

# The Relation between Executive Time Horizon and Executive Compensation

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## Abstract

This paper presents the results of a survey investigating which elements of executive compensation are perceived as short-term and which as long-term by company executives. Moreover, we analyze by linear regression, how selected features of executive compensation elements (i.e. their perceived time horizon and their amount relative to total compensation) are related to the overall time horizon of executives and their companies. A contribution is made to the field of time horizon studies by introducing several variables that measure time horizon.

Based on the findings, retirement plans, stock options and stock-based compensation are perceived as long-term whereas bonuses are perceived as short-term by executives themselves. Through the regression analysis, we found that the use of relatively large amount of variable compensation forms seems to influence executive time horizon. This finding is robust to the influence of control variables. We also found a strong relationship between a comprehensive time horizon measure of the entire compensation system and quarterly pressures from the financial markets, payback period and the time horizon of ongoing R&D investments. These results are robust to the inclusion of control variables including industry, financials and respondents' age. As we decomposed our comprehensive time horizon measure, we found that the longer perceived time horizon of variable compensation classes significantly extends the perceived time horizon of organization-specific variables, payback period and the time horizon of ongoing R&D investments. We also found that the longer perceived time horizons of bonuses and stock-based systems weaken the perceived time pressure from the stock market. Thus, not only the relative amount of each compensation system matters but also, how each executive perceives the nature of bonuses and stock-based systems.

Our results suggest that the large relative amount of stock may lead to myopic behavior in organizations, but the subjectively perceived time horizon of stock based systems counter its influence. Thus, attention should be directed towards how executives are encouraged to recognize stock-based – and bonus-based – compensation as long-term compensation.

Keywords: Time horizon; Executive compensation; Short-termism

JEL Classification: C83 J33 M12 M52

# 1 Introduction

The time horizon of compensation plans has recently been perceived by many as an important cause of global financial crisis (see Bebchuk & Fried, 2010; Bebchuk et al., 2010).<sup>1</sup> These claims strongly suggest that various types of executive compensation are associated with specific time horizons that affect executive behavior. In the aftermath of the financial crisis, strict policy measures<sup>2</sup> have been implemented around the world in order to extend the time horizon of executive compensation plans and executives themselves (Conyon et al., 2011). For the first time, there will be rules which clearly limit the authority of boards of directors to decide on executive compensation. Within European Union, restrictive regulation of executive remuneration is suggested to be implemented for all European listed companies via country-specific codes of corporate governance (European Corporate Governance Forum, 2009). Conyon et al. (2011) claim that the regulation miss the target since they did not find evidence supporting the claim that excessive risk taking prior to financial crises in banking was caused by the “banking bonus culture”.

Earlier studies have suggested that the higher the relative amount of short-term accounting-based bonuses, the shorter the time horizon of executives (Ittner et al., 2003; Widener, 2006). On the other hand, stock-based compensation is assumed to be long-term (Holmstrom, 2006; Brickley et al., 1985; Puffer and Weintrop, 1991; Lambert, 1993). However, opposite claims and findings on the stock price have also been presented (Rappaport, 2005; Bergstresser and Philippon, 2006). Besides bonuses and stock-based compensation, other elements of executive compensation plans, i.e. base salary, fringe benefits, deferred bonuses and retirement plans, have not yet been analyzed from this perspective. Rappaport (2005) has called for a reform in executive compensation in the United States in order to encourage the attainment of long-term performance targets by, for example, increasing the vesting periods of stock options. Similarly, Bebchuk and Fried (2005) would reform executive compensation systems by reducing opportunities for windfall rewards and increasing the emphasis on long-term performance. This study provides preliminary grounds to judge whether these kinds of reforms in executive compensation have anticipated influences on the time horizon of company executives.

In this study, we comprehensively analyze the relation between executive compensation plans and the time horizon of executive work. First, we describe the time horizons of the elements of executive

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<sup>1</sup> Financial Stability Forum (2009) claimed that “[h]igh short-term profits led to generous bonus payments to employees without adequate regard to the longer-term risks they imposed on their firms.” Moreover, Tim Geithner (United States Secretary of the Treasury) in his speech June 10<sup>th</sup> 2009 expressed how short-term gains benefitting company executives can lead to excessive long-term risk-taking (Press room, U.S. Department of the Treasury): “*This financial crisis had many significant causes, but executive compensation practices were a contributing factor. Incentives for short-term gains overwhelmed the checks and balances meant to mitigate against the risk of excess leverage.*”

<sup>2</sup> These policy measures include for example the G-20 Pittsburgh Summit on “Promoting responsible remuneration practices in the financial sector” on September 24–25, 2009, the Policy Statement (2009/15) of FSA of U.K. and the report of European Commission “Recommendation on the remuneration of directors of listed companies” on April 30<sup>th</sup> 2009.

compensation plans, as perceived by company management. These elements include salary, fringe benefits, bonuses, deferred bonuses, retirement plan, stock options and stocks. Second, we analyze whether the perceived relative amount and time horizon of each element of executive compensation is related to the perceived time horizon of executive work. The study forms a step towards opening the bases for the mental models of executives for analysis instead of simply assuming certain objective time horizon of compensation systems and related executive behavior. A new comprehensive measure for the time horizon of compensation system package is also constructed in order to execute the analysis. Earlier studies have concentrated on the time horizon of one compensation system at a time, and the comprehensive package of compensation systems has not yet been studied. We also applied several measures for executive and company time horizon (payback period, the time horizon of R&D (research and development) investments, financial market pressures, and executives' own estimates of their time horizon (Van der Stede, 2000, originally developed by Lawrence and Lorsch, 1969), in order to improve the robustness of our results and to capture the complexity of the time horizon variable.

A managerial perspective is taken in the study. For this purpose, the study is based on survey evidence gathered from 103 Chief Financial Officers (CFOs) in companies listed in the Nordic stock exchange, Nasdaq OMX. The survey was implemented in six European countries (Denmark, Estonia, Finland, Iceland, Lithuania and Sweden). In these countries, compensation systems have been lower and not as aggressive as in the US or UK (Towers Perrin, 2005-2006; Ikäheimo et al., 2007). CFOs were chosen as participants because they typically represent top executives and are intimately knowledgeable on the issues inquired in the survey, such as financial markets pressures and the length of payback period. The views by CFOs can also be used as surrogates for the perspectives of Chief Executive Officers (CEOs). It is notable that we collected the empirical data in the spring and summer of 2008 when the financial crisis was just about to emerge, at a time when there was a good reason to assume that the time horizon of compensation plans should have had some major consequences in the economy.

Based on our findings, the perceived time horizon of the elements of executive compensation plans vary. Retirement plans, stock options and stocks are perceived, by CFOs, to represent long-term compensation plans whereas bonuses are perceived to represent short-term compensation. Base salary, stocks and bonuses form the largest amount of executive compensation. Both the time horizon and the relative amount of each element of compensation plan vary between the CFOs.

Our main theoretically significant contributions, uncovered through regression analysis, are as follows: We found that the use of stock-based compensation tends to increase quarterly pressures and shorten the time horizon of executives and business and the use of stock options increase the time horizon of research and development investments. We also found that variable compensation influences executive time horizon, when this compensation is given in sufficiently large quantity. We created a novel measure for the comprehensive time horizon of the entire compensation system. There was a strong relationship between this measure and three time horizon measures: quarterly pressures from the financial markets, payback period and the time horizon of ongoing R&D investments, even after controlling for industry, financials and respondents age. When we decompose our comprehensive time horizon measure of compensation systems, we find that the longer the perceived time horizon of bonuses and stock-based compensation, the smaller the pressures from the stock market. It appears that the perceived time horizons of the organization-specific variables (payback period and the time horizon of ongoing R&D investments) are also influenced by the time horizon of variable compensation classes. Based on these findings we conclude that the individual differences in the perceived time horizons of bonuses and

stock-based systems between the CFOs have an impact on the perceived quarterly pressures from the stock markets, payback period and the perceived time horizon of ongoing R&D investments. Thus, the relative amount of each compensation system matters but, in addition to this impact, the way each executive comprehends the nature of bonuses and stock-based systems influences time horizon.

Our results suggest that when stocks are given in large amounts, this may lead to myopia, but the subjectively experienced time horizon of stock based systems counters this impact. These two influences could also balance each other out. In addition, time horizon measures related to the organization itself, payback period and the time horizon of R&D capture the relationship between time horizon and compensation systems. Thus the consequences of various variable compensation classes are not only dependent on whether they are used or not or how extensively they are used, but also on how they are perceived. Thus, instead of defining restrictions in defining the compensation systems for top executives, executives should be educated to perceive these systems differently, more towards long term, if necessary.

The paper is structured as follows. In Section 2, expectations on the time horizon of compensation classes are developed based on prior literature. In Section 3, information on data collection is provided and sample descriptive statistics are presented. Section 4 contains the empirical results, and Section 5 concludes the study.

## 2 Compensation classes and executive time horizon

In the following, we form hypotheses on the time horizons of each element of executive compensation plans: salary, fringe benefits, retirement plans, bonuses, deferred bonuses, stock options and stocks<sup>3</sup> (Ikäheimo et al., 2007), which are the most commonly used elements in Nordic countries and worldwide (Towers Perrin, 2005-2006, in “Managing global pay and benefits”). The hypotheses are based on earlier analytical and empirical studies. Earlier studies typically assume that each compensation system encourages towards a certain time horizon, which is thus reflected in actual executive behavior: the relationship between the use of compensation systems and the consequential behavior is thus assumed to be causal.

Earlier studies have not discussed the time horizon of *salary and fringe benefits*, with the exception of the assumption made by Tzioumis (2008, p. 102) that fixed compensation is potentially myopic. Salary and fringe benefits are typically received monthly. They are insensitive to company performance and, therefore, rather stable over time. They may be at stake in extreme cases: if an executive is denounced or a company is declared bankrupt. Even in companies with performance difficulties, drastic reductions in salary and fringe benefits may not be implemented immediately after one year of losses; instead, these might materialize only over a more extended period of inferior performance. Therefore, *the time horizon of salary and fringe benefits is hypothesized to be over one year*.

The time horizon of *retirement plans* has been studied by using executive age or tenure as a proxy of the imminence of retirement age (Bryan et al., 2000; Burns and Kedia, 2006; Kalyta, 2006). According to Kalyta (2006), the time horizon of executives close to their retirement age is shorter than that of other

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<sup>3</sup> Stocks also include restricted stock and other forms of stock-based compensation systems, which do not have the asymmetric payoff structure similar to stock options or where this structure has only a minor role.

executives because the executives close to retirement do not necessarily have financially based motivation to think about the future of the company beyond their own retirement. In addition, Kalyta (2006) found income-increasing accruals and earnings management in companies where CEOs have performance-related retirement plans whose outcome depends on company earnings in pre-retirement years. This could be caused by the CEOs' interest to increase their retirement benefits in the short term. In the study by Sundaram and Yermack (2005), also with U.S. data on Fortune 500 companies, retirement plans lowered the motives of executives to undertake risky actions prior to their retirement, since their company is responsible for paying their pension and they are reluctant to gamble with their pension.

In the Nordic countries, only very few companies possess their own retirement funds placed under the direct responsibility of the company. Normally, during the employment of executives, companies are charged payments to an independent retirement fund. The fund is thus responsible for paying pension to the retired executives. Therefore, retirement plans are not expected to have similar behavioral effects on risk-taking in Nordic countries as in the U.S. Since retirement plans are often realized after a very long period since their initiation, *it is hypothesized that retirement plan is a long term form of compensation with a time horizon of over three years.*

*Bonuses*, which are typically paid annually (Murphy, 2000; Indjejikian and Matějka, 2009), can be claimed to possess a short time horizon. This is because accounting-based earnings, which is the most common basis for bonuses, has been conceptualized as myopic (Tzioumis, 2008; Ittner et al., 2003; Widener, 2006). According to Widener (2006), bonuses clearly influence managerial decisions and behavior. From the perspective of time horizon, this implies that the larger the amount of short-term bonuses relative to other forms of compensation, the shorter is the time horizon of the compensated executives. Based on previous literature, *it is hypothesized that bonus plans have a short time horizon, close to one year.*

*Deferred bonuses* (see e.g. Sundaram and Yermack, 2005) have been suggested as a solution to the short time horizon of annual bonuses (Stewart, 1999; Financial Services Authority, 2009). They involve the use of bonus banks, in which all or a part of bonuses are deferred for longer than one year (Stern et al., 1995; Stewart, 1999). This delayed part of bonuses is linked to future performance, i.e. an executive will receive a bonus if the level of company performance is maintained for an extended period of time. In this way, managerial interest to manipulate the bonus bases within one year is limited. This lengthens the time horizon of the compensation plan, and may also influence executive behavior (see e.g. Ittner et al., 2003; Burns and Kedia, 2006; Denis et al., 2006). As an example of bonus bank, Finnish state-owned companies have a typical banking time up to three years but a certain proportion of bonuses is paid annually (Ikäheimo et al., 2007). Therefore, *we hypothesize that the time horizon of bonus banks is longer than one year.*

*Stocks and stock options* are forms of stock-based compensation. Stock options have been argued to be effective in supporting value-increasing measures that can be implemented relatively quickly, whereas stocks have been suggested to encourage steady performance towards long-term value improvement once the quick measures have been taken (Holmstrom, 2006). The connection between stocks and successful performance in the long term has implicitly been made in many previous studies (Brickley et al., 1985; Puffer and Weintrop, 1991; Lambert, 1993). In addition, Bushman et al. (1996) found that the amount of stock-based compensation relative to salary increases with growth opportunities and the

length of product life cycle, indicating that stock-based compensation is positively related to the time horizon of company activities. Stock-based compensation systems also appear to increase executive commitment for the long-term development of their companies: Balsam and Miharjo (2007) found that the value of stock-based compensation systems lowered the interest of executives to resign.

Stock-based forms of compensation have also been claimed to encourage executives towards short time horizon. Stein (1989) has suggested that the more managers are concerned about stock price (i.e. the more they own stocks or stock options), the more likely they behave myopically. According to Rappaport (2005, p. 69) executives who perceive that their companies' stock prices are formed based on short-term focus of earnings per share consensus estimates by analysts may feel that stock-based compensation relates to the short term. In relation to the consequences of stock option grants, executives seem to behave myopically, sacrificing long-term success, in the hope of receiving valuable stock options in the short term. This view is empirically supported, for example, in the misreporting of annual earnings (Burns and Kedia, 2006) and in securities fraud allegations (Denis et al., 2006). The underlying assumption here is, naturally, that misreporting and securities fraud are, by their nature, activities that may be beneficial at the short term, but problematic in the long term. Burns and Kedia (2006) found that the sensitivity of the CEO's option portfolio to stock price is significantly positively related to the propensity to misreport, i.e. to adopt aggressive accounting practices that result in a restatement, whereas other components of CEO compensation, i.e. stocks, restricted stocks, payouts from long-term incentive plans (LTIPs), salary and bonuses had no influence on the propensity to misreport. Denis et al. (2006) found a positive association between the likelihood of securities fraud allegations and a measure of CEOs' stock option incentives, supporting the view that stock options increase the incentives to engage in fraudulent activity. Again, other forms of compensation were not found to induce fraudulent behavior. Stock options form a source of convexity in executive compensation, and this convexity can cause unethical behavior (Burns and Kedia, 2006, see also Bergstresser and Philippon, 2006).

Based on the above analysis, stock options have a relatively long time horizon, but it may turn out to be shorter just prior to the vesting of the options. Long vesting period can extend the time horizon of stock options. Stocks and other stock-based compensation systems are a form of longer term compensation, when compared with stock options. Stock-based compensation is assumed not to encourage short-term behavior because of its symmetric payoff structure and the general inability of executives to sell stocks before any short-termism is detected (Burns and Kedia, 2006).

For the purpose of creating hypotheses on the time horizon of stock-based compensation in years, we benefit from the valuation practices of financial analysts. The company valuation implemented by financial analysts is typically based on near term forecasts of company performance and the terminal value. Quite frequently near term forecast, which is also a much more detailed estimate of company performance, is made for the time period of three to five years (see Ramnath et al., 2008). We expect that this time horizon is also adopted by the company executives who frequently meet with these financial analysts (see Graham et al., 2005). In support of this, Roberts et al. (2006) have shown that the ideologies of financial analysts are often adopted by company management and used for managing the business. Thus, *stocks and stock options are hypothesized to have a time horizon of over three years, and stock options have a shorter time horizon than stock-based compensation systems.*

The above discussion and our hypotheses on the time horizon of each compensation class are based on the assumption that each compensation class is associated with a time horizon and that this time horizon

has an influence on behavior (see e.g. Lawrence and Lorsch, 1969; Merchant, 1990; Van der Stede, 2000; van Rinsum and Hartmann, 2007). However, certain empirical studies indicate that it is not self-evident that compensation systems have such an influence on executive behavior and company performance. Bertrand and Mullainathan (2001) found that CEOs are effectively rewarded for luck as often as for performance, and Mishra et al. (2000) uncovered a link between CEO pay-for-performance sensitivity and company future performance only at low levels of sensitivity. Murphy (1999) argues that the evidence on the connection between pay-for-performance sensitivities and stock-price performance is scarce. Core et al. (1996) and Yermack (2006) even show a negative relationship between incentives and company performance, in case of luxury perquisites. According to the results by Krause (2009), in the commercial banking industry, there is no relationship between long-term compensation (i.e. stocks and stock options), and long-term behavior, measured as the fraction of loans allowed for losses (representing management views on the future performance of the banks).

Above we generated propositions on the time horizons of each compensation class. However, we claim that any relationship between each of the classes and the time horizon of executive behavior is not self-evident. Therefore, we generate propositions on the extent of influence compensation systems have on executive behavior. Based on the assumptions made in earlier studies, the time horizon of those forms of compensation whose amount varies based on executive performance have stronger influence on executive behavior than those whose amount does not vary (see e.g. Burns and Kedia, 2006; Denis et al., 2006). Variable compensation is assumed to tie an executive's wealth to firm performance (Burns and Kedia, 2006). Therefore *it is hypothesized that bonuses, deferred bonuses, stock options and stocks have a strong influence on the time horizon of executive behavior*. This influence could have various forms. First, whether these compensation classes are used or not? *The usage of these compensation classes change the time horizon of executive behavior. Short term compensation classes decrease and long term compensation classes increase the time horizon*. Second, how extensively they are used? *The extend of usage of these compensation classes makes this influence stronger*. Third, how the time horizon of each compensation class is perceived by individual CFO? *The perceived time horizon of each compensation class positively influences the time horizon of executive behavior*. These are not assumed to be the cases with base salary and fringe benefits, because managerial behavior does not have a direct influence on the size of these components of compensation (Denis et al., 2006). Retirement plan is also often insensitive to firm performance in the Nordic setting (see Ikäheimo et al., 2007). Therefore, *it is hypothesized that there will be only a weak relationship between the time horizon of salary, fringe benefits and retirement plans and the time horizon of executive behavior*. Table 1 shows our hypotheses on the time horizon of each compensation class and their potential to influence executive time horizon.

Table 1. Hypotheses on the time horizon of each compensation class and on the strength of their influence on executive time horizon based on the earlier literature when applicable.

Compensation class	Expected time horizon	Expected time horizon in years	Expected influence of the time horizon of compensation class on executive time horizon	
			Expected influence on executive time horizon	executive time horizon
Salary	intermediate long	over one year	no effect	no effect
Fringe benefits	intermediate long	over one year	no effect	no effect
Retirement plan	long	over 3 years	no effect	no effect
Bonuses (not deferred)	short	one year	decrease	increase
Deferred bonuses	intermediate long	over one year	increase	increase
Stock options	long	over 3 years	increase	increase
Stocks	long	over 3 years	increase	increase

### 3 Research implementation and descriptive statistics

A survey was used to generate findings that can be generalized to a larger population of listed companies. This survey was targeted towards listed firms because listed companies can face pressures from financial analysts and other stock market players, unlike non-listed companies, and the mix of compensation systems available to listed companies is more comprehensive than that in non-listed companies. Listed companies also form an influential population, as many large companies are listed.

In our survey, we followed the survey guidelines provided by Dillman (2000). The survey was tested by executives in four companies (two listed, one delisted, one mutual company), by one former CFO of listed company, by one representative of OMX Nasdaq, and by six academics. The company representatives were not among those to whom the questionnaire was finally sent. Comments were collected from each participant and survey questions were refined based on the comments.

The survey was carried out through the Internet. Respondents were initially sent an e-mail informing them of the upcoming survey. The e-mail containing the link to the survey was then sent several days after the early announcement. Those who did not respond were approached with three additional e-mail reminders. In each stage, those who had responded were cleared from the mailing list. In addition, phone calls were made to all those targeted in the survey who had not responded after the mailings.

The survey was implemented internationally in six Northern European countries (Finland, Sweden, Iceland, Denmark, Estonia and Lithuania) during May and June, 2008. Targeted companies were listed on the Nordic Nasdaq OMX stock exchange. We contacted 646 companies based on the contact information provided by the stock exchange. In 59 cases the contact information obtained was inaccurate and we were unable to obtain the correct information. Questionnaire was thus sent to 587 respondents (CFOs or equivalent), we received 111 responses, but two respondents quitted after answering the first three questions out of 27 questions. These two responses are not included in our response rate descriptions. We thus received 109 properly completed responses (response rate 18.6%). In addition, six respondents did not answer the questions concerning compensation system. Thus, our final sample size is 103 CFOs. The response rate on compensation systems was 17.5%, varying from 28.5% in Iceland to 15.2% in Denmark (see Table 2). The very same questionnaire was used also collecting data on performance measures (see Chakhovich et al., 2010).

Table 2. The break-up description of the response rate for all of our sample companies and within each country.

	Total	Sweden	Finland	Denmark	Lithuania	Estonia	Iceland
Companies where contact attempted	646	251	129	180	43	23	20
No proper contact information	59	8	1	42	2	0	6
Questionnaire sent	587	243	128	138	41	23	14
Respondents	109	43	24	21	10	6	5
Overall response rate %	18.6 %	17.7 %	18.8 %	15.2 %	24.4 %	26.1 %	35.7 %
Proper responses to the questions concerning compensation systems	103	38	24	21	10	6	4
Response rate on compensation %	17.5 %	15.6 %	18.8 %	15.2 %	24.4 %	26.1 %	28.6 %

In Table 3 we present descriptive statistics of the respondents. The majority of the CFOs had completed a Master's degree (65.0%), and most commonly their educational background was in accounting (63.1%) and finance (61.2%). The average age of respondents was 44 years, and the CFOs had been in a similar position in a listed company on average 5.4 years.

Table 3. Descriptive statistics of respondents. Respondents were allowed to choose several options from a given list for their education background (this explains the sizable percentages in relation to this variable). Regarding the other questions reported in this table, respondents were only allowed to choose one option out of a given list.

<b>Education</b>		<b>Age and experience</b>	
Level of education, n=103	%	Age, n=102	years
bachelors	29.1 %	mean	44
masters	65.0 %	min	28
other	5.8 %	max	68
		std.dev.	8

Educational background, n=103	%	In similar positions, n=103	years
accounting	63.1 %	mean	5.4
finance	61.2 %	min	0.5
business, other	31.1 %	max	25
engineering	3.9 %	std.dev.	5.7
law	1.9 %		
other	2.9 %		

The control variables used were collected from the Orbis database and include industry (SIC codes), company size (annual operating revenue, total assets), company performance (return on capital employed (ROCE)) as well as financial position (solvency ratio) and the ownership of the largest owner (see also Singh and Davidson, 2003). All figures were collected from year 2007. Descriptive statistics on control variables are presented in Table 4 and industry codes with their corresponding frequencies in Table 5. We grouped industries into four groups with similar time horizon –related qualities. These groups are indicated in the column “Group”.

Table 4. Descriptive statistics of the sample companies. Data were collected from Orbis database and home pages of companies if not available in Orbis.

Contextual variables	n	Average	Median	1. quartile	3. quartile
Operating revenue (million euros)	102	615.4	73.4	23.7	268.7
Total assets (million euros)	102	1,088,2	171.5	56.2	495.0
ROCE	101	11.9 %	14.5 %	2.3 %	23.0 %
Solvency ratio	102	48.3 %	46.1 %	31.0 %	69.9 %
Ownership of the largest owner	101	32.5 %	25.7 %	15.0 %	46.6 %

Table 5. Industry codes of the sample companies. Data were collected from Orbis database.

SIC Code	Industry	n	Group
0	Agriculture, forestry, and fishing	0	
1000	Mining and construction	6	1
2000	Manufacturing - Consumption goods	21	1
3000	Manufacturing - Industrial goods	13	1
4000	Transportation, communication, electric, gas, and sanitary services	2	2
5000	Wholesale and retail trade	8	2
6000	Finance, insurance and real estate	20	3
7000	Accommodation	30	4
8000	Other services	0	
9000	Public administration	2	2
Total		102	

## 4 Results

### 4.1 Measurement of time horizon and descriptive statistics

Most compensation studies have used either age or tenure as a proxy for executive time horizon (see e.g. Bryan et al., 2000; Burns and Kedia, 2006; Kalyta, 2006). In this study, we measure the dependent variable, the time horizon of CFOs, more directly by relating it to their activities in their own work. Several measures on this horizon, rather than only one, are employed in order to gain a deeper understanding on the complex issue of time horizon measurement. The measures include the time horizon of executive work (refined from a measure used by Lawrence and Lorsch, 1969; Merchant, 1990; Van der Stede, 2000; van Rinsum and Hartmann, 2007), R&D investments (Dechow and Sloan, 1991; Bushee, 1998; Holden and Lundstrum, 2005), the average length of payback period for operational investments (Liljebloom and Vaihekoski, 2009), and financial market pressures (Graham et al., 2005).

In the study, the following variables are used for time horizon:

Time Horizon of work (*THwork*) is a weighted average of the CFO's working time spent on matters, that will affect the profit of the company within specified time periods

$$THwork = \frac{\sum_{i=1}^4 p_i T_i}{\sum_{i=1}^4 p_i} .$$

In the above  $i$  refers to the category of time horizon (see the Question 4 in Appendix A),  $T_i$  refers to the midpoint (in years) of the time horizon category for  $i=1$  (0.125 years), 2 (0.625 years), 3 (2 years) and  $T_4=4$  (4 years)<sup>4</sup>, and  $p_i$  to the proportion of the respondent's current working time devoted to matters, that will affect the profit of her company within time horizon  $i$ <sup>5</sup>.

Short Time Horizon of work (*THshort*) is the proportion of the CFO's working time spent on matters, that will affect the profit of the company within a one-year time period. This measure is similar to the time orientation measure by Van der Stede (2000).

Using the same logic as above, the Expected Time Horizon for Profit related to R&D (*THR&D*) is defined as

$$THR \& D = \frac{\sum_{i=1}^4 \pi_i RD_i}{\sum_{i=1}^4 \pi_i}$$

where  $i$  refers to R&D time horizon category (Question 10 in Appendix A),  $RD_i$  refers to the midpoint (in years) of the time horizon for  $i=1$  (0.5 years), 2 (2 years), 3 (4 years) and 4 (7.5 years)<sup>6</sup>, and  $\pi_i$  to the proportion of R&D investments used for projects whose profit is expected to mainly influence the reports within time horizon  $i$ <sup>7</sup>. This measure relates to the strategic aspects of managerial work, because R&D investments are often considered strategic.

The Payback Period (*Payback*) requirement is defined as the average payback period requirement for operative replacement investments in the company (Question 9 in Appendix A) (Liljeblom and Vaihekoski, 2009). This measure relates to the operational, as opposed to strategic, aspects of managerial work.

Quarterly Pressures (*QPressure*) from the stock markets is based on a Likert scale (1 to 7) measure on how much the respondent felt quarterly pressures from the stock market shorten her time horizon (Question 1 in Appendix A).

Descriptive statistics for these measures on time horizon are presented in Table 6. The use of several measures offers possibilities to study different aspects of time horizon and provides for additional reliability and robustness of our results.

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<sup>4</sup> The upper limit of this category was assumed to be five years.

<sup>5</sup>  $\sum_{i=1}^4 p_i$  was not restricted to equal 1 since in our pilot phase respondents noted that there are work tasks that may affect several time periods concurrently.

<sup>6</sup> The upper limit of this category was assumed to be ten years.

<sup>7</sup> The sum  $\sum_{i=1}^4 \pi_i$  was not restricted to equal 1 since in our pilot phase respondents noted that there are R&D investments that may affect several time periods concurrently.

Table 6 indicates that the time horizon of CFOs' work is on average 1.35 years whereas the preferred time horizon is 1.60 years. In addition, 66% of the respondents preferred to have a longer time horizon than they presently held, whereas only 16% shared the opposite opinion. These results indicate that executives would prefer to extend the time horizon in their current work, if they were allowed to do that. The average time horizon of R&D investments is 2.81 years with a rather large standard deviation. Only less than half of the companies use payback period for evaluating the feasibility of operative investments. The average payback period of companies is 3.74 with the two most common lengths being two and three years. The CFOs felt that quarterly pressures from the stock market shortened their time horizon in 66% of the cases whereas only 12% respondents somewhat disagreed with this statement and no one strongly disagreed.

Table 7 shows the correlation matrix of our dependent variables. The table indicates that *THwork* and *THR&D* seem to measure very similar features of time horizon. Although *THshort* is derived from the same survey question as *THwork*, their correlation is not significant. This would suggest that these measures at least partly measure different qualities of perceived time horizon of CFOs' work. *Qpressure* does not seem to have any direct relationship with the CFOs' time horizon indicating that their time horizon is defined without the financial market pressures. The most surprising negative relationship is found between the payback period (*Payback*) and the CFOs' time horizon. This negative correlation indicates that in the companies with a shorter payback period, CFOs often have a longer time horizon in their work.

Table 6. Descriptive statistics of time horizon variables based on the responses of CFOs. *THwork* indicates the weighted average of future time horizon during which CFO's work will affect the profit of her own company. Similarly, *THworkpref* indicates the weighted average of future time horizon during which CFO would prefer to affect the profit of her own company, *THR&D* represents the weighted average of future time horizon, when ongoing R&D investments are expected to mainly influence company's profit, *Payback* is the average payback period requirement for operative replacement investments, and *Qpressure* measures the degree CFO agrees with the statement that quarterly pressures from the stock market shorten her time horizon. In each line, n refers to the number of respondents. For *Payback*, the range varied from one to ten years.

Time horizon measures	n	Mean years	St.dev. years	Quarter				
				Next quarter	to year	1-3 years	Over 3 years	Total
<i>THwork</i>	99	1,35	0,48	32,4 %	38,5 %	31,2 %	21,4 %	123,5 %
				Next annual report			After	
				1-3 years	3-5 years	5 years		
<i>THR&amp;D</i>	80	2,81	1,53	31,8 %	34,1 %	26,0 %	20,3 %	112,2 %
				One year		Four to five		longer
				Two years	Three years	years		
<i>Payback</i>	46	3,74	2,32	6,5 %	28,3 %	30,4 %	19,6 %	15,2 %
				Neither agree nor disagree		Somewhat agree		Strongly agree
				Strongly disagree	Somewhat disagree	Agree		Strongly agree
<i>Qpressure</i>	100	0,0 %	0,0 %	12,0 %	22,0 %	42,0 %	18,0 %	6,0 %

Table 7. Pearson correlation matrix of dependent variables (\*  $p < 0.05$ , \*\*  $<0.01$ ). *Qpressure* measures the degree CFO agrees with the statement that quarterly pressures from the stock market shorten her time horizon, *Payback* is the average payback period requirement for operative replacement investments, *THwork* indicates the weighted average of future time horizon, when CFO's work will affect the profit of her own company, *THshort* indicates the proportion of CFO's work that will affect the profit of her own company during the next year, and *THR&D* represents the weighted average of future time horizon, when ongoing R&D investments is expected to mainly influence the company's profit.

	<i>Qpressure</i>	<i>Payback</i>	<i>THwork</i>	<i>THshort</i>
<i>Payback</i>	0.126 43			
<i>THwork</i>	-0.031 96	-0.303* 45		
<i>THshort</i>	0.001 96	0.072 45	-0.176 99	
<i>THR&amp;D</i>	0.095 79	0.097 36	0.321** 78	-0.162 78

## 4.2 Description of compensation classes

The most common compensation elements were base salary, fringe benefits and bonuses (not deferred) (Table 8). The base salary was the most popular compensation class and had the largest relative amount (*RAsalary*) (mean 5.86 and median 6 using Likert scale from 1 to 7) and stocks (*RAstocks*) were also used extensively (mean 4.29 and median 4.5), in cases where they were used. Stocks were, however, used only for 28 CFOs (27.2% of respondents). The relative amount of bonuses (not deferred) (*RAbonus*) was also high (mean 4.11 and median 4) in cases where they were used. Both the retirement plan (*RAretirement*) (used in the case of 42.7% of CFOs) and executive stock options (*RAESO*) (40.8%) were rather common, and their relative amounts were relatively sizable (mean 3.41 and 3.50 respectively, the median for both being 4). Fringe benefits (*RAbenefits*) had only a small or moderately small relative amount (mean 2.51 and median 2), although they were commonly used (78.6% of respondents). Deferred bonuses (*RAdefbonus*) were rare (19.4% of respondents) and their relative amount was moderately low, 2.95.

Table 8. Relative amount (*RA*) of compensation classes (n=103), measured as the perceived relative amount of compensation compared to total compensation. Relative amount was enquired in the questionnaire with choices from a Likert scale from 1 to 7 as follows: 1 = very small; 2 = small; 3 = moderately small; 4 = neither small nor large; 5 = moderately large; 6 = large; 7 = very large.

Type of compensation	Users	Relative amount	Relative amount	Relative amount
	n	mean	median	mode
Salary	102	5,86	6	6
Benefits	81	2,51	2	2
Retirement	44	3,41	4	4
Bonus	79	4,11	4	5
Defbonus	20	2,95	3	2
ESO	42	3,5	4	5
Stocks	28	4,29	4,5	3, 5 and 6

Table 9 describes the time horizon (*TH*) of each compensation class in years, as perceived by executives themselves. Both base salary (*THsalary*) and fringe benefits (*THbenefits*) had a perceived time horizon

of about two years (1.95 years and 2.06 years, respectively). Based on this result, two years appears to be the perceived time horizon of monthly fixed compensation without any variable components. The shortest time horizon perceived by respondents was connected to bonuses (not banked) (*THbonus*), the average of which was 1.49 years with the median of 2 years. In other words, the average CFO experienced bonuses (not deferred) to shorten her time horizon, compared to a situation with only fixed salary, by about half a year. When bonuses were deferred (*THdefbonus*), their perceived time horizon was 2.32 years. Based on these findings, executives experience that deferred bonuses lengthen the time horizon of bonuses by almost one year. The time horizons of stock based systems, both stock options (*THESO*) and stocks (*THstocks*) were longer than three years (3.19 years and 3.20 years respectively). Respondents were almost unanimous that these stock-based compensation classes could not encourage towards a time period shorter than one year. The retirement plan (*THretirement*) had the longest perceived time horizon; the mean was 4.94 years and the median 7.5 years. These time horizons are most likely affected by the length of the time period until CFOs expect to receive their retirement benefits. Our results fit relatively well with our expectations based on earlier studies. All the compensation classes had a cross-sectional deviation from the mean indicating that each compensation class was perceived differently across companies.

The pairwise correlations of the time horizons of different compensation classes were positive, expect between *THbonus* and *THretirement*, and many of them were statistically significant at 5 % level: *THsalary* with *THbenefits*, *THsalary* with *THbonus*, *THbenefits* with *THbonus*, *THbenefits* with *THESO*, *THbonus* with *THstock*, *THdefbonus* with *THstock* and *THESO* with *THstock*. Therefore we compared the means of the time horizons using pairwise t-tests, i.e. among those respondents who had evaluated both compensation classes to be compared. Compared to the *THsalary*, *THbonus* has a significantly shorter time horizon where as *THretirement*, *THoption* and *THstock* have a significantly longer time horizon. In addition, *THdefbonus* is significantly longer than *THbonus* as was expected.

Table 9. Statistics for the time horizon of compensation classes in years (total of 103 respondents). They refer to the time horizon towards which the CFOs perceived each compensation class encourages them to work. In addition to mean and standard deviation, theoretically based expectations were adopted from Table 1 and were based on earlier literature when applicable; n refers to the number of respondents who claimed to be compensated with such a compensation system. In the test results \* p < 0.05, \*\* < 0.01.

Compensation class	Users n	Time	Time	Theoretical based expectations years	Test of the time horizon test value	Test results t-value
		Horizon, Mean years	Horizon, Std.dev. years			
THsalary	87	1.95	1.57	over one year	1 year	5.64**
THbenefits	53	2.06	1.90	over one year	1 year	4.05**
THbonus	68	1.49	1.07	one year	1 year	3.84**
THdefbonus	19	2.32	2.00	over one year	1 year	2.88**
THretirement	29	4.94	3.00	over 3 years	3 years	3.48**
THESO	37	3.19	1.77	over 3 years	3 years	0.65
THstocks	26	3.20	1.87	over 3 years	3 years	0.61

Figure 1 shows the relationship between the average values of the relative amount and the time horizon of each compensation class. The averages have been calculated for those respondents who have indicated either a relative amount or a perceived time horizon for the particular compensation class or both. Base salary with the largest relative amount is related to a rather short time horizon. Stocks also

represent a large amount of compensation, and they seem to have over one year longer time horizon than salary, whereas bonuses with high relative amount of compensation are tied to a relatively short time horizon. Stock options seem to have a very similar time horizon as stocks but they are used less. Deferred bonuses are different from non-deferred bonuses with a smaller amount and longer time horizon than non-deferred bonuses. The retirement plan has a rather small relative amount in compensation plans, but it has the longest time horizon. Fringe benefits have the smallest amount, and they seem to have a very similar perceived time horizon to base salary.

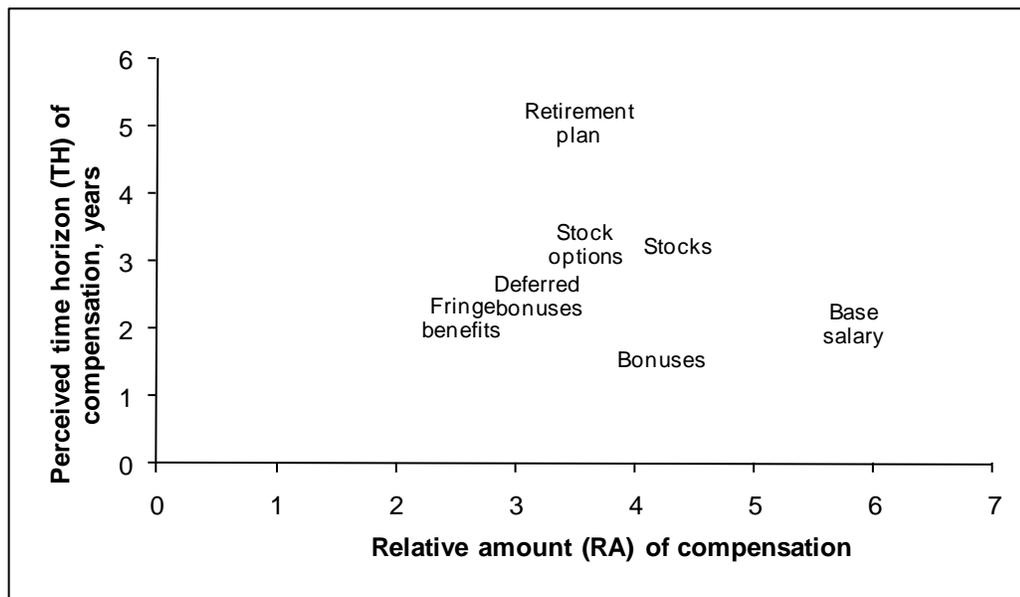


Figure 1. The average relative amount and perceived time horizon of compensation classes (n=103). This is a combination of averages from Tables 8 and 9. Time horizon is presented in years, and relative amount with the scale: 1 = very small; 2 = small; 3 = moderately small; 4 = neither small nor large; 5 = moderately large; 6 = large; 7 = very large

The relative amount of each compensation class does not necessarily indicate whether the compensation class in question has any influence on executive time horizon. In the next section, it is analyzed whether the perceived relative amount and perceived time horizon of each compensation class are related to the time horizon of executive work.

### 4.3 The relationship of time horizon of executive work with the time horizon and with the relative amount of compensation classes

*Correlation between Individual compensation classes and the time horizon of executive work and company activities*

Table 10 shows the correlations between (1) the group of independent variables, i.e. the perceived relative amount and time horizon of each compensation class with (2) the group of dependent variables, i.e. the time horizon of executive work and company activities. Based on prior literature, we expected bonuses, deferred bonuses, stock options and stocks to have an influence on the executive time horizon (see Table 1). Based on the correlation matrix, all compensation classes except benefits are correlated with the time horizon of executive work and company activities.

Table 10 also reports that some of the compensation classes, which we did not expect to influence the time horizon of executive work, are actually correlated with our dependent variables. The relative amount of base salary (*RAsalary*) is positively correlated with the quarterly pressures from the financial markets (*Qpressure*), and the time horizon of base salary is positively correlated with the payback period (*Payback*) and the expected time horizon of R&D investments (*THR&D*). Also another fixed element of compensation, retirement plan is correlated with the time horizon of executive work and company activities, since its time horizon (*THretirement*) is negatively correlated with the *Qpressure*. These correlations are unexpected: neither the relative amount nor the time horizon of compensation classes with fixed nature are not assumed to have a major influence on the time horizon of executive work and company activities.

All variable compensation classes had a significant correlation with our dependent variables. The relative amount of bonuses (*RAbonus*) is negatively correlated with the *Qpressure*, and the time horizon of bonuses (*THbonus*) is positively correlated with the *Payback*. The relative amount of deferred bonuses (*RAdefbonus*) is positively correlated with the short time horizon of executive work (*THshort*). The relative amount of stock options (*RAESO*) seems to be related to a shorter time horizon of executive work (*THshort*) and a longer expected time horizon of R&D investments (*THR&D*). The time horizon of stock options (*THESO*) has large correlation coefficients with *Qpressure*, *Payback* and *THR&D*, but partly due to small amount of observation they are not significant at a conventional level. Finally, the relative amount of stock (*RAstock*) is positively correlated with *Qpressure* and negatively correlated with *Payback*, and the time horizon of stock (*THstock*) is negatively correlated with the *Qpressure*.

A closer look at the correlation matrix shows that every compensation system time horizon has a negative correlation with quarterly pressures (*Qpressure*), all but one compensation system time horizons have a positive correlation with the time horizon of R&D investments (*THR&D*) and five out of seven compensation system time horizons have a positive correlation with payback period (*Payback*) and time horizon of CFOs' work (*THwork*) and a negative correlation with the short time horizon of CFO's work (*THshort*). In addition, interestingly both the relative amount of stock options and stocks seem to be positively correlated with the quarterly pressures from the financial markets and negatively correlated with the payback period (*Payback*) and the opposite is the case with the relative amount of bonuses. Based on the correlation matrix, perceived compensation system time horizons and executive time horizons appear to have a clear connection. The results of *THwork* are not further reported since it did not offer any significant results in any of the regressions.

Table 10. Correlation (Pearson) matrix between (1) the group of independent variables, i.e. the relative amount and time horizon of compensation classes (listed on the vertical axis) with (2) the group of dependent variables, i.e. the time horizon measures of executive work (listed on the horizontal axis). In each cell, the first value is the correlation coefficient and the second value is the t-value (\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $< 0.01$ ). *Qpressure* measures the degree CFO agrees with the statement that quarterly pressures from the stock market shorten her time horizon, *Payback* is the average payback period requirement for operative replacement investments, *THwork* indicates the weighted average of future time horizon, when CFO's work will affect the profit of her own company, *THR&D* represents the weighted average of future time horizon, when ongoing R&D investments are expected to mainly influence company's profit. Relative amount (*RA*) of compensation classes measures the perceived relative amount of compensation compared to total compensation. Relative amount was enquired in the questionnaire and respondents were given choices using a Likert scale from 1 to 7 with the following scaling: 1 = very small; 2 = small; 3 = moderately small; 4 = neither small nor large; 5 = moderately large; 6 = large; 7 = very large. Time horizon (*TH*) refers to the time horizon in years towards which CFOs perceived each compensation class encourage them to work.

	<i>Qpressure</i>	<i>Payback</i>	<i>THwork</i>	<i>THshort</i>	<i>THR&amp;D</i>
<i>RAsalary</i>	<b>,212**</b>	.009	-.008	-0.127	.079
	100	46	99	99	80
<i>THsalary</i>	-.084	<b>,320**</b>	.080	-.060	<b>,200*</b>
	85	41	85	85	69
<i>RAbenefis</i>	.078	.038	-.049	.112	.018
	100	46	99	99	80
<i>THbenefits</i>	-.024	.138	.211	-.082	.172
	53	23	53	53	44
<i>RAbonus</i>	<b>-,168*</b>	.158	.017	-.065	-.055
	100	46	99	99	80
<i>THbonus</i>	-.180	<b>,431**</b>	.059	.041	.175
	68	34	68	68	57
<i>RAdefbonus</i>	-.081	.057	-.153	<b>,251**</b>	-.056
	100	46	99	99	80
<i>THdefbonus</i>	-.165	-.070	.033	-.321	-.044
	19	10	18	18	15
<i>RAretirement</i>	.038	-.155	-.014	.007	-.078
	100	46	99	99	80
<i>THretirement</i>	<b>-,471**</b>	.053	-.268	-.182	.133
	27	11	29	29	19
<i>RAESO</i>	-.067	-.084	-.070	<b>,177*</b>	<b>,218*</b>
	100	46	99	99	80
<i>THESO</i>	-.252	.257	-.087	.025	.190
	37	11	37	37	32
<i>RAstock</i>	<b>,186*</b>	<b>-,250*</b>	.091	-.073	.099
	100	46	99	99	80
<i>THstock</i>	<b>-,495***</b>	-.060	.076	-.223	.272
	27	13	27	27	22

*Regression analysis with individual compensation classes and the time horizon of executive work and company activities*

To study the joint effects of the use of compensation classes on the time horizon of executive work, we developed the following multiple linear regression model

$$QPressure_i = \alpha_1 + (D_i, X_i, Z_i)\beta_1 + \epsilon_{1i},$$

where  $D_i$  is the (row) vector for the use of compensation classes of each company  $i$ , having a value of 1 if the compensation class is used, 0 otherwise,  $X_i$  is the (row) vector of company specific variables (industry dummies and financial ratios) and  $Z_i$  refers to the respondent CFO's age, which was the only individual variable kept in the final analysis; the parameter  $\alpha_1$  is the regression constant and  $\beta_1$  the column vector containing all the regression coefficients, and  $\epsilon_{1i}$  is the error term. Similarly we formed regression models for the other time horizon measures, with analogous notation:

$$Payback_i = \alpha_2 + (D_i, X_i, Z_i)\beta_2 + \epsilon_{2i}$$

$$THshort_i = \alpha_3 + (D_i, X_i, Z_i)\beta_3 + \epsilon_{3i}$$

$$THR\&D = \alpha_4 + (D_i, X_i, Z_i)\beta_4 + \epsilon_{4i}$$

Table 11 presents the estimation results of the regression analysis, where the compensation class dummies of all compensation classes are included first without control variables, then with industry

control and finally with all control variables. Based on the regressions, we find that quarterly pressures from the financial markets (*Qpressure*) are significantly weaker when bonuses are used (*D(bonus)*,  $p < 0.05$ ) and stronger when stocks are used (*D(stock)*,  $p < 0.05$ ). The results are not affected by the inclusion of industry control variables but the inclusion of other controls reduces their significance, although the coefficients in question are only slightly smaller. We also find that the payback period (*Payback*) tends to be over one year shorter if stocks or retirement plan is used, but these results are not significant. The proportion of short time horizon of executive work (*THshort*) is larger when deferred bonuses are in use by 12,6 % to 19,0 % and smaller when stocks are used by 14,5 % to 17,9 % (using the coefficients). Finally, we find that the expected time horizon of R&D investments (*THR&D*) tends to be shorter for companies having bonuses (0.8 to 1.2 years shorter,  $p < 0.05$ ) or retirement plan (0.7,  $p < 0.05$ , to 1.0 years shorter,  $p < 0.01$ ) in use and longer for companies having stock options in use (*D(ESO)*) by about 0.8 years ( $p < 0.05$ ). These results become stronger when including first industry and then the other control variables.

Overall, these results support our hypothesis that the use of bonuses, stock options and stocks in compensation systems has influence on executive time horizon. In addition, retirement plans seem to have some influence on the expected time horizon of R&D investments. We also find that the use of certain compensation class does not clearly indicate certain time horizon. For example, the use of bonuses on the one hand reduces the quarterly pressures from the financial markets but on the other hand it reduces also the expected time horizon of R&D investments, or the use of stocks increases the quarterly pressures from the financial markets but it also reduces the proportion of time used for activities which appear in income statement within one year (Table 11).

Table 11. Results of the regression analysis, where dependent variables are related to the time horizon of executive work and independent variables are the dummy variables (D) of each compensation class. In each cell, the first value is the regression coefficient and the second value is the t-value (\*  $p < 0.05$ , \*\*  $< 0.01$ ). *Qpressure* measures the degree CFO agrees with the statement that quarterly pressures from the stock market shorten her time horizon, *Payback* is the average payback period requirement for operative replacement investments, *THshort* indicates the proportion of CFO's work which affect the profit of her own company within one year, and *THR&D* represents the weighted average of future time horizon, when ongoing R&D investments are expected to mainly influence the company's profit. Industry controls are dummy variables based on the groups built based on the first digit of their SIC Codes, financial controls include *ln(operating assets)*, *solvency ratio*, and *ROCE*. *Age* is measured in years.

Independent variables	Qpressure	Qpressure	Qpressure	Payback	Payback	Payback	THshort	THshort	THshort	THR&D	THR&D	THR&D
Constant	3.023	3.157	5.367	4.615	5.266	0.922	0.793	0.844	0.042	2.366	2.097	-0.922
t-value	2.11	2.20	2.31	5.00	4.76	0.17	2.25	2.45	0.74	1.44	1.26	-0.33
D(salary)	2.079	1.611					-0.172	-0.128		0.855	1.251	
t-value	1.46	1.12					-0.49	-0.37		0.53	0.76	
D(benefits)	-0.199	-0.258	-0.357	-0.734	-0.973	-1.037	0.046	0.030	0.027	0.207	0.377	0.584
t-value	-0.53	-0.67	-0.90	-0.80	-1.01	-0.92	0.51	0.33	0.29	0.45	0.77	1.21
D(bonus)	-0.878	-0.775	-0.628	0.438	0.099	-0.283	0.028	0.002	0.011	-0.771	-0.960	-1.212
t-value	<b>-2,34*</b>	<b>-2,00*</b>	-1.52	0.47	0.10	-0.23	0.31	0.02	0.11	-1.67	<b>-2,00*</b>	<b>-2,47*</b>
D(defbonus)	-0.031	0.035	-0.075	0.945	0.959	1.285	0.126	0.146	0.190	-0.447	-0.492	-0.383
t-value	-0.09	0.10	-0.20	1.05	1.00	1.18	1.41	1.67	<b>2,03*</b>	-1.02	-1.11	-0.86
D(retirement)	0.418	0.379	0.324	-1.136	-1.273	-1.218	-0.005	0.008	0.002	-0.733	-0.801	-0.975
t-value	1.50	1.35	1.10	-1.49	-1.62	-1.30	-0.08	0.12	0.02	<b>-2,09*</b>	<b>-2,25*</b>	<b>-2,81**</b>
D(ESO)	0.076	0.031	0.058	-0.118	-0.154	-0.327	0.111	0.095	0.088	0.710	0.778	0.855
t-value	0.26	0.11	0.19	-0.15	-0.18	-0.33	1.54	1.34	1.21	1.97	<b>2,10*</b>	<b>2,36*</b>
D(stock)	0.681	0.691	0.663	-1.286	-1.324	-1.357	-0.145	-0.177	-0.179	0.350	0.448	0.394
t-value	<b>2,18*</b>	<b>2,15*</b>	1.98	-1.65	-1.60	-1.35	1.87	<b>-2,27*</b>	<b>-2,21*</b>	0.91	1.12	1.02
Industry control	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Financial control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Age control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R <sup>2</sup>	0.114	0.160	0.175	0.166	0.214	0.266	0.092	0.170	0.199	0.142	0.171	0.287
Adjusted R <sup>2</sup>	0.047	0.064	0.034	0.038	0.012	-0.052	0.022	0.075	0.060	0.059	0.051	0.131
F-ratio	1.697	1.674	1.238	1.297	1.057	0.837	1.311	1.787	1.437	1.706	1.424	1.840
n	99	98	96	45	44	43	98	97	95	79	79	78

Next we analyze the joint effects of the relative amounts of compensation classes on the time horizon of executive work, with the help of the following multiple linear regression model

$$QPressure_i = \alpha_1 + (RA_i, X_i, Z_i)\beta_1 + \epsilon_{1i},$$

where  $RA_i$  is the (row) vector for the relative amount of compensation classes of each company  $i$ ,  $X_i$  is the (row) vector of company specific variables (industry dummies, country, financial ratios) and  $Z_i$  refers to the respondent CFO's age, which was the only individual variable kept in the final analysis; the parameter  $\alpha_1$  is the regression constant and  $\beta_1$  the column vector containing all the regression coefficients, and  $\epsilon_{1i}$  is the error term. Similarly we formed regression models for the other time horizon measures, with analogous notation:

$$Payback_i = \alpha_2 + (RA_i, X_i, Z_i)\beta_2 + \epsilon_{2i}$$

$$THshort_i = \alpha_3 + (RA_i, X_i, Z_i)\beta_3 + \epsilon_{3i}$$

$$THR\&D = \alpha_4 + (RA_i, X_i, Z_i)\beta_4 + \epsilon_{4i}$$

Table 12 presents the estimation results of the regression analysis, where relative amounts of all compensation classes are included first without and then with the control variables. Based on the regressions, we find that quarterly pressures from the financial markets ( $Qpressure$ ) are significantly stronger with higher relative amounts of fixed salary ( $RA_{salary}$ ,  $p < 0.05$ ) and stocks ( $RA_{stocks}$ ,  $p < 0.05$ ) whereas the relative amount of bonuses ( $RA_{bonus}$ ) tends to reduce quarterly pressures ( $p < 0.05$ ). The results regarding  $RA_{bonus}$  are not affected by the inclusion of control variables and the results regarding  $RA_{stock}$  become even stronger with control variables. We also find that the payback period ( $Payback$ ) tends to be shorter with higher relative amount of stocks when the control variables are not included in

the model, but this result was not significant with the all control variables included. The relative proportion of CFO's work which affects the profit within one year is surprisingly larger for those with higher relative amount of deferred bonuses. This unexpected result could be caused by the nature of their adaptors and the novelty of deferred bonuses. Deferred bonuses could have been issued mainly in the companies which attempt to extend the time horizon of executives beyond one year. Based on our descriptive results (Table 8) deferred bonuses are used neither extensively (only 20 companies out of 103) nor intensively (relative size is mostly small or moderately small when they are used) probably because of their novel nature in the compensation systems and companies are unsure on their influence. Thus probably due to the very moderate use of deferred bonuses in the companies with problems of short termism, deferred bonuses have not had the expected influence on the time horizon of CFOs. This result is unaffected by control variables. Finally, we find that the expected time horizon of R&D investments (*THR&D*) tends to be longer for companies having larger relative amount of stock options (*RAESO*) in compensation plans ( $p < 0.05$ ). This result becomes even stronger when including control variables ( $p < 0.01$ ).

Overall, these results support our hypothesis that bonuses, stock options and stocks have influence on executive time horizon. Based on these results, only those variable compensation classes which were perceived to have larger relative amounts do have some relationship with the time horizon measures. In addition, the use of control variables considerably increases the goodness of fit of the model ( $R^2$ ), but since the reasonably small number of observations (companies) available for the individual regression analyses, the models become often overloaded with the excess number of variables, and consequently the adjusted  $R^2$  measures are considerably deflated (Table 12).

Table 12. Results of the regression analysis, where dependent variables are related to the time horizon of executive work and independent variables are the relative amounts (RA) of each compensation class. The relative amounts of each compensation class also include those responses, where certain compensation class was not used (marked as 0). In each cell, the first value is the regression coefficient and the second value is the t-value (\*  $p < 0.05$ , \*\*  $< 0.01$ ). *Qpressure* measures the degree CFO agrees with the statement that quarterly pressures from the stock market shorten her time horizon, *Payback* is the average payback period requirement for operative replacement investments, *THshort* indicates the proportion of CFO's work which affect the profit of her own company within one year, and *THR&D* represents the weighted average of future time horizon, when ongoing R&D investments are expected to mainly influence the company's profit. Relative amount (RA) of compensation classes measures the perceived relative amount of compensation compared to total compensation. Relative amount was enquired in the questionnaire and respondents were given choices using a Likert scale from 1 to 7 with the following scaling: 1 = very small; 2 = small; 3 = moderately small; 4 = neither small nor large; 5 = moderately large; 6 = large; 7 = very large. Industry controls are dummy variables based on the groups built based on the first digit of their SIC Codes, financial controls include  $\ln(\text{operating assets})$ , *solvency ratio*, and *ROCE*. *Age* is measured in years.

Independent variables	Opressure	Opressure	Opressure	Payback	Payback	Payback	THshort	THshort	THshort	THR&D	THR&D	THR&D
Constant	3.400	3.667	5.323	3.259	3.194	-1.002	0.914	0.865	0.500	1.989	2.112	-0.813
t-value	4.33	4.20	2.76	1.20	1.05	-0.15	4.53	3.90	1.04	1.90	1.84	-0.32
RAsalary	0.232	0.174	0.153	0.100	0.125	0.258	-0.039	-0.030	-0.031	0.140	0.161	0.114
t-value	<b>2,02*</b>	1.51	1.30	0.25	0.29	0.56	-1.34	-1.02	-1.04	0.91	1.02	0.74
RAbenefits	0.076	0.068	0.028	0.113	0.102	0.152	0.017	0.012	0.011	-0.010	0.005	0.023
t-value	0.87	0.77	0.31	0.44	0.37	0.52	0.78	0.55	0.48	-0.08	0.04	0.20
RAbonus	-0.140	-0.155	-0.150	0.194	0.147	0.104	-0.016	-0.012	-0.007	-0.058	-0.072	-0.157
t-value	<b>-2,15*</b>	<b>-2,35*</b>	<b>-2,16*</b>	0.96	0.67	0.42	-1.01	-0.75	-0.41	-0.71	-0.85	-1.83
RAdefbonus	-0.572	-0.014	-0.015	-0.016	-0.051	-0.039	0.056	0.054	0.068	-0.133	-0.145	-0.119
t-value	-0.56	-0.14	-0.14	-0.04	-0.13	-0.09	<b>2,20*</b>	<b>2,09*</b>	<b>2,51*</b>	-1.08	-1.13	-0.92
RAretirement	0.038	0.044	0.042	-0.284	-0.323	-0.330	-0.002	0.000	-0.002	-0.083	-0.099	-0.201
t-value	0.53	0.62	0.55	-1.34	-1.47	-1.21	-0.11	0.00	-0.11	-0.88	-1.02	<b>-2,06*</b>
RAESO	-0.025	-0.035	-0.032	-0.116	-0.128	-0.148	0.016	0.015	0.014	0.190	0.196	0.222
t-value	-0.37	-0.54	-0.47	-0.61	-0.63	-0.66	0.98	0.95	0.86	<b>2,32*</b>	<b>2,35*</b>	<b>2,72**</b>
RAstock	0.168	0.198	0.209	-0.421	-0.467	-0.458	-0.009	-0.019	-0.021	0.078	0.083	0.089
t-value	<b>2,52*</b>	<b>2,88**</b>	<b>3,00**</b>	<b>-2,11*</b>	<b>-2,16*</b>	-1.85	-0.56	1.12	-1.19	0.94	0.94	1.06
Industry control	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Financial control	No	No	Yes	No	No	Yes	No	No	No	No	No	Yes
Age control	No	No	Yes	No	No	Yes	No	No	No	No	No	Yes
R <sup>2</sup>	0.146	0.207	0.229	0.158	0.179	0.230	0.114	0.172	0.205	0.099	0.113	0.238
Adjusted R <sup>2</sup>	0.081	0.117	0.098	0.002	-0.062	-0.142	0.045	0.077	0.068	0.011	-0.016	0.071
n	99	98	96	45	44	43	98	97	95	79	79	78

The time horizons for the compensation classes could not be combined in a multiple regression analysis, since it would require most of the companies in the sample to use the same compensation classes. Therefore these results with very limited number of observations do not offer any proper basis for our analysis. Instead, in the next subsection we create a measure which comprehensively includes the time horizon of various compensation classes.

In line with Kalyta (2006), we also tested whether respondent's age is negatively correlated with the perceived time horizon of the retirement plan, but we did not find such a relationship.

#### *Comprehensive measure of perceived time horizons of executive compensation*

A comprehensive measure of the time horizon of the entire compensation system was also created for the purpose of analyzing the relationship between the time horizon of executive work and the perceived time horizon of compensation systems. This is defined as Weighted Time Horizon, WTH:

$$WTH = \frac{\sum_{k=1}^7 w_k t_k}{\sum_{k=1}^7 w_k},$$

where  $w_k$  refers to relative amount of compensation class  $k$  in respondent's compensation system (see Table 8 for a list of compensation classes), and  $t_k$  refers to the midpoint (in years) of the time horizon category chosen by the respondent for compensation class  $k=1, 2, \dots, 7$ . The time horizon categories are listed in Appendix A, Question 14, Part II.

Five comprehensive *WTH* measures were generated: *WTH(all)* including all forms of compensation, *WTH(fixed)* for fixed types of compensation systems (i.e. salary, fringe benefits and retirement plan), *WTH(bonus)* for bonus-based compensation systems including both deferred and non-deferred bonuses, *WTH(stock)* for stock-based compensation systems including stock options and stocks; and *WTH(var)* for all variable compensation systems (i.e. bonuses and stock-based compensation). The weighted time horizon of all compensation systems is 2.34 years, and for fixed compensation 2.35 years. For bonuses (*WTH(bonus)*) the time horizon is considerably shorter, 1.58 years, for stocks (*WTH(stock)*) it is longer, 3.11 years, and for variable compensation systems as a whole (*WTH(var)*) it is 2.16 years (Table 13).

Table 13. Descriptive statistics of the *WTH* variables. The mean, median, 1. quartile and 3. quartile are presented in years. *WTH* refers to the weighted time horizon where the weights are the relative amounts of the compensation classes and *TH* is the corresponding time horizon for the CFO. *All* includes all compensation classes, *fixed* comprises of salary, fringe benefits and retirement plan, *bonus* includes both deferred and not deferred bonuses, *stock* includes both stock and stock options, and *var* comprises of bonus and stock based systems.

variable	n	mean	median	1. quartile	3. quartile
<b>WTH(all)</b>	95	2.34	2	1.54	2.28
<b>WTH(fixed)</b>	89	2.35	2	1.72	2.00
<b>WTH(bonus)</b>	72	1.58	2	0.63	2.00
<b>WTH(stock)</b>	52	3.11	2	2.00	4.00
<b>WTH(var)</b>	83	2.16	2	1.39	2.44

Using these variables, we further analyzed the relationship between the perceived time horizon of compensation systems and the time horizon of executive work. We regress the comprehensive measure of perceived time horizons of the whole compensation system (*WTH(all)*) on quarterly pressures from financial markets (*Qpressure*), length of the payback period (*Payback*), the time horizon of R&D investments (*THR&D*) and the time horizon of executive work (*THshort*) (Table 14). We find that *Qpressure* tends to be lower when the time horizon of the whole compensation system is longer (*WTH(all)*). This result is unaffected by the control variables. *Payback* is positively related to the time horizon of the whole compensation system but the result is insignificant. One year extension in the time horizon of the whole compensation system extends payback period by 0.4 to 0.5 years. The longer the time horizon of the whole compensation system, the lower the proportion of working time that is devoted to tasks which affect the profit within one year. This result is not statistically significant. Finally, *THR&D* appears to become longer when the time horizon of the whole compensation system is longer. One year increase in *WTH(all)* leads to 0.397 years ( $p < 0.01$ ) longer time horizon of R&D. The inclusion of control variables slightly weakens the results to 0.353 ( $p < 0.05$ ). These results strongly show that the time horizon of the whole compensation system is related to the time horizon of executive work and organizational activities. The results are not much influenced by the control variables.

Table 14. Results of the regression analysis, where dependent variables are related to time horizon of executive work and independent variable is the comprehensive measure of perceived time horizons of the whole compensation system. In each cell, the first value is the regression coefficient and the second value is the t-value (\*  $p < 0.05$ , \*\*  $< 0.01$ ). *Qpressure* measures the degree to which CFO agrees with the statement that quarterly pressures from the stock market shorten her time horizon, *Payback* is the average payback period requirement for operative replacement investments, *THshort* indicates the proportion of CFO's work which affect the profit of her own company within one year, and *THR&D* represents the weighted average of future time horizon, when ongoing R&D investments are expected to mainly influence the company's profit. *WTH* refers to the weighted time horizon where the weight is the relative amount of each compensation class for each CFO separately and *TH* is the time horizon of respective compensation class for the respective CFO. Industry controls are dummy variables based on the groups built based on the first digit of their SIC Codes, financial controls include *ln(operating assets)*, *solvency ratio*, and *ROCE*. *Age* is measured in years.

Independent variables	Qpressure	Qpressure	Qpressure	Payback	Payback	Payback	THshort	THshort	THshort	THR&D	THR&D	THR&D
Constant	5.230	5.320	6.191	2.860	2.520	3.223	0.830	0.817	0.888	1.916	1.956	-0.227
t-value	19.26	11.37	3.63	4.30	2.10	0.67	12.32	7.08	2.07	5.20	3.24	-0.10
WTH(all)	-0.258	-0.265	-0.232	0.401	0.400	0.513	-0.044	-0.038	-0.040	0.397	0.394	0.353
t-value	<b>-2.49*</b>	<b>-2.57*</b>	<b>-2.16*</b>	1.68	1.60	1.89	-1.79	-1.59	-1.55	<b>2.74**</b>	<b>2.66**</b>	<b>2.33*</b>
Industry control	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Financial control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Age control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R <sup>2</sup>	0.065	0.116	0.130	0.063	0.067	0.164	0.034	0.109	0.125	0.094	0.099	0.137
Adjusted R <sup>2</sup>	0.054	0.075	0.043	0.041	-0.031	-0.038	0.023	0.068	0.040	0.081	0.048	0.031
n	91	90	88	43	42	41	92	91	89	74	74	73

In Table 15, we decompose  $WTH(all)$  into fixed  $WTH(fixed)$  and  $WTH(var)$  or  $WTH(bonus)$  and  $WTH(stock)$  in order to more closely analyze, how the perceived time horizon of various forms of compensation is related to the time horizon of executives and organizations. The results indicate that the quarterly pressures from financial markets ( $Qpressure$ ) is not significant if only  $WTH(var)$  is used, but separating the influence into bonuses ( $WTH(bonus)$ ) and stocks ( $WTH(stock)$ ), we find similar results as with the  $WTH(all)$ . These results remain similar even after inclusion of control variables. Our results suggest that the longer time horizon of bonuses and stock-based compensation has a negative effect on quarterly pressures, and the time horizon of fixed compensation has no relationship with these quarterly pressures, all as expected. In addition, based on the regression coefficient a one year increase in the time horizon of bonuses has about two times larger influence on the quarterly pressures from the financial markets than that of stocks.

Finally in Table 15, we analyzed whether the weighted time horizon of fixed compensation,  $WTH(fixed)$ , and variable compensation,  $WTH(var)$ , has any influence on the other time horizon measures of executives and company activities. We limit our further analysis only into  $WTH(fixed)$  and  $WTH(var)$  unlike with  $Qpressure$ , due to low number of observations with other executive and organizational time horizon measures when both  $WTH(bonus)$  and  $WTH(stock)$  are used. Both the payback period,  $Payback$ , and the expected time horizon of R&D investments,  $THR&D$ , are influenced by the time horizon of variable compensation, as expected. One year increase in the time horizon of variable compensation extends the payback period with 0.5-0.7 years and the time horizon of R&D investments with almost 0.4 years. These results strongly indicate that the perceived time horizon of variable compensation systems is strongly related with both operative ( $Payback$ ) and strategic ( $THR&D$ ) time horizon of company activities. These results become slightly stronger as we control for industry, financial aspects and age. Surprisingly, the measure  $THshort$ , is not related with the time horizon of variable compensation indicating that the perceived time horizon of compensation systems does not influence the time horizon of CFOs' work.

Table 15. Results of the regression analysis, where dependent variables are related to time horizon of executive work and independent variables are the comprehensive measures of perceived time horizons of fixed form of compensation system (*WTHfixed*), variable forms of compensation systems (*WTHvar*), bonus-based systems *WTH(bonus)* and stock-based systems *WTH(stock)*. *WTH* refers to the weighted time horizon where the weight is the relative amount of each compensation class for each CFO separately and *TH* is the time horizon of respective compensation class for the respective CFO. Industry controls are dummy variables based on the groups built based on the first digit of their SIC Codes, financial controls include *ln(operating assets)*, *solvency ratio*, and *ROCE*. *Age* is measured in years. In each cell, the first value is the regression coefficient and the second value is the t-value (\* p < 0.05, \*\* <0.01). *Qpressure* measures the degree to which CFO agrees with the statement that quarterly pressures from the stock market shorten her time horizon. *Payback* is the average payback period requirement for operative replacement investments, *THshort* indicates the proportion of CFO's work which affect the profit of her own company within one year, and *THR&D* represents the weighted average of future time horizon, when ongoing R&D investments are expected to mainly influence the company's profit.

Independent variables	Qpressure	Qpressure	Qpressure	Payback	Payback	Payback	THshort	THshort	THshort	THR&D	THR&D	THR&D	THwork	THwork	THwork
Constant	6.567	6.417	6.456	2.598	2.292	6.933	0.745	0.777	1.014	1.781	2.049	-0.778	1.362	1.443	1.014
t-value	13.89	8.00	2.61	3.43	1.78	1.43	9.23	5.72	1.44	4.37	3.04	-0.27	11.37	7.32	1.44
WTH(fixed)	-0.049	-0.030	-0.030	-0.007	0.000	-0.172	0.000	-0.007	-0.001	0.116	0.086	0.070	-0.016	-0.013	-0.001
t-value	-0.35	-0.22	-0.21	-0.02	0.00	-0.44	-0.01	-0.25	-0.02	0.94	0.67	0.52	-0.43	-0.35	-0.02
WTH(var)				0.551	0.593	0.702	0.000	0.005	0.009	0.355	0.379	0.384	0.008	0.007	0.009
t-value				1.84	1.92	2.32*	0.00	0.15	0.21	2.38*	2.48*	2.38*	0.18	0.15	0.21
WTH(bonus)	-0.571	-0.594	-0.646												
t-value	-2.20*	-2.35*	-2.16*												
WTH(stock)	-0.239	-0.305	-0.304												
t-value	-1.64	-2.14*	-1.96												
Industry control	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Financial control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Age control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R <sup>2</sup>	0.308	0.429	0.417	0.135	0.184	0.384	0.000	0.033	0.088	0.131	0.150	0.203	0.003	0.072	0.088
Adjusted R <sup>2</sup>	0.249	0.322	0.202	0.084	0.052	0.171	-0.028	-0.037	-0.042	0.102	0.075	0.065	-0.025	0.005	-0.042
n	38	38	37	36	36	35	74	74	72	62	62	61	74	74	72

### Analysis of the findings

The analysis of the findings is summarized in Table 17 in a rather similar format as in Table 1. Our findings show how complex is the nature of the relationship between the compensation classes and executive time horizon. It is interesting to note that the use of stocks as an element of compensation system (Table 11) as well as the higher relative amount of stocks (Tables 10 and 12) increase the quarterly pressures perceived by the CFOs, while the time horizon of stock-based systems including both stocks and options reduces this pressure (Tables 10 and 15). The use of stocks (Table 11, coefficient value 0.663-0.691) has approximately the same amount of influence on the quarterly pressures as an extension of two to three years in the perceived time horizon of stock based systems including both stocks and options (Table 15, coefficient value -0.239—0.305). The use of bonuses has a negative effect on the perceived quarterly pressures (Tables 10 and 11) of approximately the same size but opposite as stock-based systems (in Table 10, correlation coefficient with *Qpressures*, *RAbonus*, -0.168 vs. *RAstock*, 0.186 and in Table 11, regression coefficient with *Qpressures*, *D(bonus)*, -0.628 - -0.878 vs. *D(stock)* 0.663 – 0.691, whereas the time horizon of bonuses in total has a similar but twice as strong an effect as the time horizon of stock based systems including stock options (Table 15). These results strongly suggest that the use of bonuses leads to lower quarterly pressures among top executives of listed companies. Surprisingly and important to note, the role of stock options in the quarterly pressure analysis is almost non-existent suggesting that stock options do not have any major role among top executives of listed companies on how these executives perceive quarterly pressures from the financial markets.

Payback period (*Payback*) seems to be shorter in the companies where stocks are extensively used (Tables 10 and 12). This result gives support for the earlier studies by Burns and Kedia (2006) and Denis

et al. (2006) but contradicts with the claim that stocks are long term incentives (Brickely et al., 1985; Puffer and Weintrop, 1991; Lambert, 1993). The use of stocks as part of compensation systems reduces the payback period by about 1.3 years (Table 11). As we compare it with the average payback period of 3.74 years (Table 6), payback period is on average 35 % shorter in the companies with stocks in compensation system than in other companies. The time horizon of variable compensation seems to be related with the payback period (Table 15). This is mainly due to the time horizon of bonus systems (Table 10). It looks like a one year extension in the perceived time horizon of compensation systems, especially on bonuses, seems to prolong payback period by over half-a-year (Table 15).

Our third measure, *THshort*, which was adopted by Van der Stede (2000) seems to be influenced especially by the use of stock and to a minor degree on the time horizon of compensation systems in general. The use of stock decreases the proportion of time used for activities which appear in profit within one year by about 15 % - 17 % (Table 11). This result would suggest that stocks extend the time horizon of managerial work, although they increase quarterly pressures and shorten payback period (Table 11). Stock options have only a insignificant effect on *THshort*. The influence of stocks seems to be opposite and about two times stronger than that of options, and bonuses seem to have mostly weaker relationship than stock options with *THshort*, which was even more surprising (Tables 11 and 12).

The expected time horizon of R&D investments (*THR&D*) is strongly related with several compensation classes. The use of bonuses and stock options have quite an opposite relationship with the *THR&D*, bonuses shortening (0.7 to 1.2 years, Table 11) and stock options lengthening (0.7 to 0.9 years, Table 11) influence. Stock options also extend the time horizon of R&D investments as the relative amount of stock options is increased. Finally, the time horizon of variable compensation classes, *WTH(var)*, seems to be strongly related with the time horizon of R&D investments. A one year extension in *WTH(var)* prolongs the time horizon of R&D investments by 0.36 to 0.38 years (Table 15).

It is interesting to note that both the operational payback period and the strategic time horizon of R&D investments are closely related with the perceived time horizon of variable compensation but not with fixed compensation. Neither is the use of personal time of CFOs related to the time horizon of variable compensation. Therefore it looks very much like the work of CFOs is not much influenced by the compensation systems, rather the CFO does what she has to do, and the control systems, including payback period and compensation systems and the time horizon of strategic investments like R&D, are aligned with each other, thus fitting the company activities, which are surprisingly neither influenced by the industry nor the financial controls.

Table 1. The findings on the time horizon of each compensation class and on the strength of their influence on executive time horizon.

<b>Compensation class</b>	<b>Expected influence on executive time horizon</b>	<b>Findings: Effects of class in use (D) on executive TH</b>	<b>Findings: Effects of relative amount (RA) of class on executive TH</b>	<b>Findings: Effects of time horizon (TH) of class on executive TH</b>
Salary	weak	no effect	no effect	no effect
Fringe benefits	weak	no effect	no effect	no effect
Retirement plan	weak	<b>decrease TH of R&amp;D</b>	no effect	no effect
Bonuses (not deferred)	strong	<b>decrease quarterly pressures, decrease TH of R&amp;D</b>	<b>decrease quarterly pressures</b>	<b>bonuses and deferred bonuses: decrease quarterly pressures</b>
Deferred bonuses	strong	no effect	<b>increase short TH of CFO</b>	<b>bonuses, deferred bonuses, stocks and options: increase payback period, increase TH of R&amp;D</b>
Stock options	strong	<b>increase TH of R&amp;D</b>	<b>increase TH of R&amp;D</b>	<b>stocks and stock options: decrease quarterly pressures</b>
Stocks	strong	<b>increase quarterly pressures, decrease short TH of CFO</b>	<b>increase quarterly pressures, decrease payback period</b>	

## 4.4 Discussion

In this study, we found that the perceived time horizons of compensation classes were generally in line with those suggested in the earlier literature. Fixed compensation (base salary and fringe benefits) has a perceived time horizon of about two years, whereas retirement plans have a long perceived time horizon of about five years. We could not find any general trend that retirement plans would be conceived as short-term oriented (following Burns and Kedia, 2005 and contrary to Sundaram and Yermack, 2005; Kalyta, 2006). The perceived time horizon of variable compensation systems varies depending on the type of compensation. Bonuses (not deferred) have a short perceived time horizon: about a year and a half. If bonuses are deferred, their perceived time horizon is longer, along the lines suggested by Ittner et al. (2003) and Feltham and Xie (1994). Stock-based systems, regardless of whether they are stock options or stocks, have a perceived time horizon of over three years. This is generally in line with the arguments by Holmstrom (2006), although there was no clear difference between stocks and stock options in this regard, against expectations based on prior literature. In addition to the differences between compensation classes, each compensation class was also perceived differently by different executives. The compensation system which was perceived by one executive to be a very short-term compensation system was typically considered to be long-term by another executive. Therefore, it seems safe to at least consider that the influence of time horizon of a compensation system on executive work may not only be dependent on that specific system but also how the system is perceived by executives. In addition, although compensation systems have differences in their perceived time horizons, this result does not yet allow us to judge, whether these time horizons correlate with the time horizon of executives and organizations.

For analyzing the influence of compensation systems on the time horizon of executive work, we applied several measures of the time horizon of executive work: the quarterly pressures from the financial

markets, payback period for operational investments, the proportion of time used for activities which appear in profit within one year, and the proportion of ongoing R&D investments which are expected to generate profits during certain time horizons.

The analysis based on individual compensation classes indicates that the perceived time horizon of compensation classes has influence on the time horizon of executive work. Quarterly pressures from the financial markets are lowered by the time horizon of stocks and retirement plans. The payback period is longer for those respondents with longer perceived time horizon of base salary and bonuses. Therefore, it appears that executive perceptions on compensation systems are related to a more general executive time horizon.

Base salary, fringe benefits and bonuses (not deferred) were all very commonly used in the companies. Base salary has the largest relative amount of compensation, which is followed by stocks and bonuses, stock options and retirement plans, when used. Fringe benefits and deferred bonuses are on average only small or moderately small. When the influence of the use and relative amount of each compensation class is analyzed, we found that the use of bonuses, retirement plans, stock options and stocks and to a minor extent also deferred bonuses, and the relative amount of bonuses, deferred bonuses, stock options and stock-based systems influence executive work. We found that the use of relatively large amount of variable compensation forms seem to influence executive time horizon. This is in line with our hypotheses. A larger relative amount of bonuses seems to lower quarterly pressures from the financial markets suggesting that bonuses are defined based on the business needs instead of financial market pressures. A larger relative amount of stocks is related to increases in quarterly pressures from the financial markets. This result contradicts those implied by Bricklay et al. (1985); Puffer and Weintrop (1991), and Lambert (1993), suggesting that although stock-based compensation systems are perceived to have a long time horizon, the relatively large amount of stocks has a reversed effect. It decreases the time horizon in executive work, as suggested by Stein (1989) and Rappaport (2005). Finally, the larger relative amount of stock options is related to an extended time horizon of ongoing R&D investments, frequently regarded as risky investments. These results suggest that stocks and stock options have dissimilar influences on the time horizon of executive work. Stock options appear to be connected with long-term research investments, vital for the development of the economy.

We also created comprehensive measures (*WTH*) for the time horizon of the various types of compensation systems as well as for the entire compensation system. The comprehensive measure *WTH(all)* offered us an effective measure of the perceived time horizon of the compensation system package, and we found a strong relationship between the *WTH(all)* and quarterly pressures from the financial markets, payback period and the time horizon of ongoing R&D investments. These results are unaffected by the industry and other control variables. As we decompose our comprehensive time horizon measure *WTH(all)* of executive compensation into compensation classes, fixed compensation and variable compensation or into bonuses and stock-based compensation, we find that the longer time horizon of variable compensation strongly extends the perceived time horizon of organization-specific variables, payback period and the time horizon of ongoing R&D investments. We also find that the longer perceived time horizon of bonuses and stock-based compensation significantly reduces the quarterly pressures from the stock market. These results are also intact of control variables, i.e. compensation systems do not mediate the time horizon of specific industry or special financial characteristics. We also found that the individual differences in the perceived time horizons of bonuses and stock-based systems between the CFOs have a considerable influence on the perceived time

pressure from the stock market, payback period and the time horizon of ongoing R&D investments. Thus, not only the relative amount of each compensation system matters but also, how each executive comprehends the nature of bonuses and stock-based systems.

Surprisingly, short-term influences by stock options were not detected in our Nordic sample, as expected from samples of listed companies collected from the United States (Burns and Kedia, 2006; Denis et al., 2006). There could be several reasons for this. First, the use of executive stock options is not as extensive in the Nordic countries as in the U.S. and, second, these options are normally vested during a relatively lengthy time period.

The use of various measures of time horizon turned out to be very useful. They offered us a perspective to the different dimensions of time horizon and helped us to understand how various types of compensation systems influence these dimensions. Only the current time horizon of executive work and its short term variant by Van der Stede (2000) were not much related to any compensation system. This could be interpreted either so that these time horizons did not successfully measure time horizon or that compensation systems do not influence them.

## **5 Conclusions**

In this study, the effect of executive compensation plans on the time horizon of executive work was analyzed. We first analyzed the time horizon of executive compensation plans, as perceived by executives themselves, and found that retirement plans, stock options and stocks represent compensation plans with long time horizon, whereas bonuses represent the shortest time horizon. It was also found that salary, bonuses and stocks represent the largest relative amount of compensation, and fringe benefits and deferred bonuses the smallest.

Although salary represents the largest relative amount of all compensation classes, it has a very small perceived impact on executive time horizon. This could be explained with the stable nature of salary. It does not vary much over time or depending on the company performance or business environment. This is the case also with fringe benefits. The insensitivity of the perceived executive time horizon to these compensation classes was expected.

Based on our results, variable compensation systems have a major influence on the executive time horizon as expected. Bonuses seem to originate from the business and thus lower the quarterly pressures from the financial markets. The increased use of stocks seems to shorten executive time horizon. Stock options, on the other hand, seem to lengthen the expected time horizon of R&D. The complexity of stock-based compensation clearly deserves a lot of attention as a subject of further study.

The comprehensive time horizon measure of compensation systems which includes the entire package of compensation classes, developed by us, turned out to be very useful. It showed how the time horizon of the entire compensation system has a relationship between several time horizon variables. These results are insensitive to our control variables. When we decomposed our comprehensive measure, we were able to show that while the relative amount of stock-based compensation appeared to decrease time horizon, the perceived time horizon of stock-based compensation, and bonus compensation, had an opposite effect. When stock-based compensation is perceived as a long-term, the executive time horizon

seems to be longer. Further research is welcome on the reasons for differences between the time horizons of executives and on the specific mechanism through which these differences materialize.

The findings also reveal that the perception of compensation systems varies across companies and executives therein, although the general perception is very similar to what was expected. Therefore, researchers need to be careful in arguing for or against a certain time horizon encouraged by a certain compensation class. Idiosyncratic influences exist and they are surprisingly strong.

Finally, the findings of the study suggest that the recent discussion and criticism against variable pay and stock-based compensation, as well as their role in the financial crises, is potentially misdirected. Based on our study, in order to extend executive time horizon, either stock ownership should be reduced or attention should be directed towards how executives are encouraged to recognize variable compensation systems, especially stock-based but also bonus-based compensation as long-term compensation.

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## Appendix A: Time horizon questions in the questionnaire

### 1. To what extent do you agree with this statement:

"I feel that quarterly pressures from the stock market shorten my [time horizon](#)."

*You can see the answer categories by clicking on the text "-- Click here --". Please select the category that best fits your situation.*

Answer categories: 1 = strongly disagree; 2 = disagree; 3 somewhat disagree; 4 = neither agree nor disagree; 5 = somewhat agree; 6 = agree; 7 = strongly agree; unable to comment

### 4. On average, what percentage of your own **ACTUAL** working time is devoted to matters, that will affect the profit of your company within each of the following time periods? *Please note that the sum of the answers does NOT have to equal 100%.*

During the next quarter

After the next quarter, but during the next year

After the next year, but during the next three years

After the next three years

Answer categories: 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%

### 5. In your current position, how would you **PREFER** your working time to be used for matters, that will affect the profit of your own company within each of the following time periods? *Please note that the sum of the answers does NOT have to equal 100%.*

During the next quarter

After the next quarter, but during the next year

After the next year, but during the next three years

After the next three years

Answer categories: 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%

**8. Do you have a payback period requirement for operative replacement investments in your company?**

- Yes (after clicking Yes, go to question 9)
- No (after clicking No, go to question 10)

**9. What is your average payback period requirement for operative replacement investments?**

Answer categories: less than 6 months; 6 months; 1 year; 2 years; 3 years; 4 years; 5 years; 6 years; 7 years; 8 years; 9 years; 10 years; longer than 10 years

**10. What proportion of your ongoing R&D (research and development) investments is used for projects whose profit is expected to mainly influence the following reports?**

The next annual report

Reports after one year (but no later than three years)

Reports after three years (but no later than five years)

Reports after five years or later?

Answer categories: 0%, 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 100%

**14. Please evaluate the following issues on the basis of your own experience.**

*Click the blue underlined items to open up explanatory windows.*

<b>Compensation class</b>	<b>(I) Relative amount</b> What is the relative amount of each compensation class in your own compensation?	<b>(II) Time horizon</b> Which time horizon does the compensation class encourage you to work towards?	<b>(III) Satisfaction level</b> What is your own satisfaction level regarding the compensation class?
Base salary	<input type="text" value="-- Click here --"/>	<input type="text" value="-- Click here --"/>	<input type="text" value="-- Click here --"/>

<a href="#"><i>Fringe benefits</i></a>	-- Click here --	<del>Click here</del>	-- Click here --
<a href="#"><i>Bonuses (not deferred)</i></a>	-- Click here --	<del>Click here</del>	-- Click here --
<a href="#"><i>Deferred bonuses</i></a>	-- Click here --	<del>Click here</del>	-- Click here --
Retirement plan	-- Click here --	<del>Click here</del>	-- Click here --
<a href="#"><i>Share option based compensation</i></a>	-- Click here --	<del>Click here</del>	-- Click here --
<a href="#"><i>Share based compensation</i></a>	-- Click here --	<del>Click here</del>	-- Click here --
Other, what? 	-- Click here --	<del>Click here</del>	-- Click here --
Other, what? 	-- Click here --	<del>Click here</del>	-- Click here --

Answer categories for relative amount (I): 1 = very small; 2 = small; 3 = moderately small; 4 = neither small nor large; 5 = moderately large; 6 = large; 7 = very large; 0 = not in use

Answer categories for time horizon (II): less than a month; at least a month, but less than a quarter; at least a quarter, but less than a year; at least a year, but less than 3 years; at least 3 years, but less than 5 years; 5 years or longer; unable to comment

Answer categories for satisfaction level (III): 1=very low; 2=low; 3=moderately low; 4=neutral; 5= moderately high; 6= high; 7=very high; unable to comment