it-j}$ is $INDEP_{it-j}$ squared, $ITM_{it-j}$ and $ATM_{it-j}$ are dummy variables with the value 1 if the options were granted in-the-money or at-the-money respectively, and 0

otherwise, and the dummies are interacted with the independent variable. $CTRL_{it}$ includes company and industry specific control variables. We estimate this equation using a fixed-effect model with robust standard errors clustered by company.

### *3.2.1 Model specification*

*Dependent variables*

ESOs have been found to have different impacts on firm performance pending on context and the period in time the research was conducted, implying both that measuring a firm's long-term performance is a complex task and that the effect may vary across companies and time. Company performance has multiple aspects and is influenced by innumerable factors, making it challenging to quantify objectively. Performance can improve and worse in the same fiscal year, pending on the performance metric one emphasizes. In line with prior research focusing on long-term performance, we distinguish between accounting- and market-based performance measures.

Following the works of Ding and Chea (2021), Frye (2004), Sesil and Kroumova (2005) and Ye and Lee (2018) we use Tobin's Q as our main market-based dependent variable. Tobin's Q is the ratio of the company's market value and long-term liabilities to the replacement cost of their assets with an equilibrium of 1 (Von Furstenberg et al., 1977). It can be interpreted as a forward-looking performance measure that captures expected future earnings and growth opportunities since it incorporates the company's share price. A ratio greater than 1 indicates that investors have a positive future perception of the company (Sesil & Kroumova, 2005).

$$(2) \qquad Tobin's\ Q_t = \frac{Market\ value\ equity_t + Market\ value\ liabilities_t}{Book\ value\ equity_t + Book\ value\ liabilties_t}$$

ROA is a standard indicator of performance widely used in previous research and can be interpreted as a proxy for the company's efficiency in generating earnings (Frye, 2004; Sanders & Hambrick, 2007). ROA is our accounting-based measure of performance and includes only values from the financial statement. Thus, ROA is not directly affected by fluctuations in the share price.

We calculate ROA by multiplying the period's net income before taxes with the tax rate for the year to control for different tax rates and divide this by the average total assets for the previous and current period. Average assets are used to control for changes in assets since the earnings are generated using assets from both periods.

(3) $$ROA_t = \frac{Net\ income\ pre\ tax\ (1-tax\ rate)_t}{\frac{Net\ income\ pre\ tax_t + Total\ assets_{t-1}}{2}}$$

*Independent variables*

The scope of ESOs granted are quantified in two ways: the number of options granted and the fair value of the options. The number of options granted is used as an independent variable by dividing the number of options granted with the outstanding shares per year-end, hereafter referred to as dilution (Kedia & Mozumdar, 2002; Smith & Swan, 2008; Yermack, 1995). This is done to capture the potential dilution effect and is expected to have a positive correlation with performance. We foresee a similar curvilinear relationship found in previous literature, and have thus included a squared dilution term to capture a potential vortex (Guedri & Hollandts, 2008; Tian, 2004).

The fair value has been included in various ways in the literature to capture the value relative to company specifics. We include relative value by using the fair value to salary ratio (Sanders & Hambrick, 2007; Smith & Swan, 2008; Yermack, 1995). Also, here, a squared term is included to capture the suspected curved relationships. The effect of granting options is expected to occur in the range of one to five years after the grant, based on previous findings and the average expected lifetime of 3,6 years, per Figure 1. All independent variables are therefore lagged one to five years back to capture this delayed effect. Finally, the applied independent variable is interacted with dummy variables indicating if the grant was in-the-money (ITM), at-the-money (ATM), or out-of-the-money (OTM) to test the effect of different exercise price practices.

*Control variables*

Several industry- and company-specific control variables are included in the model to strengthen the model due to the perplexity of explaining performance. Firstly, we control for the sector in which the company operates since the

industry affects how the company operates, profitability, and thus performance (Core & Guay, 2001; Frye, 2004; Sanders & Hembrick, 2007; Sesil & Kroumova, 2005). Industry effects are controlled for by including the annualized value-weighted industry returns per industry **(**Ødegaard, n.d.).

Secondly, company size is controlled for since the size impacts both performance and the usage of options (Ding & Chea, 2021; Frye, 2004; Hochberg & Lindsey, 2010; Sanders & Hembrick, 2007). Benefits from economies of scale make larger firms more likely to report better performance, though at a decreasing rate since it becomes increasingly challenging to uphold considerable performance. Thus, the direction of the effect is indeterminate. The logarithmic value of total assets, revenue, and number of employees are included in our model since they measure different aspects of company size.

Previous research on ESOs commonly controlled for company leverage (Frye, 2004; Jones & Kato, 1995; Kedia & Mozumdar, 2002). Leverage is the ratio of liabilities over equity and is included in the model as leverage is expected to impact performance. Furthermore, the scope of a company's equity compensation scheme is included in the model as a dummy variable to control for the effect of having a broad-based program, which includes other employees in addition to executive management and key personnel. Any form of broad-based equity compensation is given the value of 1.

Lastly, measures of risk are included in our model. Firstly, in the form of volatility, calculated as the annualized standard deviation of daily returns for the underlying share (Sanders & Hembrick, 2007). Volatility was calculated based on the actual year's realized volatility and is included to measure market risk each year. Secondly, the standard deviation of the change in income from business activities for the preceding five years is used as a proxy for business risk, in line with the research of Frye (2004).

### *3.2.2 Derivation of polynomials*

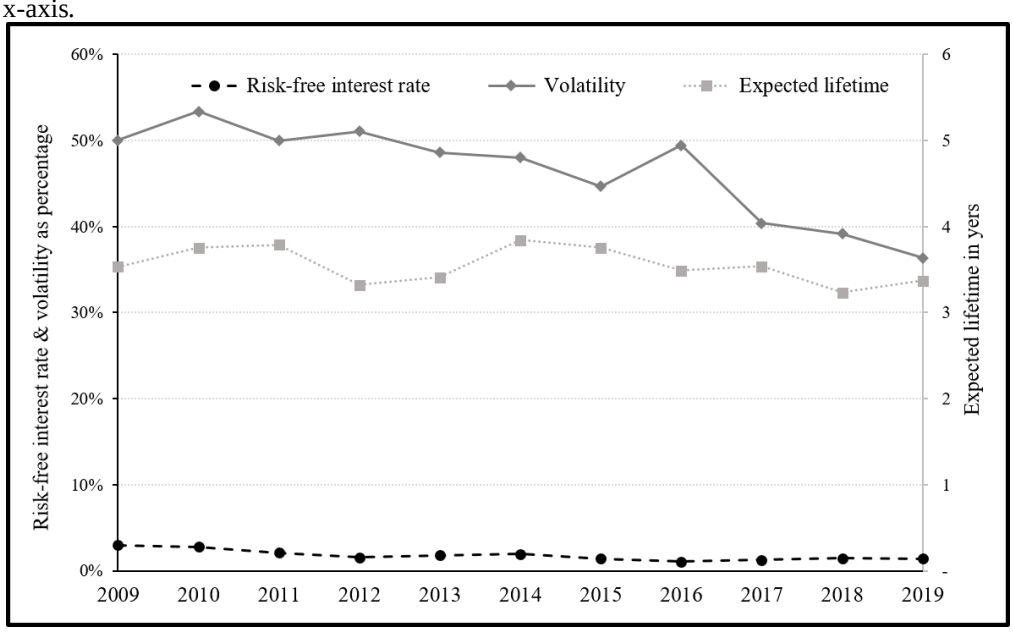
Due to our regression including a squared term, we expect to find extremal points. These points can be either minimums or maximums, depicting where the relative number or value of the options granted provides the lowest or highest possible predicted performance. This point is located by deriving the different regression equations equaling zero.

## 4. DESCRIPTIVE STATISTICS

We find that the literature is not conclusive on designing an optimal ESOP, and the design process is thus challenging for the designers of the plan. The purpose of this section is to provide an overview of the amounts granted by companies listed on the Oslo Stock Exchange: how often they grant ESO, the input variables used, and the resulting value of the options. The statistics can be used as input and benchmarks for practitioners designing ESOPs.

**Figure 1: Input variables fair value calculation on OSE from 2009-2019**

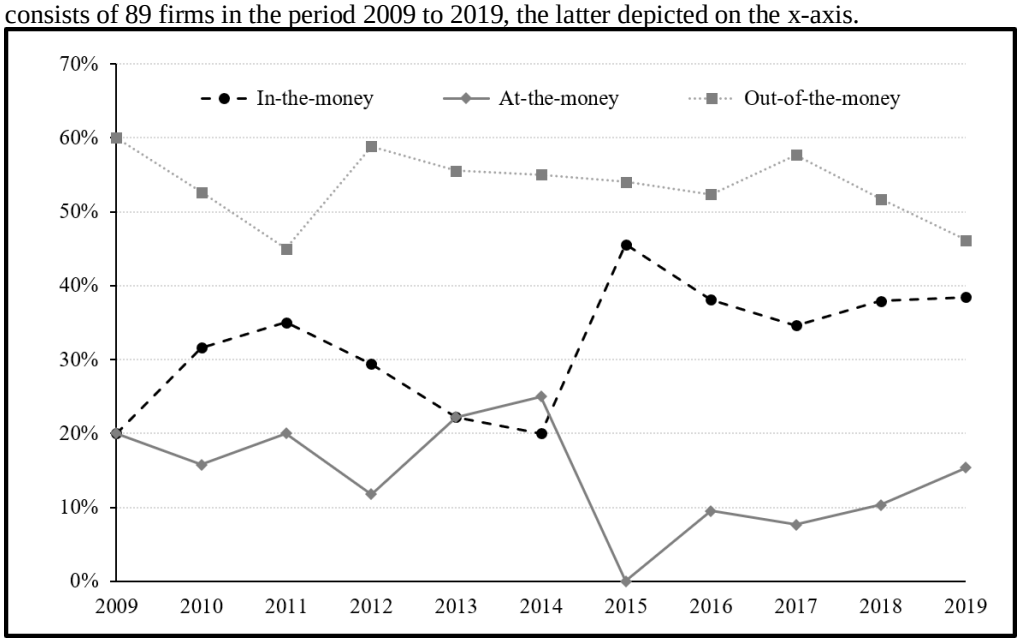
The graph shows the disclosed risk-free interest rate, volatility and expected lifetime used by companies to calculate the fair value of options granted. The primary y-axis shows the risk-free interest rate and volatility as percentage, while the secondary y-axis shows the expected lifetime in years. The sample consists of 89 firms in the period 2009 to 2019, the latter depicted on the x-axis.



The data on input parameters used to calculate the fair value of the options shows that the volatility and the risk-free interest rate had a negative trend during the period, whereas expected lifetime was relatively stable at around 3,6 years. Volatility and risk-free interest rates are directly linked to market conditions, opposed to the expected lifetime which the company sets. The fair value increases with both risk-free interest rate and volatility, implying that the fair value of an option decreased during the period, all else equal. The average expected lifetime varies among the sectors, with Utility using as little as 2,05 years as expected lifetime, in contrast to the Health sector with five years (appendix 2). Increasing the lifetime of the ESOs increases the fair value of the ESOs, in addition to the aggregated dilution since more options will be outstanding over time if the time of exercise occurs later. Hence, deciding vesting period and expiry dates influence both fair value and the dilution.

**Figure 2: Exercise price praxis on OSE from 2009-2019**

The graph depicts the development of the granting praxis in our sample. The y-axis shows the percentage of options granted in-the-money, at-the-money, or out-of-the-money. The sample consists of 89 firms in the period 2009 to 2019, the latter depicted on the x-axis.



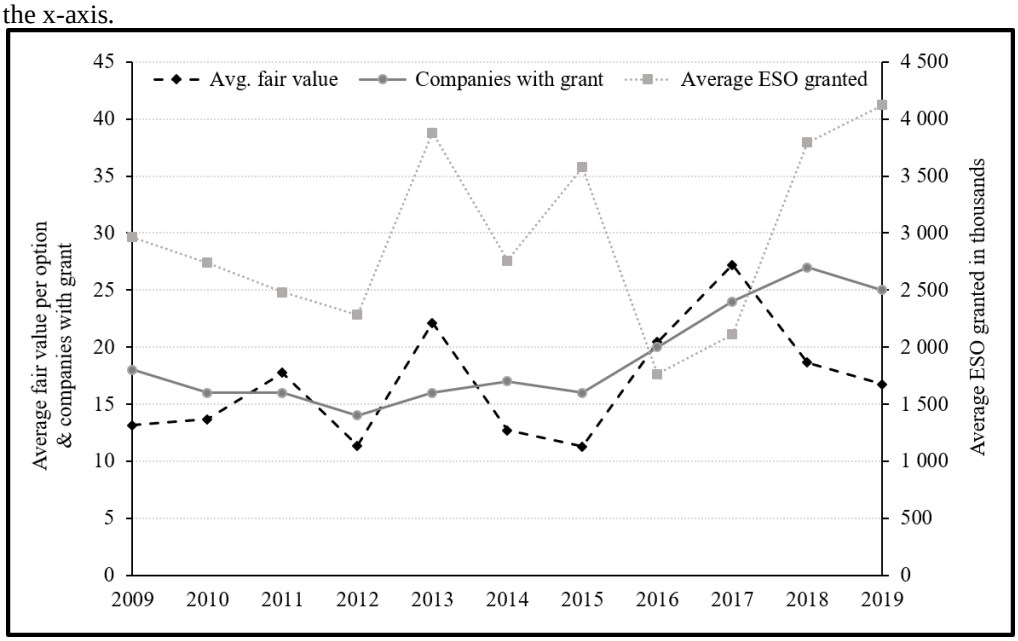

Our data further show that granting out-of-the-money happened more frequently than granting in-the-money and at-the-money. The trend of granting out-of-the-money is not persistent through all industries, where the IT - and Utility sectors granted ESOs in-the-money predominantly (appendix 2). However, the average total tendency of granting out-of-the-money is consistent

throughout. There was also a trend of granting proportionally more in-the-money after 2014 than granting at-the-money, making the options more valuable. Granting out-of-the-money options reduces the value of the options, resulting in lower costs for the company, and could be a reason for its popularity compared to at-the-money and in-the-money.

An independent sample t-test found that the companies in our sample granting in-the-money had a significantly higher ROA and Tobin's Q the year before the grant, as shown in appendix 3. Grants at- or out-of-the-money had no significant correlation with the performance in the previous period. None of the granting practices was significantly correlated with dilution, indicating that the relative number granted was stable across the three granting practices. Granting in-the-money increases the fair value and is thus the practice with the highest average value.

**Figure 3: ESO praxis on the OSE from 2009-2019**

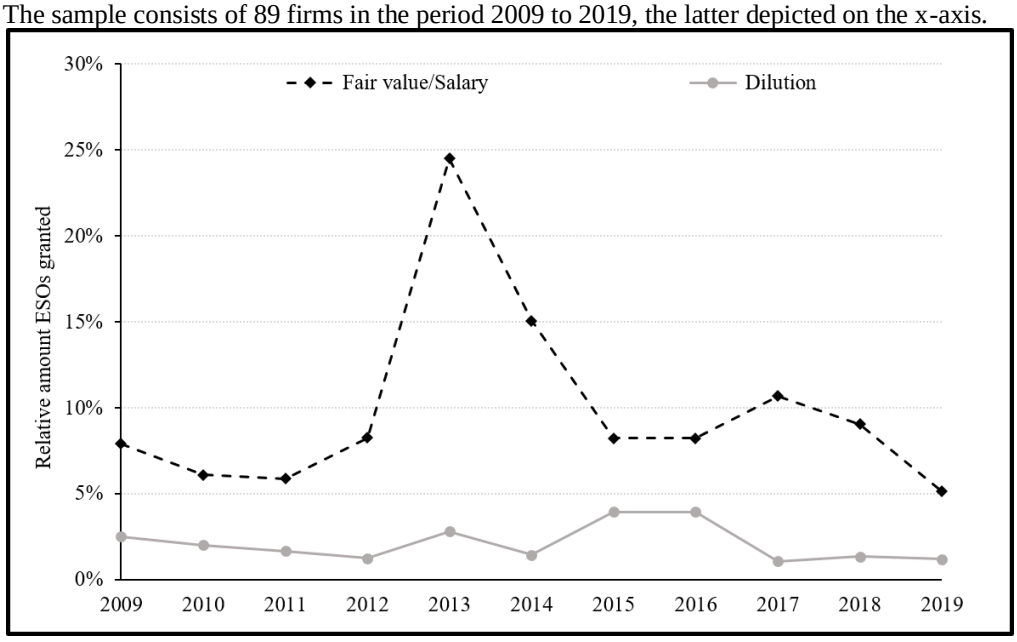
The graph shows the development of the average fair value of- ESOs granted, the number of companies that granted ESOs and the average number of ESOs the companies granted in the given year. The primary y-axis shows the average fair value and number of companies that granted ESOs, while the secondary y-axis shows the average number of options granted reported in thousands. The sample consists of 89 firms in the period 2009 to 2019, the latter depicted on the x-axis.



The average fair value of options granted has increased during the period, reaching a peak of 27 NOK per ESO in 2017. Granting ESOs deep in-the-money can increase the fair value despite the decrease of both volatility and risk-free rate, explaining the contradictory trend in fair value. However, the average number of options granted per year was more volatile, as the maximum number of options granted during the period equaled 32 100 000 options, with a corresponding fair value of 0,25 NOK, affecting the means significantly. Nevertheless, the dilution effect of this particular grant only amounted to 0,06% and is thus relatively low. The fluctuations can, therefore, be explained by some companies granting an extreme number of options some years. The number of companies granting ESOs per year increased since 2009, from 18 to 25 in 2019, with a peak of 27 grants in 2018. The average company granted options in six of the 11 years included in our data.

**Figure 4: Relative amount of ESOs granted on the OSE from 2009-2019**

The graph shows the development of the average fair value to salary ratio and dilution in the given year. The primary y-axis shows the value of options granted as a percentage of salary, while the secondary y-axis shows the number of options granted divided by outstanding shares. The sample consists of 89 firms in the period 2009 to 2019, the latter depicted on the x-axis.




The praxis in the market is seemingly to grant ESOs with a total fair value equal to around 10% of salary, with a spike up to 25% in 2013. The Energy and Industrials sector had the highest average fair value to salary ratio during the covered period, with 14% and 14,8% respectively (appendix 4). This could have

multiple explanations, including granting options deep in-the-money combined with lower salary expenses resulting in a double increasing effect. Contrastingly, companies in the Materials and Consumer Discretionary sector only granted the equivalent of 1,2% and 0,5% of salary, depicting notable sector differences.

Contrarily, the dilution percentage is less volatile with fluctuations around 2-5% during the period, indicating a broader consensus among shareholders on how much dilution to allow, irrespective of sector. Materials, IT, and Energy fluctuate the most with peaks around 7%, 4%, and 13%, respectively, though heavily exposed by the praxis of single companies. In addition, the number of companies in each sector varies in our sample, causing some sectors to be heavily influenced by the granting practice of a few or single firms. Industry level findings should therefore be generalized with awareness. Furthermore, the level of dilution is also affected by the frequency a company grants options since this affects the accumulated dilution. Consequently, granting options frequently, even with low dilution, increases aggregate dilution and negatively affects the current shareholders' share value.

# 5. RESULTS

## 5.1 Options effect on accounting-based performance

### *5.1.1 The effect of fair value granted*

**Table 1: Regression models with ROA and fair value/salary lagged 5-3 years**

This table reports the independent variables from three different regressions on ROA using a fixed-effect model with robust standard errors clustered at company level. Total fair value granted divided by salary expenses is used as an independent variable, and is included with five, four and three years of lag separately, creating three different regression models. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms**.** P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively. See appendix 5-7 for full regression models with robustness tests.

| | ROA | | |
|---|---|---|---|
| Independent variables | j = 5 | j = 4 | j = 3 |
| Fair value/salary $_{it-j}$ | -3.370** | 1.606*** | 0.0560 |
| | (0.027) | (0.000) | (0.856) |
| Fair value/salary $^{2}_{it-j}$ | 18.10** | -0.859*** | -0.0482 |
| | (0.026) | (0.000) | (0.800) |
| (ITM=1) x Fair value/salary $_{it-j}$ | 1.424*** | -1.005*** | -0.503 |
| | (0.004) | (0.000) | (0.526) |
| (ATM=1) x Fair value/salary $_{it-j}$ | 1.753 | 2.651*** | -2.160 |
| | (0.394) | (0.006) | (0.243) |
| Broadbased$_{it-j}$ | -0.00494 | 0.0360 | 0.0605 |
| | (0.845) | (0.573) | (0.138) |
| Industry return$_{it}$ | -0.0613 | -0.0674 | 0.00337 |
| | (0.103) | (0.401) | (0.968) |
| Leverage$_{it}$ | -0.00549* | -0.00296*** | -0.00369* |
| | (0.092) | (0.000) | (0.051) |
| LogAssets$_{it}$ | 0.0869 | 0.0416 | 0.0165 |
| | (0.155) | (0.536) | (0.778) |
| LogEmployees$_{it}$ | -0.0293 | -0.0225 | -0.0258 |
| | (0.258) | (0.299) | (0.295) |
| LogRevenue$_{it}$ | 0.0892** | 0.0720* | 0.131** |
| | (0.014) | (0.075) | (0.013) |
| Volatility $_{it}$ | 0.0467 | 0.0282 | 0.0117 |
| | (0.143) | (0.177) | (0.610) |
| Business risk$_{it}$ | 0.0352** | 0.0826** | 0.0573** |
| | (0.028) | (0.034) | (0.014) |
| Intercept | -0.949** | -0.611 | -0.796** |
| | (0.047) | (0.114) | (0.024) |
| N | 236 | 294 | 355 |
| R-sq | 0.304 | 0.234 | 0.137 |

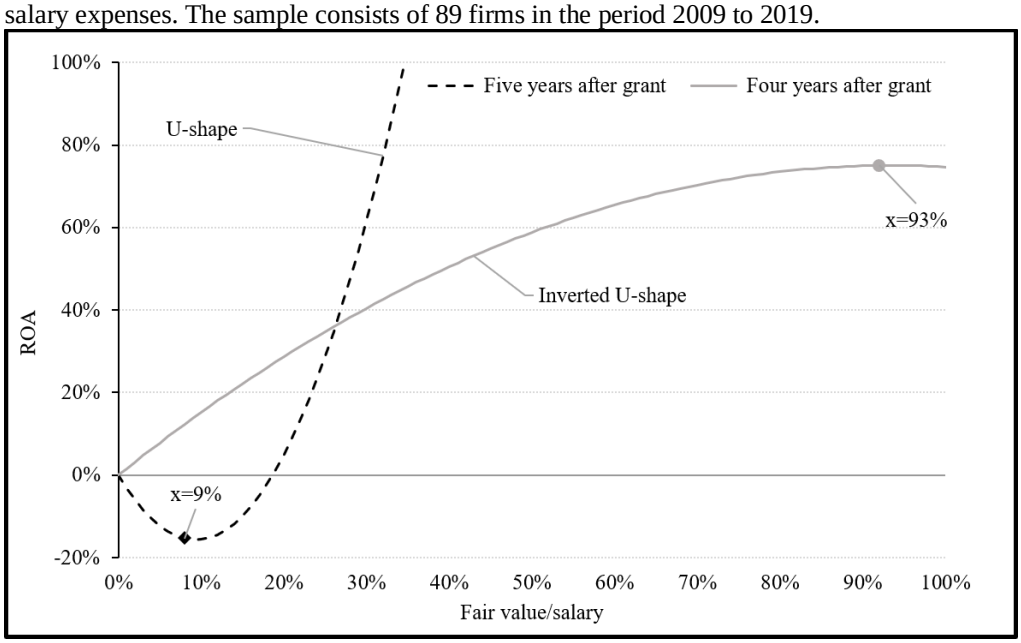
*Five years after grant*

Our results on ROA five years after grant predict a negative relationship for low relative values of ESOs granted and a positive relationship for larger values. The linear relationship between the fair value to salary ratio and ROA is significantly negative, whereas the squared term is significantly positive, forming a U-shaped

development as visualized in Figure 5. This indicates that increasing the relative value of the options granted decreases ROA down to an inflection point where additional value granted improves ROA exponentially. Granting options in-the-money has a significant positive effect on ROA, whereas granting at-the-money is insignificant.

**Figure 5: Predicted ROA based on the relative fair value of ESOs granted**

The graph shows the regression line from our regression model on ROA with five and four years of lag, using the fair value to salary ratio as an independent variable (see appendix 5-6 for full model). The y-axis is the predicted ROA, and the x-axis is the fair value granted divided by salary expenses. The sample consists of 89 firms in the period 2009 to 2019.




*Four years after grant*

Granting ESOs has a diminishing positive effect on ROA four years after grant. The linear coefficient is significantly positive, and the squared term significantly negative. This relationship implies an inverted U-shape, suggesting that increasing the relative value of the options granted improves ROA at a diminishing rate up to an extremal point where increasing the relative value affects performance negatively. Granting at-the-money now predicts best performance significantly, whereas granting in-the-money has a significant negative effect on ROA.

Our regression showed that the relative value granted proved no significant impact on ROA in the three years following the grant. The tendency is similar to the inverted U-shape found four years after the grant, with positive linear coefficients and negative quadratic terms. Nevertheless, the p-values are high, and the effect after one to three years after granting is thus inconclusive.

### *5.1.2 The effect of the number of options granted*

**Table 2: Regression models with ROA and dilution lagged 5-3 years**

This table reports the independent variables from three different regression run on ROA using a fixed-effect model with robust standard errors clustered at company level. The number of options granted divided by total outstanding shares is used as an independent variable, and is included with five, four and three years of lag separately, creating three different regression models. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms**.** P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively. See appendix 8-10 for full regression models with robustness tests.

| | ROA | | |
|---|---|---|---|
| Independent variables | j = 5 | j = 4 | j = 3 |
| $Dilution_{it-j}$ | -6.389** | 4.482*** | 1.200 |
| | (0.046) | (0.008) | (0.486) |
| $Dilution^{2}_{it-j}$ | 57.62 | -38.32*** | -10.98 |
| | (0.377) | (0.005) | (0.429) |
| (ITM=1) x $Dilution_{it-j}$ | 3.601*** | -2.409** | -1.314 |
| | (0.009) | (0.036) | (0.424) |
| (ATM=1) x $Dilution_{it-j}$ | 3.700*** | -1.768 | -1.078 |
| | (0.004) | (0.219) | (0.503) |
| $Broadbased_{it-j}$ | 0.00237 | 0.0306 | 0.0627 |
| | (0.923) | (0.633) | (0.123) |
| Industry $return_{it}$ | 0.00295 | -0.101 | 0.000446 |
| | (0.958) | (0.226) | (0.996) |
| $Leverage_{it}$ | -0.00592 | -0.00296*** | -0.00367* |
| | (0.101) | (0.001) | (0.054) |
| $LogAssets_{it}$ | 0.121* | 0.0287 | 0.0113 |
| | (0.085) | (0.675) | (0.845) |
| $LogEmployees_{it}$ | -0.0468 | -0.0268 | -0.0251 |
| | (0.120) | (0.243) | (0.288) |
| $LogRevenue_{it}$ | 0.0931** | 0.0881** | 0.129** |
| | (0.012) | (0.041) | (0.014) |
| $Volatility_{it}$ | 0.0318 | 0.0296 | 0.0121 |
| | (0.319) | (0.180) | (0.569) |
| Business $risk_{it}$ | 0.0431** | 0.0800** | 0.0514** |
| | (0.011) | (0.046) | (0.020) |
| Intercept | -1.102** | -0.585 | -0.756** |
| | (0.035) | (0.125) | (0.029) |
| N | 236 | 294 | 355 |
| R-sq | 0.249 | 0.173 | 0.127 |

*Five years after grant*

Now using dilution as an independent variable, our results predict a negative impact on accounting-based performance. The relative number of options granted has a U-shaped relationship with ROA after five years, though the squared term is insignificant. Furthermore, both granting in-the-money and at-the-money is significantly positive, indicating that granting out-of-the-money is the least beneficial practice.

*Four years after grant*

Continuing with dilution as an independent variable, we find a significant inverted U-shaped relationship with ROA, with a positive linear term and negative squared term. Grating out-the-money gives higher performance than grating in-the-money, though granting in-the-money is inconclusive.

*One to three years after grant*

The relative number of options granted during the three years following ESO grants did not have a significant impact on ROA. The p-values of the dilution variables are generally high during this time span, indicating that the number of options granted in relation to outstanding shares had little effect on accounting-based performance measures. The findings one to three years after grant being insignificant may be linked to the average expected time to exercise being 3,6 years, and that the effect, therefore, prevails closer to exercise. Thus, our analysis emphasizes four and five years after grant.

## 5.2 Results on market-based performance

### *5.2.1 The effect of the fair value granted*

**Table 3: Regression models with Tobin's Q and fair value/salary lagged 5-3 years**

This table reports the independent variables from three different regressions run on Tobin's Q using a fixed-effect model with robust standard errors clustered at company level. Total fair value granted divided by salary expenses is used as an independent variable, and is included with five, four and three years of lag separately, creating three different regression models. The independent variable is interacted with a dummy variable for both in-the-money and at-the-money grants. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively. See appendix 5-7 for full regression models with robustness tests.

| | Tobin's Q | | |
|---|---|---|---|
| Independent variables | j = 5 | j = 4 | j = 3 |
| Fair value/salary$_{it-j}$ | -3.843 | 5.431 | 38.62** |
| | (0.773) | (0.578) | (0.033) |
| Fair value/salary $^2$$_{it-j}$ | -60.02 | 30.61 | -279.5** |
| | (0.499) | (0.702) | (0.015) |
| (ITM=1) x Fair value/salary$_{it-j}$ | 13058 | 1.357 | 6.043 |
| | (0.124) | (0.790) | (0.212) |
| (ATM=1) x Fair value/salary$_{it-j}$ | 111.3** | 32.13* | -8.031 |
| | (0.030) | (0.085) | (0.749) |
| Broadbased$_{it-j}$ | 0.418 | 0.298 | 0.533 |
| | (0.154) | (0.259) | (0.234) |
| Industry return$_{it}$ | 3.169 | 1.899 | 2.622 |
| | (0.378) | (0.624) | (0.421) |
| Leverage$_{it}$ | -0.0245 | 0.0278 | -0.0252* |
| | (0.309) | (0.167) | (0.064) |
| LogAssets$_{it}$ | -1.802 | -1.916 | -1.828 |
| | (0.422) | (0.367) | (0.332) |
| LogEmployees$_{it}$ | -0.766 | -0.246 | -0.248 |
| | (0.338) | (0.428) | (0.203) |
| LogRevenue$_{it}$ | 1.336 | 0.861 | 0.861* |
| | (0.376) | (0.293) | (0.056) |
| Volatility$_{it}$ | -0.997 | -0.533 | -0.492 |
| | (0.331) | (0.419) | (0.242) |
| Business risk$_{it}$ | -0.659 | -0.754 | -0.695 |
| | (0.394) | (0.472) | (0.581) |
| Intercept | 11.16 | 11.24 | 10.49 |
| | (0.351) | (0.332) | (0.431) |
| N | 223 | 277 | 335 |
| R-sq | 0.023 | 0.018 | 0.022 |

*Five years after grant*

We did not find a correlation between the relative value of options granted and our market-based performance measure, Tobin's Q, five years after grant. However, granting at-the-money had a significantly positive correlation with performance. The R-squared of 2,3% indicates that the explanatory power of our model is low when regressing on Tobin's Q five years after grant.

When using the logarithmic value of market capitalization as a proxy for market performance, the R-squared increases to 53% while the coefficients remain insignificant, including granting at-the-money (appendix 5).

*Four years after grant*

Our results on Tobin's Q four years after grant do not show any significant relationship with neither granting ESOs nor the granting practice. However, the results from the robustness test show that ESOs have a significant inverted U-shaped impact on market capitalization, and that granting at-the-money is significantly positive. Moreover, the explanatory power is further increased to 32% with regressing on market capitalization, compared to 1,8% when regressing on Tobin's Q, indicating that the model is better at explaining fluctuations in market capitalization (appendix 6).

*One to three years after grant*

ESOs had a significant inverted U-shaped impact on Tobin's Q after three years. The three granting practices are insignificant three years after grant.

We found no significant effects on either Tobin's Q or market capitalization one or two years after grant. The only significant findings are that granting in-the-money has a positive effect on Tobin's Q and market capitalization after one year, and that granting at-the-money is positively correlated with market capitalization after two years. Thus, the explanatory power remains low for our fixed-effect model.

### *5.2.2 The effect of the number of options granted*

**Table 4: Regression models with Tobin's Q and dilution lagged 5-3 years**

This table reports the independent variables from three different regressions run on Tobin's Q using a fixed-effect model with robust standard errors clustered at company level. The number of options granted divided by total outstanding shares is used as an independent variable, and is included with five, four and three years of lag separately, creating three different regression models. The independent variable is interacted with a dummy variable for both in-the-money and at-the-money grants. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. See appendix 8-10 for full regression models with robustness tests.

| | Tobin's Q | | |
|---|---|---|---|
| Independent variables | j = 5 | j = 4 | j = 3 |
| $Dilution_{it-j}$ | -25.80 | 34.16** | 35.35 |
| | (0.384) | (0.047) | (0.106) |
| $Dilution^{2}_{it-j}$ | -123.2 | -319.0** | -312.7 |
| | (0.800) | (0.023) | (0.125) |
| (ITM=1) x $Dilution_{it-j}$ | 21.14 | -19.64* | -20.70 |
| | (0.501) | (0.081) | (0.146) |
| (ATM=1) x $Dilution_{it-j}$ | 50.47 | -19.76 | -22.11 |
| | (0.395) | (0.134) | (0.201) |
| $Broadbased_{it-j}$ | 0.329 | 0.259 | 0.416 |
| | (0.217) | (0.306) | (0.318) |
| Industry $return_{it}$ | 3.013 | 1.770 | 2.101 |
| | (0.386) | (0.662) | (0.512) |
| $Leverage_{it}$ | -0.0230 | 0.0259 | -0.0242 |
| | (0.278) | (0.160) | (0.117) |
| $LogAssets_{it}$ | -1.400 | -1.911 | -1.658 |
| | (0.534) | (0.358) | (0.368) |
| $LogEmployees_{it}$ | -0.778 | -0.276 | -0.263 |
| | (0.300) | (0.320) | (0.168) |
| $LogRevenue_{it}$ | 1.208 | 1.001 | 1.081** |
| | (0.400) | (0.229) | (0.021) |
| $Volatility_{it}$ | -0.840 | -0.562 | -0.315 |
| | (0.396) | (0.410) | (0.415) |
| Business $risk_{it}$ | -0.577 | -0.754 | -0.758 |
| | (0.449) | (0.468) | (0.561) |
| Intercept | 9.267 | 10.55 | 8.047 |
| | (0.442) | (0.351) | (0.526) |
| N | 223 | 277 | 335 |
| R-sq | 0.017 | 0.015 | 0.012 |

We did not find any significant impact on Tobin's Q five years after grant when using dilution as an independent variable. Furthermore, granting in- or out-of-the-money is also insignificant. Similarly, there is no significant effect when regressing on market capitalization five years after grant.

Four years after grant, granting ESOs has a significantly diminishing positive effect on Tobin's Q, where the linear coefficient is positive, and the squared is negative. Granting in-the-money has a significantly negative effect on Tobin's

Q, whereas grants made at-the-money are insignificant. The R-squared is 1,5% for our Tobin's Q model, and 32,5% when using market capitalization as a proxy for market-based performance, where both models predict a similar significant relationship between the relative number of options granted and market-based performance.

The effect one to three years after grant was insignificant, except for granting in-the-money having a significant positive effect in the two years following an ESO grant.

### 5.3 Robustness test

We further robustness-tested our main models by excluding 15% of the observations randomly before running the same regression, presented in table 5 on the following page. The robustness test is conducted to verify that the coefficients and p-values do not change significantly as the companies included in the models change.

The independent variable fair value divided by salary with five years lag became insignificant in one of our regressions with excluded observations, implying that the impact on ROA is sensitive to the exclusion of some companies. Dilution five years after grant turned insignificant in all models regressing on ROA and is thus interpreted with discretion. Our model with four years lag is robust when using both fair value to salary and dilution.

When regressing on Tobin's Q, fair value to salary three years after grant was significant in all tests. The coefficients and p-values when regressing with dilution after four years change as some companies are excluded, and therefore interpreted cautiously.

**Table 5: Main regression models using 85% of sample**

This table reports the results from our main regression models using 85% of our sample chosen at random. This process was repeated three times. Only the independent variables are included. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | ROA | | | |
|---|---|---|---|---|
| | 85 % | 85 % | 85 % | 100 % |
| Fair value/salary$_{it-5}$ | -3.479** | -3.757* | -3.543** | -3.370** |
| | (0.036) | (0.064) | (0.037) | (0.027) |
| Fair value/salary$^2_{it-5}$ | 18.906** | 21.0687* | 19.519** | 18.10** |
| | (0.038) | (0.063) | (0.043) | (0.026) |
| Dilution$_{it-5}$ | -7.421** | -5.325 | -3.855* | -3.370** |
| | (0.046) | (0.136) | (0.072) | (0.027) |
| Dilution$^2_{it-5}$ | 73.778 | 71.599 | 11.127 | 18.10** |
| | (0.334) | (0.287) | (0.834) | (0.026) |
| Fair value/salary$_{it-4}$ | 1.603*** | 1.621*** | 1.671*** | 1.606*** |
| | 0.000 | (0.000) | 0.000 | (0.000) |
| Fair value/salary$^2_{it-4}$ | -0.855*** | -0.866*** | -0.895*** | -0.859*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Dilution$_{it-4}$ | 4.613** | 5.562*** | 5.457*** | 1.606*** |
| | (0.018) | (0.001) | (0.000) | (0.000) |
| Dilution$^2_{it-4}$ | -39.248** | -47.185*** | -46.374*** | -0.859*** |
| | (0.012) | (0.001) | (0.000) | (0.000) |
| | Tobin's Q | | | |
| | 85 % | 85 % | 85 % | 100 % |
| Dilution$_{it-4}$ | 42.461** | 6.506 | 42.939*** | 34.16** |
| | (0.017) | (0.852) | (0.008) | (0.047) |
| Dilution$^2_{it-4}$ | -371.408** | -708.818 | -378.322*** | -319.0** |
| | (0.011) | (0.524) | (0.005) | (0.023) |
| Fair value/salary$_{it-3}$ | 45.404** | 35.999** | 31.544** | 38.62** |
| | (0.018) | (0.018) | (0.006) | (0.033) |
| Fair value/salary$^2_{it-3}$ | -334.281*** | -243.530*** | -242.153*** | -279.5** |
| | (0.003) | (0.004) | (0.001) | (0.015) |

## 5.4 Derivation of polynomial equations

Due to our regression model being a polynomial, we can calculate maximum or minimum values that could determine the optimal number and value of options to grant employees. In theory, the top of the inverted U-shaped regression line should constitute the point where the amount of ESOs has the highest effect on performance. Since we interacted our independent variable with the dummy variables, ITM and ATM, there are three extremal points to calculate for each regression because setting ITM and ATM equal to zero represents the dummy for OTM. The derivation of our regression equations with four and five years lag, which is our main focus based on our findings, gives the following extremal points:

**Table 6: Extremal points: ROA and fair value/salary**

This table reports the extremal points from the regressions on ROA using fair value/salary as an independent variable. The results are divided into two categories, four and five years. The sample period is between 2009 and 2019 and consists of 89 firms**.**

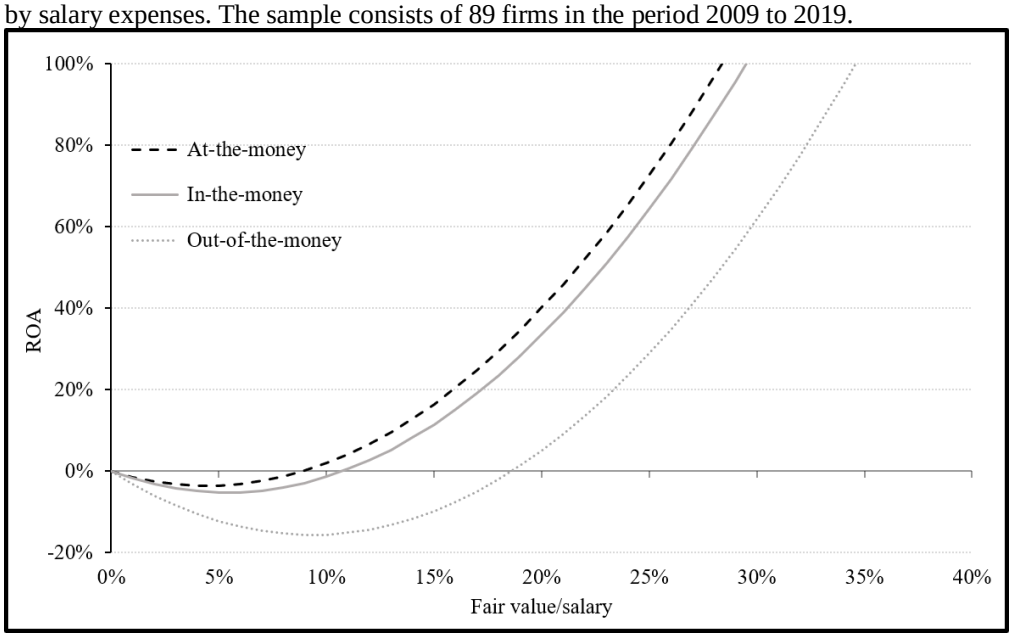
| | 4 Years | 5 Years |
|---|---|---|
| Out-of-the-money | 0.935 | 0.093 |
| In-the-money | 0.350 | 0.054 |
| At-the-money | 2.478 | 0.045 |

## 5.5 Discussion: Accounting-based performance

### *5.5.1 Five years after grant*

**Figure 6: Predicted ROA based on the relative fair value of ESOs granted in t-5**

The graph shows one regression line per granting practice from our regression model on ROA with five years of lag, using the fair value to salary ratio as an independent variable (see appendix 5 for full model). The y-axis is the predicted ROA and the x-axis is the fair value granted divided by salary expenses. The sample consists of 89 firms in the period 2009 to 2019.




Five years after grant, the predicted effect on ROA of the relative fair value granted is curvilinear. The effect on accounting-based performance is negative when ESOs equals less than around 10% of salary when granted either at-the-money or in-the-money. Thereafter, performance seemingly improves exponentially with additional granting value. appendix 4 shows that the 75th percentile for fair value/salary was 8,5% for all sectors, indicating that most companies should experience a negative effect on ROA after five years when granting at- or in-the-money, since this is below the 10% threshold provided by our model.

Furthermore, the predicted ROA is unreasonably high for higher levels of relative value granted. For example, granting around 15% of salary predicts a ROA above 10%, compared to the mean of -1% for the period. Smith and Swan (2008) similarly found that relatively small changes in options granted, measuring both number and value, is predicted to increase ROA to unreasonable levels.

For grants made out-of-the-money, the positive effect occurs if the relative value exceeds 19% of salary, further suggesting that the levels promoted by our model are above common praxis when performance five years after grant is emphasized. Previous findings, particularly in a Norwegian context, also found that the effect on performance was negative, though not significant and closer to grant.

Thus, granting options with a relatively high fair value positively impacted performance, as opposed to grants of more realistic levels. On the other hand, increasing the value of options granted to infinity to improve performance seems unrealistic. Increasing the proportion of ESOs granted relative to salary to infinity, as these results promote, may not facilitate the benefits of which options seek to reap. Attracting skilled people would prove challenging, particularly risk-averse employees, as a substantial part of remuneration is linked to the share price. Furthermore, the personal economic exposure to the value of the options could potentially harm the motivational effect, particularly if the link between effort and share price is ambiguous. Lastly, and more important, grants of the values suggested by our regression model are beyond the scope of common praxis and do not occur in our sample. Therefore, our regression model should not be used to predict the performance effect of grants of this or greater values.

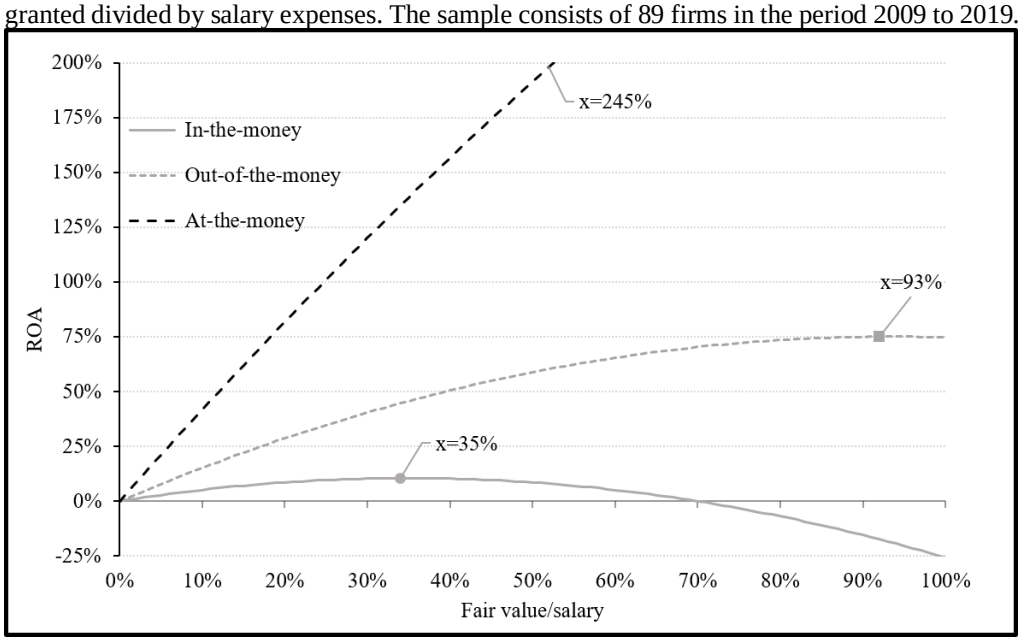
The effect of dilution follows the same trend as when the relative value granted is considered. The implication is, therefore, similar - that performance is enhanced when the relative number of options granted is increased infinitely. Performance is evidently improved when dilution is above 4% when granting in-the-money or at-the-money, and 11% when granting out-of-the-money.

Average dilution for the period equaled 2%, though some extreme dilution occurred. Dilution being the predominant concern of shareholders makes accepting an option program with extreme dilution rare in praxis, as the value of the shareholders' current shares would be significantly reduced. Since dilution impairs the current value for the shareholders, the level of dilution must be compensated enough through the positive effects from ESOs. Consequently, infinitely increasing the relative number of options beyond what is acceptable by shareholders is impractical and beyond our model's scope. Moreover, dilution was insignificant in our randomized robustness test, further reducing the significance of the findings.

### *5.5.2 Four years after grant*

**Figure 7: Predicted ROA based on the relative fair value of ESOs granted in t-4**

The graph shows one regression line per granting practice from our regression model on ROA with four years of lag, using the fair value to salary ratio as an independent variable (see appendix 6 for full model). The y-axis is the predicted ROA and the x-axis is the fair value granted divided by salary expenses. The sample consists of 89 firms in the period 2009 to 2019.




The results show a positive relationship between accounting-based performance and granting ESOs four years after grant, which is in line with the findings of Ding and Chea (2021), who also found a positive effect on accounting-based performance four years after announcement. Increasing the relative fair value increases accounting-based performance at a diminishing rate. Figure 7 depicts

the inverted U-shaped relationship between ROA and ESO, which is consistent with the reasoning of Tian (2004) and Guedri and Hollandts (2008).

Determining a performance maximizing value of ESOs has its limitations since our dataset shows that the companies on average granted ESOs with values in the range of 2-25% of salary, with a mean of 9%. As discussed, the optimizing value for performance is found at the turning point of the regression line. The turning point of the graph above shows that the optimal value equals 93% of salary for out-of-the-money grants, 245% for at-the-money grants, and 35% for in-the-money grants. Allocations of this scope are extreme and uncommon according to our data, and the interpretation of the findings is thus that there is a positive relationship between granting ESOs and performance after four years, where the effect on performance diminishes on the margin as the relative value of the options increases, as depicted in Figure 7**.** Therefore, the interpretation of our findings is limited to the span of what is practicable and within the praxis in our dataset.

The graph initially depicts performance with diminishing returns, and the marginal benefits of granting ESOs are, therefore, larger initially. These results contrast to the findings five years after grant, where only large grants had a positive effect on performance.

**Figure 8: Predicted ROA based on the relative number of ESOs granted in t-4**

The graph shows one regression line per granting practice from our regression model on ROA with four years of lag, using the number of options granted divided by outstanding shares as an independent variable (see appendix 9 for full model). The y-axis is the predicted ROA, and the x-axis is the dilution. The sample consists of 89 firms in the period 2009 to 2019.

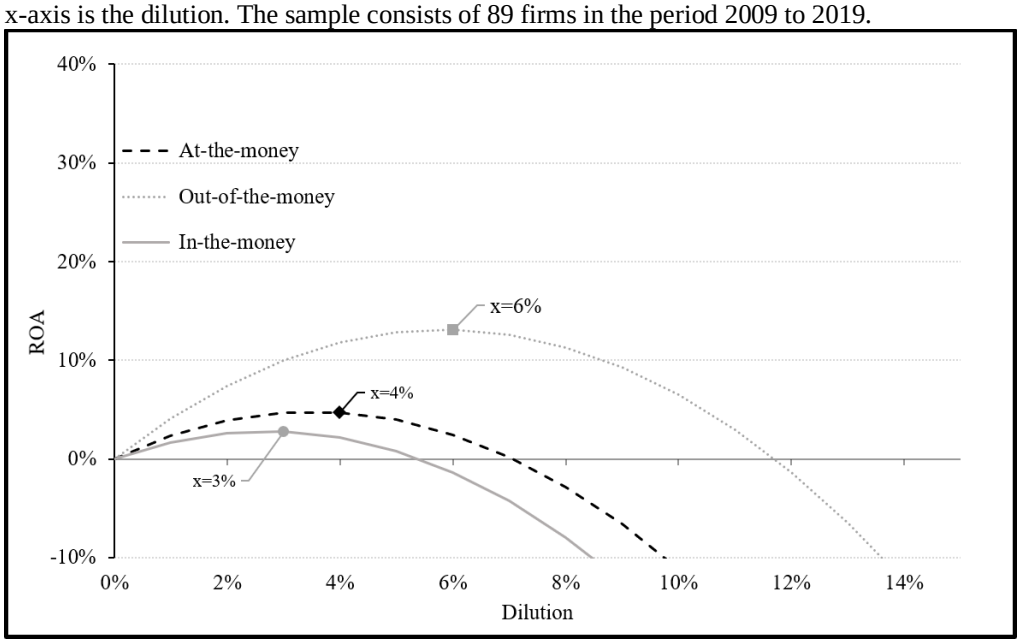



Figure 8 shows that dilution as an independent variable estimates a similar inverted U-shaped relationship as the relationship found when using fair value/salary. However, the turning points are within reasonable levels compared to the observations in our dataset. The mean dilution in our dataset is 2%, and the turning points are 3% for in-the-money, 4% for at-the-money, and 6% for out-of-the-money. Hence, the regression suggests granting slightly more ESOs than the praxis. Optimal dilution depends on whether the grant is in-the-money, at-the-money, or out-of-the-money. However, the estimate for at-the-money is not significant, and we cannot determine if the estimation is significantly different from out-of-the-money grants. Consequently, the results indicate that granting between 3% and 6% of outstanding shares is optimal for accounting-based performance, though the recommendations do not differentiate grants made at-the-money and out-of-the-money.

As earlier argued, there are conflicting interests between shareholders, employees, and the company when ESOPs are designed. Our findings indicate that the observed praxis is inefficient, with an optimal level of dilution one to four percentage points above the common praxis. Accordingly, the shareholders

should seemingly allow a higher dilution and grant more options to the employees to enhance accounting-based performance, as long as the shareholders are sufficiently compensated by the increased performance. We further found that the praxis is inefficient considering the relative value granted. In the tradeoff between the company and recipients, the latter receive less than optimal value, and the company misses an opportunity to improve their financial performance. The implication is therefore that the designers should promote granting more options of higher value and that the shareholders benefit, in the form of enhanced performance, from approving ESOPs of greater scope than the current praxis**.**

### 5.6 Discussion: Market-based performance

The relative value of options granted has a significantly positive effect with diminishing return on Tobin's Q three years after grant, which is one year earlier compared to the effect on accounting measures, indicating that the effect on market-based performance materializes sooner than accounting-based performance. Based on the coefficients, the value that maximizes Tobin's Q three years after grant equals 6,9% of salary, which is a more realistic level than the levels that maximize ROA four years after grant. Similarly, Smith and Swan (2008) reported that the relationship between granting options and Tobin's Q is less extreme than ROA, where promoted levels are closer to observed granting praxis.

Our predictions of Tobin's Q with dilution as an independent variable found the same trend as the relative value of options granted four years after grant. Nevertheless, the robustness tests found insignificant estimates and differing coefficients, resulting in a cautious interpretation.

Our model did not find a robust significant correlation between granting ESOs and market-based performance four and five years succeeding the grant. However, previous literature has often found a significant correlation between granting ESOs and Tobin's Q, though with some exceptions. Firstly, the insignificant long-term relationship may be explained by country-specific market characteristics, as the market perception of using ESOPs may vary across

markets, and thus have differing effects on the share price. Secondly, Tobin's Q as a measure of performance is influenced by innumerable factors beyond the controllable scope of the company and fluctuations may thus be challenging to predict, particularly that long after grant. Thirdly, the causality can as argued be an issue regarding Tobin's Q, as poorer performing companies must grant a higher amount of options to facilitate improved performance, implying that companies with a gloomy future grant more ESOs (Liljeblom et al., 2011). Nevertheless, we found that companies granting ESOs in-the-money had significantly better performance in the preceding year, compared to the performance of companies granting at- or out-of-the-money.

Lastly, market capitalization was used as a proxy for market performance, and the coefficients differed from the ones found when regressing on Tobin's Q. Contrastingly, the coefficient for market capitalization is more in line with findings using accounting-based measures, with an insignificant U-shape after five years and a significant inverted U-shape four years after grant. The deviation of the proxy compared to the main model impairs the confidence that Tobin's Q is correlated to granting ESO.

We find that the shareholders benefit in the form of increased market-performance three years after granting ESOs when granting a higher relative value than the current praxis. On the other hand, our findings are inconclusive in suggesting if shareholders receive improved market performance in exchange for increasing the dilution. Consequently, the intuition is that shareholders should approve ESOPs of higher value, whereas the optimal relative number is indeterminate since it has not been shown that shareholders are compensated sufficiently for the allowed dilution in the form of increased value per share.

### 5.7 Determining exercise price

The literature is, as presented, inconsistent on how to determine the exercise price relative to the share price. Our data suggest that granting at-the-money gives the best long-term performance while granting in-the-money and out-of-the-money appears less effective. However, the regression with dilution predicts better performance for out-of-the-money grants three to five years after grant, though not at our chosen significance level. We can therefore not conclude that at-the-money is different from out-of-the-money when market performance is considered.

Conversely to our findings, the most common praxis in our data sample is granting out-of-the-money, followed by granting in-the-money in the previous five years, illustrating an inefficient praxis.

The difference between granting at-the-money and not could be both marginal and substantial. Our data do not capture to which extent the options are not at-the-money, only that they are not. Consequently, we classify a broad spectrum of practices using only three categories. Grants barely not at-the-money might provide a different effect on performance compared to being far from at-the-money, and the effect of granting close to at-the-money may be similar to the effect of granting at-the-money. Furthermore, the exercise price practice may also be determined by the company's performance. Companies with a negatively trending share price and a gloomy future are argued to grant options deeply in-the-money in order to possibly generate profit for the recipient. Prior and predicted performance could, therefore, determine the chosen exercise price practice. Nevertheless, our independent sample t-test shows that in-the-money grants are associated with higher performance in the prior period for our sample.

There could be several reasons why granting in-the-money predicts poorer performance than granting at-the-money. Firstly, granting in-the-money does not require an increase in share price for the employee to gain a profit, and consequently does not provide the recipient a goal to reach in the same way as granting at- or out-of-the-money. Further, granting in-the-money results in higher costs for the company, reducing the attractiveness of granting in-the-

money. However, since the shareholders usually set a limit on how much dilution they accept, granting in-the-money might be a tool to compensate for the limited number of options available for grant. Furthermore, risk-averse employees may only deem in-the-money options as valuable and are granted in-the-money to meet the needs of their risk profile. In-the-money grants might also provide a stronger retention effect since the cost of quitting increases with the value of the option. Granting in-the-money may, therefore, be a necessity to achieve the argued benefits of granting ESO.

Conversely, granting out-of-the-money can lead to only attracting risk-perverse and positive employees. The possibility of a decrease in share price, making the gap between exercise price and share price even wider, can have a demotivating effect on employees.

The reasoning for at-the-money predicting the best performance may be that it balances the problems with granting in-the-money and out-of-the-money. Granting at-the-money is a middle ground, where there is a motivational effect to increase the share price above the exercise price, while reducing the chance of ESOs ending "under the water" and becoming worthless. This practice is also promoted as it maximizes the motivating effect for risk-averse grantees as this ensures a relatively high probability of payout (Hall & Murphy, 2000).

Our findings on how to determine exercise price are generalized and are not necessarily the optimal praxis for every company. Building on the arguments of Brandes et al., (2003), companies should tailor the ESOPs to their needs and strategy and decide exercise price accordingly. Rather than relying on a universal solution that fits all, the determination of exercise price requires a holistic approach where company context is considered.

## 6. LIMITATIONS

There are some limitations that need to be addressed. First is the data. Our research only targets the largest companies on the Oslo Stock Exchange, and is thus unable to explain the usage by smaller firms, which is arguably of relevance to more practitioners. Further, the number of observations decreases when the number of years the independent variables are lagged increases. Recent grants are consequently excluded from the regression as performance data is unavailable for periods succeeding recent grants. Thus, the most recent grants in our model with five years of lag are from 2014. Fewer observations may reduce significance and validity, making the selection biased, as the impact of firms with a shorter appearance on the Oslo Stock Exchange will decrease. This selection bias could partially explain the differing results when the number of years lagged changes. Furthermore, inclusion of more companies would particularly benefit our research concerning the different industries, as some companies heavily influence some industries in our data. Therefore, our industry level findings are not generalizable**.**

Secondly, the categorization of in- and out-of-the-money includes a broad spectrum of granting praxis's and could be misleading, as previously discussed. Ideally, exercise price relative to the share price at grant is categorized using smaller intervals, such as 5-10% and 10-15% above or below share price at grant. This enables testing the effect of different grades of in- and out-of-the-money. However, due to the often-lacking disclosure of either share price at grant or exercise price, in addition to many companies having multiple grants in a given year, including such intervals would significantly reduce the number of observations in our dataset.

Thirdly, our dataset does not separate who the recipients of the options are. The results are therefore general, opposed to specifically addressing ESOPs for executives, key personnel, and employees. Consequently, we are unable to provide evidence of who the recipients of ESOs should be, which is a key aspect when designing the plan.

Future research should address these limitations by researching the effect of using ESOs in smaller companies, both listed and unlisted; focusing on specific sectors in order to provide sector individual insights; using smaller intervals of granting praxis's to determine a more specific best praxis for determining exercise price; and differentiating between options to key executives and a broad-based granting praxis with the aim of determining who a given ESOP should target.

## 7. CONCLUSION

*Does granting employee stock options positively affect long-term performance for companies listed on the Oslo Stock Exchange?*

Our thesis provides evidence of ESOs enhancing long-term performance for companies listed on the Oslo Stock Exchange. The significance is though dependent on the performance metric considered and the number of years after grant the effect is examined.

First, there is a significant positive effect on the accounting-based performance measure ROA after five and four years, whereas the effect is insignificant in the three years succeeding the grant. For the market-based performance measure Tobin's Q, the results were mostly insignificant except three years after grant, indicating that the effect materializes sooner in the market.

Secondly, the number of years after grant affects ESO's impact on performance. After four years, the effect on accounting- and market-based performance provides an inverted U-shaped relationship with diminishing returns. Conversely, after five years, the relationship with accounting-based performance has a U-shaped relationship where predicted performance decreases with lower level of grants, before increasing exponentially after a given amount. Our significant findings are robust and consistent using both relative number and fair value of options granted. The performance effect is further determined by the amount granted and if the options are granted in-, at-, or out-of-the-money.

The second part of our thesis aims to provide practitioners with input on the design of ESOPs based on empirical results, answering our research question: *How did companies at the Oslo Stock Exchange use employee stock options from 2009 to 2019, and how should the employee stock options plans be designed in the future to optimize the effect on performance?*

Our findings include suggestions on the size of the grant and how to determine the exercise price. Our results suggest that granting more than 10% of salary costs as ESOs provides a positive effect on performance after four and five years if the ESOs are granted in-the-money or at-the-money. After five years, levels below 10% are estimated to decrease performance, indicating that the value of options must be sufficiently high to affect performance after five years positively. The inverted U-shape found after four years indicates that granting options is beneficial up to an inflection point where the benefits diminish with increased value granted.

Applying dilution as a measurement for the grants suggests that the optimal relative number of options granted is between 3% and 6% considering the performance four years after grant, and at least 4,5% for optimal performance five years after grant. Optimal grant size is dependent on the exercise price praxis.

The praxis of the companies in our sample favored granting out-of-the-money, followed by in-the-money in the previous five years. Conversely, our findings indicate that granting at-the-money provides the best predicted long-term performance. Moreover, the common praxis is to grant lower levels than optimal of ESOs, measuring both relative number and value. This implies that granting more ESOs in the future is preferable for both employees and the company. However, we are not able to conclude whether the effect on market measures favors the shareholder, due to limited results on market-based performance. Nevertheless, the increased accounting-based performance could benefit shareholders.

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# 9. APPENDIX

## Appendix 1: Dataset with included companies and variables for 2019

This tables shows the companies and variables included in our dataset. Only input for 2019 is depicted here (Time=11). Blank cells indicate unavailable data and is not included in our regressions.

| Company index | Company name | Time | Industry Dummy | ROE | ROA | Tobin | Opt. granted | FVgranted | Dilution | FV/Salary | FV*1000/ Marketcap | Industry return | ITM | ATM | Broad-based | Leverege | LogRevenue | Logassets | LogEmp | Business risk | Volatility |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AF GRUPPEN ASA | 11 | 3 | 0.4836 | 0.1211 | 2.1779 | 220 959 | 4 333 | .0021 | .001 | .239 | .0986 | 1 | 0 | 1 | 3.29 | 7.3543 | 7.109 | 8.492491 | .263 | .20378755 |
| 2 | AKVA GROUP ASA | 11 | 3 | 0.0099 | 0.0039 | 1.4866 | 50 000 | 608 | .0015 | .0008 | .246 | .0986 | 0 | 1 | 1 | 2.06 | 6.4844 | 6.482 | 7.294717 | .282 | .22286361 |
| 3 | AQUALISBRAEMAR LOC | 11 | 3 | 0.3071 | 0.2562 | .7457 | 8 630 000 | 8 248 | .1222 | .0329 | 30.112 | .0986 | 0 | 0 | 1 | .34 | 5.6831 | 5.7466 | 6.045005 | .276 | .47376297 |
| 4 | ARCUS ASA | 11 | 5 | 0.0813 | 0.0303 | 1.1468 | 2 195 086 | 9 163 | .0323 | .0209 | 3.691 | .1205 | 0 | 0 | 1 | 2.36 | 6.433 | 6.7474 | 6.075346 | .048 | .22963848 |
| 5 | ATEA ASA | 11 | 8 | 0.1583 | 0.0347 | 1.7377 | 2 314 332 | 153 942 | .0211 | .0272 | 10.911 | .1045 | 1 | 0 | 0 | 3.86 | 7.5641 | 7.1748 | 8.920656 | .092 | .21196982 |
| 6 | ATLANTIC SAPPHIRE AS | 11 | 5 | -0.0758 | -0.0686 | 4.3168 | 81 000 | 2 772 | .0011 | .083 | .301 | | 1 | 0 | | .21 | 4.6879 | 6.3463 | 4.110874 | .816 | .28584998 |
| 7 | AWILCO LNG ASA | 11 | 3 | -0.0567 | -0.0167 | .8436 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 2.52 | 5.5136 | 6.5202 | 2.014903 | .207 | .57508149 |
| 8 | B2holding ASA | 11 | 7 | 0.0295 | 0.0080 | .9811 | 3 050 000 | 5 619 | .0074 | .0086 | 1.435 | .1026 | 0 | 0 | 0 | 3 | 6.4511 | 7.229 | 7.863459 | .353 | .52795979 |
| 10 | BORREGAARD ASA | 11 | 2 | 0.1097 | 0.0612 | 1.895 | 400 000 | 10 366 | .004 | .0101 | 1.091 | .1911 | 0 | 0 | 1 | .95 | 6.7044 | 6.8289 | 7.003066 | .065 | .24331861 |
| 11 | ELECTROMAGNETIC GE | 11 | 1 | 3.9859 | 0.1773 | 1.1441 | 0 | 0 | 0 | 0 | 0 | .1333 | 0 | 1 | 0 | 5.61 | 5.8956 | 5.9669 | 4.832306 | .451 | 1.0496442 |
| 12 | ELKEM ASA | 11 | 2 | 0.0645 | 0.0284 | 1.0497 | 8 000 000 | 32 656 | .0138 | .0088 | 2.269 | .1911 | 1 | 0 | 0 | 1.24 | 7.3473 | 7.4625 | 8.762098 | .227 | .47159173 |
| 13 | EVRY ASA | 11 | 8 | | | | | | | | | | 0 | 0 | | | | | | | |
| 14 | FJORDKRAFT HOLDING | 11 | 10 | 0.4392 | 0.1109 | 2.6812 | 120 000 | 880 | .0011 | .0037 | .145 | .1685 | 1 | 0 | 1 | 2 | 6.8526 | 6.4783 | 5.592851 | .25 | .24771153 |
| 15 | Frontline Ltd | 11 | 3 | 0.0955 | 0.0361 | 1.2497 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 0 | 1.45 | 6.9254 | 7.5114 | 5.01728 | .251 | |
| 16 | Golar LNG Ltd | 11 | 1 | -0.0328 | -0.0125 | .933 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 3.29 | 6.5964 | 7.6092 | 7.149524 | .692 | |
| 17 | GRIEG SEAFOOD ASA | 11 | 5 | 0.1688 | 0.0805 | 2.29 | 0 | 0 | 0 | 0 | 0 | .1205 | 0 | 0 | 1 | 1.16 | 6.9177 | 6.9511 | 6.719013 | .181 | .35788227 |
| 18 | HEXAGON COMPOSITE | 11 | 3 | 0.0563 | 0.0332 | 1.9341 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 0 | 1.24 | 6.5335 | 6.6837 | 6.872646 | .454 | .35788227 |
| 19 | IDEX BIOMETRICS ASA | 11 | 3 | -1.7925 | -1.4133 | 4.7017 | 20 414 143 | 16 196 | .0284 | .0846 | 17.623 | | 1 | 0 | | .32 | 3.5707 | 5.3139 | 4.722953 | 1.247 | 1.1576135 |
| 20 | KOMPLETT BANK ASA | 11 | 7 | 0.1346 | 0.0226 | 1.0422 | 630 969 | 6 083 | .0034 | .0449 | 2.647 | .1026 | 0 | 0 | 1 | 4.74 | 6.0696 | 7.0261 | 4.740575 | .563 | .36579161 |
| 21 | KONGSBERG AUTOMOT | 11 | 4 | 0.1329 | 0.0411 | .9959 | 4 227 035 | 9 629 | .0207 | .003 | 3.506 | .1335 | 0 | 1 | 1 | 2.28 | 7.058 | 6.9601 | 9.319598 | .1 | .42364945 |
| 22 | MOWI ASA | 11 | 5 | 0.1634 | 0.0915 | 2.558 | 1 470 000 | 73 233 | .0028 | .0132 | .621 | .1205 | 0 | 0 | 1 | 1.02 | 7.6097 | 7.7594 | 9.595705 | .119 | .24465192 |
| 23 | NEL ASA | 11 | 1 | -0.1370 | -0.1112 | 4.5894 | 11 086 000 | 13 110 | .0091 | .0539 | 1.24 | | 0 | 0 | | .32 | 5.7557 | 6.3857 | 5.509388 | .617 | .60705275 |
| 24 | NEXT BIOMETRICS GRO | 11 | 3 | -1.0744 | -0.8542 | 1.1142 | 1 437 650 | 4 040 | .0317 | .033 | 26.139 | | 0 | 0 | | .28 | 4.9265 | 5.2378 | 4.350278 | .481 | |
| 25 | NORDIC SEMICONDUCT | 11 | 8 | 0.0347 | 0.0288 | 3.8538 | 1 949 010 | 18 830 | .0111 | .0267 | 1.88 | .1045 | 0 | 0 | 0 | .37 | 6.4044 | 6.4463 | 6.58755 | .181 | .37887188 |
| 26 | NORWAY ROYAL SALMO | 11 | 5 | 0.1596 | 0.0905 | 2.5095 | 366 223 | 16 127 | .0083 | .1044 | 1.547 | .1205 | 1 | 0 | 0 | .39 | 6.7472 | 6.6703 | 5.204007 | .179 | .3205542 |
| 27 | NORWEGIAN AIR SHUT | 11 | 4 | -0.7723 | -0.0235 | 1.024 | 1 800 000 | 26 736 | .011 | .0039 | 4.33 | | 0 | 0 | | 19.69 | 7.6387 | 7.9312 | 9.19029 | .236 | .75286966 |
| 28 | NORWEGIAN ENERGY C | 11 | 1 | 27.2517 | -1.2593 | 1.0142 | 956 954 | 87 944 | .039 | .6247 | 15.886 | | 1 | 0 | | 3.98 | 6.4668 | 7.411 | 2.80336 | 1.958 | .3827128 |
| 29 | NRC GROUP ASA | 11 | 3 | -0.0963 | -0.0472 | 1.1941 | 33 125 | 269 | .0006 | .0002 | .087 | | 0 | 0 | | 1.67 | 6.7919 | 6.7342 | 7.296074 | .64 | .25931883 |
| 30 | ORKLA ASA | 11 | 5 | 0.1129 | 0.0732 | 1.9436 | 0 | 0 | 0 | 0 | 0 | .1205 | 0 | 0 | 1 | .64 | 7.6396 | 7.759 | 9.821681 | .094 | .17128253 |
| 31 | OTELLO CORPORATION | 11 | 8 | -0.0279 | -0.0234 | .8092 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | .28 | 6.326 | 6.5823 | 6.299868 | .302 | .46560384 |
| 32 | PGS ASA | 11 | 1 | -0.0413 | -0.0125 | 1.0114 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 2.61 | 6.9132 | 7.3055 | 7.136483 | .086 | .68236209 |
| 34 | Q-FREE ASA | 11 | 3 | -0.0970 | -0.0415 | 1.2822 | 402 438 | 285 | .0045 | .0009 | .47 | | 0 | 0 | | 1.47 | 5.9833 | 5.946 | 5.967428 | .084 | .47813394 |
| 35 | REC SILICON ASA | 11 | 2 | -0.9434 | -0.2817 | 1.291 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 362.25 | 6.1491 | 6.4067 | 5.995207 | .208 | .88863277 |
| 36 | SALMAR ASA | 11 | 5 | 0.2695 | 0.1628 | 3.2888 | 0 | 0 | 0 | 0 | 0 | .1205 | 0 | 0 | 0 | .85 | 7.0877 | 7.2549 | 7.336937 | .174 | .31206586 |
| 38 | SCATEC ASA | 11 | 1 | 0.0580 | 0.0097 | | 478 816 | 8 099 | .0038 | .0497 | .522 | .1333 | 1 | 0 | 0 | 4.93 | 6.2577 | 7.334 | 5.613128 | .272 | .35110199 |
| 39 | SCHIBSTED ASA | 11 | 8 | 0.1036 | 0.0556 | 1.551 | 0 | 0 | 0 | 0 | 0 | .1045 | 0 | 0 | 1 | .94 | 7.2805 | 7.5156 | 8.806499 | .084 | .24769584 |
| 40 | SEABIRD EXPLORATION | 11 | 1 | -0.4768 | -0.3065 | 2.363 | 32 100 000 | 8 081 | .006 | .0431 | 26.539 | | 0 | 1 | | .51 | 5.5989 | 5.7939 | 5.972537 | .573 | |
| 41 | Seadrill Ltd | 11 | 1 | -0.3293 | -0.0921 | .8252 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 4.18 | 7.0868 | 7.9109 | 8.45808 | .471 | |
| 42 | Siem Offshore Inc | 11 | 1 | -0.1924 | -0.0513 | 1.5145 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 3.28 | 6.4106 | 7.1313 | 7.105376 | .194 | 1.2691276 |
| 45 | Veidekke ASA | 11 | 3 | 0.1140 | 0.0241 | 4.3092 | 657 000 | 7 696 | .0049 | .0011 | .477 | .0986 | 1 | 0 | 1 | 4.57 | 7.5631 | 7.3421 | 9.045171 | .141 | .23877791 |
| 46 | ABG SUNDAL COLLIER H | 11 | 7 | 0.3734 | 0.0974 | 1.4953 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 2.02 | 6.1308 | 6.3563 | 5.609472 | .058 | .30754099 |
| 47 | AKASTOR ASA | 11 | 1 | 0.0345 | 0.0165 | .8443 | 0 | 0 | 0 | 0 | 0 | .1333 | 0 | 0 | 1 | 1.42 | 6.7291 | 7.0244 | 7.612584 | .612 | .38228559 |
| 48 | AKER ASA | 11 | 7 | -0.0284 | -0.0123 | .9861 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 1.61 | 7.688 | 8.0282 | 3.7612 | .458 | .31103336 |
| 49 | AKER BP ASA | 11 | 1 | 0.2894 | 0.0804 | 1.7726 | 0 | 0 | 0 | 0 | 0 | .1333 | 0 | 0 | 1 | 4.16 | 7.4732 | 8.0307 | 7.435733 | .441 | .35510805 |
| 50 | AKER SOLUTIONS ASA | 11 | 1 | 0.0174 | 0.0063 | .9809 | 0 | 0 | 0 | 0 | 0 | .1333 | 0 | 0 | 1 | 2.67 | 7.4663 | 7.4243 | 9.52391 | .123 | .34573612 |
| 51 | AMERICAN SHIPPING C | 11 | 3 | 0.0306 | 0.0066 | 1.0822 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 0 | 3.56 | 5.8879 | 6.8198 | 1.098612 | .031 | .25166042 |
| 52 | ARENDALS FOSSEKOMI | 11 | 7 | 0.0596 | 0.0321 | 1.4184 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 0 | .85 | 6.6484 | 6.7885 | 7.705713 | .147 | .32872709 |
| 53 | AUSTEVOLL SEAFOOD A | 11 | 5 | 0.0957 | 0.0566 | .8726 | 0 | 0 | 0 | 0 | 0 | .1205 | 0 | 0 | 0 | .71 | 7.3676 | 7.6002 | 8.779326 | .144 | .33704315 |
| 54 | DNB ASA | 11 | 7 | 0.1088 | 0.0092 | 1.0061 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 10.53 | 7.7168 | 9.4461 | 9.156148 | .043 | .22778131 |
| 55 | DNO ASA | 11 | 1 | -0.0311 | -0.0189 | 1.0817 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 1.82 | 6.9318 | 7.4582 | 7.08632 | .667 | .38575276 |
| 56 | DOF ASA | 11 | 1 | -0.3099 | -0.0677 | .8735 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 5.8 | 6.7977 | 7.3704 | 8.171599 | .211 | 1.0893104 |
| 57 | EIDESVIK OFFSHORE A | 11 | 1 | -0.3770 | -0.1310 | .8798 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 3.61 | 5.8013 | 6.5264 | 6.100319 | .308 | .54657655 |
| 58 | ENTRA ASA | 11 | 7 | 0.1308 | 0.0611 | 1.037 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 1.24 | 6.4213 | 7.7089 | 5.099866 | .143 | .17312737 |
| 59 | EQUINOR ASA | 11 | 1 | 0.1713 | 0.0655 | 1.2167 | 0 | 0 | 0 | 0 | 0 | .1333 | 0 | 0 | 1 | 1.24 | 8.7431 | 9.0155 | 9.950777 | .168 | .22766992 |
| 60 | EUROPRIS ASA | 11 | 4 | 0.2095 | 0.0788 | 1.517 | 0 | 0 | 0 | 0 | 0 | .1335 | 0 | 0 | 1 | 1.24 | 6.7893 | 6.8643 | 7.912606 | .101 | .345155 |
| 61 | GC RIEBER SHIPPING AS | 11 | 3 | 0.0064 | 0.0037 | .6421 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 1 | 1.45 | 5.3057 | 6.462 | 6.39693 | .364 | .70779861 |
| 62 | GJENSIDIGE FORSIKRIN | 11 | 7 | 0.2536 | 0.0386 | 1.5866 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 1.45 | 7.4662 | 8.0508 | 8.238405 | .051 | .16068382 |
| 63 | KONGSBERG GRUPPEN A | 11 | 3 | 0.0515 | 0.0235 | 1.3083 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 1 | 2.05 | 7.3663 | 7.5913 | 9.084494 | .192 | .26373935 |
| 65 | Leroy Seafood Group AS | 11 | 5 | 0.1077 | 0.0650 | 1.5621 | 0 | 0 | 0 | 0 | 0 | .1205 | 0 | 0 | 1 | .7 | 7.3102 | 7.4799 | 8.410499 | .139 | .33009813 |
| 66 | MAGSEIS FAIRFIELD AS | 11 | 1 | -0.3407 | -0.2155 | .8254 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | .93 | 6.6068 | 6.4955 | 6.261492 | 1.053 | .75996086 |
| 67 | MEDISTIM ASA | 11 | 6 | 0.3435 | 0.2634 | 10.7704 | 0 | 0 | 0 | 0 | 0 | .1232 | 0 | 0 | 0 | .42 | 5.5608 | 5.5265 | 4.68675 | .131 | .51599888 |
| 68 | MPC CONTAINER SHIPS | 11 | 3 | -0.0685 | -0.0435 | .693 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | .75 | 6.211 | 6.7996 | 2.772589 | .595 | .38942404 |
| 69 | MULTICONSULT ASA | 11 | 3 | 0.0703 | 0.0221 | 1.5087 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 1 | 3.6 | 6.536 | 6.4272 | 7.994295 | .153 | .33187166 |
| 70 | NORDIC NANOVECTOR | 11 | 6 | -0.9292 | -0.7126 | 4.3184 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | .33 | | 5.7124 | 3.7612 | .174 | .76637329 |
| 71 | Norsk Hydro ASA | 11 | 2 | -0.0134 | -0.0074 | .8993 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | .96 | 8.1754 | 8.2159 | 10.49883 | .269 | .30563859 |
| 72 | OCEAN YIELD ASA | 11 | 3 | 0.0608 | 0.0189 | 1.026 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 0 | 2.6 | 6.2892 | 7.4422 | 3.044523 | .244 | .22056123 |
| 73 | ODFJELL SE | 11 | 3 | -0.0444 | -0.0145 | .8563 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 2.66 | 6.8851 | 7.2484 | 7.806493 | .045 | .35363307 |
| 74 | Olav Thon Eiendomsselsk | 11 | 7 | 0.0679 | 0.0311 | .8337 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 0 | 1.15 | 6.5893 | 7.7772 | 6.108136 | .076 | .19892699 |
| 75 | PARETO BANK ASA | 11 | 7 | 0.1631 | 0.0262 | .968 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 4.38 | 5.8362 | 7.2433 | 3.749504 | .227 | .18947556 |
| 77 | POLARIS MEDIA ASA | 11 | 4 | 0.0616 | 0.0428 | .8527 | 0 | 0 | 0 | 0 | 0 | .1335 | 0 | 0 | 1 | .78 | 6.3697 | 6.618 | 6.906755 | .189 | .59702887 |
| 78 | PROTECTOR FORSIKRIN | 11 | 7 | -0.0276 | -0.0044 | 1.1695 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 6.3 | 6.6458 | 7.1686 | 5.913503 | .215 | .37175323 |
| 79 | SBANKEN ASA | 11 | 7 | 0.1157 | 0.0078 | 1.0117 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 12.51 | 6.2519 | 7.9685 | 5.877736 | .148 | .24324577 |
| 80 | SELVAAG BOLIG ASA | 11 | 7 | 0.2138 | 0.1026 | .8319 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 1.04 | 6.5275 | 6.8396 | 4.442651 | .041 | .29568932 |
| 81 | SOLSTAD OFFSHORE A | 11 | 1 | 2.7239 | -0.0733 | .8533 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | | 6.7197 | 7.4747 | 8.184374 | .243 | .91609378 |
| 82 | Sparebank 1 Nord-Norg | 11 | 7 | 0.1477 | 0.0182 | 1.1381 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 6.87 | 6.5951 | 8.0474 | 6.794587 | .138 | .15470276 |
| 83 | Sparebank 1 Ringerike H | 11 | 7 | 0.1140 | 0.0170 | .9615 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 0 | 5.62 | 5.8039 | 7.3989 | 5.440251 | .097 | .20867611 |
| 84 | Sparebank 1 SMN | 11 | 7 | 0.1286 | 0.0150 | .9926 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 7.16 | 6.6661 | 8.2218 | 7.38461 | .137 | .16651625 |
| 85 | Sparebank 1 SR Bank AS | 11 | 7 | 0.1379 | 0.0127 | .9555 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 9.3 | 6.7516 | 8.4081 | 7.105786 | .112 | .19569481 |
| 86 | Sparebank 1 Ostlandet | 11 | 7 | 0.1229 | 0.0147 | .9436 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 7.48 | 6.5483 | 8.1296 | 7.084645 | .24 | .12749538 |
| 87 | Sparebanken More | 11 | 7 | 0.1117 | 0.0100 | 1.0029 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 9.74 | 6.1992 | 7.8743 | 5.883322 | .077 | .14521765 |
| 88 | Sparebanken Vest | 11 | 7 | 0.1294 | 0.0107 | .9488 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 10.66 | 6.5721 | 8.2948 | 6.574378 | .117 | .17264966 |
| 89 | STOREBRAND ASA | 11 | 7 | 0.0615 | 0.0035 | .9488 | 0 | 0 | 0 | 0 | 0 | .1026 | 0 | 0 | 1 | 17.96 | 7.9361 | 8.8015 | 7.480992 | .324 | .23515716 |
| 90 | TELENOR ASA | 11 | 9 | 0.3003 | 0.0855 | .9982 | 0 | 0 | 0 | 0 | 0 | .1055 | 0 | 0 | 1 | 4.74 | 8.0556 | 8.396 | 9.92818 | .072 | .18808278 |
| 91 | TGS NOPEC Geophysica | 11 | 1 | 0.0844 | 0.0657 | 1.7384 | 0 | 0 | 0 | 0 | 0 | .1333 | 0 | 0 | 1 | .42 | 6.712 | 7.2858 | 6.424058 | .117 | .35519884 |
| 92 | TOMRA SYSTEMS ASA | 11 | 3 | 0.1684 | 0.0919 | 3.8773 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 1 | 1.07 | 6.9706 | 7.0361 | 8.361124 | .157 | .28645081 |
| 93 | WALLENIUS WILHELMS | 11 | 3 | 0.0309 | 0.0120 | 1.5539 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 0 | 1.67 | 7.5365 | 7.8353 | 9.151015 | .737 | .31559177 |
| 94 | Wilh Wilhelmsen Holdin | 11 | 3 | 0.0566 | 0.0371 | .7602 | 0 | 0 | 0 | 0 | 0 | .0986 | 0 | 0 | 0 | .58 | 6.8666 | 7.461 | 9.587063 | .229 | .28642361 |
| 95 | XXL ASA | 11 | 4 | -0.0706 | -0.0342 | .6326 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 1.77 | 6.9539 | 7.0022 | 8.111028 | .127 | .52429308 |
| 96 | YARA INTERNATIONAL | 11 | 2 | 0.0714 | | .9257 | | | | | | | 0 | 0 | 1 | .88 | 8.0536 | 8.1668 | 9.704732 | .072 | .24496008 |

**Appendix 2: Granting praxis and expected lifetime on the OSE from 2009 to 2019**

The table reports average values for 10 sectors in the time span of the sample period. The percentage for each grant praxis, in-the-money, at-the-money and out-of-the-money, is shown per industry. Average expected lifetime is the disclosed value from annual reports used to calculate the fair value of ESOs. The sample period is between 2009 and 2019 and consists of 89 firms.

| Sector | ITM | ATM | OTM | Average expected lifetime |
|---|---|---|---|---|
| Energy | 35 % | 30 % | 36 % | 3,22 |
| Material | 18 % | 0 % | 82 % | 4,36 |
| Industry | 44 % | 5 % | 51 % | 3,24 |
| Discretionary | 12 % | 6 % | 82 % | 2,97 |
| Consumer staples | 16 % | 19 % | 65 % | 3,60 |
| Health | 30 % | 10 % | 60 % | 5,00 |
| Finance | 31 % | 0 % | 69 % | 4,50 |
| IT | 41 % | 30 % | 30 % | 3,38 |
| Telecom | N/A | N/A | N/A | N/A |
| Utility | 100 % | 0 % | 0 % | 2,05 |

**Appendix 3: Independent sample t-test: Prior period performance and current period granting praxis**

This table reports a comparison of the mean performance in the previous period for companies granting in-the-money and the companies not granting in-the-money. The test is conducted using both return on assets and Tobin's Q. The test shows a significant difference in the means of the two samples. The sample period is between 2009 and 2019 and consists of 89 firms.

| | Independent sample t-test | | | |
|---|---|---|---|---|
| Variable | Obs | Mean | Std. Err. | Pr(\|T\| > \|t\|) |
| ROA: ITM=0 | 804 | -0.00732 | 0.0818 | |
| ROA: ITM=1 | 64 | -0.07422 | 0.0608 | 0.0472 |
| Tobin: ITM=0 | 761 | -1.65588 | 0.0838 | |
| Tobin: ITM=1 | 59 | -2.45261 | 0.4688 | 0.0153 |

**Appendix 4: Descriptive statistics of granting praxis's in the different sectors on the OSE**

This table shows means, 25th and 75th percentiles, standard deviation, and the number of observations for each of the 10 sectors from 2009 to 2019. The variables depicted in the table are the average total fair value granted in ESO by a company, the average number of ESO granted by a company, average fair value per option granted, average dilution, and average fair value divided by salary, in that order. The sample consists of 89 firms in the period 2009 to 2019.

| | | Energy | | | | | Material | | | | | Industrials | | | | | Consumer Discretionary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | FV | Number | Avg. | | FV/ | FV | Number | Avg. | | FV/ | FV | Number | Avg. | | FV/ | FV | Number | Avg. | | FV/ |
| Time | Stats | granted | granted | FV | Dilution | salary | granted | granted | FV | Dilution | salary | granted | granted | FV | Dilution | salary | granted | granted | FV | Dilution | salary |
| **2009** | mean | 30 033 | 2 894 | 12 | 2,2% | 11,4% | 24 462 | 3 250 | 8 | 3,8% | 1,5% | 12 183 | 5 363 | 16 | 5,7% | 16,2% | 5 096 | 1 090 | 10 | 1,0% | 0,4% |
| | p25 | 10 163 | 2 460 | 4 | 1,1% | 7,3% | 24 462 | 3 250 | 8 | 3,8% | 1,5% | 2 140 | 382 | 1 | 0,8% | 1,3% | 3 034 | 384 | 2 | 1,0% | 0,2% |
| | p75 | 40 446 | 3 053 | 13 | 1,5% | 13,1% | 24 462 | 3 250 | 8 | 3,8% | 1,5% | 22 227 | 10 344 | 31 | 10,5% | 31,1% | 7 157 | 1 795 | 19 | 1,1% | 0,6% |
| | sd | 25 599 | 802 | 13 | 2,3% | 8,9% | - | - | - | - | - | 17 463 | 9 662 | 28 | 7,6% | 19,5% | 2 915 | 998 | 12 | 0,1% | 0,3% |
| | N | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 |
| **2010** | mean | 38 532 | 2 130 | 20 | 1,4% | 11,6% | 21 157 | 7 245 | 3 | 6,8% | 1,0% | 7 973 | 2 164 | 4 | 2,2% | 6,0% | 9 917 | 2 010 | 22 | 1,4% | 0,6% |
| | p25 | 12 038 | 1 667 | 8 | 0,6% | 7,6% | 21 157 | 7 245 | 3 | 6,8% | 1,0% | 2 479 | 1 | 1 | 1,3% | 1,2% | 7 344 | 292 | 2 | 0,8% | 0,4% |
| | p75 | 47 062 | 2 323 | 28 | 1,6% | 13,9% | 21 157 | 7 245 | 3 | 6,8% | 1,0% | 17 346 | 2 850 | 6 | 3,9% | 14,5% | 12 490 | 3 728 | 43 | 2,1% | 0,8% |
| | sd | 37 303 | 705 | 20 | 1,2% | 7,0% | - | - | - | - | - | 8 157 | 1 104 | 3 | 1,4% | 7,4% | 3 639 | 2 430 | 29 | 0,9% | 0,3% |
| | N | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| **2011** | mean | 31 982 | 1 435 | 21 | 0,7% | 9,4% | 21 071 | 4 995 | 9 | 5,0% | 2,4% | 6 232 | 2 134 | 18 | 1,6% | 8,0% | 7 400 | 3 936 | 2 | 2,2% | 0,4% |
| | p25 | 18 381 | 897 | 7 | 0,4% | 6,7% | 19 585 | 1 390 | 2 | 1,4% | 1,5% | 3 633 | 368 | 2 | 0,9% | 0,8% | 7 400 | 3 936 | 2 | 2,2% | 0,4% |
| | p75 | 45 434 | 1 787 | 30 | 1,1% | 12,1% | 22 557 | 8 600 | 16 | 8,6% | 3,2% | 8 831 | 3 900 | 33 | 2,3% | 15,2% | 7 400 | 3 936 | 2 | 2,2% | 0,4% |
| | sd | 29 007 | 947 | 16 | 0,5% | 6,0% | 2 102 | 5 098 | 10 | 5,1% | 1,2% | 3 450 | 2 524 | 30 | 0,9% | 12,0% | - | - | - | - | - |
| | N | 5 | 5 | 5 | 5 | 5 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 |
| **2012** | mean | 20 743 | 3 221 | 14 | 0,9% | 7,8% | 15 788 | 2 540 | 6 | 2,5% | 2,3% | 7 589 | 2 270 | 12 | 1,5% | 18,7% | 3 400 | 4 000 | 1 | 2,2% | 0,2% |
| | p25 | 6 511 | 1 591 | 3 | 0,0% | 1,2% | 15 788 | 2 540 | 6 | 2,5% | 2,3% | 2 142 | 467 | 3 | 0,7% | 1,1% | 3 400 | 4 000 | 1 | 2,2% | 0,2% |
| | p75 | 34 975 | 4 852 | 24 | 1,8% | 14,4% | 15 788 | 2 540 | 6 | 2,5% | 2,3% | 13 037 | 4 074 | 21 | 2,3% | 36,3% | 3 400 | 4 000 | 1 | 2,2% | 0,2% |
| | sd | 21 676 | 2 256 | 17 | 1,0% | 7,7% | - | - | - | - | - | 6 322 | 2 611 | 17 | 1,0% | 31,7% | - | - | - | - | - |
| | N | 4 | 4 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 |
| **2013** | mean | 19 530 | 5 761 | 15 | 4,3% | 34,3% | - | - | - | - | - | 16 842 | 4 034 | 34 | 2,6% | 41,4% | 19 156 | 2 238 | 29 | 1,9% | 0,8% |
| | p25 | 16 756 | 2 066 | 2 | 0,8% | 1,0% | - | - | - | - | - | 10 751 | 438 | 6 | 0,9% | 1,8% | 2 310 | 625 | 1 | 1,8% | 0,1% |
| | p75 | 19 167 | 8 297 | 4 | 3,6% | 15,1% | - | - | - | - | - | 22 357 | 2 184 | 25 | 4,4% | 67,4% | 36 002 | 3 850 | 58 | 2,1% | 1,5% |
| | sd | 13 456 | 5 492 | 27 | 6,3% | 64,6% | - | - | - | - | - | 9 579 | 7 186 | 51 | 2,1% | 39,2% | 23 824 | 2 280 | 40 | 0,2% | 0,9% |
| | N | 5 | 5 | 5 | 5 | 5 | - | - | - | - | - | 5 | 5 | 5 | 5 | 5 | 2 | 2 | 2 | 2 | 2 |
| **2014** | mean | 11 795 | 3 597 | 5 | 1,0% | 15,7% | 5 080 | 4 250 | 6 | 2,0% | 0,8% | 13 814 | 2 033 | 22 | 1,6% | 34,1% | 7 399 | 3 775 | 2 | 2,1% | 0,3% |
| | p25 | 3 732 | 2 397 | 1 | 0,4% | 2,1% | 4 800 | 500 | 1 | 0,5% | 0,7% | 5 897 | 0 | 4 | 0,6% | 0,9% | 7 399 | 3 775 | 2 | 2,1% | 0,3% |
| | p75 | 19 858 | 4 797 | 10 | 1,5% | 29,2% | 5 360 | 8 000 | 11 | 3,5% | 0,8% | 19 369 | 3 500 | 26 | 1,7% | 25,3% | 7 399 | 3 775 | 2 | 2,1% | 0,3% |
| | sd | 11 397 | 2 029 | 7 | 0,8% | 15,7% | 396 | 5 303 | 7 | 2,1% | 0,1% | 10 743 | 2 470 | 30 | 1,4% | 48,9% | - | - | - | - | - |
| | N | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 1 |
| **2015** | mean | 10 613 | 4 025 | 12 | 13,4% | 1,8% | 6 190 | 4 250 | 7 | 1,8% | 0,8% | 7 246 | 863 | 18 | 0,8% | 13,4% | 8 961 | 3 813 | 2 | 2,1% | 0,3% |
| | p25 | 4 002 | 710 | 0 | 0,6% | 1,0% | 5 600 | 500 | 1 | 0,5% | 0,8% | 6 992 | 342 | 4 | 0,5% | 1,2% | 8 961 | 3 813 | 2 | 2,1% | 0,3% |
| | p75 | 20 712 | 10 460 | 29 | 38,6% | 3,3% | 6 779 | 8 000 | 14 | 3,1% | 0,8% | 8 338 | 830 | 29 | 1,2% | 15,4% | 8 961 | 3 813 | 2 | 2,1% | 0,3% |
| | sd | 8 884 | 5 574 | 15 | 21,8% | 1,3% | 834 | 5 303 | 9 | 1,9% | 0,0% | 2 537 | 832 | 16 | 0,4% | 17,6% | - | - | - | - | - |
| | N | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 1 |
| **2016** | mean | 8 687 | 861 | 15 | 0,9% | 11,5% | 3 200 | 8 000 | 0 | 3,1% | 0,5% | 18 197 | 2 102 | 18 | 1,3% | 11,9% | 30 136 | 2 209 | 41 | 1,9% | 0,8% |
| | p25 | 4 343 | 200 | 8 | 0,3% | 4,7% | 3 200 | 8 000 | 0 | 3,1% | 0,5% | 5 057 | 0 | 4 | 0,6% | 1,3% | 11 415 | 625 | 3 | 1,8% | 0,4% |
| | p75 | 14 740 | 1 890 | 22 | 1,9% | 21,7% | 3 200 | 8 000 | 0 | 3,1% | 0,5% | 34 469 | 3 648 | 35 | 1,5% | 22,5% | 48 857 | 3 792 | 78 | 2,1% | 1,2% |
| | sd | 5 405 | 903 | 7 | 0,9% | 9,0% | - | - | - | - | - | 16 042 | 2 855 | 15 | 1,2% | 11,7% | 26 475 | 2 240 | 53 | 0,2% | 0,6% |
| | N | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 7 | 7 | 7 | 7 | 7 | 2 | 2 | 2 | 2 | 2 |
| **2017** | mean | 8 026 | 260 | 76 | 0,3% | 20,2% | 9 762 | 6 182 | 13 | 2,5% | 1,4% | 18 295 | 2 243 | 14 | 1,6% | 14,9% | 1 369 | 35 | 39 | 0,1% | 0,0% |
| | p25 | 4 772 | 80 | 11 | 0,1% | 1,4% | 8 844 | 364 | 1 | 0,4% | 1,0% | 2 251 | 463 | 2 | 0,8% | 0,5% | 1 369 | 35 | 39 | 0,1% | 0,0% |
| | p75 | 11 280 | 440 | 141 | 0,4% | 38,9% | 10 680 | 12 000 | 24 | 4,7% | 1,8% | 26 161 | 2 483 | 22 | 2,3% | 22,6% | 1 369 | 35 | 39 | 0,1% | 0,0% |
| | sd | 4 602 | 255 | 92 | 0,2% | 26,5% | 1 298 | 8 228 | 17 | 3,1% | 0,6% | 18 350 | 3 219 | 15 | 1,1% | 22,8% | - | - | - | - | - |
| | N | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 8 | 8 | 8 | 8 | 8 | 1 | 1 | 1 | 1 | 1 |
| **2018** | mean | 11 183 | 9 213 | 7 | 0,7% | 7,8% | 16 892 | 6 750 | 8 | 2,2% | 0,9% | 9 401 | 3 310 | 14 | 1,1% | 6,2% | 22 707 | 1 404 | 46 | 1,2% | 0,4% |
| | p25 | 6 294 | 499 | 1 | 0,5% | 2,7% | 2 880 | 400 | 0 | 0,4% | 0,6% | 2 088 | 2 | 4 | 0,1% | 0,2% | 4 895 | 455 | 2 | 1,2% | 0,2% |
| | p75 | 16 072 | 17 928 | 13 | 1,0% | 13,0% | 39 894 | 12 000 | 20 | 4,7% | 1,2% | 10 817 | 1 015 | 20 | 1,2% | 9,8% | 40 519 | 2 353 | 89 | 1,3% | 0,6% |
| | sd | 9 362 | 11 254 | 7 | 0,3% | 9,3% | 20 078 | 5 878 | 10 | 2,3% | 0,3% | 14 418 | 8 127 | 13 | 1,4% | 9,4% | 25 190 | 1 342 | 61 | 0,1% | 0,3% |
| | N | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 8 | 8 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | 2 |
| **2019** | mean | 29 309 | 11 155 | 28 | 1,4% | 19,3% | 21 511 | 4 200 | 15 | 0,9% | 0,9% | 5 209 | 3 981 | 7 | 2,4% | 1,9% | 18 183 | 3 014 | 9 | 1,6% | 0,3% |
| | p25 | 8 090 | 718 | 1 | 0,5% | 4,6% | 10 366 | 400 | 4 | 0,4% | 0,9% | 447 | 135 | 1 | 0,2% | 0,1% | 9 629 | 1 800 | 2 | 1,1% | 0,3% |
| | p75 | 50 527 | 21 593 | 54 | 2,4% | 33,9% | 32 656 | 8 000 | 26 | 1,4% | 1,0% | 7 972 | 5 034 | 12 | 3,0% | 3,3% | 26 736 | 4 227 | 15 | 2,1% | 0,4% |
| | sd | 39 162 | 14 795 | 44 | 1,6% | 28,8% | 15 761 | 5 374 | 15 | 0,7% | 0,1% | 5 452 | 7 242 | 7 | 4,1% | 3,0% | 12 096 | 1 716 | 9 | 0,7% | 0,1% |
| | N | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 8 | 8 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | 2 |
| **Total** | mean | 21 965 | 4 205 | 18 | 2,3% | 14,0% | 14 265 | 5 238 | 8 | 2,8% | 1,2% | 11 608 | 2 806 | 16 | 1,9% | 14,8% | 14 054 | 2 323 | 21 | 1,6% | 0,5% |
| | p25 | 6 841 | 804 | 3 | 0,4% | 2,9% | 5 600 | 500 | 1 | 0,5% | 0,8% | 2 904 | 335 | 3 | 0,5% | 0,7% | 4 895 | 625 | 2 | 1,1% | 0,2% |
| | p75 | 25 590 | 4 181 | 21 | 1,6% | 15,4% | 21 157 | 8 000 | 14 | 3,8% | 1,5% | 16 787 | 2 285 | 22 | 2,6% | 19,8% | 12 490 | 3 813 | 39 | 2,1% | 0,6% |
| | sd | 23 532 | 6 290 | 27 | 6,1% | 24,2% | 10 886 | 4 225 | 9 | 2,4% | 0,7% | 12 334 | 5 140 | 22 | 2,7% | 24,0% | 14 594 | 1 635 | 29 | 0,6% | 0,4% |
| | N | 44 | 44 | 44 | 44 | 44 | 17 | 17 | 17 | 17 | 17 | 61 | 61 | 61 | 61 | 61 | 17 | 17 | 17 | 17 | 17 |

## *Appendix 4 continued:*

| | | Consumer Staples | | | | | IT | | | | | All sectors | | | | | | Financials | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | Stats | FV granted | Number granted | Avg. FV | Dilution | FV/ salary | FV granted | Number granted | Avg. FV | Dilution | FV/ salary | FV granted | Number granted | Avg. FV | Dilution | FV/ salary | Time | FV granted | Number granted | Avg. FV | Dilution | FV/ salary |
| **2009** | mean | 37 772 | 3 308 | 10 | 1,3% | 4,6% | 6 985 | 691 | 19 | 0,6% | 1,5% | 20 435 | 2 964 | 13 | 2,5% | 7,9% | **2015** | 14 518 | 10 850 | 2 | 3,8% | 26,2% |
| | p25 | 8 066 | 1 300 | 6 | 0,6% | 0,7% | 1 200 | 150 | 3 | 0,2% | 0,1% | 5 089 | 663 | 3 | 0,6% | 0,6% | | 13 664 | 3 399 | 1 | 2,5% | 6,9% |
| | p75 | 81 250 | 6 525 | 12 | 2,1% | 9,0% | 13 139 | 1 566 | 44 | 1,3% | 4,2% | 25 971 | 3 053 | 13 | 2,1% | 9,0% | | 15 372 | 18 300 | 4 | 5,0% | 45,6% |
| | sd | 38 487 | 2 814 | 3 | 0,7% | 4,2% | 5 978 | 765 | 22 | 0,6% | 2,4% | 23 317 | 4 516 | 16 | 3,9% | 11,3% | | 1 208 | 10 537 | 2 | 1,8% | 27,4% |
| | N | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 18 | 18 | 18 | 18 | 18 | | 2 | 2 | 2 | 2 | 2 |
| **2010** | mean | 31 579 | 2 700 | 12 | 0,7% | 3,4% | 33 439 | 3 666 | 9 | 3,4% | 4,5% | 26 199 | 2 740 | 14 | 2,0% | 6,1% | **2016** | 6 340 | 901 | 6 | 0,5% | 13,4% |
| | p25 | 666 | 100 | 7 | 0,1% | 0,3% | 31 795 | 3 047 | 7 | 3,2% | 1,3% | 8 156 | 1 497 | 4 | 0,7% | 0,9% | | 984 | 600 | 2 | 0,2% | 0,4% |
| | p75 | 64 786 | 6 495 | 19 | 1,5% | 9,4% | 35 082 | 4 285 | 12 | 3,6% | 7,6% | 33 439 | 3 494 | 15 | 3,3% | 9,3% | | 11 696 | 1 202 | 10 | 0,8% | 26,5% |
| | sd | 32 121 | 3 361 | 7 | 0,7% | 5,1% | 2 324 | 875 | 3 | 0,3% | 4,5% | 26 186 | 1 994 | 15 | 1,8% | 6,5% | | 7 575 | 426 | 6 | 0,5% | 18,5% |
| | N | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 16 | 16 | 16 | 16 | 16 | | 2 | 2 | 2 | 2 | 2 |
| **2011** | mean | 29 090 | 3 005 | 17 | 0,4% | 1,0% | 22 049 | 2 018 | 12 | 1,8% | 4,0% | 21 041 | 2 480 | 16 | 1,7% | 5,9% | **2017** | 6 368 | 949 | 8 | 0,4% | 7,4% |
| | p25 | 5 554 | 220 | 9 | 0,2% | 0,5% | 13 846 | 945 | 10 | 1,0% | 0,4% | 6 554 | 744 | 3 | 0,6% | 0,5% | | 3 060 | 772 | 3 | 0,3% | 0,9% |
| | p75 | 52 625 | 5 789 | 25 | 0,6% | 1,4% | 30 251 | 3 090 | 15 | 2,6% | 7,7% | 26 404 | 3 513 | 23 | 2,1% | 9,8% | | 9 675 | 1 125 | 13 | 0,5% | 14,0% |
| | sd | 33 284 | 3 938 | 11 | 0,2% | 0,7% | 11 600 | 1 517 | 3 | 1,2% | 5,1% | 20 723 | 2 425 | 17 | 2,0% | 7,3% | | 4 678 | 249 | 7 | 0,1% | 9,3% |
| | N | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 16 | 16 | 16 | 16 | 16 | | 2 | 2 | 2 | 2 | 2 |
| **2012** | mean | 1 564 | 655 | 4 | 0,6% | 0,5% | 14 551 | 1 064 | 14 | 0,9% | 2,9% | 11 767 | 2 282 | 10 | 1,2% | 8,2% | **2018** | 4 642 | 891 | 9 | 0,3% | 3,2% |
| | p25 | 598 | 110 | 2 | 0,1% | 0,1% | 3 231 | 235 | 14 | 0,2% | 0,1% | 2 904 | 358 | 2 | 0,2% | 0,5% | | 2 822 | 433 | 2 | 0,3% | 0,5% |
| | p75 | 2 530 | 1 200 | 5 | 1,1% | 0,9% | 25 870 | 1 894 | 14 | 1,6% | 5,8% | 15 788 | 4 000 | 14 | 2,1% | 6,4% | | 6 461 | 1 350 | 15 | 0,3% | 5,9% |
| | sd | 1 366 | 771 | 2 | 0,7% | 0,5% | 16 008 | 1 173 | 0 | 1,0% | 4,0% | 13 838 | 2 010 | 12 | 1,0% | 17,4% | | 2 573 | 649 | 9 | 0,1% | 3,8% |
| | N | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 14 | 14 | 14 | 14 | 14 | | 2 | 2 | 2 | 2 | 2 |
| **2013** | mean | 4 904 | 600 | 8 | 0,5% | 1,6% | 20 244 | 2 670 | 9 | 2,0% | 3,7% | 17 863 | 3 879 | 21 | 2,8% | 24,5% | **2019** | 5 851 | 1 840 | 6 | 0,5% | 2,7% |
| | p25 | 4 904 | 600 | 8 | 0,5% | 1,6% | 11 881 | 1 335 | 3 | 1,0% | 0,8% | 7 828 | 588 | 3 | 0,8% | 1,1% | | 5 619 | 631 | 2 | 0,3% | 0,9% |
| | p75 | 4 904 | 600 | 8 | 0,5% | 1,6% | 31 871 | 3 960 | 13 | 2,6% | 7,0% | 24 889 | 4 066 | 19 | 3,1% | 31,3% | | 6 083 | 3 050 | 10 | 0,7% | 4,5% |
| | sd | - | - | - | - | - | 10 387 | 1 313 | 5 | 0,9% | 3,1% | 11 781 | 4 994 | 33 | 3,6% | 43,0% | | 328 | 1 711 | 6 | 0,3% | 2,6% |
| | N | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 16 | 16 | 16 | 16 | 16 | | 2 | 2 | 2 | 2 | 2 |
| **2014** | mean | 19 134 | 900 | 16 | 0,3% | 0,9% | 27 336 | 2 746 | 16 | 1,9% | 6,5% | 14 946 | 2 757 | 13 | 1,4% | 15,1% | **Total** | 7 544 | 3 086 | 6 | 1,1% | 10,6% |
| | p25 | 2 637 | 300 | 9 | 0,3% | 0,8% | 19 744 | 900 | 6 | 0,6% | 0,5% | 5 360 | 500 | 2 | 0,5% | 0,8% | | 3 060 | 631 | 2 | 0,3% | 0,9% |
| | p75 | 35 631 | 1 500 | 24 | 0,4% | 1,1% | 35 939 | 5 844 | 29 | 3,6% | 14,8% | 26 325 | 3 775 | 15 | 1,9% | 25,0% | | 11 696 | 3 050 | 10 | 0,8% | 14,0% |
| | sd | 23 330 | 849 | 11 | 0,1% | 0,2% | 8 145 | 2 699 | 12 | 1,5% | 7,4% | 12 046 | 2 475 | 18 | 1,2% | 29,0% | | 4 864 | 5 442 | 5 | 1,5% | 14,7% |
| | N | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 17 | 17 | 17 | 17 | 17 | | 10 | 10 | 10 | 10 | 10 |
| **2015** | mean | 27 195 | 1 538 | 18 | 0,9% | 1,9% | 56 761 | 3 778 | 15 | 3,6% | 1,2% | 14 350 | 3 579 | 12 | 3,9% | 8,2% | | **Utilities** | | | | |
| | p25 | 10 545 | 1 475 | 7 | 0,3% | 1,2% | 56 761 | 3 778 | 15 | 3,6% | 1,2% | 6 886 | 680 | 3 | 0,6% | 0,9% | **2018** | 5 377 | 870 | 6 | 0,8% | 2,5% |
| | p75 | 43 845 | 1 600 | 30 | 1,5% | 2,6% | 56 761 | 3 778 | 15 | 3,6% | 1,2% | 14 518 | 3 796 | 22 | 2,8% | 7,0% | | 5 377 | 870 | 6 | 0,8% | 2,5% |
| | sd | 23 547 | 88 | 16 | 0,8% | 1,0% | - | - | - | - | - | 14 889 | 4 876 | 13 | 9,3% | 14,6% | | 5 377 | 870 | 6 | 0,8% | 2,5% |
| | N | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 16 | 16 | 16 | 16 | 16 | | - | - | - | - | - |
| **2016** | mean | 22 355 | 617 | 40 | 0,2% | 20,7% | 11 218 | 940 | 13 | 0,6% | 2,2% | 15 954 | 1 762 | 20 | 1,1% | 10,7% | | 1 | 1 | 1 | 1 | 1 |
| | p25 | 3 227 | 0 | 17 | 0,1% | 1,0% | 4 505 | 0 | 11 | 0,3% | 0,1% | 4 424 | 300 | 6 | 0,3% | 0,8% | **2019** | 880 | 120 | 7 | 0,1% | 0,4% |
| | p75 | 58 831 | 1 500 | 65 | 0,3% | 59,7% | 17 930 | 1 580 | 15 | 1,0% | 4,3% | 23 236 | 1 735 | 33 | 1,6% | 17,5% | | 880 | 120 | 7 | 0,1% | 0,4% |
| | sd | 31 602 | 775 | 24 | 0,1% | 33,7% | 9 493 | 905 | 3 | 0,5% | 3,0% | 17 106 | 2 374 | 21 | 1,0% | 15,2% | | 880 | 120 | 7 | 0,1% | 0,4% |
| | N | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 20 | 20 | 20 | 20 | 20 | | - | - | - | - | - |
| **2017** | mean | 22 901 | 1 016 | 41 | 1,0% | 4,8% | 51 551 | 3 205 | 21 | 2,0% | 4,1% | 21 531 | 2 111 | 26 | 1,3% | 9,0% | | 1 | 1 | 1 | 1 | 1 |
| | p25 | 8 382 | 401 | 19 | 0,3% | 2,0% | 17 454 | 1 087 | 11 | 0,6% | 0,7% | 4 250 | 401 | 7 | 0,4% | 0,9% | **Total** | 3 129 | 495 | 7 | 0,5% | 1,4% |
| | p75 | 33 463 | 1 460 | 41 | 1,6% | 6,8% | 85 647 | 5 322 | 31 | 3,5% | 7,5% | 26 161 | 1 720 | 34 | 1,7% | 10,3% | | 880 | 120 | 6 | 0,1% | 0,4% |
| | sd | 23 727 | 766 | 41 | 0,9% | 3,1% | 47 246 | 3 498 | 13 | 2,6% | 5,5% | 26 830 | 3 212 | 34 | 1,5% | 15,4% | | 5 377 | 870 | 7 | 0,8% | 2,5% |
| | N | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 24 | 24 | 24 | 24 | 24 | | 3 180 | 530 | 1 | 0,5% | 1,5% |
| **2018** | mean | 25 636 | 892 | 35 | 0,9% | 8,4% | 158 854 | 3 278 | 36 | 2,3% | 3,8% | 29 992 | 3 794 | 19 | 1,2% | 5,1% | | 2 | 2 | 2 | 2 | 2 |
| | p25 | 5 639 | 267 | 20 | 0,2% | 1,6% | 17 924 | 1 477 | 12 | 0,7% | 1,4% | 3 183 | 400 | 2 | 0,3% | 0,6% | | **Health** | | | | |
| | p75 | 45 633 | 1 517 | 49 | 1,6% | 15,2% | 381 542 | 5 801 | 66 | 5,3% | 7,0% | 25 209 | 2 557 | 30 | 1,3% | 7,0% | | *No grants* | | | | |
| | sd | 29 720 | 734 | 21 | 1,0% | 7,9% | 195 110 | 2 250 | 27 | 2,6% | 2,9% | 73 160 | 6 628 | 22 | 1,4% | 7,1% | | | | | | |
| | N | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 27 | 27 | 27 | 27 | 27 | | | | | | |
| **2019** | mean | 25 324 | 1 028 | 33 | 1,1% | 5,5% | 86 386 | 2 132 | 38 | 1,6% | 2,7% | 20 998 | 4 123 | 18 | 1,6% | 5,1% | | | | | | |
| | p25 | 5 968 | 224 | 19 | 0,2% | 1,7% | 18 830 | 1 949 | 10 | 1,1% | 2,7% | 4 333 | 400 | 2 | 0,3% | 0,4% | | | | | | |
| | p75 | 44 680 | 1 833 | 47 | 2,0% | 9,4% | 153 942 | 2 314 | 67 | 2,1% | 2,7% | 16 196 | 3 050 | 20 | 2,1% | 4,5% | | | | | | |
| | sd | 32 402 | 982 | 20 | 1,4% | 4,5% | 95 539 | 258 | 40 | 0,7% | 0,0% | 34 915 | 7 457 | 23 | 2,5% | 12,3% | | | | | | |
| | N | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 25 | 25 | 25 | 25 | 25 | | **Telecommunications** | | | | |
| **Total** | mean | 24 269 | 1 466 | 25 | 0,8% | 5,7% | 45 870 | 2 385 | 19 | 1,8% | 3,6% | 20 232 | 2 997 | 17 | 1,8% | 9,2% | | *No grants* | | | | |
| | p25 | 3 655 | 300 | 7 | 0,3% | 1,0% | 13 653 | 945 | 10 | 0,6% | 0,5% | 4 895 | 440 | 3 | 0,5% | 0,8% | | | | | | |
| | p75 | 43 845 | 1 534 | 39 | 1,2% | 8,3% | 35 939 | 3 090 | 23 | 2,6% | 5,8% | 24 462 | 3 325 | 23 | 2,1% | 8,5% | | | | | | |
| | sd | 25 525 | 1 740 | 23 | 0,8% | 10,9% | 75 457 | 1 951 | 17 | 1,5% | 3,8% | 33 428 | 4 561 | 22 | 3,3% | 18,7% | | | | | | |
| | N | 31 | 31 | 31 | 31 | 31 | 27 | 27 | 27 | 27 | 27 | 209 | 209 | 209 | 209 | 209 | | | | | | |

**Appendix 5: Full regression models with all performance proxies and fair value/salary as independent variable lagged 5 years**

This table reports the independent and control variables from the regression with independent variables lagged five years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. Total fair value granted divided by salary expenses is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| Fair value/salary$_{it-5}$ | -3.370** | -2.359*** | -6.770*** | -4.680*** | -3.843 | -11.44 | -1.242 | 0.573 |
| | (0.027) | (0.008) | (0.004) | (0.002) | (0.773) | (0.445) | (0.857) | (0.862) |
| Fair value/salary$^2_{it-5}$ | 18.10** | 8.644*** | 38.48*** | 16.91*** | -60.02 | 32.70 | 45627 | -1.327 |
| | (0.026) | (0.007) | (0.002) | (0.001) | (0.499) | (0.719) | (0.801) | (0.919) |
| (ITM=1) x Fair value/salary$_{it-5}$ | 1.424*** | 1.533*** | 2.971*** | 3.337*** | 13058 | 3.275 | 3.636 | 2.569 |
| | (0.004) | (0.000) | (0.000) | (0.000) | (0.124) | (0.495) | (0.337) | (0.462) |
| (ATM=1) x Fair value/salary$_{it-5}$ | 1.753 | 1.905 | 6.828* | 7.374* | 111.3** | 97.23** | 32.35 | 31.59 |
| | (0.394) | (0.346) | (0.099) | (0.073) | (0.030) | (0.046) | (0.460) | (0.470) |
| Broadbased$_{it-5}$ | -0.00494 | -0.0147 | -0.0291 | -0.0253 | 0.418 | 0.669 | 0.142 | 0.191 |
| | (0.845) | (0.342) | (0.566) | (0.471) | (0.154) | (0.338) | (0.278) | (0.110) |
| Industry return$_{it}$ | -0.0613 | -0.0806*** | -0.185* | -0.185*** | 3.169 | 1.686 | -0.483 | -0.130 |
| | (0.103) | (0.002) | (0.065) | (0.002) | (0.378) | (0.398) | (0.402) | (0.714) |
| Leverage$_{it}$ | -0.00549* | -0.00182 | -0.0307*** | -0.00574 | -0.0245 | 0.00863 | -0.211*** | -0.191*** |
| | (0.092) | (0.182) | (0.000) | (0.438) | (0.309) | (0.591) | (0.000) | (0.000) |
| LogAssets$_{it}$ | 0.0869 | -0.0463**- | 0.00510 | -0.0584 | -1.802 | -1.300* | 1.429*** | 1.625*** |
| | (0.155) | (0.014) | (0.973) | (0.280) | (0.422) | (0.083) | (0.004) | (0.000) |
| LogEmployees$_{it}$ | -0.0293 | -0.0101 | -0.0704 | -0.0259* | -0.766 | 0.0109 | -0.222 | -0.0767 |
| | (0.258) | (0.112) | (0.217) | (0.078) | (0.338) | (0.895) | (0.228) | (0.187) |
| LogRevenue$_{it}$ | 0.0892** | 0.0827*** | 0.322*** | 0.157** | 1.336 | 0.269 | 0.789*** | 0.686*** |
| | (0.014) | (0.007) | (0.000) | (0.021) | (0.376) | (0.303) | (0.008) | (0.004) |
| Volatility$_{it}$ | 0.0467 | 0.00239 | 0.118* | 0.0245 | -0.997 | -0.917 | -0.0654 | -0.0966 |
| | (0.143) | (0.928) | (0.054) | (0.682) | (0.331) | (0.175) | (0.766) | (0.688) |
| Business risk$_{it}$ | 0.0352** | 0.0146 | 0.0378 | -0.0321 | -0.659 | -0.958 | 0.0663 | -0.0776 |
| | (0.028) | (0.270) | (0.409) | (0.545) | (0.394) | (0.317) | (0.761) | (0.719) |
| Intercept | -0.949** | -0.0803 | -1.356 | -0.255 | 11.16 | 9.077* | 2.435 | 0.504 |
| | (0.047) | (0.537) | (0.109) | (0.313) | (0.351) | (0.068) | (0.412) | (0.663) |
| N | 236 | 236 | 236 | 236 | 223 | 223 | 236 | 236 |
| R-sq | 0.304 | 0.1664 | 0.323 | 0.0891 | 0.023 | 0.0716 | 0.533 | 0.8027 |

**Appendix 6: Full regression models: fair value/salary lagged 4 years**

This table reports the independent and control variables from the regression with independent variables lagged four years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. Total fair value granted divided by salary expenses is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| Fair value/salary$_{it-4}$ | 1.606*** | 0.659 | 3.019*** | 1.090 | 5.431 | 4.519 | 6.737** | 4.829** |
| | (0.000) | (0.224) | (0.001) | (0.260) | (0.578) | (0.756) | (0.031) | (0.022) |
| Fair value/salary$^2_{it-4}$ | -0.859*** | -0.376 | -1.619*** | -0.615 | 30.61 | 78.13 | -3.708** | -2.776** |
| | (0.000) | (0.260) | (0.001) | (0.298) | (0.702) | (0.360) | (0.034) | (0.025) |
| (ITM=1) x Fair value/salary$_{it-4}$ | -1.005*** | -0.273 | -1.651** | -0.139 | 1.357 | -7.658 | 2.849 | 3.398* |
| | (0.000) | (0.540) | (0.025) | (0.875) | (0.790) | (0.189) | (0.221) | (0.093) |
| (ATM=1) x Fair value/salary$_{it-4}$ | 2.651*** | 1.584 | 8.805*** | 5.670 | 32.13* | 23.66* | 22.60** | 25.70*** |
| | (0.006) | (0.292) | (0.006) | (0.271) | (0.085) | (0.060) | (0.047) | (0.004) |
| Broadbased$_{it-4}$ | 0.0360 | 0.00800 | 0.109 | 0.0451 | 0.298 | 0.488 | 0.152 | 0.0293 |
| | (0.573) | (0.782) | (0.425) | (0.518) | (0.259) | (0.382) | (0.410) | (0.838) |
| Industry return$_{it}$ | -0.0674 | -0.0214 | -0.0481 | 0.0812 | 1.899 | 1.217 | -2.698*** | -2.192** |
| | (0.401) | (0.726) | (0.810) | (0.678) | (0.624) | (0.684) | (0.009) | (0.017) |
| Leverage$_{it}$ | -0.00296*** | -0.00331** | -0.0219*** | -0.0175*** | 0.0278 | 0.0297** | -0.0263 | -0.0333 |
| | (0.000) | (0.044) | (0.000) | (0.006) | (0.167) | (0.017) | (0.620) | (0.492) |
| LogAssets$_{it}$ | 0.0416 | -0.0297*- | 0.00354 | 0.00559 | -1.916 | -1.252** | 0.892 | 0.810*** |
| | (0.536) | (0.091) | (0.983) | (0.914) | (0.367) | (0.038) | (0.172) | (0.001) |
| LogEmployees$_{it}$ | -0.0225 | -0.00827 | -0.0714 | -0.0287 | -0.246 | 0.0281 | 0.0276 | 0.0847 |
| | (0.299) | (0.155) | (0.235) | (0.136) | (0.428) | (0.649) | (0.896) | (0.210) |
| LogRevenue$_{it}$ | 0.0720* | 0.0632* | 0.272** | 0.115 | 0.861 | 0.386* | 0.559 | 0.911*** |
| | (0.075) | (0.063) | (0.011) | (0.185) | (0.293) | (0.057) | (0.194) | (0.001) |
| Volatility$_{it}$ | 0.0282 | -0.0119 | 0.0707 | -0.0333 | -0.533 | -0.724 | -0.116 | -0.146 |
| | (0.177) | (0.685) | (0.189) | (0.669) | (0.419) | (0.239) | (0.766) | (0.679) |
| Business risk$_{it}$ | 0.0826** | 0.00636 | 0.150*- | 0.00512 | -0.754 | -0.895 | 0.0898 | -0.0708 |
| | (0.034) | (0.836) | (0.091) | (0.943) | (0.472) | (0.282) | (0.803) | (0.796) |
| Intercept | -0.611 | -0.105 | -1.205 | -0.471 | 45597 | 7.758** | 5.591 | 3.529** |
| | (0.114) | (0.469) | (0.182) | (0.201) | (0.332) | (0.038) | (0.106) | (0.015) |
| N | 294 | 294 | 294 | 294 | 277 | 277 | 293 | 293 |
| R-sq | 0.234 | 0.1726 | 0.283 | 0.1248 | 0.018 | 0.0843 | 0.332 | 0.7262 |

**Appendix 7: Full regression models: fair value/salary lagged 3 years**

This table reports the independent and control variables from the regression with independent variables lagged three years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. Total fair value granted divided by salary expenses is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| Fair value/salary$_{it-3}$ | 0.0560 | 0.227 | 1.353 | 1.956 | 38.62** | 34.70* | 0.398 | 0.973 |
| | (0.856) | (0.539) | (0.541) | (0.413) | (0.033) | (0.086) | (0.836) | (0.620) |
| Fair value/salary$^2_{it-3}$ | -0.0482 | -0.158 | -0.847 | -1.351 | -279.5** | -210.9* | -0.163 | -0.533 |
| | (0.800) | (0.509) | (0.534) | (0.398) | (0.015) | (0.061) | (0.891) | (0.664) |
| (ITM=1) x Fair value/salary$_{it-3}$ | -0.503 | -0.708 | -8.388 | -3.471 | 6.043 | -1.398 | 5.036*** | 5.067** |
| | (0.526) | (0.474) | (0.283) | (0.440) | (0.212) | (0.845) | (0.005) | (0.013) |
| (ATM=1) x Fair value/salary$_{it-3}$ | -2.160 | -0.695 | -8.055 | -5.107 | -8.031 | 1.765 | 3.678 | 13.95* |
| | (0.243) | (0.429) | (0.340) | (0.156) | (0.749) | (0.918) | (0.716) | (0.051) |
| Broadbased$_{it-3}$ | 0.0605 | 0.00327 | 0.166 | -0.0208 | 0.533 | 0.465 | 0.316 | 0.172 |
| | (0.138) | (0.846) | (0.195) | (0.638) | (0.234) | (0.369) | (0.262) | (0.402) |
| Industry return$_{it}$ | 0.00337 | -0.0436 | 0.0648 | -0.131 | 2.622 | 1.495 | -0.494 | -0.714 |
| | (0.968) | (0.487) | (0.841) | (0.491) | (0.421) | (0.539) | (0.386) | (0.194) |
| Leverage$_{it}$ | -0.00369* | -0.000761 | -0.0303* | 0.00309 | -0.0252* | 0.0103 | -0.156*** | -0.145*** |
| | (0.051) | (0.467) | (0.074) | (0.480) | (0.064) | (0.409) | (0.000) | (0.000) |
| LogAssets$_{it}$ | 0.0165 | -0.0460*** | -0.536 | -0.113*** | -1.828 | -1.067** | 1.223** | 1.192*** |
| | (0.778) | (0.000) | (0.383) | (0.009) | (0.332) | (0.023) | (0.026) | (0.000) |
| LogEmployees$_{it}$ | -0.0258 | -0.00733 | 0.0942 | -0.0147 | -0.248 | 0.00435 | -0.108 | -0.0523 |
| | (0.295) | (0.120) | (0.581) | (0.207) | (0.203) | (0.944) | (0.546) | (0.542) |
| LogRevenue$_{it}$ | 0.131** | 0.0613*** | 0.949* | 0.117** | 0.861* | 0.303* | 1.650*** | 1.175*** |
| | (0.013) | (0.001) | (0.099) | (0.025) | (0.056) | (0.088) | (0.000) | (0.000) |
| Volatility$_{it}$ | 0.0117 | -0.0313 | -0.0802 | -0.0297 | -0.492 | -0.700 | -0.426* | -0.461* |
| | (0.610) | (0.220) | (0.639) | (0.778) | (0.242) | (0.107) | (0.055) | (0.051) |
| Business risk$_{it}$ | 0.0573** | -0.0409* | 0.135 | -0.131** | -0.695 | -0.952 | 0.344* | 0.171 |
| | (0.014) | (0.082) | (0.121) | (0.019) | (0.581) | (0.271) | (0.090) | (0.377) |
| Intercept | -0.796** | 0.0429 | -2.963** | 0.342** | 18172 | 7.118** | -2.840 | 0.241 |
| | (0.024) | (0.643) | (0.015) | (0.037) | (0.431) | (0.039) | (0.252) | (0.831) |
| N | 355 | 355 | 355 | 355 | 335 | 335 | 354 | 354 |
| R-sq | 0.137 | 0.1978 | 0.167 | 0.0392 | 0.022 | 0.0866 | 0.621 | 0.8030 |

**Appendix 8: Full regression models: dilution lagged 5 years**

This table reports the independent and control variables from the regression with independent variables lagged five years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. The number of options granted divided by total outstanding shares is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| $Dilution_{it-5}$ | -6.389** | -4.893** | -11.27** | -10.17*** | -25.80 | -31.47 | 18.34 | 18.85 |
| | (0.046) | (0.021) | (0.026) | (0.002) | (0.384) | (0.463) | (0.391) | (0.262) |
| $Dilution^2_{it-5}$ | 57.62 | 37.61** | 84.60 | 79.73*** | -123.2 | 108.2 | -116.8 | -159.6 |
| | (0.377) | (0.044) | (0.493) | (0.007) | (0.800) | (0.703) | (0.768) | (0.223) |
| $(ITM=1) \times Dilution_{it-5}$ | 3.601*** | 2.898** | 6.978** | 6.087*** | 21.14 | 7.949 | -19.19 | -18.44 |
| | (0.009) | (0.027) | (0.014) | (0.008) | (0.501) | (0.715) | (0.378) | (0.165) |
| $(ATM=1) \times Dilution_{it-5}$ | 3.700*** | 3.209** | 9.211*** | 9.305** | 50.47 | 33.96 | 44426 | 15.97 |
| | (0.004) | (0.027) | (0.004) | (0.011) | (0.395) | (0.529) | (0.457) | (0.502) |
| $Broadbased_{it-5}$ | 0.00237 | -0.0149 | -0.0165 | -0.0280 | 0.329 | 0.737 | 0.123 | 0.163 |
| | (0.923) | (0.367) | (0.737) | (0.462) | (0.217) | (0.327) | (0.389) | (0.205) |
| Industry $return_{it}$ | 0.00295 | -0.0256 | -0.0594 | -0.0750 | 3.013 | 1.997 | -0.515 | -0.318 |
| | (0.958) | (0.590) | (0.574) | (0.444) | (0.386) | (0.433) | (0.375) | (0.414) |
| $Leverage_{it}$ | -0.00592 | -0.00212 | -0.0316*** | -0.00588 | -0.0230 | 0.00936 | -0.213*** | -0.190*** |
| | (0.101) | (0.157) | (0.000) | (0.417) | (0.278) | (0.582) | (0.000) | (0.000) |
| $LogAssets_{it}$ | 0.121* | -0.0435** | 0.0672 | -0.0549 | -1.400 | -1.374* | 1.480*** | 1.617*** |
| | (0.085) | (0.016) | (0.657) | (0.290) | (0.534) | (0.085) | (0.004) | (0.000) |
| $LogEmployees_{it}$ | -0.0468 | -0.00959 | -0.107* | -0.0248* | -0.778 | 0.0397 | -0.212 | -0.0819 |
| | (0.120) | (0.125) | (0.084) | (0.091) | (0.300) | (0.653) | (0.257) | (0.160) |
| $LogRevenue_{it}$ | 0.0931** | 0.0806*** | 0.330*** | 0.155** | 1.208 | 0.200 | 0.841*** | 0.726*** |
| | (0.012) | (0.009) | (0.000) | (0.023) | (0.400) | (0.441) | (0.004) | (0.001) |
| $Volatility_{it}$ | 0.0318 | -0.00916 | 0.0896 | 0.00393 | -0.840 | -1.000 | -0.0542 | -0.0806 |
| | (0.319) | (0.756) | (0.152) | (0.952) | (0.396) | (0.202) | (0.816) | (0.748) |
| Business $risk_{it}$ | 0.0431** | 0.0183 | 0.0539 | -0.0247 | -0.577 | -0.784 | 0.0981 | -0.0484 |
| | (0.011) | (0.215) | (0.248) | (0.663) | (0.449) | (0.379) | (0.669) | (0.830) |
| Intercept | -1.102** | -0.0906 | -1.673* | -0.279 | 9.267 | 9.823* | 1.655 | 0.353 |
| | (0.035) | (0.531) | (0.069) | (0.322) | (0.442) | (0.071) | (0.612) | (0.781) |
| N | 236 | 236 | 236 | 236 | 223 | 223 | 236 | 236 |
| R-sq | 0.249 | 0.1705 | 0.271 | 0.0848 | 0.017 | 0.0790 | 0.537 | 0.8054 |

**Appendix 9: Full regression models: dilution lagged 4 years**

This table reports the independent and control variables from the regression with independent variables lagged four years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. The number of options granted divided by total outstanding shares is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| $Dilution_{it-4}$ | 4.482*** | 3.545** | 8.173** | 5.024 | 34.16** | 27.64 | 37.21** | 35.71*** |
| | (0.008) | (0.036) | (0.045) | (0.151) | (0.047) | (0.524) | (0.010) | (0.002) |
| $Dilution^2_{it-4}$ | -38.32*** | -31.70** | -72.23** | -46.35 | -319.0** | -315.0 | -358.7*** | -357.8*** |
| | (0.005) | (0.020) | (0.032) | (0.109) | (0.023) | (0.354) | (0.005) | (0.000) |
| $(ITM=1) \times Dilution_{it-4}$ | -2.409** | -2.145** | -4.235 | -2.375 | -19.64* | -23.47 | -21.83** | -22.35*** |
| | (0.036) | (0.050) | (0.144) | (0.302) | (0.081) | (0.352) | (0.022) | (0.005) |
| $(ATM=1) \times Dilution_{it-4}$ | -1.768 | -1.755 | -3.016 | -1.458 | -19.76 | -19.61 | -1.757 | -2.385 |
| | (0.219) | (0.166) | (0.367) | (0.628) | (0.134) | (0.394) | (0.828) | (0.716) |
| $Broadbased_{it-4}$ | 0.0306 | 0.00259 | 0.0961 | 0.0330 | 0.259 | 0.458 | 0.118 | -0.0158 |
| | (0.633) | (0.927) | (0.490) | (0.632) | (0.306) | (0.424) | (0.495) | (0.909) |
| Industry $return_{it}$ | -0.101 | -0.0426 | -0.113 | 0.0533 | 1.770 | 1.120 | -2.925*** | -2.550*** |
| | (0.226) | (0.517) | (0.582) | (0.796) | (0.662) | (0.738) | (0.007) | (0.008) |
| $Leverage_{it}$ | -0.00296*** | -0.00345** | -0.0219*** | -0.0176*** | 0.0259 | 0.0297*** | -0.0274 | -0.0346 |
| | (0.001) | (0.049) | (0.000) | (0.007) | (0.160) | (0.010) | (0.597) | (0.460) |
| $LogAssets_{it}$ | 0.0287 | -0.0285 | -0.0266 | 0.00634 | -1.911 | -1.327** | 0.889 | 0.793*** |
| | (0.675) | (0.102) | (0.878) | (0.904) | (0.358) | (0.034) | (0.187) | (0.001) |
| $LogEmployees_{it}$ | -0.0268 | -0.00850 | -0.0801 | -0.0282 | -0.276 | 0.0128 | 0.0517 | 0.0758 |
| | (0.243) | (0.138) | (0.193) | (0.132) | (0.320) | (0.846) | (0.808) | (0.263) |
| $LogRevenue_{it}$ | 0.0881** | 0.0603* | 0.306*** | 0.108 | 1.001 | 0.446** | 0.667 | 0.936*** |
| | (0.041) | (0.073) | (0.007) | (0.212) | (0.229) | (0.043) | (0.139) | (0.001) |
| $Volatility_{it}$ | 0.0296 | -0.0174 | 0.0735 | -0.0419 | -0.562 | -0.738 | -0.133 | -0.174 |
| | (0.180) | (0.562) | (0.182) | (0.603) | (0.410) | (0.228) | (0.732) | (0.625) |
| Business $risk_{it}$ | 0.0800** | 0.00478 | 0.148 | -0.00689 | -0.754 | -0.850 | 0.0383 | -0.0779 |
| | (0.046) | (0.878) | (0.105) | (0.923) | (0.468) | (0.283) | (0.918) | (0.775) |
| Intercept | -0.585 | -0.0825 | -1.177 | -0.410 | 20363 | 8.040** | 4.809 | 3.662*** |
| | (0.125) | (0.567) | (0.190) | (0.260) | (0.351) | (0.028) | (0.185) | (0.010) |
| N | 294 | 294 | 294 | 294 | 277 | 277 | 293 | 293 |
| R-sq | 0.173 | 0.1883 | 0.247 | 0.1277 | 0.015 | 0.0798 | 0.325 | 0.7284 |

**Appendix 10: Full regression models: dilution lagged 3 years**

This table reports the independent and control variables from the regression with independent variables lagged three years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. The number of options granted divided by total outstanding shares is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| $Dilution_{it-3}$ | 1.200 | 1.031 | 15.53 | 18598 | 35.35 | 25.78 | 3.070 | 2.813 |
| | (0.486) | (0.609) | (0.400) | (0.401) | (0.106) | (0.492) | (0.722) | (0.774) |
| $Dilution^2_{it-3}$ | -10.98 | -13.34 | -117.0 | -117.3 | -312.7 | -306.8 | -4.271 | -25.64 |
| | (0.429) | (0.412) | (0.408) | (0.343) | (0.125) | (0.311) | (0.954) | (0.762) |
| $(ITM=1) \times Dilution_{it-3}$ | -1.314 | -1.394 | -17.71 | -10.50 | -20.70 | -20.55 | -0.250 | 0.420 |
| | (0.424) | (0.433) | (0.379) | (0.441) | (0.146) | (0.407) | (0.974) | (0.960) |
| $(ATM=1) \times Dilution_{it-3}$ | -1.078 | -1.369 | -12.69 | -12.83 | -22.11 | -12.10 | 2.540 | 5.803 |
| | (0.503) | (0.377) | (0.385) | (0.296) | (0.201) | (0.646) | (0.712) | (0.510) |
| $Broadbased_{it-3}$ | 0.0627 | 0.00736 | 0.182 | -0.0110 | 0.416 | 0.428 | 0.312 | 0.142 |
| | (0.123) | (0.665) | (0.133) | (0.814) | (0.318) | (0.413) | (0.261) | (0.493) |
| Industry $return_{it}$ | 0.000446 | -0.0570 | 0.0178 | -0.231 | 2.101 | 0.844 | -0.475 | -0.747 |
| | (0.996) | (0.364) | (0.954) | (0.393) | (0.512) | (0.734) | (0.460) | (0.224) |
| $Leverage_{it}$ | -0.00367* | -0.000839 | -0.0304* | 0.00161 | -0.0242 | 0.0128 | -0.156*** | -0.144*** |
| | (0.054) | (0.424) | (0.085) | (0.712) | (0.117) | (0.318) | (0.000) | (0.000) |
| $LogAssets_{it}$ | 0.0113 | -0.0463*** | -0.597 | -0.111*** | -1.658 | -1.191** | 1.228** | 1.172*** |
| | (0.845) | (0.000) | (0.308) | (0.007) | (0.368) | (0.017) | (0.036) | (0.000) |
| $LogEmployees_{it}$ | -0.0251 | -0.00726 | 0.102 | -0.0195 | -0.263 | 0.00118 | -0.0981 | -0.0541 |
| | (0.288) | (0.133) | (0.504) | (0.160) | (0.168) | (0.986) | (0.599) | (0.531) |
| $LogRevenue_{it}$ | 0.129** | 0.0617*** | 0.923 | 0.133** | 1.081** | 0.409** | 1.683*** | 1.194*** |
| | (0.014) | (0.001) | (0.104) | (0.025) | (0.021) | (0.023) | (0.000) | (0.000) |
| $Volatility_{it}$ | 0.0121 | -0.0273 | -0.0759 | -0.0396 | -0.315 | -0.519 | -0.438* | -0.452* |
| | (0.569) | (0.266) | (0.586) | (0.579) | (0.415) | (0.205) | (0.072) | (0.080) |
| Business $risk_{it}$ | 0.0514** | -0.0392* | 0.0647 | -0.133** | -0.758 | -0.939 | 0.365* | 0.191 |
| | (0.020) | (0.085) | (0.478) | (0.021) | (0.561) | (0.274) | (0.094) | (0.350) |
| Intercept | -0.756** | 0.0385 | -2.419** | 0.270 | 8.047 | 7.424** | -3.155 | 0.294 |
| | (0.029) | (0.690) | (0.018) | (0.146) | (0.526) | (0.032) | (0.257) | (0.804) |
| N | 355 | 355 | 355 | 355 | 335 | 335 | 354 | 354 |
| R-sq | 0.127 | 0.1858 | 0.119 | 0.0397 | 0.012 | 0.0827 | 0.608 | 0.7984 |

**Appendix 11: Full regression models: fair value/salary lagged 2 years**

This table reports the independent and control variables from the regression with independent variables lagged two years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. Total fair value granted divided by salary expenses is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| Fair value/salary$_{it-2}$ | 0.0184 | -0.0309 | 0.0738 | -0.101 | 2.148 | 1.999 | -0.926 | -0.907 |
| | (0.900) | (0.790) | (0.829) | (0.753) | (0.842) | (0.665) | (0.380) | (0.402) |
| Fair value/salary$^2_{it-2}$ | -0.0134 | 0.0103 | -0.0506 | 0.0261 | -41.37 | -13.30 | 0.475 | 0.494 |
| | (0.882) | (0.889) | (0.810) | (0.900) | (0.567) | (0.450) | (0.466) | (0.463) |
| (ITM=1) x Fair value/salary$_{it-2}$ | 0.405 | 0.280 | 0.545 | -0.268 | 15.18*** | 8.210*** | 14.35** | 16.18*** |
| | (0.290) | (0.563) | (0.607) | (0.876) | (0.004) | (0.007) | (0.019) | (0.008) |
| (ATM=1) x Fair value/salary$_{it-2}$ | -0.656 | 0.120 | 0.652 | 0.167 | -1.257 | 15.70** | 7.336 | 16.64*** |
| | (0.798) | (0.863) | (0.905) | (0.894) | (0.907) | (0.019) | (0.192) | (0.000) |
| Broadbased$_{it-2}$ | -0.0264 | -0.00821 | -0.0562 | -0.00170 | 0.263 | 0.284 | 0.0801 | 0.0475 |
| | (0.417) | (0.562) | (0.505) | (0.962) | (0.577) | (0.500) | (0.784) | (0.817) |
| Industry return$_{it}$ | -0.0120 | 0.00571 | 0.0692 | 0.134 | 1.327 | 0.947 | -0.334 | -0.854 |
| | (0.810) | (0.908) | (0.616) | (0.475) | (0.422) | (0.601) | (0.580) | (0.143) |
| Leverage$_{it}$ | -0.00549*** | -0.00388** | -0.0254*** | -0.0144** | -0.00560 | 0.0135 | -0.0569 | -0.0657** |
| | (0.000) | (0.011) | (0.000) | (0.019) | (0.628) | (0.138) | (0.117) | (0.046) |
| LogAssets$_{it}$ | -0.0259 | -0.0305** | -0.193 | -0.00542 | -1.942 | -1.081*** | 2.096*** | 1.005*** |
| | (0.619) | (0.030) | (0.133) | (0.883) | (0.422) | (0.005) | (0.000) | (0.000) |
| LogEmployees$_{it}$ | -0.0476** | -0.00878* | -0.0896* | -0.0218 | -0.120 | 0.0160 | -0.143 | -0.00736 |
| | (0.037) | (0.099) | (0.070) | (0.141) | (0.666) | (0.817) | (0.384) | (0.922) |
| LogRevenue$_{it}$ | 0.146*** | 0.0571*** | 0.444*** | 0.0777* | 0.863** | 0.380* | 0.967** | 1.183*** |
| | (0.001) | (0.001) | (0.000) | (0.079) | (0.017) | (0.065) | (0.011) | (0.000) |
| Volatility$_{it}$ | 0.00278 | -0.0570** | 0.00299 | -0.199** | -0.366 | -0.595** | -0.235 | -0.417 |
| | (0.891) | (0.040) | (0.959) | (0.038) | (0.296) | (0.036) | (0.317) | (0.100) |
| Business risk$_{it}$ | 0.0289 | -0.0210 | 0.0521 | -0.0397 | -0.720 | -0.827 | -0.0870 | -0.185 |
| | (0.290) | (0.331) | (0.477) | (0.439) | (0.526) | (0.289) | (0.769) | (0.404) |
| Intercept | -0.378 | -0.0163 | -0.712 | -0.0866 | 24746 | 6.762** | -4.491* | 1.132 |
| | (0.143) | (0.868) | (0.319) | (0.726) | (0.491) | (0.024) | (0.067) | (0.277) |
| N | 413 | 413 | 413 | 413 | 393 | 393 | 412 | 412 |
| R-sq | 0.152 | 0.2128 | 0.267 | 0.1639 | 0.016 | 0.0812 | 0.554 | 0.7651 |

**Appendix 12: Full regression models: fair value/salary lagged 1 years**

This table reports the independent and control variables from the regression with independent variables lagged one year on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. Total fair value granted divided by salary expenses is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| Fair value/salary$_{it-1}$ | 0.0600 | 0.0909 | 0.402 | 2.170 | 3.953 | 3.287 | 1.373 | 1.679 |
| | (0.787) | (0.665) | (0.394) | (0.328) | (0.182) | (0.324) | (0.328) | (0.291) |
| Fair value/salary$^2_{it-1}$ | -0.0514 | -0.0765 | -0.284 | -1.610 | -2.256 | -2.346 | -0.973 | -1.226 |
| | (0.716) | (0.578) | (0.341) | (0.315) | (0.170) | (0.281) | (0.277) | (0.235) |
| (ITM=1) x Fair value/salary$_{it-1}$ | 0.459 | 0.0677 | 20059 | 0.528 | 3.555 | -2.092 | 2.347 | 1.103 |
| | (0.411) | (0.645) | (0.246) | (0.786) | (0.304) | (0.320) | (0.142) | (0.259) |
| (ATM=1) x Fair value/salary$_{it-1}$ | -1.642*** | -0.239 | -2.315 | -2.751 | 3.426 | 15.28** | 9.993** | 16.94*** |
| | (0.002) | (0.570) | (0.382) | (0.206) | (0.566) | (0.036) | (0.040) | (0.000) |
| Broadbased$_{it-1}$ | 0.0156 | 0.00592 | 0.0372 | 0.0431 | 0.195 | 0.237 | 0.00254 | 0.0371 |
| | (0.174) | (0.493) | (0.509) | (0.209) | (0.624) | (0.516) | (0.987) | (0.793) |
| Industry return$_{it}$ | -0.0123 | -0.0365 | 0.215 | -0.131 | 1.385 | 0.896 | -0.218 | -0.668 |
| | (0.783) | (0.309) | (0.186) | (0.348) | (0.377) | (0.510) | (0.599) | (0.221) |
| Leverage$_{it}$ | -0.00621*** | -0.00568*** | -0.0536*** | -0.0155 | 0.0198 | 0.0218** | -0.0225 | -0.0349 |
| | (0.000) | (0.001) | (0.000) | (0.146) | (0.223) | (0.020) | (0.502) | (0.328) |
| LogAssets$_{it}$ | -0.0322 | -0.0193 | -0.430** | 0.0187 | -2.056 | -1.085*** | 2.387*** | 1.012*** |
| | (0.395) | (0.113) | (0.048) | (0.745) | (0.345) | (0.001) | (0.000) | (0.000) |
| LogEmployees$_{it}$ | -0.0329** | -0.0101* | -0.0798** | -0.0207* | -0.0682 | 0.0119 | -0.314*** | -0.108 |
| | (0.036) | (0.061) | (0.044) | (0.079) | (0.843) | (0.879) | (0.001) | (0.105) |
| LogRevenue$_{it}$ | 0.114*** | 0.0480*** | 0.508*** | 0.0252 | 0.791* | 0.430* | 1.032*** | 1.401*** |
| | (0.001) | (0.001) | (0.001) | (0.598) | (0.096) | (0.074) | (0.001) | (0.000) |
| Volatility$_{it}$ | 0.00427 | -0.0163 | 0.0428 | -0.00458 | -0.636 | -0.535* | -0.295 | -0.396* |
| | (0.802) | (0.363) | (0.635) | (0.968) | (0.241) | (0.088) | (0.158) | (0.088) |
| Business risk$_{it}$ | 0.0320 | 0.00284 | 0.0245 | -0.0106 | -0.695 | -0.659 | -0.0412 | -0.238 |
| | (0.159) | (0.861) | (0.819) | (0.826) | (0.497) | (0.290) | (0.863) | (0.288) |
| Intercept | -0.236 | -0.0375 | 0.500 | 0.0436 | 22221 | 6.409** | -5.857*** | 0.247 |
| | (0.240) | (0.661) | (0.505) | (0.847) | (0.448) | (0.033) | (0.005) | (0.821) |
| N | 475 | 475 | 475 | 475 | 454 | 454 | 474 | 474 |
| R-sq | 0.207 | 0.2525 | 0.481 | 0.1036 | 0.016 | 0.0828 | 0.579 | 0.7439 |

**Appendix 13: Full regression models: dilution lagged 2 years**

This table reports the independent and control variables from the regression with independent variables lagged two years on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. The number of options granted divided by total outstanding shares is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represent 1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| $Dilution_{it-2}$ | -0.295 | -0.572 | -1.548 | -3.000 | -22.17 | -19.40 | -14.58** | -9.014 |
| | (0.798) | (0.550) | (0.606) | (0.292) | (0.368) | (0.346) | (0.033) | (0.189) |
| $Dilution^2_{it-2}$ | -1.522 | -4.398 | 8.295 | 23316 | 151.7 | 45.15 | 108.0* | 37.35 |
| | (0.879) | (0.568) | (0.742) | (0.615) | (0.481) | (0.754) | (0.095) | (0.569) |
| $(ITM=1) \times Dilution_{it-2}$ | 0.0778 | 0.369 | 0.144 | 1.747 | 20.36* | 13.78 | 17.87** | 16.80** |
| | (0.910) | (0.553) | (0.943) | (0.367) | (0.072) | (0.155) | (0.018) | (0.032) |
| $(ATM=1) \times Dilution_{it-2}$ | 0.438 | 0.551 | 1.913 | 1.972 | 14.43 | 44494 | 23.75** | 26.20** |
| | (0.759) | (0.583) | (0.535) | (0.419) | (0.240) | (0.165) | (0.016) | (0.027) |
| $Broadbased_{it-2}$ | -0.0278 | -0.00636 | -0.0590 | 0.00524 | 0.207 | 0.286 | 0.0380 | -0.00798 |
| | (0.387) | (0.625) | (0.481) | (0.884) | (0.644) | (0.510) | (0.894) | (0.970) |
| Industry $return_{it}$ | -0.0204 | -0.000579 | 0.0584 | 0.145 | 1.316 | 0.878 | -0.331 | -1.047 |
| | (0.705) | (0.990) | (0.678) | (0.441) | (0.434) | (0.629) | (0.624) | (0.129) |
| $Leverage_{it}$ | -0.00453*** | -0.00335*** | -0.0238*** | -0.0150** | 0.0162 | 0.0273*** | -0.0305 | -0.0395 |
| | (0.000) | (0.010) | (0.000) | (0.024) | (0.269) | (0.005) | (0.472) | (0.357) |
| $LogAssets_{it}$ | -0.0267 | -0.0363*** | -0.189 | -0.0104 | -1.681 | -1.234*** | 2.320*** | 0.887*** |
| | (0.619) | (0.007) | (0.146) | (0.796) | (0.477) | (0.003) | (0.000) | (0.000) |
| $LogEmployees_{it}$ | -0.0470** | -0.00813 | -0.0862* | -0.0209 | -0.154 | 0.0269 | -0.146 | -0.000914 |
| | (0.043) | (0.116) | (0.085) | (0.164) | (0.584) | (0.713) | (0.404) | (0.990) |
| $LogRevenue_{it}$ | 0.152*** | 0.0572*** | 0.448*** | 0.0774* | 0.913** | 0.450** | 0.986** | 1.289*** |
| | (0.001) | (0.000) | (0.000) | (0.086) | (0.018) | (0.026) | (0.015) | (0.000) |
| $Volatility_{it}$ | 0.00474 | -0.0598** | 0.00863 | -0.197** | -0.292 | -0.565* | -0.155 | -0.358 |
| | (0.819) | (0.034) | (0.883) | (0.040) | (0.428) | (0.062) | (0.577) | (0.229) |
| Business $risk_{it}$ | 0.0278 | -0.0210 | 0.0516 | -0.0326 | -0.695 | -0.789 | -0.0801 | -0.190 |
| | (0.323) | (0.334) | (0.493) | (0.530) | (0.541) | (0.304) | (0.815) | (0.453) |
| Intercept | -0.413 | 0.0213 | -0.792 | -0.0565 | 8.662 | 7.310** | -6.273** | 1.215 |
| | (0.123) | (0.820) | (0.276) | (0.823) | (0.560) | (0.019) | (0.019) | (0.297) |
| N | 413 | 413 | 413 | 413 | 393 | 393 | 412 | 412 |
| R-sq | 0.147 | 0.2359 | 0.267 | 0.1667 | 0.012 | 0.0824 | 0.505 | 0.7399 |

**Appendix 14: Full regression models: dilution lagged 1 years**

This table reports the independent and control variables from the regression with independent variables lagged one year on ROA, ROE, Tobin's Q and the logarithm of market capitalization using both fixed-effect and random-effect models with robust standard errors clustered at company level. The number of options granted divided by total outstanding shares is used as an independent variable. The independent variable is interacted with a dummy variable for grants both in-the-money and at-the-money. Control variables are also included, such as: dummy variable for broad based ESOP in the year of the grant, and measures of size, risk and industry return. The sample period is between 2009 and 2019 and consists of 89 firms. P-values are reported in parentheses. ***, **, * represen1%, 5% and 10% significance level respectively.

| | **Accounting** | | | | **Market** | | | |
|---|---|---|---|---|---|---|---|---|
| | ROA | | ROE | | Tobin's Q | | LogMC | |
| | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* | *Fixed* | *Random* |
| $Dilution_{it-1}$ | -0.600 | -0.956 | 4.142 | 0.761 | -2.838 | -7.857 | -4.358 | -0.297 |
| | (0.613) | (0.216) | (0.276) | (0.797) | (0.819) | (0.689) | (0.483) | (0.966) |
| $Dilution^2_{it-1}$ | 16.93 | 11.40* | -38.35 | -28.30 | 15.00 | -37.42 | 44.76 | 2.520 |
| | (0.116) | (0.082) | (0.415) | (0.460) | (0.905) | (0.763) | (0.429) | (0.967) |
| (ITM=1) x $Dilution_{it-1}$ | 0.461 | 1.018 | 33909 | 13.40 | 10.18** | 8.199 | 6.667 | 5.215 |
| | (0.517) | (0.120) | (0.357) | (0.209) | (0.033) | (0.368) | (0.110) | (0.158) |
| (ATM=1) x $Dilution_{it-2}$ | -0.733 | 0.173 | 0.0663 | -1.429 | 1.275 | 22.27 | 10.36* | 14.17 |
| | (0.544) | (0.743) | (0.988) | (0.502) | (0.837) | (0.216) | (0.065) | (0.140) |
| $Broadbased_{it-1}$ | 0.0156 | 0.00478 | 0.00838 | 0.0417 | 0.177 | 0.242 | -0.00816 | 0.0134 |
| | (0.176) | (0.598) | (0.903) | (0.227) | (0.653) | (0.533) | (0.960) | (0.926) |
| Industry $return_{it}$ | -0.0194 | -0.0333 | 0.341 | -0.131 | 1.510 | 1.147 | -0.175 | -0.662 |
| | (0.622) | (0.352) | (0.221) | (0.240) | (0.351) | (0.474) | (0.661) | (0.214) |
| $Leverage_{it}$ | -0.00685*** | -0.00582*** | -0.0651*** | -0.0181 | 0.0125 | 0.0205** | -0.0257 | -0.0363 |
| | (0.000) | (0.001) | (0.001) | (0.139) | (0.386) | (0.040) | (0.418) | (0.303) |
| $LogAssets_{it}$ | -0.0296 | -0.0186 | -0.388 | 0.0463 | -2.029 | -1.121*** | 2.422*** | 1.011*** |
| | (0.425) | (0.147) | (0.103) | (0.543) | (0.353) | (0.002) | (0.000) | (0.000) |
| $LogEmployees_{it}$ | -0.0341** | -0.00955* | -0.0834* | -0.0207* | -0.0667 | 0.0222 | -0.314*** | -0.102 |
| | (0.031) | (0.071) | (0.093) | (0.095) | (0.846) | (0.783) | (0.001) | (0.124) |
| $LogRevenue_{it}$ | 0.118*** | 0.0453*** | 0.617** | -0.0149 | 0.830* | 0.394* | 1.034*** | 1.366*** |
| | (0.001) | (0.003) | (0.021) | (0.836) | (0.068) | (0.097) | (0.001) | (0.000) |
| $Volatility_{it}$ | 0.00515 | -0.0179 | 0.0650 | 0.0372 | -0.640 | -0.559* | -0.298 | -0.406* |
| | (0.767) | (0.317) | (0.605) | (0.804) | (0.239) | (0.092) | (0.155) | (0.083) |
| Business $risk_{it}$ | 0.0381 | 0.00361 | 0.0132 | 0.000120 | -0.695 | -0.660 | -0.0349 | -0.239 |
| | (0.107) | (0.823) | (0.930) | (0.998) | (0.505) | (0.294) | (0.889) | (0.294) |
| Intercept | -0.273 | -0.0245 | -0.447 | 0.105 | 43770 | 6.852** | -6.101*** | 0.499 |
| | (0.157) | (0.777) | (0.445) | (0.600) | (0.461) | (0.027) | (0.005) | (0.655) |
| N | 475 | 475 | 475 | 475 | 454 | 454 | 474 | 474 |
| R-sq | 0.209 | 0.2536 | 0.326 | 0.1037 | 0.015 | 0.0815 | 0.574 | 0.7376 |

**Appendix 15: Preliminary Thesis**

BI Norwegian Business School - campus Oslo

# GRA 19702

Master Thesis

## Preliminary thesis report

Preliminary Master Thesis


| | |
|---|---|
| Navn: | Fredrik Ole Oldereid Andersen, Johannes Jarmund Molnes |


| | |
|---|---|
| Start: | 17.08.2020 09.00 |
| Finish: | 15.01.2021 12.00 |

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# Introduction

Employee stock options (ESO) are widely used among companies listed on Oslo stock exchange. As of 2002, Gaarud and Nilsen (2004) reported that 57,7% of the companies listed on Oslo stock exchange used ESO, whereas in 2013, that percentage was down to 47,1 (Skogseth, 2015). Nonetheless, research on ESO as a performance enhancer in Norwegian companies is not yet adequately covered. Foreign studies show that employee equity compensation could have a positive impact on performance (Fang, Nofsinger & Quan, 2015; Hochberg & Lindsey, 2010; Kroumova & Sesil, 2005). Studying the impact of ESO on performance in a Norwegian context is therefore of relevance. There are many reasons for compensating employees with equity, for instance HR reasons, such as attraction, retention and sorting (Lai, 2010), as well as performance reasons and cash conservation for the firm.

Equity compensation could consist of a variety of instruments and settlement types. The most common is option, but Restricted share units (RSUs), Performance share units (PSUs), Restricted share awards (RSAs) and variations of options exist. Synthetic instruments also exist, where the payoff of the instrument is the same as an equity settled instrument, but a synthetic instrument is settled with cash. Synthetic instruments are subject to a more volatile accounting with fair value calculation every quarter of the year, instead of fair value at grant and linear allocation of initial cost as an equity settled instrument (IFRS-2). This research is focused on options.

# Research questions and objectives

## Objective

In our thesis we seek to obtain knowledge and investigate how ESO and share based incentive schemes are used, and if they provide value to the firm. There is previous research on the topic, but it seems to be challenging to determine whether it has an effect on performance in general, or if it is determined by context or how one measures performance, due to the challenge of quantifying it generally. There are multiple gaps in the field we can fill, for instance getting current data on companies listed on Oslo stock exchange and mapping their use of equity compensation, finding arguments whether equity based compensation is a

performance enhancer for Norwegian listed firms and exploring reasons why equity based compensation is used regardless of not having a clear positive effect on performance. Furthermore, we can investigate how big an incentive scheme has to be or if there is a limit where there is no reason to allocate more instruments in order to improve performance.

Lai (2010) suggested more research on non-executive ESOPs (employee stock options plan) to get an understanding on how a wider ESOP is constructed, and the implication of having non-executives compensated with equity instruments. Our research aims at filling this gap.

Our main objective will be to increase the knowledge of how much listed firms in Norway should compensate their employees with ESO, why they have employee equity compensation schemes, and quantify the effect of having different amounts for companies listed on Oslo stock exchange.

**Relevance of the study**

The study will be conducted with support from a firm in the industry, Optio Incentives. Based on conversations with practitioners, companies face challenges when determining the amount of ESO, and they have a tendency to simply opt the same amount as their peers. The research can provide value for firms in multiple ways: provide a better foundation and rationale when consulting compensation boards; provide firms with more efficient compensation schemes; raise awareness to which extent ESO is used in practice in the different industries and be used as benchmark; and it can give a better understanding of why ESO is chosen over other alternatives.

**Research question**

ESOP is widely used, but there is lack of research on Norwagian firms. Each year the owners of Norwegian firms allow for dilution of their shares in the belief that the positive effect of giving employees ownership exceeds the dilutive (negative) effect of an ESOP on their shares. We are therefore interested in investigating both if there is positive correlation between a ESOP program and what the ideal level of compensation will be:

*"How does ESOPs affect performance in Norwegian firms listed on Oslo stock exchange, and what is the optimal level of compensation for performance?"*

## Literature review

This section provides a brief overview of the current literature on the topic, including option theory, how it works and why companies use it, and some of the previous foreign research on ESOs effect on performance.

### Options theory

An option is a financial derivative based on the underlying value of a stock (Chisholm, 2010). There are two variations of options, call-options and put-options. In this thesis we will focus on employee stock options as a part of compensation, which will always be a call option. A call option is the right, but not the obligation to purchase the underlying stock for the agreed upon strike price (also called exercise price) at a predetermined time or time interval. The value of the option at exercise is the market price of stock deducted by the strike price, also referred to as intrinsic value. Further a call option could have different traits, and we distinguish between ordinary "vanilla options" and more exotic options (Lai 2010). Some "exotic"options might have performance criteria, lock up periods, or be a purchased option (warrant).

### The value of an employee stock option

An option has a value which could be calculated, and in practice an ESO is calculated as an European option, although an ESO by definition is not considered to be an European option. Hull and White (2019) argue that it is difficult to calculate an Employee stock options (ESO) because of the uncertainty of exercise timing. There are several methods to calculate the value of an option and the most common valuation methods are: binomial tree, Black & Scholes and intrinsic value. ESOs are usually not exercisable at only one date like an European option, neither are they exercisable in a whole period like an American option. Usually there are exercise windows at certain times where it is possible to exercise the option, which makes the derivative less liquid and less valuable than an American option. ESO can for that reason be similar to a Bermuda option with recurring time windows when the options are exercisable. There is no known formula to

calculate a Bermuda option (Alghalith & Moawia, 2019) which makes calculation of ESO difficult.

**Options and accounting**

When a company grants their employees options, the value of the options have to be recognized as an equity cost according to IFRS 2.2.40. ESO is recognized with parameters form grant date. using Black and scholes merton. As discussed, valuation of ESO can be difficult, but IFRS-2 Appendix B §B16-18 gives the opportunity to use expected exercise as a time parameter and then calculating the instrument as an European option using B&S-Merton (Lai 2010).

**Why use options?**

There are several reasons for offering options in companies. Some being increased motivation and productivity by mitigating the principal-agent problem and retention and attraction of employees.

Firstly, options are used as a means to better align the interest of employees and shareholders by mitigating the agent-principal problem, incentivizing employees to act in the shareholders interest, now also their own interest, resulting in motivated employees. Blasi, Freeman, Mackin and Kruse (2008) reported that 75% of the 41,000 respondents stated that being offered stock options improved motivation ‘to a great or very great extent’. On the other hand, this implies that the work of the employees have an effect on the share price, which is not the reality for most employees (Core & Guay, 2001; Hall & Murphy, 2003; Kedia & Mozumdar, 2002).

Secondly, options are argued to have an effect on the retention of key employees and the attraction of new people (Core & Guay, 2001; Kedia & Mozumdar, 2002; Oyer & Schaefer, 2005 ). The option is settled in the future, providing an incentive for employees with options to stay with the company. Offering options can make a company more attractive when hiring new personnel. This argument has critics arguing that this applies to top management and key personnel (Hall & Murphy, 2003; Lazear, 2004; Oyer & Scheafer, 2005).

**Previous research**

The effect of ESO on performance has been researched extensively in several international contexts through the years, but there is limited quantitative research on the effect for companies listed on Oslo stock exchange.

Jones and Kato (1993) reported that ESO increased productivity by 7% in Japan and Ya-Ying (2003) reported a 4-5% productivity increase in Taiwan, whereas in South Korea, Cin and Smith (2012) found that a 1% increase in ESO resulted in a 2,6% increase in productivity. Furthermore, Kruse (2002) concluded that the average difference in productivity between ESO-companies and non-ESO-companies equals 6,2% and that productivity increases with 4,4% after implementation of EOS.

Hochberg and Lindsey (2010) found that ESO for non-executive employees had a positive impact on operating performance for companies, though the effect being more present in companies with few employees and higher growth opportunities. Kroumova and Sesil (2005) on the other hand, reported that ESO promotes superior performance across all size categories.

Fang, Nofsinger and Quan (2015) found that ROE for companies with ESO in China were significantly higher compared to matching firms, particularly for firms that are likely to benefit from having incentivized employees, concluding that ESO increases motivation and thus performance. Additionally, they reported that the announcement of implementation of ESO had a positive effect on the companies' share price. Martes (2012) also found a positive effect on ROE and ROA. Zhu, Hoffmire, Hoffmire and Wang (2013) conducted a case study on Huawei and found that ESO plays a positive role in employee productivity.

Lai (2010) argues that small companies have a greater effect of an ESOP. In particular Lai emphasised that a small business could be able to attract more talent to the company. Further a positive correlation was found in the number of allocated options and the volatility of the company.

Contrastingly, D'Arcimole and Trebucq (2002) could not provide evidence of ESO having a positive effect on ROE for listed companies in France, but on some other financial measures, such as return on investments.

The research is extensive and varying, both in context and findings, but that ESO has an effect on performance is often found, to different degrees.

## Methodology

The following chapter provides a description and justification for our chosen research design. This includes a description of data applied and how it will be collected, measured and analyzed in order to answer our research questions.

### Research design

Research design refers to the general plan of how we intend to answer our research questions, and includes our research questions, theoretical approach, data sources and how to collect and analyze these, and discussion of ethical issues and limitations (Saunders, Lewis & Thornhill, 2016). Our research follows a quantitative research design where we examine relationships between numeric variables from financial statements in order to answer our research questions.

### Theoretical approach

Research can either test or develop a known theory, a deductive approach, or further explore a topic and develop a theoretical explanation as the data are collected and analyzed, being more data driven, known as an inductive approach. The latter approach intends to allow for meaning to appear from the collected data in order to identify patterns and relationships to establish a theory, but it does not exclude existing theory (Saunders et al., 2016). There is a limited amount of evidence on the subject, especially in a Norwegian context. Though, our research is aimed at testing the established hypothesis: options having a positive effect on performance. Thus, we apply a deductive approach in our research.

### Data collection

Our dataset will consist of financial information from xx companies listed on Oslo Stock exchange with a timespan of xx years, from xx to 2019, the last year with

available financial statements. We will generate the dataset by extracting financial information from the balance sheet and income statement in Excel, using databases such as Orbis and Proff Forvalt. This is referred to as secondary date, since the data initially was collected for a different purpose (Saunders et al., 2016). The upside is that the information is already available to us, reducing the amount of resources needed to retrieve the data. That being said, the challenge lies in extracting information regarding the use of options. As of now, there are no databases disclosing this for companies listed on Oslo Stock exchange. Thus, ordering financial reports for the chosen companies from Brønnøysundregisteret and extracting the values manually seems most efficient. A downside is that these values are disclosed in the notes and not disclosed similarly across all companies, requiring much manual labor. Luckily, we have some data from previous research and have been offered free help by a company interested in our research. Generating the dataset is key to investigating the use of options, as well as it provides value in itself, by mapping the use through time in different companies and industries. Therefore, data collection is key in our research.

We would also like to compare different levels of compensation with a suitable measure. Since the amount of options does not necessarily represent the potential gain and therefore the value of the compensation, we will if possible use fair value of the instruments instead of the number of options.

In addition to using secondary data for our dataset, we will discuss with practitioners working with options remuneration for companies in order to get further insight and ensure that our research provides value. Through Optio Incentives we will have access to people in the industry, and members of compensation committees.

**Quantitative analysis**

Our research will be conducted on the basis of the dataset discussed in the previous paragraph, making it quantitative, opposed to qualitative. The data will be analyzed to test the stated hypothesis, through examination of relationships between variables, common for quantitative research (Saunders et al., 2016). Qualitative research on the other hand, is more suited for discovering underlying meaning and causes, and would be more suitable for research regarding reasons as

to *why* options do, or do not, have an effect on performance, investigating its effect on motivation, attraction and retention of key employees and so forth.

Quantitative analysis techniques, such as graphs and statistics, enables us to explore, present, describe and examine relationships and trends within our dataset (Saunders et al., 2016). In our research, we will use multiple linear regression models in order to examine relationships and correlations, and check significance, as we learned in the courses Research Methodology In Accounting and Business Control and Data Analytics w/Programming, using STATA and R respectively. As of now, our plan is to use STATA, as perceived more user friendly and suitable for our research.

When the dataset is ready, we can test our hypothesis in several ways. For instance, performance can be measured in numerous ways, such as return on equity (ROE), return on assets (ROA), stock price, net profit to name some. Furthermore, options can have an effect in and of itself, where simply using options improves performance, or only if above/below a certain threshold. These types of considerations will be discussed more in depth in our research. Further we will analyse if there is reasons to believe that there is a "optimal" level of option allocation.

**Limitations**

Constructing the datasets brings some challenges. Firstly, it is time consuming to extract financial information regarding options from the notes for all companies and all years. Thus, the timespan and number of included companies must be limited to some extent, affecting the validity of our research. Secondly, entering the numbers manually brings the risk of typing error, affecting the dataset and thus our results. Handling the data correctly is therefore of high importance and is time consuming.

## Plan for thesis progression

*End of January - end of March*

We will start gathering data and creating the dataset immediately, being our first priority. The sooner the dataset is ready, the sooner our analysis can begin.

*Mid February - end of April*

Start working with theory. We are aware that the applicable theory might change along the way, so getting a good overview of key theory and getting some down on paper is emphasized in this period.

*Start March - end March*

Finish the dataset and conduct our analysis using STATA or R. During this period we aim to work with the data, apply multiple models, work with graphics and so forth.

*End of March - end of May*

Finish up the theory part applicable for our results and start concluding on our findings.

*Start June - end*

Finish the things where we underestimated needed time.

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