

Changes in Executive Compensation: Needless Costs or a Key to Shareholders' Wealth?

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Abstract: This paper aims to examine stock market reaction to announced changes in executive compensation packages. The hand-picked sample of 136 official news announcements released over 2002-2012 by companies included in the NASDAQ OMX Nordic list is employed. For comparison reasons a larger sample of 309 events is used, which additionally includes announcements released on the dates when companies had published other news. The standard event study methodology is applied in order to examine if abnormal returns caused by the announcements could be observed. Also, the total value of compensation programs documented in the announcements is estimated and compared to the aggregate euro return observable after the announcements. The event study results reveal that there is no statistically significant market reaction to changes in executive compensation packages when full samples are employed. Subsample analysis provides with some weak evidence for abnormal return of 1.1% over a two-day event window if compensation changes are targeted at top executives, i.e. CEOs, CFOs and/or Board of Executives. Besides, some weak statistical evidence has been found for slightly negative market response of -0.4% to company proposals to introduce new pay programs or to continue existing ones.

Keywords: *changes in executive compensation; news announcements; event study; stock market reaction*

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1 Introduction

The annual general meeting season of 2012 has been one of the stormiest in the living memory. A substantial number of shareholder protests against exceedingly high compensation packages of top managers have forced large European corporations and banks to reconsider their executive compensation programs (Stewart, Treanor, & Kollewe, 2012). Thus, it seems that investors have finally started to more actively question why executives are paid such considerable amounts of money that could otherwise be reinvested or distributed to shareholders or employees.

Over the last few decades executive compensation has faced dramatic changes. Since the early 1970s the level of compensation has soared, the structure has been significantly altered and the gap between the earnings of top managers and lower level employees widened (Frydman & Jenter, 2010). Nowadays the seven or eight digit salaries are no longer unexpected. The question remains how much is still hidden under sometimes hardly comprehensible management pay structures. Not surprisingly such significant changes in executive compensation continue to keep the interest of policy makers, academics, media, and citizens. Yet, naively or not, by allowing such changes shareholders expect to motivate managers to work towards increasing firm's value.

Executive compensation has not stopped to increase even in turbulent times following the recent economic downturn when the corporate profits were hurt, workers were laid-off and the future remained gloomy (O'Neill, 2010). Such an unbreakable trend, thus, seems to have poured oil on the flame of a never ending debate on executive pay. Are executives simply greedy or their compensation could be justified by the performance improvement of the companies they manage?

In recent decades quite a substantial amount of research has been aimed at finding the answer to this question (Gomez-Mejia & Wiseman, 1997; Murphy, 1999; Devers, Cannella Jr., Reilly, & Yoder, 2007). Nevertheless, there is still no consensus regarding the relationship between executive compensation and corporate performance. Despite the ambiguity of the effectiveness of different pay structures in aligning the interests of shareholders and managers, companies continuously alter existing compensation schemes or introduce new ones. Therefore, a question arises, what are the market's expectations about adjustments to executive compensation schemes? Does it believe it's an unnecessary waste or a key to an increased shareholders' wealth? Thus, in this study we aim to investigate the following research question:

Is there a stock market reaction to the changes in executive compensation packages?

In order to find an answer to the research question, we examine a hand-collected sample of official announcements of changes in executive compensation schemes released by companies listed on the NASDAQ OMX Nordic list (NASDAQ OMX Stockholm, Copenhagen, Helsinki, and Iceland). We analyse the announcements published on the “News” section of NASDAQ OMX home-page in 2002-2012. In our study we investigate two samples: a ‘contaminated’ sample that includes 309 announcements for 149 stocks and a ‘clean’ sample that consists of 136 announcements for 89 stocks. Our focus is on the latter sample, which excludes the announcements released on the dates when companies had published other news.

We investigate stock market reaction to announcements by conducting an event study. Besides testing the main samples, we examine several sub-samples based on the compensation recipient, announcement type and compensation form. In addition, we estimate the total value of compensation programs documented in the announcements and compare it to the aggregate dollar return observable after the announcement.

In general, the event study does not capture statistically significant stock market reaction to the announcements about changes in executive compensation plans over 2002-2012. Yet, we find some, albeit weak, support that news releases about proposals to implement or continue a certain compensation program lead to a slightly negative stock market reaction. Nevertheless, when the compensation change is targeted at top executives (CEO, CFO, and the Board of Executives only), test results provide some evidence for positive abnormal returns. Our additional analysis suggests that there is a relation between expected value creation in the company and the costs incurred by companies due to changes in compensation packages.

Our findings contribute to the existing literature in several ways. Most of the studies investigating the pay-performance link have been based on the data from Anglo-Saxon countries (Devers et al., 2007). The only European event study we are familiar with, which was conducted on the Finnish market (Ikäheimo, Kjellman, Holmberg, & Jussila, 2004), analysed a relatively small sample for drawing any statistically sound results. Thus, by employing data from the Nordic countries (i.e., Sweden, Denmark, Finland and Iceland) we extend a scarce understanding of pay-performance link in the European setting where compensation structures are rather different.

Besides, we collect a unique data sample, which allows us to investigate executive compensation phenomenon beyond data provided by statistical databases.

Furthermore, the existing research mostly examines the effects of the adoption of individual compensation package elements, e.g. stock option plans. Yet, by looking at the announcements of any kind of changes in compensation packages, we are able to assess whether all adjustments to executive compensation schemes are perceived by investors as increasing shareholders' value. Finally, unlike traditional event studies, we additionally express the observed stock market reaction in monetary terms and look how it compares to the costs incurred by a company due to changes in executive compensation.

This paper is structured in the following way. In Section 2 we provide an overview of the theories used to explain the pay-performance link and prior empirical findings in the field. In Section 3 data collection process and data characteristics are described. Subsequently, in Section 4 the methodology is explained. The discussion, which accompanies results presented in Section 5, is provided in Section 6. In Section 7 we perform the comparative analysis of the compensation cost and aggregate dollar return. In Section 8 we describe the limitations of our study and provide suggestions for future research in Section 9. Finally, conclusions are stated in Section 10.

2 Literature Review

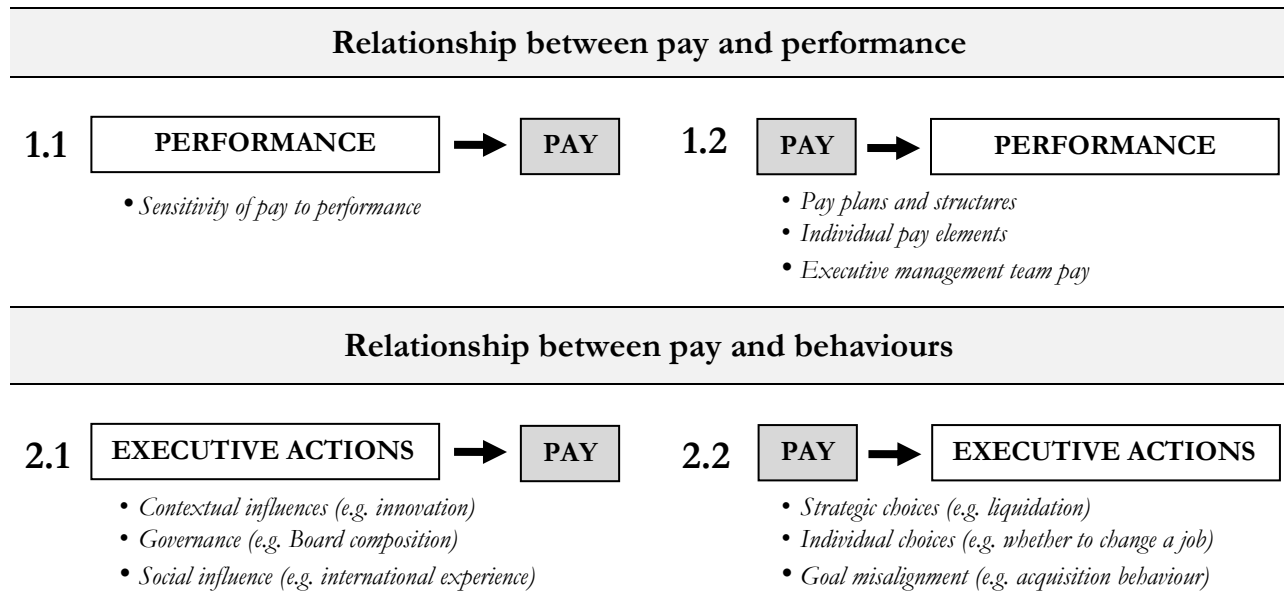
2.1 Structuring an intense academic debate

Academic research on executive compensation dates back to the early 1990s. In one of the earliest empirical studies in the field Taussig & Baker (1925) found little relationship between executive pay and company performance. Ever since, a considerable amount of research has been performed aiming to investigate the link between executive compensation and firm performance. Recently, the growth in the research conducted on executive compensation has been only outpaced by the rise in executive pay itself. Yet, the researchers still disagree whether the relationship between executive compensation and corporate performance is positive, negative or there is no relationship at all (Bruce, Buck, & Main, 2005).

Due to the vast amount of research, there were a few attempts to structure the previous literature on the topic, such as the works by Gomez-Mejia & Wiseman (1997), Murphy (1999), Core, Guay, & Van Buskirk (2003), and Devers et al. (2007). The latest attempt to review recent findings

by Devers et al. (2007) organized previous research into two categories: (1) relationship between pay and performance, and (2) relationship between pay and behaviours. Each of the two categories was further split into two subcategories. The first subcategory focuses on research studying the determinants of compensation, while the second looks at research examining the effects of compensation (see Figure 1).

Figure 1 *The categorization of the previous research on executive pay*



Source: Compiled by authors based on Devers et al. (2007)

Studies that fall under the subcategory 1.1 (Performance → Pay) examine the impact of the firm's performance on executive pay or, as it is often referred, the sensitivity of pay to performance. In this these studies compensation is perceived as a reward for past performance. Research assigned to the subcategory 1.2 (Pay → Performance) studies the influence of executive compensation on a firm's performance. In this case compensation is interpreted as a motivational tool.

The subcategory 2.1 (Executive Actions → Pay) includes studies that examine how pay is affected by executive actions and other factors, such as governance-related issues or social influence. Studies classified under the category 2.2 (Pay → Executive Actions) attempt to investigate the direct effects of pay on managerial behaviour. For instance, the studies analyse how compensation affects strategic or individual choices of executives. Also, they investigate whether compensation helps to align goals and risk preferences of shareholders and managers (Devers et al., 2007).

By examining stock market reaction to changes in executive compensation packages, we aim to investigate how changes in pay affect firm's value. Therefore, in the rest of this literature review we focus on empirical findings that fall under the subcategory 1.2, i.e. the influence of pay on performance.

2.2 Theoretical perspectives

Before reviewing previous literature on the subject, we introduce the main theories that attempt to explain the relationship between executive compensation and firm's performance or the absence of this relationship. Two opposing views, agency theory and executive power theory, are most commonly employed when interpreting empirical findings in the field. Yet, the lack of consensus regarding the pay-performance relationship led to the emergence of other theoretical explanations, several of which we review thereafter. Even though some of the theories reviewed below go beyond the sole explanation of pay-performance relationship, we aim at discussing these theories only in the context of managerial compensation and its effects on company performance.

2.2.1 Agency theory

The principal theoretical perspective employed in the majority of studies of executive compensation has been the agency theory developed back in 1970s by Jensen & Meckling (1976). The theory is sometimes also referred to as the arm's-length bargaining model or the optimal contracting view. The principal-agent theory rests on the fundamental problem created by the separation of ownership and control: the principal (shareholders) delegates the job to an agent (manager), who is expected to act in the best interest of the principal (Tosi, Werner, Katz, & Gomez-Mejia, 2000). Such dispersion of ownership and control raises moral hazard dilemma: shareholders are unable to fully observe and evaluate the actions of managers (Jensen & Meckling, 1976). Therefore, decisions taken by self-interested managers might not always be directed towards increasing shareholders' value (Tosi et al., 2000).

Agency theory argues that, besides the Board of Directors and market for managerial talent, compensation is one the means to align the incentives of managers and shareholders (Jensen & Meckling, 1976). In order to do so, the value of an optimal executive's compensation package should depend on changes in shareholders' wealth (Jensen & Murphy, 1990). Consequently, equity-based compensation arrangements, such as stock options, restricted stock, or other long-term incentive contracts are used to motivate executives to maximize firm's value (Conyon, 2006).

Nevertheless, according to the opponents of the theory, a lot of different phenomena related to executive compensation that are observed in real life cannot be explained by the agency theory. For example, the inability of individual shareholders to influence the selection of the Board of Directors, compensation even in the case of failure, the popularity of compensation consultants, insufficiently strong threat of take-over, and others (Bruce et al., 2005).

2.2.2 Executive power or rent extraction theory

In order to explain compensation practices that cannot be fully understood by optimal contracting, executive power theory has emerged. The developers of the theory Bebchuk & Fried (2003) argue that even though a contract might be optimal from an agency theory point of view, a lack of effective arm's length bargaining between managers and directors as well as weak market constraints cannot guarantee that compensation packages will cost-effectively provide incentives to managers. For example, they argue that since directors do not own equity interest in the company, they are subject to agency problem as well. In addition, CEOs have influence on directors, since they play an important role in re-nominating directors to the boards. Finally, market forces are not sufficiently strong to prevent managers from extracting private benefits, because, for instance, executives have substantial defences or 'golden parachutes' in case of market for corporate control.

Consequently, the executive power theory states that compensation reflects managerial rent-seeking (or "skimming") behaviour rather than incentive alignment. The theory predicts that managerial compensation will be higher and pay-for-performance sensitivity lower in firms having more powerful executives (Bebchuk & Fried, 2003).

Bebchuk, Fried, & Walker, (2002) provided empirical evidence showing that managers indeed have substantial influence on their own remuneration by engaging in earnings management through producing short-term increases in stock prices or misrepresenting company's financial statements. Moreover, Bebchuk & Fried (2003) argue that existing equity-based compensation plans allow managers to extract substantial benefits without suspicion since such arrangements fail to filter out general market increases and give managers freedom to unload options and shares. In addition, managers are able to time option grants based on the inside information or prior to release of positive news (Yermack, 1997). Finally, incentive plans enable extracting rents because there are no generally accepted norms for such type of compensation arrangements (Buck, Bruce, Main, & Udueni, 2003).

Nevertheless, executives' power to influence their compensation is constrained by the social outrage costs that would occur in case the misalignment between their compensation and firm's performance would become too large and too apparent (Bruce et al., 2005). Thus, in order to minimize or avoid outrage managers engage in "camouflage", i.e. construct such compensation schemes that would hide and legitimize their extraction of rents (Bebchuk & Fried, 2003).

2.2.3 Other possible theoretical explanations of pay-performance relationship

Institutional theory

According to institutional theory, companies generally aim to copy practices, conventions and management fashions of other firms in the market, i.e. their institutional environment, in order to gain social acceptance and legitimacy. Thus, similarly as other organizational actions, the introduction of an incentive pay for executives might serve as a signal that the company belongs to a "particular identifiable social context" (Fernandez-Alles, Cuevas-Rodríguez, & Valle-Cabrera, 2006; p.962). Consequently, a term *symbolic compensation*, which defines a type of compensation that does not aim to achieve financial objectives, but rather stems from institutional pressures, occurred. (Westphal & Zajac, 1994). This implies that executives might receive certain compensation packages solely because it is an acceptable practice in the industry, which does not lead to an increased value of a firm (Staw & Epstein, 2000). From this perspective, incentive compensation plans should not be expected to raise shareholders' wealth.

Signalling

The adoption of an equity-based compensation plan might also be interpreted as a signal to the market of management's expectations about an improved firm's performance in the future (Bhagat, Brickley, & Lease, 1985). If executives accept higher ownership of a company's equity, this might be perceived as a disclosure of an optimistic 'inside' information (Brickley, Bhagat, & Lease, 1985). In this case, the introduction of compensation should lead to a rise in a firm's value, even though the increase would not stem from increased managers' incentives.

The common pool approach

According to the common pool approach developed by Frey & Osterloh (2005), corporate activities could be characterized by a high degree of cooperation and interdependencies. Yet, due to strong interdependencies it is hard to observe the contribution of each self-interested individual towards reaching common organizational goals. On the contrary to the agency theory, which assumes that

managers are motivated only by extrinsic incentives (e.g. monetary compensation), a common pool approach states that normally self-interested executives are motivated to work towards common goals due to both extrinsic and intrinsic incentives (e.g. a work itself, its outcomes). According to the theory, even though incentive compensation raises extrinsic motivation of managers, it might as well lead to the reduction of intrinsic motivation and to a dysfunctional behaviour of managers. Thus, the approach might explain why there might be no relationship with individual incentive pay and firm's performance or why the relationship might be negative.

Stakeholder approach

The stakeholder theory has a “less cynical view” of executives (Bruce et al., 2005; p.1496). From the perspective of the stakeholder theory, managers set aside their immediate individual interests and act in the interests of all the stakeholders of a firm. Therefore, executives serve as agents of not only shareholders, but also stakeholders (Driver & Thompson, 2002). Consequently, since managers work not only towards increasing shareholders' wealth, executive pay-for-performance sensitivity might be less relevant for the firm's value.

Individual preferences

Even though compensation might serve as a motivational tool, its effectiveness to provide incentives is highly dependent not only on various situational factors, but also on individual preferences and differences in personalities of managers. For example, compensation is more valued by extroverts than introverts or by men than women. Also, pay plans linking pay to performance are preferred by people who like the feeling of achievement or high-contingency compensation plans are preferred by high performing individuals, etc. Consequently, a certain incentive plan might not be appropriate for all managers (Rynes, Gerhart, & Minette, 2004). These individual differences and preferences suggest that not in all cases an adoption of incentive compensation might lead to an increase in a company's value.

2.3 Prior empirical findings in the field

In this section we overview the empirical findings of the studies examining the influence of managerial pay on corporate performance. We review in detail the performance implications of a total compensation level as well as various accounting and equity-based compensation plans. The list of the overviewed papers and the summary of their findings is provided in Appendix, Table 6.

2.3.1 The impact of the total executive pay on performance

In contrast to the considerable body of research on pay-performance sensitivity, i.e. the research that measures to what extent managers' pay depends on their performance, there is rather little research performed that looks at the total compensation's influence on firm performance. Nevertheless, employing data on individual executives over a few years' time, already in the 1980s Murphy (1985) studied the relationship between total executive pay and firm performance. The author provides evidence that executive pay is strongly positively correlated with firm's performance, which is represented by stockholder return and an increase in firm's sales. In a more recent study, employing first-differenced and system Generalized Method of Moments regression techniques, Lilling (2006) also found a positive relationship between total CEO compensation and shareholders' wealth.

Buck, Liu, & Skovoroda (2008) additionally hypothesized that there is a mutual influence of executive pay and firm performance over each other through both reward and motivation. The dataset of Chinese firms allowed the researchers to analyse two-way causal links employing Granger causality tests, because Chinese firms award executives only with cash-based short-term incentive compensations. Such causality tests would not be possible to implement on the Western data because of the common usage of long-term stock option plans. Options create methodological problems because their valuation formulas imply direct causal relationship running from stock value to option value. The results of the study indeed show a two-way causality, from pay to performance and vice versa.

Examining pay-performance relationship among 50 highest paid CEOs in the US in 2007 Nystrom, Soofi, & Yasai-Ardekani (2010) found the opposite relationship. Applying the statistical extremes methodology, they concluded that there is a negative relationship between extreme CEO compensation and extreme firm's performance. On the contrary, the authors found no association between the level of pay and firm performance when employing the full sample of top-paid CEOs. In addition, Bebchuk, Cremers & Peyer (2010) find further support for the negative relationship. The authors examined the compensation of top executives and its influence on corporate performance by constructing a new measure – CEO Pay Slice (CPS). CPS shows what part of the total compensation of a firm's top five executives a CEO receives. They find that a higher CPS leads to lower corporate value determined by Tobin's Q, lower accounting earnings, poorer acquisition decisions, worse outcomes of opportunistic timing of stock option plans as well as lower CEO turnover.

2.3.2 The effect of various compensation plans on performance

In 1990 Jensen & Murphy declared the idea that it does not matter how much CEOs are paid. What matters is how they are paid. This implies that the structure and composition of the remuneration package received by the CEO influences company's performance. Mehran's (1995) findings support the idea that the form, not the level of compensation, gives executives incentives to increase firm's value.

In a recent study, Matolcsy & Wright (2011) brought new insights into the link between compensation structure and firm performance by developing a model of 'efficient' CEO pay structure based on a firm's characteristics and checking the performance implications of deviation from this efficient structure. The results obtained analysing Australian sample suggest that firms whose CEOs receive compensation is inconsistent with their firm characteristics demonstrate lower performance compared to those firms whose CEOs' pay matches their firms' characteristics. The findings are based on both accounting and market-based firm performance measures.

From the agency theory point of view, companies tie compensation to firm's performance so that managers would be more motivated to work towards increasing shareholders' wealth. Moreover, the theory predicts that the higher performance-pay sensitivity, the higher manager's motivation and, consequently, the better firm's performance. Consistently with this view, Abowd (1990) proved that performance-pay sensitivity is positively related to firm's performance in the following year. The evidence based on accounting measures is weak, yet, it is strong for market-based measures. On the contrary, employing data on Japanese firms Kubo (2005) found that such relationship is negative.

In order to better understand the pay-performance relationship, a lot of studies were conducted to investigate the effect of a particular type of a compensation plan. Thus, in the following subsections we provide an overview of selected studies investigating both accounting and equity-based pay plans.

Accounting-based plans

In the early 1980s Tehranian & Waagelein (1985) studied a stock market reaction to the adoption of short-term managerial compensation plans based on accounting goals. They observed a positive stock market reaction around the adoption of such plans. On the contrary, Gaver, Gaver, & Battistel

(1992) found no significant response to the adoption of long-term incentive pay plans based on accounting goals.

More recently, Wallace (1997) showed that residual income-based compensation plans result in increases in residual income, however, the author failed to find a link between the adoption of such plan and shareholders' wealth increase. Balachandran (2006) observed that the use of residual income-based plans affects investment decisions in the firms and that the adopters of such plans exhibit higher residual income. Even though Balachandran (2006) did not examine shareholders' value creation, both authors inferred that "you get what you measure and reward" (Wallace, 1997; p.276).

Hogan & Lewis (2005) investigated the effects of adopting economic profit plans (EPP), under which managers are rewarded if earnings exceed the cost of capital. The study showed that not in all types of companies an adoption of such a plan implies shareholder value creation. The authors found that some companies are better candidates for adopting EPPs than others. From those that are "good candidates", the ones that actually adopt economic profit plans demonstrate more efficient asset management, have higher profitability and create greater shareholder value as compared to a set of "good candidates" that did not adopt economic profit plans.

Equity-based compensation plans

One of the earliest studies examining the effect of equity-based compensation on firm's performance was conducted by Brickley et al. (1985). The authors studied market reaction to the announcement of long-term equity-based compensation plans. They found that such announcements were met with positive share price response. No differences in market response to different compensation forms (e.g. option, restricted stock, performance, stock appreciation rights) were observed. Yet, the analysed compensation plans had tax benefits, thus, it might be that equity-based plans had a positive effect on shareholders wealth due to tax reasons. Yet, when Bhagat et al. (1985) examined market perception of the announcement of stock purchase plans that did not have tax benefits, they still found a positive stock market reaction to such announcements. Their results also suggest that share purchase plans motivate top executives more than other employees.

In more recent studies, DeFusco, Johnson, & Zorn (1990) also provide evidence that changes in managerial stock option plans lead to an increase in shareholder's wealth, which stems from an increased managerial risk-taking evidenced by increased share price variance and stock

return variance. Similarly, Morgan & Poulsen (2001) found that shareholders react positively to the announcements of stock option plans, especially when such plans are aimed at top executives in the firm. Yet, they found that the plans implying dilution effects are less likely to be approved by shareholders. In the same way, after examining a sample of the US firms that adopted “target stock ownership plans” under which managers were required to own a minimum amount of firm stock, Core & Larcker (2002) concluded that an adoption of such plans results in improved firm performance measured by return on assets (ROA) and stock returns. Firms that adopt such plans exhibit low managerial stock ownership and weak stock market performance prior to the adoption. During the two years after the plan adoption, authors observed a significant increase in stock ownership as well as excess accounting and stock returns.

There are quite a few studies that depart from an event study methodology commonly used to analyse pay-performance relationship. For example, regressing stock price on employee stock options (ESO) costs, Aboody (1996) provided evidence that there is negative relationship between the value of outstanding stock options and firm’s stock price. Moreover, Hanlon, Rajgopal, & Shevlin (2003) examined the relationship between corporate earnings and stock option grants targeted at top five executives. They found that \$1 Black & Scholes value of stock option grant leads to \$3.71 in future operating income. Ittner, Lambert, & Larcker (2003) also applied different methodology and studied the determinants of equity grants for senior executives and their influence on corporate performance for ‘new economy’ firms, i.e. firms that have bigger part of total compensation devoted to equity-based pay and more often use stock option programs for all employees as compared to traditional ones. They compared the determinants with more traditional firms and based on their benchmark model predicted a size of an individual grant for a ‘new economy’ firms. The authors found that lower than predicted grants or existing option holdings by top executives lead to lower ROA and stock market performance in the following years.

The vast majority of studies on executive compensation are conducted on the US data. One of the rare studies based on non-American data found a slightly positive market reaction to the announcements of adoption of executive stock option plans targeted to executives in Finland Ikäheimo et al. (2004). The analysis of Finnish sample also revealed a negative stock market reaction if proposed stock option plans were targeted at all employees or had potential dilution effects. However, the sample of the study consisted of only of 29 observations, which is too small to draw statistically sound results. Kato, Lemmon, Luo, & Schallheim (2005) investigated the market

perception of adopting option-based compensation plans by the firms in the Japanese market where such plans were not allowed before 1997. In such a setting, it was found that announcements of stock plan adoption resulted in abnormal stock returns around the announcement date and improved future operating performance.

Finally, Martin & Thomas (2005) found a negative cumulative abnormal return over three days around the proposals of stock option plans that had higher potential dilution. What is more, they provided evidence that the percentage vote against the plan proposal and percentage change in managers' compensation next year is negatively related. This indicates that directors mind shareholder concerns about stock option awards. The authors concluded that stock market's perception of equity-based compensation is changing. On contrary to the plans adopted in the 1980s and the 1990s, more recent plans are not met positively due to the potential dilution stemming from the widespread usage of equity-based compensation.

2.3.3 Concluding insights

Summing all the overviewed previous research it could be noted that there is no clear consensus of how executive compensation affects corporate performance. First, the studies focusing on the aggregate level of executive compensation provide mixed evidence. Yet, the most recent studies focusing on CEOs unanimously find negative relationship. Second, event studies find positive market reaction to accounting-based compensation plans; yet, other studies argue that such plans do not necessarily lead to increased shareholders' wealth. Finally, the most widely researched equity-based compensation does not bring more clarity as well. The majority of the studies prove that equity-based compensation is successful in aligning the incentives of managers and shareholders: in most cases positive market reaction to equity-based compensation could be observed, especially when it is targeted at top executives. This is opposite to the findings of the studies focusing on compensation levels. Nevertheless, some of the research also points to the negative relationship, especially when compensation plans lead to high potential dilution.

3 Data

3.1 The process of creating a hand-picked data sample

In order to find out whether stock market reacts to changes in compensation packages, we firstly need to form a sample of announcements related to changes in executive compensation packages.

The announcements have to be the first public releases that reveal the intended changes. The process of collecting a unique sample is described in the following paragraphs.

We start by narrowing the scope of data gathering both geographically and time-wise. We limit our potential data sample to the companies listed on the NASDAQ OMX Nordic list, which covers NASDAQ OMX Stockholm, Copenhagen, Helsinki and Iceland stock exchanges. On January 2, 2012 there were a total of 617 companies included in the four lists. Since Sweden, Denmark, Finland and Iceland all belong to the same Nordic region, they are fairly homogenous on both country and corporate levels (Lindell & Arvonen, 1996; Sinani, Stafsudd, Thomsen, Edling, & Randøy, 2008). Such similarities between countries helped us to avoid, at least to some extent, the effects of possible macroeconomic, microeconomic, cultural, institutional or regulative differences on financial transactions made by investors in the stock markets of different countries. We choose to investigate the most recent announcements spanning across approximately 10 years, i.e. from January 1, 2002 to March 15, 2012, because the required data is scarcely available in earlier years. In addition, we expect a period of 10 years to contain enough distinct events to test our research question.

Our data source for collecting announcements about changes in executive compensation packages is the “News” section of NASDAQ OMX home-page, where official company news releases are published. By regulations, NASDAQ OMX is supposed to be the first place where any official company news regarding executive compensation is announced to the public. In addition, as compared to other possible news sources, such as media, the official announcements to the public through the stock exchange provide well-structured and detailed information about compensation packages offered to executives. Therefore, using NASDAQ OMX as a source of news enables us to create a database of announcements that could be later split into various subsamples according to certain characteristics found in the news releases. Finally, a single source of news for all the four analysed countries allowed us to ensure consistency in data interpretation.

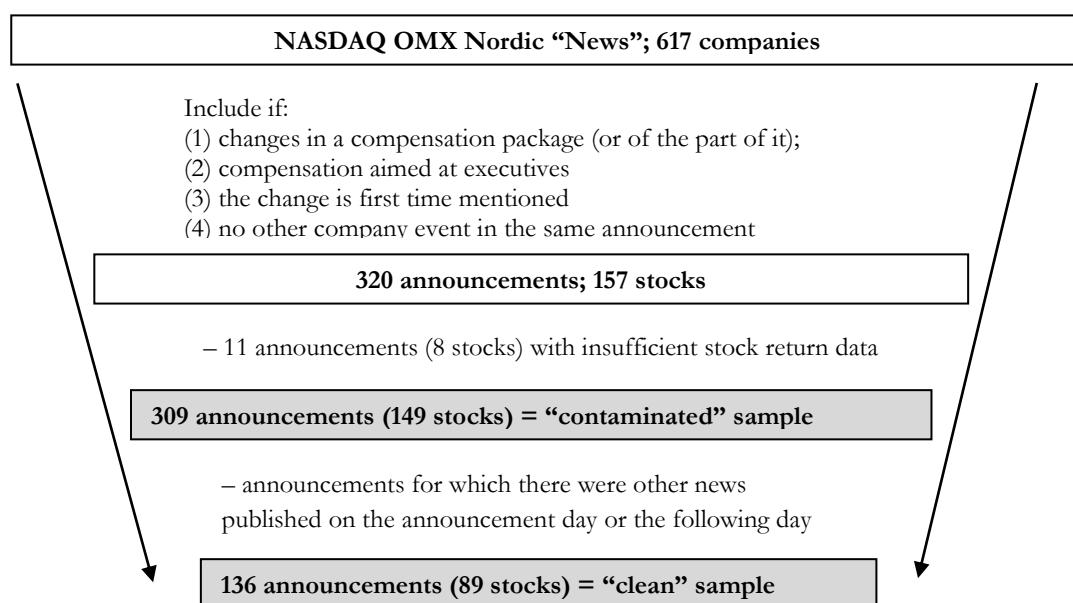
Next, out of all the announcements released on NASDAQ OMX in 2002-2012, we screen out and analyse in detail news releases that contain the following keywords either in the title or in the main body: *incentive*, *incentive program*, *salary*, *compensation*, *remuneration*, *bonus*, *warrant*, *option*. In the earlier years of our analysed time period relatively fewer announcements were published in the

English language. Therefore, in order not to lose valuable announcements, we check the news releases both in the English and local languages.

When analysing the pool of announcements collected using the above keywords, we look for certain criteria that need to be met in order for an announcement to be included in our initial sample: (1) the content of the announcement has to be related to the change in the management compensation package (or the part of it); (2) since company executives are the focus of our study, compensation change has to be aimed at executives, not all employees; (3) the (proposed) change in the compensation package has to be mentioned for the first time; (4) no other company event (e.g. a release of financial reports, a proposal of dividends, etc.) could be included in the same announcement. We analyse both news releases that inform about introduction of new executive compensation programs and notify about the renewal or adjustment of existing programs.

In general, we observe that a significant amount of decisions regarding changes in managerial compensation packages is made during annual general shareholders' meetings. However, usually the agendas for those meetings include the ratification of annual reports or approvals of proposed dividends, i.e. pieces of news that have strong signalling effects to the stock market. Consequently, all the news releases pertaining to annual general shareholders' meetings violated our 4th sample collection criterion and, thus, are excluded from the sample.

Figure 2 *Sample delimitation process*



The initial screening of all the company news releases for 617 stocks over the last 10 years results in 320 hand-picked announcements related to changes in executive compensation and released by 157 companies. We further exclude 11 announcements (8 stocks) from the sample due to the fact that there is not enough stock return data necessary to perform further analysis. The exclusion leaves us with **309 announcements for 149 stocks**.

In order to observe the effect of a news release about the change in managerial compensation, the news release has to be isolated from other significant company events announced on the same day. Therefore, we further check whether any other company information is released on the event day and the following trading day. If no other news is found to be published on these days, the announcement is included in our clean sample. We notice that quite frequently news announcements regarding compensation package change are released on the same day as a company's interim report. We find that 175 announcements are contaminated by other company-related news. Therefore, in the end we form a sample of **136 clean announcements for 89 stocks**. For simplicity reasons, we will further refer to this sample as a "clean sample". The full sample that includes the events with contaminated effects will be called a "contaminated sample". For the illustration of data delimitation process, see Figure 2 above.

A short overview of the collected announcements is provided in the following sub-section, where we describe the observed types of compensation package changes, their target management group and some perceived differences among countries.

For further data analysis we employ dividend-adjusted daily stock return data and daily stock market returns for four market price indexes, namely, OMX Stockholm PI, OMX Copenhagen, OMX Helsinki and OMX Iceland. We retrieve the returns from the Bloomberg database.

3.2 Insights obtained from the collected announcements

3.2.1 The sample quite closely resembles NASDAQ OMX Nordic list

First of all, we compare our collected contaminated and clean samples with the characteristics of the companies included in NASDAQ OMX Nordic list. The majority of the companies in NASDAQ OMX Nordic list have small market capitalization: 54% as of 2 January 2012. Thus, not surprisingly, small-caps make up the largest share, i.e. 46% and 41%, of our contaminated and clean samples, respectively. Mid-caps and large-caps constitute 36% and 18% of the companies of the contaminated sample and 38% and 21% of the clean sample.

The distribution of the firms according to the sectors in the samples nicely resembles the one observed in the Nordic list. Therefore, there is no specific sector in our sample that would have released more news, related to the changes of compensation package, than expected. However, there are some discrepancies if compared by a company's origin. Even though a majority, i.e. 54% and 45%, of companies in our contaminated and clean samples are listed on NASDAQ OMX Helsinki stock exchange, only 22% of the firms on the Nordic list are Finnish. Swedish and Danish companies make up 23% and 22% of our sample respectively, while there is only one stock listed on NASDAQ OMX Iceland, which represents 1% of the sample. Swedish and Danish companies constitute 21% and 33% of the clean sample. For the summarized composition of our samples, as compared to NASDAQ OMX Nordic list, see Table 1.

Table 1 *The composition of contaminated sample, clean sample and the NASDAQ OMX Nordic list*

	Contaminated sample	Clean sample	Nordic List
Total Number of Stocks	149	89	558
Capitalization			
LARGE	18%	21%	19%
MID	36%	38%	27%
SMALL	46%	41%	54%
Sector			
Industrials	27%	29%	26%
Information Technology	20%	17%	16%
Consumer Discretionary	14%	19%	13%
Health Care	13%	15%	10%
Financials	9%	5%	22%
Materials	7%	6%	6%
Consumer Staples	7%	5%	4%
Energy	1%	1%	1%
Utilities	1%	1%	1%
Telecommunication Services	1%	2%	1%
Stock Exchange			
XHEL	54%	45%	22%
XSTO	23%	21%	46%
XCPH	22%	33%	31%
XICE	1%	1%	1%

Note: The table above represents the composition of the contaminated and clean samples. The latter sample excludes announcements around whose release date other company's news releases were published. The stocks are categorized according to stock exchange, size, and sector. The sample structure is compared with the composition of the NASDAQ OMX Nordic list as of January 2, 2012. For the Nordic list, companies with multiple listings were included only in Home Exchange.

3.2.2 Most of the announcements refer to “key employees”

Companies targeted compensation package changes at various types of executives. Therefore, we attempt to sort the announcements according to the recipient of the compensation (see Table 2). The task is complicated due to the fact that usually companies provide a very general indication of who the recipient of the compensation is. For example, the biggest part of the announcements, i.e. 94 (30%) and 36 (26%) announcements in contaminated and clean samples, respectively, addresses the compensation of “key employees”. However, the term “key employees” is not always clearly defined by the company. Moreover, most of the announcements concern compensation programs targeted at various types of recipients. For instance, compensation plans might be awarded to “CEO and senior management” or “Executive Board and key employees of the company”.

Table 2 *The categorisation of announcements according to recipients of compensation*

Recipient	Contaminated sample				Clean sample			
	N	%	N	%	N	%	N	%
Board of Directors	3	1%			1	1%		
Top executives: <i>announcements targeted at CEOs, CFOs, Executive Board or combination of those</i>	41	13%			21	15%		
CEO			22	7%			11	8%
CEO and CFO			5	2%			3	2%
Executive Board			8	2%			3	2%
Combination of CEOs, CFOs, or Executive Board			6	2%			4	3%
Other: <i>announcements targeted to key employees, 'key executives', 'executive management', 'senior management' or combination of those</i>	265	86%			114	84%		
Key employees			94	30%			36	26%
Total:	309	100%			136	100%		

Note: The table above represents the categorisation of announcements according to recipients of compensation. Percentages denote the shares of the categories in a total sample. Results are reported for contaminated sample (N=309) and clean sample (N=136). The latter sample excludes announcements around whose release date other company’s news releases were published.

Nevertheless, the categorization of the announcements according to a recipient reveals that 22 (7%) of announced compensation changes included in the contaminated sample and 11 (8%) announcements in the clean sample are aimed at CEOs only. Further 5 (2%) and 3 (2%) announcements in the respective samples announce changes in compensation packages for CEO and CFO of a company. In addition, there are merely 8 (2%) and 3 (2%) releases of compensation changes aimed solely at Board of Executives in the contaminated and clean samples, respectively. The respective samples include 41 (13%) and 21 (15%) announcements targeted only at top executives, i.e. CEOs, CFOs, Executive Board or combination of them. This indicates that companies usually introduce various compensation programs or adapt existing ones for a broader base of executives.

Other types of executives mentioned in the announcements are senior or key executives, executive management or senior management. However, it is not always clear how many and what kind of executives are included under these headlines. We do not exclude the announcements informing about the changes in the compensation packages for the Board of Directors since directors have high power to influence the performance of the company. Moreover, their compensation packages is a great expense for the company and, accordingly, for shareholders. However, our full sample includes only 3 announcements of such type.

3.2.3 Majority of the announcements reveal already taken decisions

None of the announcements in our sample indicate a change in the executives' base salary, i.e. the fixed, cash-based part of compensation. Most of the announcements provide information about the incentive part of the compensation package based on various equity instruments.

We distinguish between two types of announcements: (1) the announcements that propose a certain plan which still needs to be approved and (2) the announcements that inform about an already made decision to execute a compensation program without prior proposition to implement it. Yet, since the first disclosure of news is more likely to provoke a stock market reaction, if any at all, we make sure that in the second case all programs are mentioned for the first time.

Table 3 *The categorisation of announcements according to the announcement types*

Announcement type	Contaminated sample				Clean sample			
	N	%	N	%	N	%	N	%
Proposal:	43	14%			20	15%		
To start new program			21	7%			9	7%
To continue/adjust an existing program			22	7%			11	8%
Decision taken:	229	74%			97	71%		
To start new program			93	30%			34	25%
To continue/adjust an existing program			136	44%			63	46%
Other:	37	12%			19	14%		
<i>subscription of warrants/ options/ shares, proposed or approved compensation guidelines</i>								
Total:	309	100%			136	100%		

Note: The table above represents the categorisation of announcements according to the announcement types. Percentages denote the shares of the categories in a total sample. Results are reported for contaminated sample (N=309) and clean sample (N=136). The latter sample excludes announcements around whose release date other company's news releases were published.

Our contaminated and clean samples include 36 (12%) and 20 (15%) proposals suggesting compensation changes for the executives, respectively (see Table 3). There are 236 (76%) and 97 (71%) releases announcing decisions to introduce a certain compensation program. The remaining announcements are related to proposals and approvals of general compensation guidelines or the implementation of compensation programs, e.g. subscription to the offered equity instruments or transfer of these instruments as a reward for performance as approved by an incentive plan.

3.2.4 Regular changes vs. first time introduction of compensation plans

We observe that for some companies altering of compensation packages is not a regular procedure, while others reconsider the incentive pay for managers on a regular basis (yearly or every few years). 114 (37%) announcements in the contaminated sample and 43 (32%) announcements in the clean sample are related to proposals or decisions to implement new incentive programs that often establish an incentive pay strategy for the upcoming 3 years (see Table 3). Slightly more news releases involve proposals or decisions to renew or continue execution of an existing incentive

program, i.e. 158 (51%) and 74 (54%) announcements in the respective samples. The remaining announcements cannot be attributed to one of these categories, since they are related to the implementation of existing programs or concern general compensation guidelines.

3.2.5 Options – the most common incentive compensation form

Most of the executive incentive compensation packages included in our sample are based on options. Options are the basis for 104 and 47 announcements, which constitute 34% and 35% of the contaminated and clean samples, respectively. Shares and warrants are stated in 102 (33%) and 62 (20%) announcements, respectively, in the contaminated sample, while they are mentioned in 30 (22%) and 32 (24%) news releases in the clean sample. Options and warrants are granted free of charge or offered for subscription for either a market price or a symbolic fee without pre-emption rights for the shareholders. The types of shares granted or offered for subscription include ordinary, restricted or/and performance shares.

As it can be seen in the Table 4 below, our sample of announcements indicates that over the last decade in Sweden and Denmark options and warrants were the most popular forms of incentive compensation, while in Finland share-based compensation was the most common. Furthermore, in Finland a share-based compensation plan in most cases included a proportion of cash primarily

Table 4 *The categorisation of announcements according to compensation forms and countries*

Compensation form	Contaminated sample					Clean sample				
	Total N(%)	STO N(%)	CPH N(%)	HEL N(%)	ICE N(%)	Total N(%)	STO N(%)	CPH N(%)	HEL N(%)	ICE N(%)
Warrants	61 (19%)	16 (5%)	42 (13%)	3 (1)	0	34 (25%)	13 (10%)	21 (15%)	0	0
Options	104 (34%)	21 (7%)	46 (15%)	35 (11%)	2 (1%)	47 (35%)	16 (12%)	18 (13%)	12 (9%)	1 (1%)
Shares	30 (10%)	3 (1%)	2 (1%)	25 (8%)	0	10 (7%)	1 (1%)	1 (1%)	8 (5%)	0
Shares & Cash	71 (23%)	0	0	71 (23%)	0	31 (23%)	0	0	31 (23%)	0
Other	43 (14%)	16 (5%)	6 (2%)	21 (7%)	0	14 (10%)	7 (5%)	2 (1%)	5 (4%)	0
Total:	309 (100%)	56 (18%)	96 (31%)	155 (50%)	2 (1%)	136 (100%)	37 (28%)	42 (31%)	56 (40%)	1 (1%)

Note: The table above represents the categorisation of announcements according to the compensation forms and stock exchanges. STO, CPH, HEL and ICE stand for NASDAQ OMX Stockholm, Copenhagen, Helsinki and Iceland, respectively. Percentages denote the shares of the categories in a total sample. Results are reported for contaminated sample (N=309) and clean sample (N=136). The latter sample excludes announcements around whose release date other company's news releases were published.

aimed to cover taxes resulting from the transfer of shares. In addition, these plans were linked to certain factors, such as company's sales, operating profit, cash flow, total shareholder return, equity ratio, return on capital employed or earnings per share. Our contaminated sample includes 71 (23%) announcements related to share-based compensation plans that also include cash payments, while our clean sample has 31 (23%) such announcement. All these plans were introduced in Finland.

3.2.6 Most announcements are regular company news releases

The change in a managerial compensation package is one of the reasons why an extraordinary shareholders' meeting might be called. Our contaminated sample includes 34 and clean sample includes 19 news releases that inform about the proposal to change a managerial compensation package (or a part of it) through the invitation to the extraordinary shareholders' meeting. We infer that Sweden has the highest propensity to use extraordinary shareholders' meeting for making managerial compensation-related decisions, since 24 out of 34 news releases with the title "Invitation to the extraordinary shareholders meeting" in the contaminated sample come from Sweden. The remaining announcements are regular company news releases.

4 Research design

The ultimate goal of adjusting compensation packages of top managers is to increase the value of a firm. Therefore, any previously unknown information on managers' pay, documented in the news release, should be reflected in the company's stock price. To test this relationship, we employ the event study methodology. The event study is a common approach when measuring the impact of an economic event, be it an earnings announcement or a change in the regulatory environment, on a stock price of a firm. The idea behind measuring movements in stock prices is that, assuming that market players are rational, their expectations of an event's impact on the firm's value (even in medium and long term) will be immediately reflected in security prices. Thus, on the contrary to direct productivity-related measures that require long periods of observation and have to deal with the inherent 'noise' from other external events, an event study allows measuring the economic impact of an event by using security prices over a short period of time (MacKinlay, 1997).

Our aim is to determine whether, on average, there are abnormal returns in the stock price of either Swedish, Danish, Finnish or Icelandic company's, listed on the NASDAQ OMX Nordic

list, when the company announces changes in the compensation packages for its executives. Thus, the null hypothesis that we test is as follows:

H₀: there are no significant abnormal returns on a company's stock, listed on the NASDAQ OMX Nordic, when an announcement of changes in the top management's compensation packages is made.

4.1 Validating event study assumptions

Event studies are based on several assumptions. First of all, the method assumes that markets are efficient. Thus, any new information is instantaneously incorporated into a stock price. Second, it is assumed that an event was unanticipated. Therefore, any information leakages to the market before the formal announcement must be taken into account. Finally, the critical assumption is that there are no confounding effects during the event window. If the considered event is not isolated from other events that might have an impact on the firms value, it becomes not clear to which event should abnormal returns be attributed (McWilliams & Siegel, 1997).

Therefore, in order to make sure that we correctly measure abnormal returns associated with the events under the study, and that, consequently, our conclusions of the event study are valid, we control our initial sample so that the above assumptions are maximally fulfilled. The first assumption of market efficiency is out of our control. The second assumption of unanticipated events is hardly fully realizable, since it is difficult to determine when an investor becomes aware of the new information (McWilliams & Siegel, 1997). Yet, we tried to increase the validity of this assumption by checking for possible earlier releases of the news documented in our collected announcements on Factiva business news database, which covers a wide range of business information sources. We investigated whether the particular change in managerial compensation package was mentioned in Factiva news sources a month before the identified event date. The investigation revealed 3 pieces of news that had been mentioned before. We re-set the dates for these events. In addition, we account for the possible news leakages based on inside information by analysing the stock price development over 3-day and 10-day periods prior to the event date, as explained in the section below.

To validate the third assumption, i.e. to avoid confounding effects, we checked NASDAQ OMX news section for any other company news released on the event day or the day after. We found that 173 events were contaminated by other events, thus they were eliminated from our initial sample. As a result, we use the “clean sample” of 136 observations in our analysis.

We further follow a research design of an event study as described by (Campbell, Lo, & MacKinlay, 1997).

4.2 Event definition and timing

The events of our study are the announcements of changes in executive compensation packages of Swedish, Danish, Finish and Icelandic companies included in the NASDAQ OMX Nordic list.

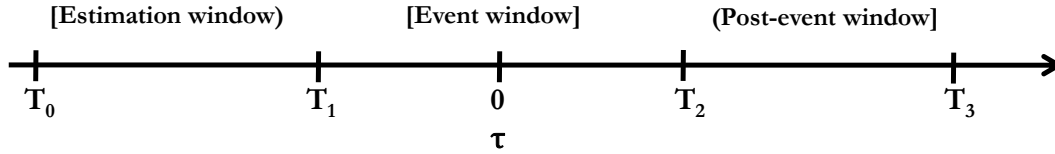


Figure 3 *Time-line for the event study*

The time-line for our event study is depicted in Figure 3. We define $\tau = 0$ as the event date and $\tau \in [T_1; T_2]$ as an event window – a period over which stock prices will be analyzed. We choose three different event windows: $[0; 1]$, $[-3; 3]$, and $[-10; 10]$. The first event window includes the event day and the day following the announcement day. The event window expansion to two days helps us account for the fact that some of the announcements in our sample were published after the stock market closure on the event day. In order to examine the stock price development over days surrounding the event, i.e. to account for a possible information leakage before the event and investigate the post-event price drift, we also chose longer event windows of 7 and 21 trading days (event windows of $[-3; 3]$ and $[-10; 10]$). We did not use even longer event windows to avoid confounding effects of other events. Also, the statistical power of an event study to capture abnormal returns decreases as the event window becomes longer (Campbell et al., 1997).

4.3 The design of an event study

The event's impact on a firm's value is measured by the abnormal return: excess return of a security over the event window as compared to security's normal return over the same period, which would be expected if the event did not happen. An observed deviation from normal return, i.e. abnormal return, for a security i at event date τ is measured as:

$$AR_{i\tau} = R_{i\tau} - E[R_{i\tau}|X_\tau] \quad (1)$$

where $AR_{i\tau}$, $R_{i\tau}$, and $E[R_{i\tau}|X_\tau]$ are the abnormal, actual and expected, or normal, returns for the period τ , respectively. X_τ is the information needed to estimate normal return.

Based on the formula above, the event study procedure involves the following steps:

- 1) Modelling the normal returns for all events,
- 2) Calculating abnormal returns for each event,
- 3) Cumulating abnormal returns across events and time,
- 4) Testing if obtained cumulative abnormal return is statistically significantly different from zero.

The first three steps will be explained in greater detail in the following subsections, i.e. 4.3.1 through 4.3.3, while the testing procedures will further be described in the Section 4.4.

4.3.1 Modelling the normal return

Two approaches are commonly used for modelling the abnormal return: a constant mean return model and the market return model. We choose the most widely used option in practice – the market model. By eliminating the systematic risk, the market model reduces the variance of the abnormal return of a stock and, consequently, the estimation bias (Campbell et al., 1997). In essence, the market model relates the return of a particular security to the return of the market portfolio. The model is based on the assumption that asset returns follow a normal distribution.

The parameters of the market model are estimated using data from the estimation window $\tau \in [T_0; T_1]$ (see Figure 3). The estimation window was chosen to be 210 trading days. Such a window is sufficiently long in order to obtain minimally biased estimates for modelling the normal returns (MacKinlay, 1997). The event window and the estimation window should not overlap so that the normal return model's parameter estimates would not be distorted by the abnormal returns caused by the event.

We estimate the market model return of a security i as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (2)$$

$$E(\varepsilon_{it})=0, \quad \text{Var}(\varepsilon_{it})=\sigma_{\varepsilon_i}^2$$

where R_{it} and R_{mt} are daily returns of the security i and the market portfolio over a period t , respectively. ε_{it} is a zero mean disturbance term. We use usual OLS estimators to estimate α_i and β_i . We employ OMX Stockholm PI, OMX Copenhagen, OMX Helsinki and OMX Iceland price

indices as proxies for market portfolio returns. These indices include all the stocks listed on a particular exchange and, therefore, are the best estimates of the market returns.

We further adjust the OLS betas for mean reversion (Blume, 1979). This procedure also helps to reduce the possible estimation error arising from low liquidity stocks:

$$\beta_i^A = 0.34 + 0.67 \times \hat{\beta}_i \quad (3)$$

where β_i^A denotes beta estimate adjusted for mean reversion, while $\hat{\beta}_i$ denotes beta estimate for security i .

4.3.2 Calculating the abnormal return

The estimation of market model parameters allows us to calculate the abnormal return for the event window. We estimate the abnormal returns by:

$$AR_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau} \quad (4)$$

where $AR_{i\tau}, \tau \in [T_1; T_2]$, is the sample of abnormal returns for firm i over the event window.

For the further hypothesis testing it is important to know the variance of the abnormal return $AR_{i\tau}$:

$$\sigma^2(AR_{i\tau}) = \sigma_{\varepsilon_i}^2 + \frac{1}{L_1} \left[1 + \frac{(R_{m,t} - \hat{\mu}_m)^2}{\hat{\sigma}_m^2} \right] \quad (5)$$

where L_1 is the length of the estimation window, $\hat{\mu}_m$ is the average market return over the estimation period and $\hat{\sigma}_m^2$ is the variance of the market return over the estimation period. The first term of the equation (5) represents real disturbances, while the second term is the additional variance stemming from the sampling error in $\hat{\alpha}_i$ and $\hat{\beta}_i$ (MacKinlay, 1997). We assume that our estimation window is large enough to eliminate the estimation error. Thus, under the null hypothesis abnormal returns are distributed normally:

$$AR_{i\tau} \sim N(0, \sigma^2(AR_{i\tau})) \quad (6)$$

4.3.3 Cumulating abnormal returns

In order to find the overall implications of an event, we next calculate the average of the abnormal returns across the sample of events and cumulate them across each of the three chosen event windows to get cumulative average abnormal returns:

$$\overline{CAR}(T_1, T_2) = \sum_{i=T_1}^{T_2} \frac{1}{N} \sum_{k=1}^N \widehat{AR}_{i\tau} \quad (7)$$

where T_1 and T_2 denote the beginning and end of the event window, while N is the number of events.

Since the variance of the abnormal returns is unknown, it can be estimated by a sample variance found using the market model regression (equation (5)). Next, we accumulate the obtained variances:

$$\sigma^2[\overline{CAR}(T_1, T_2)] = \sum_{i=T_1}^{T_2} \sigma^2(\overline{AR}_\tau) = \frac{1}{N^2} \sum_{i=1}^N \hat{\sigma}_{\varepsilon_i}^2(T_1, T_2) \quad (8)$$

In order to ensure that there is no covariance between abnormal returns and cumulative abnormal returns of different securities, we checked if the event windows of different announcements for one stock do not overlap. Yet, there were no such cases in our sample.

Under H_0 cumulative abnormal returns are distributed normally:

$$\overline{CAR}(T_1, T_2) \sim N[0, \sigma^2(\overline{CAR}(T_1, T_2))] \quad (9)$$

4.4 Tests

4.4.1 Parametric tests

Parametric tests are based on the assumption that the distribution of abnormal returns is normal. Applying Central Limit Theory, this assumption holds for any sample that has more than 30 observations, which is the case for most of our subsamples (see Table 5).

We test our H_0 hypothesis, which states that there are no abnormal returns on the event day, employing two test statistics. Alternative hypothesis H_1 in both tests states that abnormal returns (CAR) are not equal to zero.

First, we use a standard test statistic, which is based on the assumption that stocks with higher variance have higher abnormal returns. Therefore, the returns of individual stocks are assigned equal weights.

$$t_1 = \frac{\overline{CAR}(T_1, T_2)}{\sqrt{\widehat{\sigma^2}[\overline{CAR}(T_1, T_2)]}} = \frac{\overline{CAR}(T_1, T_2)}{\sqrt{\frac{1}{N^2} \sum_{i=1}^N \widehat{\sigma}_{\varepsilon_i}^2(T_1, T_2)}} \quad (10)$$

$$t_1 \sim^{H_0} N(0, 1)$$

We further test H_0 by standardizing each abnormal return using an estimator of its standard deviation. Average standardized cumulative abnormal return SCAR over N securities over the event window is:

$$\overline{SCAR}(T_1, T_2) = \frac{1}{N} \sum_{i=1}^N \widehat{SCAR}_i(T_1, T_2) = \frac{1}{N} \sum_{i=1}^N \frac{\widehat{CAR}_i(T_1, T_2)}{\widehat{\sigma}_i(T_1, T_2)} \quad (11)$$

Under H_0 in large samples $\overline{SCAR}(T_1, T_2)$ is normally distributed with a mean of zero and variance $\left(\frac{L_1-2}{N(L_1-4)}\right)$. Consequently, a second test statistic is:

$$t_2 = \sqrt{\left(\frac{N(L_1-4)}{L_1-2}\right)} \times \overline{SCAR}_{(T_1, T_2)} \quad (12)$$

$$t_2 \sim^{H_0} N(0, 1)$$

In situations where the abnormal return is constant across securities, t_2 is preferable, because it gives more weight to the securities that have lower variance of abnormal returns. Yet, it is not likely that the results will highly depend on the choice of t_1 or t_2 over short event windows (MacKinlay, 1997).

4.4.2 Non-parametric tests

Parametric tests are stronger in the samples where normal distribution of abnormal returns can be assumed (i.e. in the samples that have more than 30 events). In order to perform the robustness check of the results obtained using parametric tests and to test the null hypothesis in small samples, non-parametric tests that do not need to assume any specific distribution of returns are used. Therefore, we also run two commonly used non-parametric tests: a sign test and Corrado rank test.

The sign test is based on the sign of the cumulative abnormal return and on the expectation that, under H_0 , the probabilities of CAR being positive or negative are equal. Null hypothesis H_0 to be tested under sign test is that non-negative return is associated with the event, i.e. $p(CAR_i \leq 0.0) \leq 0.5$. H_0 is tested against alternative hypothesis H_1 that negative abnormal returns are associated with the event, i.e. $p(CAR_i \leq 0.0) > 0.5$. Thus, when N^- is the number of cases when CAR is negative and N is the total number of cases, we have:

$$t_3 = \left[\frac{N^-}{N} - 0.5 \right] \frac{\sqrt{N}}{0.5} \quad (13)$$

$$t_3 \sim^{H_0} N(0, 1)$$

Yet, the power of the sign test might be weaker if the distribution of returns is skewed: the proportion of positive and negative returns is not even. Skewness would imply that even under H_0 the proportion of negative returns may differ from 0.5, as can be the case with daily data (Campbell et al., 1997). Therefore, in order to achieve robust results, we also conduct a non-parametric Corrado rank test.

In order to implement the test we take the time series of each security comprising of estimation and event window and estimate abnormal returns for L windows, where L is the number of these windows (of length of 2, 7 or 21 days) comprising the time series of security i . Then we rank abnormal returns of each security from 1 to L , denoting the rank for the security i on the event time τ as $K_{i\tau}$. K_{i0} stands for the rank of the abnormal return of security i on the event window. The expected rank under H_0 that there are no abnormal returns when the event occurs is $\frac{L+1}{2}$. The test statistic is, thus, defined as:

$$t_4 = \frac{1}{N} \sum_{i=1}^N \frac{K_{i0} - \frac{L+1}{2}}{s(K)} \quad (14)$$

$$t_4 \sim^{H_0} N(0, 1)$$

where

$$s(K) = \sqrt{\frac{1}{L_2} \sum_{i=T_1}^{T_2} \left(\frac{1}{N} \sum_{k=1}^N \left(K_{i\tau} - \frac{L+1}{2} \right) \right)^2} \quad (15)$$

It is important to emphasize that if one of the tests manages to reject H_0 , it alone provides insufficient evidence that the abnormal returns can be observed over the event window. The results obtained by all four tests have to be interpreted jointly.

5 Empirical results

In this section the empirical results of the event study are discussed. We run the tests and report the results both for the contaminated sample of 309 events and for the clean sample consisting of 136 events. However, we must emphasize that the results obtained from the contaminated sample should be interpreted with reasonable care due to the fact that other events might have influenced stock price development over the event window. Consequently, the abnormal return attributed to a particular event might be distorted. On the other hand, the relevant strength of the signals from other events, as compared to the announcements under study, is not evident. In addition, since a sample of 309 events is rather big, there is a possibility that the “noise” created by different confounding events has been cleared away. Therefore, for comparison reasons, we test both contaminated and clean samples.

First of all, we focus on the general test of whether there is no market reaction to any type of announcements about changes in the compensation packages of company executives. We run the tests for the two samples, contaminated and clean, which include all observations (309 and 136, respectively), and, therefore, are hereafter referred to as *whole samples*. We further test the same hypothesis employing different subsamples formed according to the recipient of the compensation package, the announcement type and various compensation forms. We create different subsamples expecting that some distinct categories of the announcements might send stronger or clearer signals to the market and, thus, would enable us to better capture the stock market reaction to the announcements.

Abnormal returns for various subsamples are portrayed in Table 5 below. We show the results for all three chosen event windows of $[0; 1]$, $[-3; 3]$ and $[-10; 10]$ trading days surrounding the event. We disclose the statistics of all four tests: two parametric and two non-parametric.

Table 5 *Results of the event study tests*

Event window	Contaminated sample						Clean sample					
	CAR	t test, t ₁	Stand. t test, t ₂	Sign test, t ₃	Corrado test, t ₄	N	CAR	t test, t ₁	Stand. t test, t ₂	Sign test, t ₃	Corrado test, t ₄	N
Whole samples, i.e. including all observations												
[0;1]	0.38%	1.769* (0.077)	1.408 (0.159)	0.284 (0.388)	0.275 (0.783)	309	0.24%	0.753 (0.452)	0.330 (0.741)	-0.343 (0.366)	0.324 (0.746)	136
[3;3]	0.50%	1.229 (0.219)	1.963** (0.050)	0.171 (0.432)	0.369 (0.712)	309	0.29%	0.490 (0.624)	0.590 (0.555)	0.000 (0.500)	-0.067 (0.946)	136
[-10;10]	1.79%	2.566*** (0.010)	3.081*** (0.002)	-1.081 (0.140)	0.671 (0.502)	309	2.02%	1.950** (0.051)	2.411** (0.016)	-0.515 (0.303)	0.834 (0.404)	136
Subsample based on the recipient: only CEOs, CFOs, and/or Board of Executives included												
[0;1]	0.43%	0.732 (0.464)	0.719 (0.472)	-2.655*** (0.004)	2.244** (0.025)	41	1.10%	1.249 (0.212)	1.381 (0.167)	-1.964** (0.025)	1.814* (0.070)	21
[3;3]	0.36%	0.331 (0.740)	1.027 (0.304)	-1.406* (0.080)	1.450 (0.147)	41	-0.07%	-0.041 (0.967)	0.430 (0.667)	-0.218 (0.414)	0.502 (0.616)	21
[-10;10]	0.42%	0.220 (0.825)	1.160 (0.246)	-0.781 (0.217)	1.259 (0.208)	41	-0.73%	-0.259 (0.796)	0.585 (0.559)	-0.218 (0.414)	0.570 (0.568)	21
Subsample based on proposals												
[0;1]	-0.11%	-0.205 (0.838)	-1.164 (0.244)	1.677** (0.047)	-1.452 (0.147)	43	-0.40%	-0.504 (0.614)	-0.865 (0.387)	2.236** (0.013)	-1.854* (0.064)	20
[3;3]	-0.11%	-0.106 (0.916)	-0.482 (0.630)	1.677** (0.047)	-1.030 (0.303)	43	-0.62%	-0.422 (0.673)	-0.715 (0.475)	0.894 (0.186)	-1.180 (0.238)	20
[-10;10]	0.11%	0.063 (0.950)	-0.015 (0.988)	1.067 (0.143)	-0.864 (0.387)	43	0.97%	0.380 (0.704)	0.286 (0.775)	0.000 (0.500)	-0.301 (0.764)	20
Subsample based on initial programs												
[0;1]	0.15%	0.436 (0.663)	0.032 (0.975)	0.749 (0.227)	-0.835 (0.404)	114	0.25%	0.469 (0.639)	-0.211 (0.833)	-0.458 (0.324)	-0.321 (0.748)	43
[3;3]	-0.16%	-0.259 (0.796)	0.126 (0.900)	1.311 (0.095)	-0.968 (0.333)	114	-0.08%	-0.082 (0.935)	-0.125 (0.900)	0.458 (0.324)	-0.855 (0.392)	43
[-10;10]	2.07%	1.876* (0.061)	2.232** (0.026)	-0.187 (0.426)	0.617 (0.538)	114	3.42%	2.019** (0.044)	1.721* (0.085)	-0.153 (0.439)	0.852 (0.394)	43

Table 5 continued

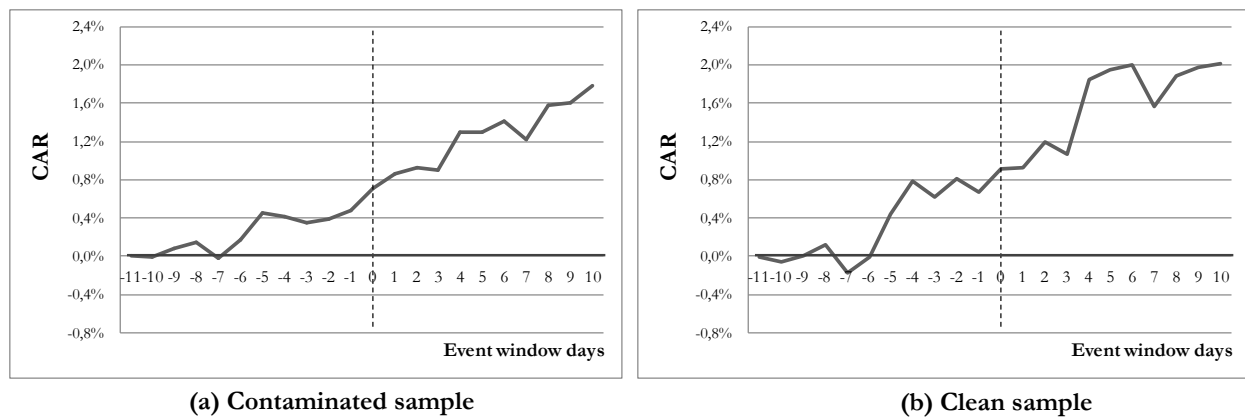
Event window	Contaminated sample						Clean sample					
	CAR	t test, t_1	Stand. t test, t_2	Sign test, t_3	Corrado test, t_4	N	CAR	t test, t_1	Stand. t test, t_2	Sign test, t_3	Corrado test, t_4	N
Subsample based on warrants												
[0;1]	0.40%	0.652 (0.514)	0.488 (0.625)	0.128 (0.449)	0.421 (0.674)	61	0.67%	0.786 (0.432)	0.632 (0.527)	0.000 (0.500)	0.791 (0.429)	34
[3;3]	0.30%	0.264 (0.792)	-0.007 (0.995)	0.384 (0.350)	0.709 (0.478)	61	0.94%	0.590 (0.555)	0.447 (0.655)	-0.686 (0.246)	1.157 (0.247)	34
[-10;10]	3.58%	1.803* (0.071)	1.520 (0.129)	0.896 (0.185)	0.637 (0.524)	61	5.61%	2.044** (0.041)	1.605 (0.109)	0.686 (0.246)	0.608 (0.543)	34
Subsample based on options												
[0;1]	0.68%	1.815* (0.070)	2.23** (0.026)	-0.196 (0.422)	0.622 (0.534)	104	0.06%	0.118 (0.906)	0.096 (0.924)	-0.438 (0.331)	0.072 (0.943)	47
[3;3]	0.75%	1.069 (0.285)	2.218** (0.027)	-0.196 (0.422)	0.876 (0.381)	104	-0.09%	-0.097 (0.923)	-0.016 (0.987)	0.146 (0.442)	-0.266 (0.790)	47
[-10;10]	1.17%	0.965 (0.335)	1.462 (0.144)	-0.784 (0.216)	0.982 (0.326)	104	1.37%	0.859 (0.391)	1.717* (0.086)	-0.729 (0.233)	0.917 (0.359)	47
Subsample based on shares												
[0;1]	0.74%	2.358** (0.018)	1.487 (0.137)	-0.896 (0.185)	1.219 (0.223)	101	0.35%	0.732 (0.464)	0.310 (0.756)	-0.781 (0.217)	0.409 (0.683)	41
[3;3]	0.87%	1.468 (0.142)	1.790* (0.074)	-0.697 (0.243)	0.294 (0.769)	101	0.70%	0.775 (0.439)	1.113 (0.266)	-0.781 (0.217)	0.468 (0.639)	41
[-10;10]	1.52%	1.479 (0.139)	2.174** (0.030)	-1.493** (0.068)	0.443 (0.658)	101	1.73%	1.104 (0.269)	1.713* (0.087)	-1.718** (0.043)	0.440 (0.660)	41

Note: The table summarizes the results of the tests of the event study. The results of the tests for the whole contaminated and clean samples as well as different subsamples are reported under the headings of the table parts. The clean sample and its subsamples exclude announcements around whose release date other company's news releases were published. Tests were performed for three event windows, i.e. [0;1]; [-3;3], and [-10;10]. The event day, or the day of the announcement, is day 0. The 2nd and 8th columns depict the calculated cumulative average abnormal returns (CAR) during those intervals. The test statistics of four tests are reported: two parametric tests (t_1 and t_2) and two nonparametric tests (t_3 for sign test and t_4 for Corrado rank test). Null hypothesis H_0 for the sign test is $p(CAR_i \leq 0.0) \leq 0.5$, while alternative hypothesis H_1 of the test is that $p(CAR_i \leq 0.0) > 0.5$. For the rest of the tests null hypothesis H_0 is $\overline{CAR} = 0$, while alternative hypothesis H_1 is that $\overline{CAR} \neq 0$. The p-values of tests are reported in brackets. *, **, *** denotes significance levels of 10%, 5%, and 1%, respectively.

5.1 No evidence for abnormal return was found in the whole samples

We first tested market reaction to announcements concerning changes in compensation packages based on the whole samples of events ($N=309$ for the contaminated sample and $N=136$ for the clean sample). Cumulative abnormal returns over $[-10; 10]$ event window are plotted in Figure 4 (a) and (b) below for the contaminated and clean samples, respectively. A few insights about the samples employed can be made by looking at the graphs. First, the disruption of the abnormal returns by other news released around the event date in the contaminated sample is minimal since the curves in both plots are very similar. Moreover, the smoother curve in Figure 4 (b) suggests the expectations that a larger sample reduces “noise” in abnormal returns were reasonable. Therefore, we infer that it is worthwhile to run tests for both samples in parallel.

Figure 4 *Plot of cumulative abnormal returns over $[-10;10]$ event window based on the whole samples*



Note: The figures above show the development of the average cumulative abnormal return (CAR) for the announcement of executive compensation changes over 21 trading days surrounding the event date. The event day, or the day of the announcement, is day 0 and is marked by the vertical line. Figure (a) represents CAR obtained using contaminated sample ($N=309$), while Figure (b) shows CAR obtained employing clean sample ($N=136$). The latter sample excludes announcements around whose release date other company’s news releases were published. CAR is calculated by aggregating abnormal returns of different events over time and across securities. Abnormal returns are calculated employing the market model as the normal return estimate.

Both plots show no stock market reaction on the event day. Rather a positive drift is observable both prior and after the announcement. The results obtained with the tests reflect the curve developments in the graphs. As can be seen in Table 5, little to no support is provided for statistically significant abnormal returns over 2-day and 7-day event windows. For a contaminated sample, only one out of two parametric tests in each of the two event windows suggests significance, while both nonparametric tests fail to reject their null hypotheses of equal likelihood of positive and negative CAR (sign test) and of zero abnormal returns (Corrado rank test). When the clean sample is

employed, all four tests show no statistical significance of abnormal returns in [0;1] and [-3;3] event windows.

Testing abnormal returns over [-10;10] event window provides some support for abnormal returns being statistically significant. Both parametric tests for both samples demonstrate statistical significance at 1% and 5% significance levels ($t_1=2.566$, $t_2=3.081$ and $t_1=1.950$, $t_2=2.411$ for the contaminated and clean samples, respectively). One could speculate that finding support for non-zero abnormal returns only in the longest event window could be interpreted as an indication that investors need time to comprehend the information provided in the announcements. However, the results of parametric tests lack robustness since nonparametric tests fail to reject their null hypotheses of equal probability of CAR being either positive or negative (sign test) and of non-zero abnormal returns (Corrado sign test). Also, since we observe a positive drift not only after, but also before the event date, the argument of slow market reaction after the event does not seem very plausible. It might rather be that we capture the effects of some other events taking place around our event window. Therefore, we conclude that the test results based on the whole samples including all observations provide insufficient evidence to support the alternative hypothesis of non-zero abnormal returns caused by the announcements about changes in managerial compensation packages.

The results of our test on whole samples are largely consistent with the findings of Ikäheimo et al. (2004), who have not found any statistically significant stock market reaction to employee stock option plan (ESOP) announcements of companies listed on the Helsinki Stock Exchange. In addition, we support the findings of Martin & Thomas (2005), who have not been able to capture significant market response to the adoption of stock option plans targeted at executives in the US firms in 1998.

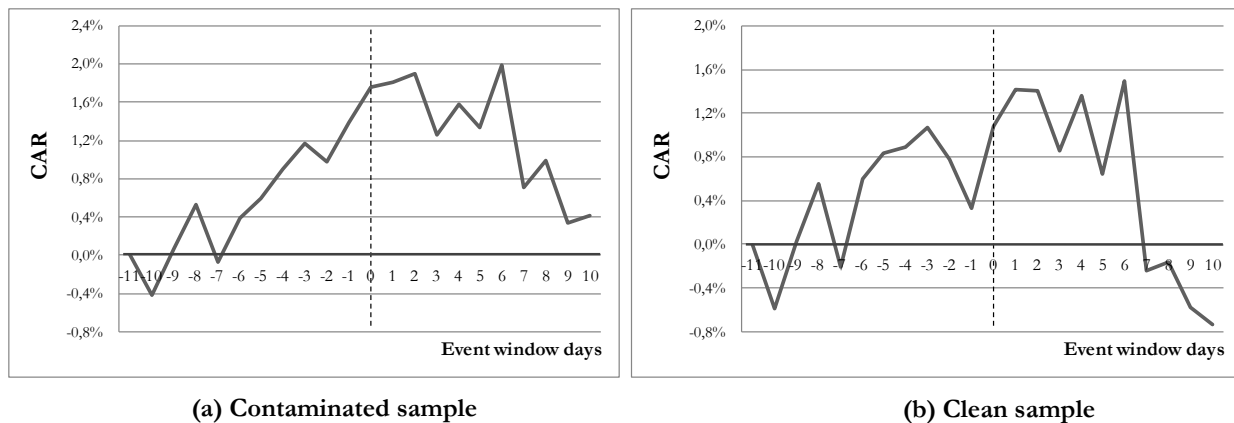
5.2 Weak evidence for immediate reaction was found in sub sample of top executives

Our sample of announcements reveals that CEOs, and in some cases other members of the Executive Board, quite frequently receive individual incentive compensation packages. CEO, CFO and the whole Executive Board are chief executives in the company who make key decisions and implement the company's strategy, i.e. they have the necessary power to influence the company's performance if incentivized accordingly. Therefore, we would expect that an announcement

declaring changes in top executives' compensation should convey more useful information about the firm's future performance and, thus, create a stronger signal to the stock market. This logic is supported by previous literature that finds positive stock market reaction to adoption of certain pay plans for top executives (Bhagat et al., 1985; Morgan & Poulsen, 2001; Ikäheimo et al., 2004). Thus, we run the tests for the contaminated and clean subsamples of news releases related to the changes in compensation for CEOs, CFOs, and/or other members of the Board of Executives only.

Since both subsamples are rather small ($N=41$ and $N=21$ for the contaminated and clean subsamples, respectively), we rely on the results of nonparametric tests. For $[0; 1]$ event window, sign test rejects its null hypotheses of equal probabilities of CAR being positive or negative at 1% ($t_3=-2.655$) and 5% ($t_3=-1.964$) significance levels for contaminated and clean samples, respectively. Corrado rank test supports the results of sign test as its null hypothesis of zero abnormal return is rejected at 5% and 10% significance levels for contaminated and clean subsamples ($t_4=2.244$ and, $t_4=1.814$, respectively) over $[0; 1]$ event window. This suggests that immediate positive abnormal return of 0.43% in the contaminated sample and 1.1% return in the clean sample could be observed after the announcements about changes in compensation packages of top executives.

Figure 5 *Plot of cumulative abnormal returns over $[-10;10]$ event window for the subsamples including top executives: CEOs, CFOs and/or Executive Board*



Note: The figures above show the development of the average cumulative abnormal return (CAR) for the announcement of executive compensation changes over 21 trading days surrounding the event date. The event day, or the day of the announcement, is day 0 and is marked by the vertical line. Figure (a) represents CAR obtained using contaminated subsample ($N=41$), while Figure (b) shows CAR obtained employing clean subsample ($N=21$). The subsamples include announcements concerning compensation changes for top executives, i.e. CEO, CFO, and/or Executive Board. The latter subsample excludes announcements around whose release date other company's news releases were published. CAR is calculated by aggregating abnormal returns of different events over time and across securities. Abnormal returns are calculated employing the market model as the normal return estimate.

However, if we look at the plots in Figures 5 (a) and (b) depicting CAR development over 21-day surrounding the event, no clear stock market reaction can be observed on the event day. Considering both the test results and the graphs, we conclude that there is weak evidence of immediate positive stock market reaction to changes in compensation packages of top executives (i.e. CEOs, CFOs and/or Board of Executives). Our results are in line with the findings of several studies proving evidence that there is a positive stock market reaction to the adoption of certain compensation packages, especially when these packages are targeted at top executives (Bhagat et al., 1985, Morgan & Poulsen, 2001; Ikäheimo et al., 2004).

Looking at two other event windows, i.e. $[-3;3]$ and $[-10;10]$, we can see that only the sign test for the contaminated subsample indicates a significant abnormal return at 10% significance level over 7 trading days. However, because of the shortcomings of the test, the sign test alone does not provide sufficient evidence of statistically significant abnormal returns. On top of that, the test result is not statistically significant when the clean subsample is employed. In brief, test results provide no support to the alternative hypothesis of non-zero abnormal returns over 7-day and 21-day event windows.

We have also performed the tests on the subsample including announcements related solely to CEO compensation. However, there are only 14 clean events of such type, and the obtained results are statistically insignificant.

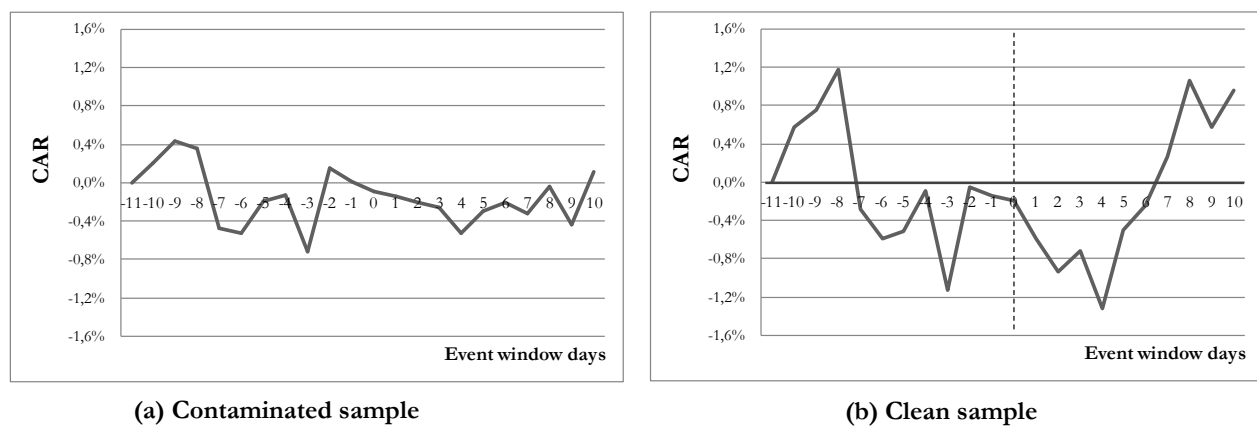
5.3 Weak evidence was found for negative abnormal return in the subsample of compensation proposals

In our sample of announcements we have distinguished between the two types of announcements: the ones that propose certain compensation changes which still need to be approved in the shareholders' meeting and the ones that inform about the already taken decisions to approve compensation packages. Even though we have tried to make sure that all the events documented in our collected announcements are unanticipated, there is still a chance that we might have missed the initial proposals of already approved programs due to the fact that only official announcements are released on the NASDAQ OMX. Consequently, some of the news releases announcing the decisions of the Board of Directors to introduce or execute any kind of incentive program might not be the initial mentioning of the program. Therefore, we expect that the subsample of the announcements with the proposals about certain changes in compensation packages of top

management might provide a clearer signal, if any. Hence, we perform analysis for the contaminated and clean subsamples that include the announcements containing proposals only.

Table 5 reveals that in this case the sign of abnormal return is inconsistent over different event windows in both contaminated (N=43) and clean (N=20) samples: abnormal returns are negative over the first two event windows and positive over the third, the longest, window. The plots of CARs over 21-day event window depicted in Figures 6 (a) and (b) also illustrate high volatility of CAR in this subsample.

Figure 6 *Plot of cumulative abnormal returns over [-10;10] event window for the subsamples based on the proposals*



Note: The figures above show the development of the average cumulative abnormal return (CAR) for the announcement of executive compensation changes over 21 trading days surrounding the event date. The event day, or the day of the announcement, is day 0 and is marked by the vertical line. Figure (a) represents CAR obtained using contaminated subsample (N=43), while Figure (b) shows CAR obtained employing clean subsample (N=20). The subsamples include announcements concerning proposals to implement a new compensation program or adjust/continue an existing one. The latter subsample excludes announcements around whose release date other company's news releases were published. CAR is calculated by aggregating abnormal returns of different events over time and across securities. Abnormal returns are calculated employing the market model as the normal return estimate.

Due to a small number of events in both contaminated and clean subsamples, we again rely on nonparametric tests. As for the contaminated subsample, over the shortest [0;1] and [-3;3] event windows, statistical significance of negative abnormal returns (-0,11% for both event windows) is supported only by the sign test, which rejects the null hypothesis of equal probability for CAR being either positive or negative at 5% significance level. The test supports an alternative hypothesis that a negative abnormal return is associated with a given event. However, since the validity of the sign test depends on the skewness of returns distribution, one has to be careful interpreting these results. Though, the Corrado rank test, that is free of the weakness mentioned above, confirms statistically

significant negative abnormal return of -0.4% over [0;1] event window for the clean sample at 10% significance level ($t_4=-1.854$). Sign test supports negative abnormal return over 2-day event window at 5% level ($t_3=2.236$).

What concerns the longest event window of [-10;10] trading days, all of the tests fail to reject the null hypotheses of zero or non-negative abnormal returns for both contaminated and clean samples.

5.4 Insufficient evidence for abnormal return was found in subsample of initial programs

We are further interested if the information content varies between the announcements stating the proposition or the adoption of a new incentive compensation program and the announcements informing about the renewals of already existing programs. We would expect that the former announcements would result in a stronger stock market reaction since they provide new and unanticipated information as opposed to the regular yearly renewals of management compensation programs.

All four tests for both the contaminated ($N=114$) and clean ($N=43$) subsamples fail to reject the null hypothesis of zero abnormal returns over [0;1] and [-3;3] event windows. For the longest event window of 21 trading days, parametric tests suggest some support for alternative hypothesis of non-zero abnormal returns at either 5% or 10% significance levels ($t_1=1.876$, $t_2=2.232$ and $t_1=2.019$, $t_2=1.721$ for contaminated and clean samples, respectively). However, nonparametric tests do not provide any support for robustness of these results, since both of them fail to reject their null hypotheses of equal probability of either positive or negative CAR and of zero abnormal returns (for sign and Corrado rank tests, respectively).

5.5 No evidence of abnormal returns was found in subsamples of various compensation forms

Finally, we are interested if any of different compensation forms, such as stocks, options, or warrants, send a stronger signal to the stock market. Awards of shares or equity instruments might provoke different stock market reaction due to their diverse pay-off structures, timing or their effect on the company's share capital. For instance, granting of warrants to management might be negatively perceived by investors, since it might lead to the issuance of new shares and, consequently, a dilution of a common stock possessed by existing shareholders. Indeed, previous

research (Morgan & Poulsen, 2001, Ikaheimo et al., 2004; Martin & Thomas, 2005) found that there is negative market reaction to compensation packages having potential dilution effects. In addition, the time an effort needed to grasp the value of the announced compensation change might also influence investors' reaction to such changes. For instance, in order to calculate the value of granted warrants, market players must employ financial models, while the value of a share-based compensation program might be easily assessed. Therefore, we form three subsamples of the announcements about the incentive programs that are based on warrants, options, and stocks.

When comparing test results for the subsamples of three different compensation forms (see Table 5), we see that none of the subsamples provides stronger evidence for non-zero abnormal returns than the others. First, when we run the tests for the warrant subsample, only one test out of four, i.e. standard test statistic, provides support for non-zero abnormal returns at 10% and 5% significance levels for contaminated and clean subsamples, respectively, but only in the longest event window of 21 trading days. The estimated abnormal return over this event window is positive, which contradicts the reasoning that investors negatively perceive compensation forms that imply stock dilution as shown by Morgan & Poulson (2001), Ikaheimo et al. (2004), or Martin & Thomas (2005).

Furthermore, test results for the option subsample differ rather substantially for contaminated and clean subsamples. For the contaminated subsample, over $[0;1]$ event window both parametric tests indicate non-zero abnormal returns ($t_1=1.815$, $t_2=2.230$); over $[-3;3]$ event window only one of the parametric tests supports non-zero return ($t_2=2.218$), while in the longest event window no non-zero abnormal returns are observed. Nonparametric tests provide no support for non-zero returns in all event windows, indicating that the statistically significant results obtained by parametric tests lack robustness to provide sufficient evidence for non-zero abnormal return. In short, we find that for the clean subsample of options, only in the longest event window one of parametric test indicates non-zero abnormal return at 10% significance level. Yet, this is a very weak support for statistically significant market reaction to the announcements to changes in compensation packages based on options as a reward form.

A subsample of shares includes all the announcements about the compensation package changes based on the granting of shares and shares plus cash (mainly to cover tax expenses) to executives conditional on performance (see Table 4 in Data section). While in the contaminated subsample in each of the event windows one or two tests indicate statistical significance of abnormal

returns over the event window, the tests employing the clean subsample provide some weak evidence of non-zero abnormal returns only for the longest event window at either 10% or 5% significance level ($t_2=1.713$, $t_3=-1.718$).

All in all, no strong inference about market reaction to different executive compensation forms could be drawn, i.e. we find no evidence that some of the compensation forms would provide clearer information or stronger signal to the market.

5.6 Other subsamples provided no evidence of abnormal returns

In addition to the tests that we report in Table 5, we also have performed analysis on other subsamples. First, we form subsamples based on different countries (except for Iceland, which has too few observations). Furthermore, we create additional subsamples for other compensation forms, such as cash or mixed compensation programs consisting of various performance measures and pay-off structures. We also have run tests for other announcement types and their combinations, such as the announcements related to subscriptions to warrants and/or options. Yet, neither of these tests provides statistically significant results. Moreover, we have attempted to split the subsamples even further based on two criteria, such as an announcement type and a compensation recipient. For instance, we aimed to check whether announcements of proposals or adoptions of new incentive programs for CEOs, CFOs and the Executive Board members only convey any relevant information to the stock market. Yet, we are not able to test such subsamples due to a too small number of observations. Finally, we try to speculate that the market could demonstrate stronger and more immediate reaction to the announcements of the executive incentive programs whose value can be more easily measured. However, running the tests on the subsample of such programs, we find no statistically significant abnormal returns either.

6 Discussion

In general, as discussed in the empirical results section, the event study did not capture any significant stock market reaction to the announcements of changes in executive compensation packages. In general, these results contradict to the findings of the similar event studies performed on the US data, which find a positive stock market reaction to various types of compensation changes (e.g. Brickley et al., 1985; DeFusco et al., 1990; Core et al., 2003; and others, see Table 6 in Appendix). It might be that we do not find significant market reaction to compensation changes in the Nordics, because equity-based compensation constitutes a relatively lower part of the total

executive compensation in this region (Bryan, Nash, & Patel, 2006). It might also be that we do not capture significant market reaction because we examine all kinds of compensation changes, as opposed to other studies that look only at a specific type of plans, e.g. stock option programs.

From the perspective of the institutional theory, this finding of no stock market reaction would not be a surprising result. The theory argues that companies adopt certain pay plans not because they have an intention to increase a firm's value, but rather because they want to conform to industry standards. Thus, one should not expect a market to react to an action that is not aimed at increasing shareholders' wealth. Moreover, taking the common pool approach one might argue that compensation changes do not lead to shareholders' value creation because giving monetary incentives to managers might crowd out their intrinsic motivation to manage the company well. Following the same theory, stock market might not react because, given intensive interdependencies within a firm, it is hard for investors to observe the actual effort (or the change in it) of an individual executive to work towards increasing firm's value. Finally, stakeholder theory suggests that market might not expect value creation due to incentive pay because executives cannot only concentrate on increasing firm's performance since they also have to address the needs of other stakeholders.

Nevertheless, although the observed abnormal returns could not be proved to be statistically significant, in most of the subsamples they are positive (a subsample based on the proposals for changes in compensation plans indicated negative abnormal returns, see Table 5). Positive value effects stemming from the announcements related to management compensation are in line with the explanations of agency theory, which sees compensation as a tool for aligning the interests of shareholders and managers (Jensen & Meckling, 1976). From the agency theory perspective, the purpose of the changes in compensation packages is to reduce agency costs and, consequently, increase shareholders' wealth.

Indeed, most of the changes in compensation packages, as documented in the announcements, are either introduction, continuation or adjustment of executive incentive pay plans (mostly equity-based compensation schemes). The companies that explained their rationale for introducing incentive pay for executives generally stressed that they aimed at providing managers with motivation and incentives to strengthen the results of the company as well as direct their efforts towards the long-term value creation. Some of the companies even explicitly stated that their objective was to increase the market price of the company's stock or to augment the company's

market capitalization value. Positive, albeit insignificant, market reaction to changes in executive compensation might suggest that equity-based compensation programs have some incentivizing effect on managers; yet this effect is very weak.

In addition, a tendency for positive market reaction could be explained by the signalling argument. The amendments in executive compensation packages might be a signal to the market that a company's profitability and cash flows are expected by insiders to improve in the future. Therefore, even though changes in compensation are not aimed at increasing incentives of managers, market participants might still react solely due to signalling reasons (Bhagat et al., 1985).

An interesting observation is that the plots of cumulative abnormal returns in the general case based on whole samples (see Figures 4 (a) and (b)) demonstrate an upward trend. One explanation for such a trend could be based on the managerial power theory. If managers have power to affect the timing of a compensation plan adoption, they might try to persuade the Board to introduce such plans when they expect improvement in the future performance of a firm. In such a way they might attempt to benefit by tying their compensation to strong future corporate earnings (Morgan & Poulsen, 2001). Consequently, the increasing CAR observed in our subsamples might be a sign that managers pushed for the changes in compensation packages at a time of favourable stock market development. On the other hand, it might be that the observed increasing cumulative abnormal return over the whole event window is just a consequence of a drift from a preceding important event or it is a result of a non-normal distribution of stock returns.

We find some, although weak, evidence of a stock market reaction to the announcements only for the subsamples based on top executives and the subsamples that include proposals for compensation changes. The announcements of changes in compensation plans targeted at CEO, CFO and the Board of Executives only result in an immediate stock market reaction with positive 1.1% abnormal return over a two-day event window. The instantaneous market reaction is not surprising since top managers have the greatest impact on the firm's performance (Morgan & Poulsen, 2001). There might be no market reaction for the sample including incentive programs dedicated for lower level managers because shareholders might anticipate a free-rider problem. When more individuals are involved in an incentive program, each employee might have less incentive to put effort in increasing the company's value because of their marginal contribution to the stock price development (Bhagat et al., 1985).

We also find some proof for an instantaneous stock market reaction to the announcements that contain proposals to adopt a new executive compensation program as well as the proposals to replace or continue an existing one. The fact that an immediate reaction might be observed is not unexpected since, as compared to the announcements of compensation decisions, the announcements of the proposals have a higher likelihood to provide new information to the market.

Interestingly, on the contrary to the positive market reaction that we observe in other cases, the proposals to make certain changes in executive compensation packages result in slightly negative abnormal return of -0.4%. A market might have a slightly sceptical perception to the proposals because such announcements have a higher propensity to be rather vague and inaccurate as compared to the announcements informing about the decision to introduce a particular compensation program. Indeed, in some of our collected announcements the proposals lacked detailed information. Such proposals merely expressed an intention by a company to introduce a new program or adjust/continue an existing program and did not provide specific details about the recipients of the compensation, the compensation form, the duration of a plan or other conditions. For example, one of such announcements states: “the Board of Directors of Affecto Plc has decided to survey a possibility to establish an incentive plan directed to selected members of the Affecto Group Executive Team where the target group purchases the Company's shares potentially partly by means of financing provided by the Company” (Affecto, 2010). In short, the market might negatively respond to the announcement of proposals because these messages do not provide sufficient information for investors that could help them evaluate the potential impact of executive compensation on their wealth.

Finally, we were not able to find stock market reaction to any of the equity-based compensation forms, such as warrants, options, or stocks. This result suggests that a particular means of compensation does not provoke a market to react. This is consistent with the notion that firms have distinct characteristics and, therefore, face different conflicts of interests between managers and other stakeholders. Consequently, each firm will design its executive compensation programs in such a way that it best minimizes agency costs. As a result, there is no certain dominant type of remuneration (Brickley et al., 1985).

7 The analysis of compensation cost vs. aggregate euro return

Up to now, we analysed shareholder value creation based on different qualitative characteristics of compensation package changes. Since compensation (including incentive systems) is an expense to the company with a rather unclear outcome, the amount of money involved in compensation-related programs is an important factor to look at. Therefore, in this section we try to estimate the value of the programs documented in the announcements and try to compare it to the euro return associated with these announcements. Moreover, we compare it to the theoretical euro return, i.e. an increase in company value, which we should have had observed in our sample in order to be able to make statistical inferences that non-zero abnormal returns hold even outside our sample.

Such comparison is not aimed at supporting or rejecting the null hypothesis of an event study or postulating any new hypotheses. Nevertheless, even though this supplementary analysis of the event study results in monetary terms requires rather strict assumptions, it might well give additional insights and serve as a robustness check for insignificant abnormal results obtained in the event study.

This section is structured as follows. Firstly, we estimate the aggregate value of compensation programs, calculate the aggregate euro value of the observed abnormal returns and compute a theoretical change in the market value of a company. We then provide our interpretation of the obtained results.

7.1 Estimation procedure

In order to perform a comparative analysis mentioned above, we need to estimate three values:

- 1) Aggregate cost of compensation packages. This measure is equal to a part of the market value of the adopted changes in compensation packages that represent costs to the companies, i.e. the part that is not covered by required upfront investments from executives' side.
- 2) Aggregate observed euro return. This measure represents changes in firms' market capitalizations following the release of the announcements aggregated for all securities. This measure could be interpreted as expected aggregate company value creation in our sample due to announced changes in executive compensations.

- 3) Theoretical aggregate euro return. This measure shows an increase in company value, which we should have had observed in our sample in order to be able to make statistical inferences that non-zero abnormal returns hold even outside our sample.

We base our additional analysis on the clean sample of 136 news releases.

7.1.1 Compensation cost estimation

The majority of the compensation package changes in our sample were based on the introduction of share-based incentive schemes where the main means of pay were shares (in Finland it usually was a mix of shares and cash), stock options and warrants (see Table 4 in Data section). The valuation of certain compensation packages would require making various assumptions about stock return volatility or risk-free interest rate at the announcement dates. Therefore, in order to avoid the reliance on the assumptions we decided to take the market values of the programs provided by the companies. Otherwise, we excluded the announcements from the sample. We attempted to estimate the value only of the share programs since they required a valuation method that did not require company-specific assumptions.

It should be noted that in a big part of the programs the granting of options, warrants or stocks is conditional on some clauses, such as employment time or company performance. Such conditions might be stricter for some companies and easily achievable to the others, thus, it is very difficult to assign a monetary value to them. Therefore, they are not taken into account when estimating the value of the changes of compensation plans.

Value estimation of warrant and option based programs

For warrant and option based programs we took the estimated market values that were provided in the announcements. In total 51 values were obtained.

Value estimation of share based programs

As mentioned before, in Finland the majority of the programs grant a mix of shares and cash. We estimated their value based on three assumptions:

- 1) We set the expected value of the stocks to be equal to the closing price of the stock on the announcement day, which is quite a common assumption following a random walk theory.

- 2) The amount of shares granted depends on the future performance of the top managers, which makes it difficult to predict the number of shares to be distributed. Therefore, we assume that the maximum allowed number of shares (this number is usually provided in the announcements) will be granted.
- 3) For the announcements that do not include cash in the reported value of stocks to be granted and do not provide the exact proportion of cash to be allocated, we assume that cash makes up 50% of stocks' value. This is a reasonable number to assume since the same number was reported in all the announcements that provided the proportion of cash to be allocated (6 announcements). It is explained in the announcements that cash is supposed to cover tax and tax-related expenses, thus, this rate should not vary since only one country is taken into consideration.

By multiplying the assumed expected price of shares by the number of shares planned to be granted and adding the proportion of cash to be paid, we estimated the value of 33 share and cash based programs in Finland.

We ended up with of 84 announcements whose value could be obtained. The remaining 52 announcements were excluded from the analysis because they did not provide with the estimated market value of the programs and it was too difficult to estimate it ourselves due to either a high complexity of the program or the lack of provided numerical information about the program.

Estimating the cost of the programs

In order to have a meaningful comparative analysis against share capital increase, we distinguished between the share of the market value of the program that is covered by the company and the share that is asked to be contributed by managers. Since we decided to look at the aggregate market value of the programs that presented an expense to companies, 14 programs had to be excluded from our further analysis. These programs caused zero expense to the company as the managers had to buy financial instruments at the full market price themselves. After excluding these 14 programs (all of them were in Sweden), we had a sample of 70 programs for our further analysis.

At the end we arrived at the total value of these 70 compensation programs equal to 475m EUR (6.8m EUR per announcement). This represents 0.64% of total aggregate market capitalization of the companies.

7.1.2 Estimation of observed aggregate euro return

Under assumption of semi-strong market efficiency, all new publicly available information is immediately reflected in the stock price of a firm. Following this assumption, if there are any abnormal returns associated with changes in compensation packages, we should be able to observe a statistically significant stock market reaction already on the event day or day after if the market was already closed when the new announcement was released. Therefore, in this section our analysis is based only on [0;1] event window.

We calculated observed aggregate euro return using the following formula:

$$ADR = \sum_{i=1}^N CAR_i(T_1, T_2) \times MktCAP_i(T_1 - 1) \quad (16)$$

where T_1 and T_2 denote the beginning and end of the event window, (T_1-1) denote a day before the event window, $MktCAP_i$ stands for market capitalization of the company in event i , while N is the number of events. Cumulative abnormal returns were taken from our calculations performed in the event study, while market capitalizations for different dates were retrieved from Bloomberg database. In order to be able to add up euro returns of all the events, we translated all market capitalization figures into euro at the official closing exchange rate of the day of the event as provided by European Central Bank.

We found that the observed aggregate euro return over [0;1] event window for the sample of 70 companies was 514m EUR (7.3m EUR per program). This is 39m EUR more than the aggregate costs of the compensation programs, which indicates that 1 EUR of compensation cost corresponds to approximately 1.1 EUR observed euro return.

7.1.3 Estimation of theoretical aggregate euro return

As concluded in the empirical results section, there is little to no support that abnormal returns observed in [0;1] event window of our event study are statistically significantly different from zero. This means that there is little evidence that observed non-zero abnormal returns would hold outside our sample. Therefore, we aimed at computing how big aggregate euro return should have been observed in our sample in order to be statistically significantly different from zero. In other words, the measurement shows how much aggregate shareholder value should have been created in our sample ($N=70$) over the event window [0;1] so that we would be able to attribute this created value to the event of releasing information about compensation package changes rather than to the

ordinary daily stock price fluctuations. Then we compared it to both observed aggregate euro return and aggregate compensation cost.

To calculate statistically significant, i.e. theoretical, aggregate euro return, we used similar formula as above:

$$ADR^* = \overline{CAR}^*(T_1, T_2) \times \sum_{i=1}^N MktCAP_i(T_1 - 1) \quad (17)$$

where ADR^* stands for statistically significant aggregate euro return and $\overline{CAR}^*$ represents statistically significant average accumulative abnormal return.

$\overline{CAR}^*$ is obtained by solving equation based on test statistic formula (10).

$$t_1 = \frac{\overline{CAR}(T_1, T_2)}{\sqrt{\widehat{Var}[\overline{CAR}(T_1, T_2)]}} \quad (18)$$

where t_1 is set to 2.58, which, according to standardized normal distribution, represents a significance level of 1%. We take variance specific for this particular sample (N=70). After solving the equation, we get theoretical $\overline{CAR}^*$ to be equal to 1.19% for [0;1] event window.

The calculations led us to a theoretical aggregate euro return of 887m EUR (12.7m EUR per program). This is 412m EUR more than the aggregate costs of the compensation programs, which indicates that 1 EUR of compensation cost corresponds to approximately 1.9 EUR observed euro return.

7.2 Results and interpretation

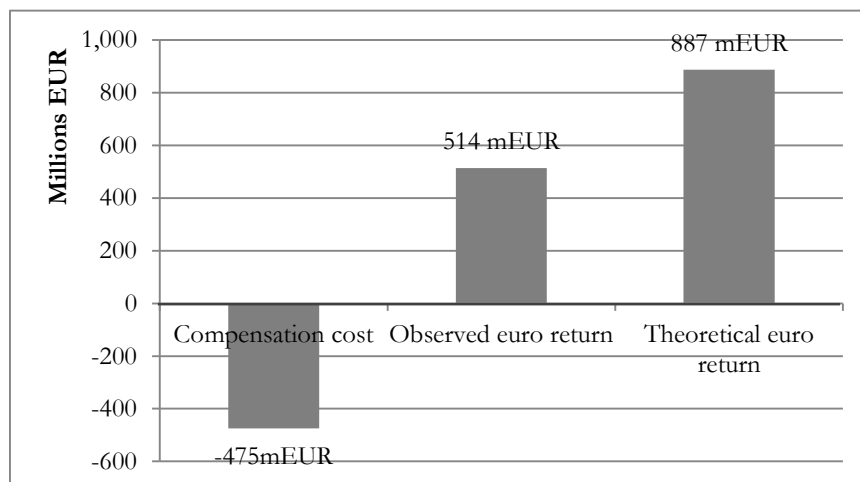
Before interpreting the numbers, it is important to understand what standard event study and its null hypothesis mean in the context of managerial compensation. The results of our event study indicate that the null hypothesis of zero abnormal return on the event day and the following trading day cannot be rejected. This means that we found no (or little) evidence that changes in managerial compensation packages can create shareholders' value. Since compensation changes incur certain costs to the companies, the outcome under the null hypothesis that company value remains constant implies that shareholders expect managers to create as much value in the company as they get paid. If statistically significant abnormal return is positive, this means that the stock market expects

managers to create not only as much value as they receive from the company in compensation form, but also some additional wealth. Statistically significant negative abnormal return implies that managers are believed to be paid more than they bring back to the company.

In Figure 7 below we plot our estimates of aggregate compensation cost to the companies, the aggregate observed euro return, i.e. observed value creation, caused by the compensation packages reported in the announcements, and the aggregate statistically significant euro return, i.e. theoretical value creation.

As depicted in Figure 7 below, theoretical aggregate statistically significant euro return is equal to 887m EUR and is twice as high as the aggregate cost to the companies of 475m EUR stemming from the adoption of the compensation package changes as documented in 70 announcements. This implies that in order to observe a statistically significant stock market reaction, shareholders would have to expect that in total executives will create 1,362m EUR in company value (i.e. not only would cover compensation costs, but also would earn additional return of 887m EUR). Similarly, if every euro invested in top management compensation had demonstrated a 1.9 EUR expected return in company value above the costs incurred, it would be sufficient amount of value creation to statistically demonstrate that changes in executive pay lead to an increase in company's value.

Figure 7 *Aggregate compensation costs vs. observed and theoretical aggregate euro returns*



Note: The figure depicts compensation cost, aggregate observed and theoretical euro returns for event window [0;1].

It would be quite reasonable to believe that 1 EUR given to a manager can create extra value to the company of 1.9 EUR since it is not an overly high number. However, the observed aggregate

euro return in our sample reveals that investors expect even less, only 1.1 EUR return for each euro invested in top management's compensation. Since there is no evidence that the observed return can be attributed to the announced compensation package change, we can only assume that investors expect managers to create approximately as much additional value to the company as they get paid (1.1 EUR in company value for 1 EUR invested in management compensation). In addition, this would mean that in total managers have to bring back 2.1 EUR for each 1 EUR they receive as their compensation.

Having in mind that our estimated aggregate compensation cost constitutes only 0.64% of total aggregate market capitalization, it might be reasonable to believe that stock market does not perceive these compensation programs to be a sufficient motivator for the top managers to create value in the company and, thus, we cannot find any statistical evidence that compensation package changes can help to create shareholders' value.

On the other hand, an important factor is managers' perception of this remuneration when they evaluate it against the remaining part of their compensation packages. Yet, this is difficult (if possible at all) to evaluate for the announcements employed in our study. Each announcement documents a compensation program representing a cost to the company of 6.8m EUR on average. However, the number of recipients is reported in only approximately half of the announcements. On top of that, it is difficult both to track who they are and to find the values of total compensation packages of these managers.

All in all, the presentation of observed aggregate abnormal returns versus theoretical statistically significant abnormal returns in monetary terms and comparing them to the actual compensation cost incurred by companies complements the outcomes of standard event study. Our sample of 70 incentive programs revealed that for each 1 Euro invested in executive incentive compensation investors expect to get a 1.1 EUR return, while a 1.9 EUR return would be needed in order to make statistical inferences about extra value creation in the company outside our sample.

8 Possible limitations of our study

8.1 Limitations stemming from the assumption of an event study

Even though we have tried to maximize the fulfilment of event study assumptions, they still represent the main source of possible biases in our obtained results. First of all, the choice of an

event study methodology to investigate whether there is a relationship between the compensation packages of top management and company value was based on the reasoning that a change in managerial compensation package has an immediate impact on stock prices, which requires at least semi-strong form of market efficiency. If in reality, however, the stock markets are not efficient, value created by compensation package changes cannot be measured by changes in stock prices, which questions the suitability of an event study methodology to investigate the sought relationship.

Secondly, even if the market efficiency assumption holds, we cannot be completely sure that all the events in our sample were unanticipated. We screened NASDAQ OMX official news releases and news announcements in Factiva database to make sure that we record the date of an event when the particular change in a compensation package was mentioned for the first time. However, we cannot rule out the possibility that some of the news about compensation package changes were made public through other channels before the date that we recorded. In addition, in some cases, the news might have been shared with the market through personal channels (news leakage). Consequently, we might have observed weaker stock market reaction than it is in reality.

Thirdly, even though we checked for confounding events around the event date within an event window, we did not investigate what other company events take place on the days outside our specified event windows. If there is some systematic tendency of other significant company events (e.g. the release of financial statements) taking place some time before the dates of the announcements about changes in compensation packages, it would imply that we attribute the obtained results to the wrong events. Consequently, we would then fail to capture the real effects of the changes in top management's compensation packages.

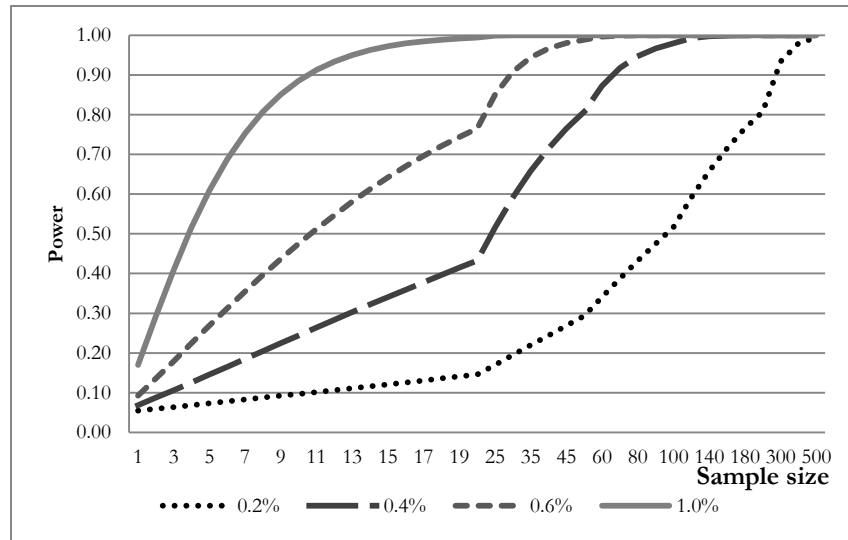
8.2 Limitations stemming from the power of an event study

Our sample of 309 events seems to be reasonably big for eliminating any “noise” factors and, consequently, for deriving statistically sound results. Yet, the ability of the tests used to detect non-zero abnormal return when we split our sample to subsamples might be greatly reduced. Therefore, we decided to evaluate the power of our tests or their ability to capture abnormal returns. That is, we estimated the likelihood that our event-study test rejects the null hypothesis for a given level of abnormal return associated with an event (Campbell et al., 1997). Considering the power of a test is crucial when selecting a sample size. If the power is too low, it means that the sample must be increased.

We calculated probabilities that an event study test rejects the null hypothesis following (Campbell et al., 1997): $P(\alpha, H_A) = \Pr\left(t_1 < z_{\left(\frac{\alpha}{2}\right)} | H_A\right) + \Pr\left(t_1 > z_{\left(1-\frac{\alpha}{2}\right)} | H_A\right)$. We calculated the power of our event-study using cumulative-abnormal-return-based statistic t_1 (formula (11) above) at a significance level of 5%. In addition, we built 8 alternative hypotheses (H_A) of 8 different abnormal returns. We also used two different levels of square roots of average variance: 1% and 3% for calculations. These square roots of average variance approximately represent the respective average variances of 2-day and 21-day event windows in our sample.

From the Figure 8 below, representing the case of 2-day event window, we see that if the abnormal return is as low as 0.2%, in order to have a maximum power of test to capture it, we need a very large sample of events, i.e. approximately 500. This might explain why in some subsamples we were not able to find any statistically significant results. Indeed, the power estimates of the tests for subsamples based on initial programs (N=43 and N=114 for clean and contaminated samples, respectively) are only 0.27 and 0.59, respectively. Yet, if taking the full sample of 309 events, the power of the test is at least 0.93, which is sufficient to be able to trust the event-study test results. Moreover, in most of the subsamples (12 out of 16), the estimated return is around 0.4% indicating that all subsamples consisting of over 70 events have a likelihood of at least 92% to capture a non-zero abnormal return if it exists.

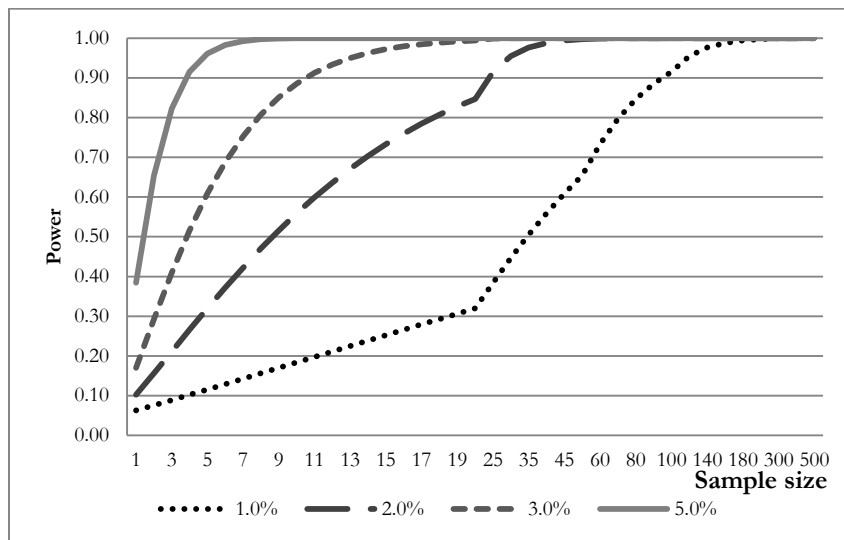
Figure 8 Power of the event-study for square root of the average variance of 1%



Note: Power of the event-study test statistic t_1 to reject the null hypothesis that the abnormal return is zero, when the square root of the average variance of the abnormal return across firms is 1%. Curves depicted in the figure stands for different levels of abnormal return.

Figure 9 below represents the case of 21-day event window where the square root of average variance of abnormal returns across the firms reaches 3%. Even though in general the power of the test declines dramatically, when volatility increases (Campbell et al., 1997), in our case the observed abnormal returns observed over 21-days are higher as well. Therefore, given higher variance, for the same sample sizes we achieve stronger test power if compared to the case of lower variance and lower abnormal returns. In order to achieve maximum power of the event-study test to capture an abnormal return of approximately 2%, 50 events in the sample are enough to achieve the highest power of 1.00. Our sample includes 10 out of 16 subsamples where the abnormal return over 21-day event window is around 2% or more, indicating that in most of the cases we have a very high power of the event-study test. Nevertheless, we have to be cautious about some of our results, as here again the subsamples showing the lowest abnormal returns (under 21-day event window these are subsamples based on top executives and proposals) are also the smallest ones (only 20-43 events). This indicates that the power of their event-study test is low, i.e. less than 0.50. This supports our choice to rely on nonparametric tests for subsamples.

Figure 9 *Power of the event-study square root of the average variance of 3%*



Note: Power of the event-study test statistic t_1 to reject the null hypothesis that the abnormal return is zero, when the square root of the average variance of the abnormal return across firms is 3%. Curves depicted in the figure stand for different levels of abnormal return.

8.3 Other limitations

Furthermore, even though all the announcements that are included in our sample were carefully chosen and attributed to certain subsamples by inspecting each announcement several times by both of us separately and collectively, a possibility of human error and some degree of subjectivity still remains. It might be that some of the announcements that fulfilled the selection criteria were missed or that some announcements were wrongly attributed to the subsamples. For example, sometimes it was rather difficult to decide whether the program should be treated as the initial program or not, if little or no information could be found about the previous program. The lack of distinct information content of separate subsamples might result in biased abnormal return estimates for these subsamples.

In addition, our chosen time period of 2002-2012 includes the global financial crisis of 2008-2009 when certain periods of excessive return volatility were observed (Bartram & Bodnar, 2009). Consequently, abnormal returns for some of the events might include much bigger noise factor than in the remaining events, and, thus, may distort the event-study results.

9 Suggestions for future research

In order to find out whether changes in top executive compensation might increase a company's value, we measured stock market reaction to changes in executive remuneration programs. We did not manage to find evidence of abnormal returns caused by the announcements related to compensation changes. The results support the findings of the event study conducted on Finnish market (Ikäheimo et al., 2004). To our knowledge there are no other event studies performed on European data, therefore, expanding the scope of the study by including more European countries could be of a high interest of future research in the field.

Examination of the stocks listed on other European stock exchanges could not only validate or contradict our findings but would also allow making a comparison between countries and, therefore, would increase the possibility to generalize the results. However, the bias stemming from the subjectivity factor when sorting announcements is highly likely to increase. Already among the Nordic countries that were listed on the same stock exchange differences in compensation programs and their presentation in official announcements could be observed. Therefore, official releases of companies listed on other stock exchanges could be expected to differ even more.

Finally, it might be investigated how investors' perceptions of different incentive compensation programs for executives changed over time. This would necessitate prolonging observation period at least to twenty years. However, since announcements employed in the study are hand-collected, the latter two suggestions would require a significant amount of time and effort.

In case applying other sample would lead to statistically significant abnormal returns, we believe that trying to examine whether and how abnormal returns could be explained by various factors would add additional insights regarding the relationship between executive compensation and firm's value. Abnormal returns could be regressed on different characteristics of compensation packages such as a target group, whether it is an initial adoption of a compensation plan, potential dilution effect of a program, etc.

We measured the aggregate monetary value of the introduced compensation changes. Yet, we did not analyse the value of compensation change on individual basis and we did not investigate what part of the total manager's compensation a change represented. Nevertheless, it would be interesting to partition announcements according to the proportion a compensation change represents of the total manager's remuneration. Such separation would allow examining whether changes that comprise a larger part of the total manager's compensation lead to higher improvements of a firm's value. In addition, it could be studied whether a firm's performance depends on the share of the total company's equity owned by the CEO or the Board of Executives.

Expecting that certain announcements might lead to more significant value changes in the stock market, we partitioned our sample into various subsamples. For instance, we formed a subsample based on a recipient, announcement type (proposals or decisions taken) or compensation form (warrants, options, stocks). However, various compensation packages of executives could be further analysed based on their structure. One way to do that would be to try to make a distinction between various compensation parts according to their duration. Usually, companies introduce three types of compensation: a fixed salary, a short-term variable remuneration, and an incentive pay. The last part is a long term remuneration that is usually based on equity and delivered over three years or more. It would be interesting to examine whether a higher proportion of long-term-oriented remuneration has a stronger impact on a firm's value. However, since Nordic countries analysed in our study do not disclose exact proportions of each type of remuneration awarded to executives, such analysis would require turning focus to other markets.

10 Conclusion

This study looks at corporate news announcements of changes in executive compensation packages of the companies listed on NASDAQ OMX Stockholm, Copenhagen, Helsinki and Iceland. From the official news releases published on NASDAQ OMX Nordic “News” section over 2002-2012 we form a hand-picked sample of 309 announcements for 149 companies, which we further delimit to the “clean sample” of 136 announcements for 89 stocks. The announcements mainly concern long-term incentive programs for executives.

Our aim is to examine whether company value can be created by introducing changes in executive compensation packages. Therefore, we have investigated the following research question: *Is there a stock market reaction to the changes in executive compensation packages?* In order to answer the question proposed above, an event study methodology has been employed.

The event study findings reveal that there is no statistically significant market reaction to changes in executive compensation packages when both, full and clean, samples of announcements are employed. Expecting that certain types of announcements might send stronger or clearer signals to the market, we separately study several subsamples based on the compensation recipient, the announcement type and compensation form. We find weak evidence for abnormal return of 1.1% on the announcement day and the following trading day if compensation changes are targeted at top executives: CEOs, CFOs and/or Board of Executives. Besides, we observe a slightly negative market response, i.e. an abnormal return of -0.4%, over two trading days for the subsample containing proposals to introduce new pay programs or to continue existing ones. Finally, we do not see any significant market reaction to the announcements related to different compensation forms, such as stocks, options or warrants.

Since no significant abnormal market reaction was observed, we attempted to find out whether it is reasonable to expect the market to respond given the amount of aggregate value of compensation changes that represented cost to the companies. Our analysis suggests that an extra 1.90 EUR stock market return for a 1 EUR invested in executive compensation would be a sufficient amount of value creation to statistically demonstrate that changes in executive pay lead to an increase in company’s value.

Overall, our study does not turn the scale of the pay-performance debate to one or the other direction. In contrast to most of the prior empirical findings revealing that the adoption of incentive

compensation plans increases shareholder wealth (e.g. Bhagat et al., 1985; Morgan & Poulsen, 2001; Lilling, 2006) we do not find strong statistical evidence that the market positively reacts to the companies' efforts to adopt new or adjust existing compensation programs. We conclude that, in line with the institutional theory, compensation packages are not intended to improve a firm's value, but rather they are adopted because other companies in the industry do so. It might also be that we obtain different results from the previous studies, which are mostly based on Anglo-Saxon countries, because we employ data on the Nordic countries where equity-based compensation occupies a relatively lower part of the total compensation. Finally, similarly to Martin & Thomas (2005), it could be argued that since various incentive programs are not as new tool to reward managers as in the 1980s or 1990s, the perception of equity-based compensation is simply changing and the initial enthusiasm for such schemes from stock market and shareholders is fading.

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12 Appendix

Table 6 *The summary of the most important prior empirical findings on the relationship between pay and performance*

Publication date	Authors	Sample	Years studied	Findings
The impact of the total executive pay level on performance				
1985	Murphy	500 CEOs from the largest US manufacturing firms	1964-1970	Executive pay is strongly positively correlated to firm's performance represented by stockholder return and an increase in firms sales
2008	Buck, Liu & Skovoroda	601 Chinese firms listed on Shanghai and Shenzhen Stock Exchanges	2000-2003	There is a two-way causal relationship between pay and performance.
2006	Lilling	Panel data of 8378 observations of CEO compensations in the US	1993-2003	There is a positive relationship between total CEO compensation and shareholder's wealth.
2010	Bebchuk, Cremers, Peyer	Panel data for 3,256 CEOs in 2,015 firms	1993-2004	Higher share of CEO compensation of the aggregate pay of top 5 executives in a firm leads to lower corporate value, lower accounting earnings, poorer acquisition decisions, worse consequences of opportunistic timing of stock option plans as well as lower CEO turnover.
2010	Nystrom, Soofi & Yasai-Ardekan	50 highest paid CEOs in the US in 2007	2007	There is a negative relationship between extremes of CEO compensation and firm's performance. No relationship was found employing the full sample.
Level vs. form				
1990	Jensen and Murphy	2,505 CEOs in 1,400 listed companies in the US	1974-1988	The form rather than level of executive compensation matters. \$1,000 increase in firm's value lead to an average increase in CEO compensation of \$2.59.
1995	Mehran	153 randomly-selected manufacturing firms	1979-1980	The form, not the level of compensation, is what motivates managers. Equity-based compensation positively affects firm's value.

Table 6 (continued)

Publication date	Authors	Sample	Years studied	Findings
The influence of pay-performance sensitivity on firm's performance				
1990	Abowd	16,000 managers at 250 large corporations	1981-1986	Higher performance-pay sensitivity leads to better performance, i.e. 10% bonus leads to 30-90 b. point increase in expected total shareholder return the following year.
2005	Kubo	210 Japanese firms	1993-1995	There is a negative relationships between performance-pay sensitivity and firm's value.
Accounting based compensation plans				
1984	Tehrani & Waagelein	42 US firms that proposed or adopted short-term compensation plans	1970-1980	Positive abnormal return could be observed around the announcement of short-term compensation plans.
1992	Gaver	238 US firms that adopted performance plans	1970-1980	There is no significant reaction to the adoption of long term incentive compensation plans neither two days around SEC stamp date, nor the voting date of Board of Directors or proxy statement signing date
1998	Wallace	40 firms in the US that implemented residual income plans and their matched pairs	1988-1997	Residual income-based plans result in increases of residual income of firm's adopting them, yet, they do not lead to an increase in firm's value.
2006	Balachandran	147 firms in the US that adopted residual income plans and their matched pairs	2006	Residual income-based plans result in increases of residual income of firm's adopting them.
2005	Hogan & Levis	108 firms in the US that adopted economic profit plans and their matched pairs	1983-1996	Firms that could be characterized as potential adopters of EPP and that actually implement them, demonstrate a better performance than potential adopters that did not do that.

Table 6 (continued)

Publication date	Authors	Sample	Years studied	Findings
Equity based compensation plans				
1984	Bhagat, Brickley & Lease	88 proxy statements of the stock purchase plans and IRS 423 plans	1970-1982	Adoption of share purchase plans leads to an increase in shareholder's wealth for reasons other than tax. Equity-based compensation motivates top executives more than lower level employees.
1985	Brickley, Bhagat & Lease	175 announcement of the long-term compensation plans in the US	1979-1982	Positive stock market reaction to the announcements of long-term compensation plans. No differences in response to different types of plans.
1990	DeFusco, Johnson & Zorn	641 announcements of changes in stock option plans of the US firms	1978-1982	Changes in executive stock option plans are associated with an increase in shareholder and a decrease in bondholder wealth.
1996	Aboodey	672 US firms with the ratio of outstanding fixed options to outstanding common stock higher than 5%	1983-1990	There is a negative relationship between the value of outstanding stock options and firm's stock price.
2001	Morgan & Poulson	958 proposals of stock option plans by S&P 500 firms	1992-1997	Proposals to adopt stock option plans lead to increase in shareholders' wealth, especially when they are targeted at top executives. Proposing firms are the ones that could benefit from the plans the most. There is a less positive reaction to plans having potential dilution effects.
2002	Core & Lacker	170 firms that adopted mandatory stock ownership programs	1991-1997	Stock ownership programs lead to improved firm performance and greater managerial ownership.
2003	Hanlon, Rajgopal, Shevlin	1,609 firms from S&P 1500 index	1992-2000	1\$ Black&Scholes value of an employee stock option grant is associated with \$3.71.
2003	Ittner, Lambert, Larcker	217 new economy firms	1998-2000	Lower than predicted grants or existing option holdings by top executives lead to lower ROA and stock market performance in the following years

Table 6 (continued)

Publication date	Authors	Sample	Years studied	Findings
Equity based compensation plans				
2004	Ikaheimo, Kjellman, Holmberg & Jussila	71 employee stock option announcements of companies listed on Helsinki Stock Exchange	1988-1998	There is a positive stock market response to announcements targeted at top management and negative reaction to those targeted at all employees. Dilution effects were found to have negative effect on stock returns, especially when plans are targeted at all employees.
2005	Kato, Lemmon, Luo, & Schallheim	562 adoptions of stock option programs by Japanese firms	1997-2001	The adoption of stock plans provokes positive stock market reaction and lead to an increased operating performance.
2005	Martin & Thomas	635 stock option plan proposal by the US firms	1998	There is a negative stock market reaction to stock option plans having higher potential dilution. The percentage vote against the plan proposal and percentage change in managers' pay next year is negatively related.