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CEO COMPENSATION, FIRM SIZE
AND FIRM PERFORMANCE:
EVIDENCE FROM FINNISH PANEL DATA*

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ABSTRACT: This paper examines how CEO pay is related to firm size and to firm performance in Finland by using new individual-level compensation data in 1996-2002. We find robust evidence that CEO average compensation has increased substantially between 1996 and 2002. For example, the ratio between CEO and industrial worker mean total compensation was 7 in 1996, peaked at 24 in 2000, and thereafter dropped to 13 in 2002. We argue that the change in CEO compensation, and especially in total compensation, is highly related to changes in stock market measures of firm performance. Our shareholder wealth measure suggests that the salary and bonus change in CEO wealth is €6.84 per €1,000 change in shareholder wealth. Respectively, the total compensation change is €21.85 per €1,000 change in shareholder wealth. We find no evidence on the contemporaneous link between a change in CEO compensation and change in ROA% (Return on Assets). However, one-year lagged accounting and stock market based firm performance measures are associated with the change in CEO total compensation. In line with previous studies, our findings suggest that pay-for-firm size elasticity is close to 0.3. We also find interesting corporate governance findings. First, the share of foreign ownership is positively and statistically significantly associated with the level of compensation. Also, foreign ownership parameter estimates are about three times larger for total compensation than for salary and bonuses in most specifications. Second, ownership concentration, as measured by the voting share of a largest shareholder, is negatively related to the level of compensation, but only in the pooled model. Third, the size of the board is positively related to the level of compensation, especially to the level of base salary and bonus.

KEYWORDS: CEO compensation, pay for performance, stock options, firm size

JEL-codes: J33, M52, L25

1. Introduction

After Enron Corp's financial frauds and bankruptcy in December 2001, chief executive officer (CEO) remuneration has been a popular topic of public debate in a number of countries (e.g. The Economist, 1999; 2000; Krugman, 2002; and Samuelson, 2003). Enron Corp's scandal was not a unique incidence, and afterwards we have witnessed, for example, the accounting and compensation scandals of Arthur Andersen, AOL Time Warner, Dynegy, Merck, Qwest, Tyco, WorldCom and Xerox in the U.S., Parmalat in Italy, Dutch-based Royal Ahold, and Swedish Scandia. Shareholders of these firms have lost billions of dollars, and the scandals are said to be related to an increased use of equity-based incentive components in CEO compensation, such as stock options.

With the increased use of stock options in CEO compensation packages, CEO average compensation has increased substantially, especially in the U.S. For example, the CEO average pay at the largest companies in the U.S. was 40 times that of the average worker a generation ago, but in 1999 it was 475 as much. In 2002, the pay of top American CEOs was still over 400 times average earnings, but in 2004 the figure is estimated to have fallen close to 160 (The Economist, 2005). On the contrary, the estimated ratios are considerably smaller in Europe, ranking from 11 in the Switzerland to 24 in the U.K. times that of average employees in 1999 (The Economist, 2000).

The differing interests between shareholders and top executives is not a recent notion in economics. In fact, already Adam Smith (1776) suggests: … "*What are the common wages of labour depends everywhere upon the contract usually made between those two parties, whose interests are not the same. The workmen desire to get as much, the masters to give as little as possible* " … "*The directors of [joint stock] companies, however, being the managers of other people's money than of their own, it cannot be expected that they should*

watch over it with the same anxious vigilance [as owners]... Negligence and profusion,

therefore, must prevail, more or less, in the management of the affairs of such a company".

Later Berle and Means (1932) propose that the separation of ownership and control in a

modern corporation may introduce a principal-agent problem due to asymmetric information

between shareholders and executives.[1] Although it is unjustified to categorise executives'

behaviour as a group, asymmetric information may encourage opportunistic and ineffective

behaviour, which in turn may lead to decreases in shareholder value.[2] Thus, executives'

compensation packages may be revised so that managers have monetary incentives to exert

more effort and take actions that are mutually beneficial to both them and shareholders.

This study examines CEO compensation in Finland over the period 1996-2002. By

providing new evidence from a very different institutional context than the U.S. and the U.K.,

we hope to increase our understanding of CEO compensation practices across different coun-

tries. In particular, we follow previous empirical studies in the literature by exploring CEO

pay-for-firm size elasticity and CEO pay-for-firm performance sensitivity. We estimate sev-

eral empirical specifications where we control for industry of the firm, CEO age, the size of

the board, the voting share of the largest shareholder and the share of foreign ownership,

since all these variables may affect the level and the changes of CEO compensation.

Unlike in the U.S., where publicly listed firms are required to disclose detailed in-

formation on the top five executives' compensation, Finnish listed firms typically dis-

closed only aggregated total compensation of the CEO and the board of directors in 1996-

2002. To avoid measurement error biases associated with aggregated data, we utilise new,

hand-collected individual-level CEO compensation data obtained from Finnish tax authori-

ties' registers. In this annual compensation data pay is divided into different categories al-

lowing us to separate CEO compensation from different origins. Our data also contain a

variable that includes executives' revenues from exercised stock options during a given year.

The key finding is that CEO average compensation has increased substantially between 1996 and 2002. For example, the ratio between CEO and industrial worker average total compensation was 7 in 1996, peaked at 24 in 2000, and thereafter dropped to 13 in 2002. In real terms the mean salary and bonus of CEOs was €166,000 (median €147,000) in 1996, whereas it was €280,000 in 2002 (median €208,000). The percentage increase from 1996 to 2002 is 69% (median 41%). Respectively, CEO mean total compensation increased from €180,000 to €357,000 (98%), whereas median total compensation increased from €155,000 to €233,000 (50%). This development is related to the stock market boom and bust in the Helsinki Stock Exchange, since changes in CEO compensation, and especially in total compensation, are highly related to changes in stock market-based measures of firm performance. Our shareholder wealth measure, close to that of Jensen and Murphy (1990), suggests that the salary and bonus change in CEO wealth is €6.84 per €1,000 change in shareholder wealth. Respectively, the total compensation change is €21.85 per €1,000 change in shareholder wealth, being likely upward biased due to a few large stock option exercises. Moreover, the estimated "semi-elasticity" of CEO salary and bonus with respect to stock returns is 0.09, and 0.28 for total compensation. We did not find statistical evidence on a contemporaneous association between the change in CEO compensation and change in ROA% (Return on Assets), an accounting-based measure of firm performance. However, changes in one-year lagged performance measures, both accounting and stock market-based, can be associated with the change in CEO total compensation.

Another key finding is that the pay level of CEOs is related to firm size: pay-for-firm size elasticity does not deviate substantially from 0.3, after controlling for CEO age, industry of the firm, ROA% and three corporate governance indicators, namely the size of

the board, the voting share of the largest shareholder, and the share of foreign ownership.[3] Also interestingly, from a corporate governance perspective, the CEO pay level is positively related to foreign ownership and the size of the board, but negatively to a dominant shareholder's ownership.

The paper is organised as follows. Section 2 briefly describes the principles of corporate governance mechanisms in a publicly listed firm. It also summaries major institutional and corporate governance changes in Finland in the 1990s. Section 3 summarises the relevant previous literature. In section 4 we describe the data and present the empirical models. Section 5 presents the estimation results. Finally, section 6 concludes.

2. Corporate Governance Principles and Institutional Changes

2.1 Corporate Governance Principles

In a publicly listed firm the principles of corporate governance mechanisms can be factorised into internal and external governance.[4] From shareholders perspective, internal corporate governance can be associated with shareholders' annual general meeting and the active governance done by shareholders' representatives, the board of directors. External corporate governance is strictly defined as an increasing threat of takeover (e.g. when a firm's performance is inferior), but more broadly understood it may contain the actions of all outside stakeholders, competitors and regulators. Internal governance mechanisms may consider as primary factors to detect and to prevent corporate scandals, and if these mechanisms fail, then external governance is likely to intervene in corporate control, at least in well-functioning stock markets.[5]

As a solution to mitigate the principal-agent problem, shareholders' may directly monitor executives' behaviour. However, if ownership is highly dispersed, it is ineffective

for all shareholders separately to carry out monitoring and governance tasks. Besides ineffectiveness, a highly dispersed ownership exposes shareholders' individual monitoring to free-rider problems. Obviously, shareholders can do much better, if select the board of directors to represent and to ensure their financial interests. Since a modern firm has a full legal capacity, the principal tasks of the board of the directors are illustrated in corporate law and regulations, and nowadays more often in corporate governance recommendations.[6]

As a second potential solution to mitigate the principal-agent problem, shareholders may utilise incentive-based remuneration, such as accounting-based bonuses, restricted stocks and stock options, in order to link financial interests between shareholders and executives. The key difference between accounting-based bonuses and equity-based instruments is that the value of a firm's stock is determined outside of executives' direct control if a stock market is well-functioning and efficient. On the contrary, a badly implemented accounting-based bonus plan may be adjusted by executives, at least to some extent. Also, accounting-based bonuses focus on a firm's annual and past performance, whereas stocks and stock options reflect more a firm's future growth potential. With a carefully implemented and adopted equity-based incentive programs, executives' attention should be on selecting and implementing actions that increase the firm's total value in the long-run.[7] We also underline that corporate governance practices and executive compensation policy principles are closely related issues. Without coherent corporate governance practices within a firm, executives' compensation packages may be implemented badly, potentially spurring a decrease in the shareholders' wealth, e.g. via corporate scandals.[8]

2.2 Institutional Changes

During the 1990s Finland experienced substantial institutional changes in corporate governance, foreign ownership, industrial relations and globalisation of firms. The Finnish

corporate governance system in listed firms was very much bank-centred and resembled the German stakeholder system at the end of 1980s. During this time moderate accounting-based bonuses, if any, were the only performance pay component in CEO compensation. Financial institutions owned around 25% of the value of shares in the Helsinki Stock Exchange. Bank loans were the most significant source of external funding for listed companies.[9] On the other hand, at the end of the 1980s, the stock market was booming and the number of listed firms was at a record high. This, however, ended in the early 1990s, when Finland suffered the most severe depression in any OECD country since the Second World War. For example, during 1990-1993 unemployment soared close to 20% and GDP plummeted by 14%.[10] This caused e.g. a significant change in the financial markets: the value of bank loans dropped significantly, as did share prices on the Helsinki Stock Exchange. After the devaluation of the Finnish currency in 1991 and its floating in 1992, the stock market and the economy started to recover, but bank lending continued to decline throughout the 1990s. Turnover on the Helsinki Stock Exchange grew dramatically during the 1990s (although this is partly because of the growth of Nokia) and the number of firms listed also increased significantly, especially in the late 1990s and 2000. Nowadays stock markets are much deeper, more informative and more transparent. At the same time, both monitoring of insider trading and legal punishments have become stricter. During the last 10-15 years Finland has shifted from a system of bank-based financial intermediation closer to a market-based Anglo-American system. As a part of this institutional change publicly listed Finnish firms have extensively adopted stock option schemes in the 1990s.[11]

Another important institutional change is the increase of *foreign ownership* in publicly listed Finnish firms. The Finnish stock market was fully opened to foreign investors only in 1992, but today foreigners are the largest ownership group (although again this is largely because of Nokia). By 2000, foreign ownership had increased to 53%, while own-

ership by domestic financial institutions had dropped at the same time from 20% to 4% (Hyytinen, Kuosa and Takalo, 2003). According to Barca and Becht (2001), an increase of foreign ownership has triggered changes in corporate governance in many European countries. This is the case also in Finland, where, according to Tainio and Lilja (2003), increase in foreign ownership has contributed to the transformation of Finnish business towards a more competitive and open culture, where shareholder value is given a high priority. Moreover, foreign owners may have also played a major role when the use of stock options increased during the 1990s.

Third, turning to *industrial relations*, we observe both continuity and change. Traditionally, Finland has been seen as a highly egalitarian society, which from an industrial relations perspective is characterised by high labour taxes, an extensive public sector, and small wage dispersion. Consensual collective bargaining and centralised income agreements have continued as the norm for decades. Since the late 1960s, the unionisation rate of the workforce has been around 70-80%, and collective agreements are typically binding also for non-union workers or workplaces. Wage increases consist of a collectively agreed element that is typically economy-wide. In addition, firms can adapt their internal wage structures according to their financial possibilities. Throughout the 1990s, profit-sharing and other forms of performance-related pay have become common compensation methods throughout the economy (Kauhanen and Piekkola, 2002). Forms of performance-related pay are not negotiated in collective bargaining rounds, but employers can decide on their use unilaterally. The widespread use of performance-related pay, as well as the popularity of stock options, represents a change in industrial relations. However, despite the increase of performance and equity-related compensation within companies, there has been only a moderate rise in wage dispersion in Finland[12], especially by international standards.

Finally, when focusing on the *globalisation of large Finnish firms* during the 1980-1990s, we observe dramatic change in the number of firms' employees abroad. For example, the share of ten major Finnish firms' employees abroad was about 15% of personnel in 1983, whereas in 2002 the share was over 60%. This huge increase reflects the fact that in the early 1980s Finnish firms mainly exported their products from Finland. However, gradually firms adopted more complex business practices abroad, such as their own production units. The value of inward foreign direct investments increased in the end of 1990s due to active cross-border mergers and international acquisitions of Finnish firms.[13] In sum, changes in globalisation of large Finnish firms indicate that their business environment is nowadays much larger and more complex than in the 1980s.

3. Previous Literature

The previous empirical literature on CEO compensation is multidisciplinary. Various academics from economics, finance, accounting and management fields have contributed to the current state of the literature. The vast majority of this extensive research has emerged during the last 25 years, since before the 1980s only a handful of CEO compensation studies were published (e.g. including works by Roberts, 1956; Baumol, 1959; Lewellen and Huntsman, 1970; and Becker, 1975). Since then research has been conducted *in economics* (e.g. Jensen and Murphy, 1990; Rosen, 1990; Gregg, Machin and Szymanski, 1993; Conyon and Leech, 1994; Main, Bruce and Buck, 1996; Vittaniemi, 1997; Hall and Liebmann, 1998; Murphy, 1999; Conyon and Murphy, 2000; Murphy, 2000; and Kato and Kubo, 2005), *in finance* (e.g. Yermack, 1997), and *in accounting and management* (e.g. Finkel-

stein and Boyd, 1998; Gomez-Mejia and Wiseman, 1997; and Randøy and Nielsen, 2002). We next survey the directly related studies.

Lewellen and Huntsman (1970) analyse data on 50 U.S. firms at three-year intervals from 1942 to 1963. They find strong evidence that top executives' compensation is heavily dependent upon the generation of firm profits. Their results also indicate that firm accounting-based profits and stock market values are substantially more important in the determination of executive compensation than are firm sales.

Jensen and Murphy (1990) use CEO compensation data on a sample of 1,295 U.S. firms from 1974 to 1986. They estimate pay-for-performance models in first-differences to study how change in CEO compensation is related to change in shareholders' wealth. They find that CEO pay-for-performance sensitivity has been modest and it has fallen in real terms from the 1930s: *"... on average, corporate America pays its most important leaders like bureaucrats. ... The total change in all CEO wealth is $3.25 per $1,000 change in shareholder wealth for the full sample, $1.85 for large firms, and $8.05 for small firms. The largest CEO performance incentives come from ownership of their firm's stock."*

Rosen (1990) surveys several independent empirical studies on CEO pay-for-firm performance. Based on the evidence from these studies, he concludes that the effect of stock returns on log compensation is in the range of 0.10-0.15.

Gregg, Machin and Szymanski (1993) focus on the relationship between the wage of the highest paid director and firm performance with a U.K. data sample of 288 large listed firms from 1983 to 1991. They find evidence that, in terms of share returns over the whole period, the relationship between the top director's pay and firm performance is very weak in the period. However, after splitting the data into two sub-periods, i.e. 1983-1988 and 1989-1991 (recession period), they find a positive but small pay-for-performance relationship for the first sub-period, but not for the second. When focusing on the link between

the top director's pay and firm size, they argue that growth in the top director's pay is strongly correlated with the growth of firm size: a 50% increase in sales leads to a 10% increase in the top director's pay.

Conyon and Leech (1994) examine the determinants of the top director's salary and bonus with a sample of 294 large U.K. listed firms in 1983-86. They find a positive but very small pay elasticity with respect to firm performance. For the median director, a 10% increase in shareholder wealth corresponds to an increase in compensation of 375 pounds. Another key finding is that ownership control and concentration decrease the level of the top director's pay, but these variables do not affect the growth of pay.

Main, Bruce and Buck (1996) use U.K. panel data for 60 firms from 1981 to 1989. They find that because of stock options there is a statistically significant relationship between the wage of the highest paid executive and firm performance. For example, a 10% increase in shareholder wealth increases the top paid director's compensation about 9%. The sensitivity of top executive compensation with respect to firm performance is greater than in the previous U.K. studies, since they have also taken into account information on stock options.

Hall and Liebman (1998) use a 15-year panel of CEOs in the largest U.S. firms from 1980 to 1994. They argue that CEO compensation is highly responsive to firm performance if the value changes of CEO stock and option holdings are taken into account in the empirical analysis. For example, the median elasticity of CEO compensation with respect to firm market value is 3.9 for 1994, which is about 30 times larger than previous estimates that rely on salary and bonus changes alone. They also argue that CEO mean (median) compensation increased by 207% (146%) in real terms between 1980 and 1994. Perhaps more importantly, virtually all of this increase is attributable to changes in the value of CEO holdings of stock and stock options. When using an analogous measure to that of

Jensen and Murphy (1990), in 1994 the total change in CEO wealth is $5.25 per $1,000 change in shareholder wealth. Although this degree of sensitivity may appear modest, Hall and Liebman show that CEO wealth may change millions of dollars for a typical change in firm value.[14] Thus, they conclude that CEO compensation is strongly related to the success of the companies they manage.

A majority of the previous empirical CEO compensation studies have been conducted either in the U.S. or in the U.K., mainly due to a better availability of data on CEO compensation.[15] There has also been interest in CEO compensation research in other countries recently. For example, Randøy and Nielsen (2002) examine the relationship between firm performance, corporate governance and CEO compensation in Sweden and Norway in 1998, by using data on 120 Norwegian and 104 Swedish publicly listed firms. The evidence based on cross-sectional estimates indicates a statistically significant and positive relationship between the size of the board and CEO compensation, foreign board membership and CEO compensation, and firm market capitalisation and CEO compensation. On the contrary, they do not find evidence that CEO compensation is statistically related to firm performance.

Kato and Kubo (2005) examine the link between CEO compensation and firm performance in Japan by using new panel data from 1986 to 1995. They find evidence that CEO cash compensation is sensitive to firm performance, especially for accounting-based measures of firm performance. However, stock market-based measures of firm performance seem to be a less important factor in CEO compensation. One reason may be the fact that until 1997 executives' stock options were banned in Japan, except at small venture capital companies.

In Finland, Vittaniemi (1997) has studied the relationship between CEO compensation and firm performance previously. He uses panel data on 48 listed and 70 non-listed

firms in 1989-93 (5 years) and estimates separate models for listed and non-listed firms. As a firm performance measure he uses once lagged variables. He finds a significant pay-for-performance relationship in listed firms, but in non-listed firms the relationship is less important. Contrary to Vittaniemi, we focus only on listed firms, since we pay special attention to stock option compensation, which can work properly only in situations where the value of shares can be assessed in the stock market.[16] In addition, the time period in Vittaniemi's study is very exceptional in the Finland's economic history, since in 1990-93 Finland suffered the most severe depression in any OECD country since the Second World War.

When turning to the empirical research on the relationship between CEO compensation and firm size, an interesting and a well-documented finding is the relative uniformity of CEO pay-for-firm size elasticity estimates. For example, Baker, Jensen and Murphy (1988) report elasticities in the range of 0.25-0.35, when summarizing the U.S. Conference Board data on the link between CEO cash compensation and firm sales from 1973 to 1983. This finding is supported by Rosen (1990), who summarizes a variety of studies for different time periods in the U.S. and the U.K. He finds some variation in CEO pay-for-firm size elasticities, but "*...the relative uniformity of estimates across firms, industries, countries, and periods of time is notable and puzzling because the technology that sustains control and scale should vary across these disparate units of comparison. The estimated elasticities for all companies are not significantly different from 0.3.*" Recently Conyon and Murphy (2000) estimate CEO pay-for-firm size elasticities with the data on the U.K. and the U.S. firms in 1997. Their findings support "the near uniformity elasticity hypothesis *β=0.3*" for the U.S. (*β=0.3*), but not for the U.K. (*β=0.2*) firms.

Although the previous empirical studies commonly report an almost uniform 0.3 point estimate for CEO pay-for-firm size elasticity, the studies do not explain what might

be a possible reason behind this phenomenon. To the best of our knowledge, we are unfamiliar with any theoretical study that might explain why the point elasticity estimate is near 0.3 across different firms, industries, times and countries. The only explanation that we are familiar with is Davidson Consultants' (1984) "Wage and Salary Administration in a Changing Economy", as noted in Baker, Jensen and Murphy (1988). It interestingly describes how a consulting firm sets a CEO pay-for-firm size elasticity coefficient: *"The general rule is that as sales volume doubles, executive pay increases by one-third."* If Davidson Consultants' "general rule" presents a common practice among compensation consultants, it may explain surprising commonalities in elasticity point estimates across firms, industries, times and countries.

4. Data Description and Empirical Models

4.1 Data Description

We have combined several data sets for this study. First, CEO annual compensation data are hand-collected from the Finnish tax authorities' registers. The data is not a random sample, but we have used all the feasible information on CEOs to construct as large an individual-level compensation data set as possible.[17] Second, firm-level financial statement data are compiled from Balance Consulting, a Finnish consulting firm. Third, we use information on the firms' foreign ownership and market values, based on the data from the Helsinki Stock Exchange. Fourth, the largest shareholder's ownership and the size of the board data are hand-collected from the Pörssitieto-handbooks[18] and the firms' annual reports. Fifth, the data on stock returns were kindly provided by the department of finance and accounting from the Helsinki School of Economics (originally from the Helsinki Stock

Exchange). Finally, all nominal monetary variables are deflated to real Euros of the year 2000 using gross-output based industry deflator, published by Statistics Finland.

The great benefit of our individual-level compensation data is that it disaggregates CEO's salary and bonus by origins.[19] The data contain information on CEO's taxable benefits, such as company car and other perquisites. The other perquisites item is especially interesting, since it includes the taxable income of exercised stock options in a given year for the years 1996-1999.[20] For more recent years from 2000 onwards, the data explicitly show the taxable income of exercised options.[21]

When assessing firm performance, we use both accounting and stock market-based measures, since both have been used in the previous literature. In economics and finance, most CEO pay-for-performance studies use stock market-based measures. In contrast, according to Joskow and Rose (1994), studies in the accounting literature typically use accounting-based or both measures.

As a stock market-based firm performance measure we use two variables that have been used previously. The first is annual stock return, which is based on a firm's continuously-compounded daily stock returns, i.e. $\ln\left[\left(p_t + d_t\right)/p_{t-1}\right]$, where p_t is the price of a firm's share in the last trade in period t, p_{t-1} is the last trading price in period $t-1$ and d_t is the dividend.[22] To make our stock market measure comparable to Jensen and Murphy (1990), our second stock market-based firm performance measure is shareholder wealth, i.e. $\ln\left[\left(\left(p_t + d_t\right)/p_{t-1}\right)*V_{t-1}\right]$, where V_{t-1} is firm market value in the beginning of a period.[23] As an accounting-based firm performance measure we use ROA% (Return on Assets), since this has been used previously.[24]

Table 1 summarizes CEO compensation data in real 2000 Euros over the period 1996-2002. The number of CEOs varies between 43 (in 1996) and 82 (in 2000).[25] Table 1

suggests that the level of CEO compensation has increased substantially between 1996 and 2002. For example, CEO mean salary and bonus in real terms was €165,878 (median €147,113) in 1996, whereas in 2002 it was €279,733 (median €207,856). In percentages, the increase was 69% (median 65%). Respectively, mean total compensation was €180,190 (median €155,142) in 1996, whereas it was €356,863 (median €232,750) in 2002. In percentages, the increase was 98% (median 50%) indicating a few large stock option exercises. When examining the compensation increases of the cohort 1996, the corresponding increases were 74% for both mean and median salary and bonus. Respectively, the percentage change in mean total compensation was 105% and 74% for median total compensation.

The growth trend in our CEO compensation data diverges clearly from the development of industrial workers' average compensation. For example, industrial worker mean total compensation in Finland was €24,793 in 1996, whereas in 2002 it was €27,660. In percentages, the increase was 12% between 1996 and 2002, which is a fairly moderate increase compared to the growth of CEO compensation. Moreover, the ratio of CEO mean total compensation and industrial worker mean total compensation was only 7 in 1996, but 24 in 2000, mainly due to executives' exercised options during the stock market boom. Thereafter the ratio has fallen to 13 in parallel with the stock market bust in 2000-2002. Our estimated ratio of 16 in 1999 exceeds somewhat that reported for Germany (13), Sweden (13) and France (15), but is little less than in the Netherlands (17), Spain (17) and Belgium (18).[26] These "European ratios" are substantially smaller than in the U.S. (475) in 1999.[27]

Table 1 also shows some other interesting issues. First, CEO compensation distributions are clearly skewed to the right, being a consequence of the fact that pay levels are higher in large firms. This is a well documented observation from the previous literature (e.g. Murphy, 1999; Conyon and Murphy, 2000).

Second, although CEO mean compensation increased substantially over the period 1996-2002, at the same time firms' mean EBIT (earnings before interests, taxes and extraordinary items) has increased even more in real terms (189%).[28] However, annual percentage changes in compensation and EBIT diverge in some years. In 1997, 1998 and 2000 both increased from the previous year, but in 1999 mean EBIT increased about 6%, whereas mean salary and bonus decreased -0.7%. In 2001, we see a drop of -42% in mean total compensation, when both the HEX portfolio index (-19%) and mean EBIT (-18%) sank. Surprisingly, however, mean salary and bonus increased already by 17% in 2001. In 2002, the development of CEO compensation and firm performance tends to be mixed: mean salary and bonus (9%) and mean EBIT increased (14%), but mean total compensation decreased (-5%).

Third, there seems to be a great variation in the yearly growth rates of mean and median salary and bonus, although this may be partially explained by the variation in the number of CEOs in a given year. Maen salary and bonus increased in 1998 (17%) and 2001 (17%), but decreased in 1999 (-0.7%). Respectively, median salary and bonus increased in 1997 (19%), 1998 (12%) and 2000 (10%), but decreased in 1999 (-9%).

Fourth, percentage changes in mean total compensation appear to be larger than changes in mean salary and bonus. For example, CEO mean total compensation increased 53% in 2000, then decreased 42% in 2001 the reason being the stock market slump that degraded the value of stock options. However, the number of CEOs that exercised stock options increased from 1 (1996) to 11 (2002) corresponding to a relative change from 2% (1996) to 16% (2002).[29] In parallel with the increase in the number of CEOs that exercised stock options, mean values of exercised options have exploded, as can be seen from the last row of Table 1. For example, in 1997 the mean value of exercised options was €369,137 (in real terms), in 2000 a record high €3,787,800, and even in the stock market bust years 2001-2002 over €900,000. At the same time the sum of all exercised options per

year as a percentage of the sum of CEOs' total compensation per year has jumped from 2%

(1996) to 43% (2002). This clearly indicates that a few CEOs have gained substantially

from stock option-based compensation in Finland between 1996 and 2002.

Table 1. CEO compensation data summary (in real 2000 Euros).

	1996	1997	1998	1999	2000	2001	2002	Change from 1996 to 2002	[2] Change of cohort 1996 from 1996 to 2002
# of CEOs (% of listed firms total)[1]	43 (58.9%)	54 (47.0%)	62 (52.1%)	74 (54.0%)	82 (54.7%)	78 (53.8%)	71 (51.1%)	+65%	
CEO mean salary + bonus, €(% change from previous year)	165,878	174,288 (+5.1%)	204,679 (+17.4%)	203,233 (-0.7%)	220,549 (+8.5%)	257,818 (+16.9%)	279,733 (+8.5%)	+69%	+74%
CEO median salary + bonus, € (% change from previous year)	147,113	174,337 (+18.5%)	194,582 (+11.6%)	176,353 (-9.4%)	193,495 (+9.7%)	199,250 (+3.0%)	207,856 (+4.3%)	+41%	+74%
CEO mean total compensation, € (% change from previous year)	180,190	205,481 (+14.0%)	318,865 (+55.2%)	422,974 (+32.7%)	646,845 (+53.0%)	375,439 (-42.0%)	356,863 (-4.9%)	+98%	+105%
CEO median total compensation, € (% change from previous year)	155,142	183,434 (+18.2%)	206,736 (+12.7%)	202,542 (-2.0%)	205,891 (+1.7%)	218,384 (+6.1%)	232,750 (+6.6%)	+50%	+74%
Industrial worker mean total compensation, € (% change from previous year)	24,793	25,000 (+0.8%)	25,379 (+1.5%)	25,973 (+2.3%)	26,435 (+1.8%)	27,130 (2.6%)	27,660 (+2.0%)	+12%	
Ratio between CEO and industrial worker mean total compensation	7	8	13	16	24	14	13		
Mean EBIT, €1000 (% change from previous year)	48,752	91,078 (+86.8%)	109,800 (20.6%)	116,734 (+6.3%)	150,000 (+28.5%)	123,493 (-17.7%)	140,721 (+14.0%)	+189%	
Median EBIT, €1000 (% change from previous year)	16,215	18,770 (+15.8%)	17,650 (-6.0%)	16,839 (-4.6%)	13,800 (-18.0%)	17,406 (+26.1%)	16,578 (-4.8%)	+2%	
HEX portfolio index (Log change from previous year, %)	-	+27.3%	+13.8%	+54.1%	-24.2%	-19.1%	-15.0%		
Mean age	47.6	48.6	49.3	50.1	50.8	51.6	52.2		
Median age	48.5	50.0	50.5	50.0	51.0	52.0	52.5		
# of CEOs, who exercised stock options (% of CEOs in data)	1 (2.3%)	3 (5.6%)	8 (12.9%)	9 (12.2%)	9 (11.0%)	10 (12.8%)	11 (15.7%)		
Mean value of exercised stock options, €(exercised options as a % of total compensation)	173,283 (2.2%)	369,137 (10.0%)	793,856 (32.1%)	1,714,511 (49.2%)	3,787,800 (64.2%)	919,949 (28.3%)	966,671 (42.5%)		

[1] We have information of all listed firms from 1997 onwards. Thus, for 1996 the number of listed firms is firms in the main list. Note that the CEO wage distributions are skewed to the right, i.e. the means are typically higher than the medians. As a deflator we have used the GDP deflator obtained from Statistics Finland.

Table 2 presents some summary statistics in 2000. CEO mean (median) salary and bonus is €220,549 (€193,495), whereas CEO mean (median) total compensation is €646,845 (€205,891). The firm size distribution, measured by sales, is skewed to the right (mean sales €1,370,000,000 is much larger than median sales €251,000,000). The median size of the board is 6 members, and CEO median age is 51 years. The mean of foreign ownership is 20.5%, which is a little less than the mean share of the dominant shareholder's ownership 22.1%.

Table 2. Summary statistics for year 2000.

Variable	N	Mean	Median	Standard deviation
CEO salary and bonus, €	82	220,549	193,495	159,647
CEO total compensation, €	82	646,845	205,891	2,538,019
CEO age	82	50.75	51	5.98
Firm sales, €	82	1,370,000,000	251,000,000	3,820,000,000
Size of board	77	6.12	6	1.65
EBIT, €	82	150,000,000	13,800,000	680,000,000
ROA, %	81	10.92	9.7	10.82
Foreign ownership, %	82	20.48	16.5	20.46
Dominant shareholder's ownership, %	82	22.14	19.04	15.33
Annual stock return, %	82	-18.36	-8.51	52.16

Table 3. CEO total compensation in Finland, Norway and Sweden in 1998.

	Finland	Norway	Sweden
# of firms in data sample	62	120	104
Mean total compensation, €	310,732	161,670	279,249
Median total compensation, €	189,619	N/A	N/A
% of firms that paid a bonus	N/A	N/A	42% (44 firms)
Mean value of a bonus, € (bonuses as a % of total compensation)	N/A	N/A	42,057 (23%)
% of CEOs that exercised options	13% (8 CEOs)	N/A	N/A
Mean value of exercised stock options, € (exercised options as a % of total compensation)	773,609 (32%)	N/A	N/A
Mean total compensation without those 8 CEOs that exercised stock options, €	185,308	-	-

N/A= not available. CEO compensation data for Norway and Sweden is from Randøy and Nielsen (2002). CEO mean total compensation includes all pay components.

Table 3 compares CEO mean total compensation in Finland, Sweden and Norway.[30] Table 3 suggests that, in 1998, mean total compensation is higher in Finland than in Norway or in Sweden, mainly because of large option gains of 8 Finnish CEOs. When we drop these CEOs from the comparison, mean total compensation in Finland (€185,000) is still higher than in Norway (€162,000), but lower than in Sweden (€280,000).

4.2 Empirical Models

The best-documented empirical finding is the relative consistency of the relationship between *CEO pay and firm size*. To follow the previous pay-for-firm size elasticity studies (e.g. Baker, Jensen and Murphy, 1988; Rosen, 1990; Murphy, 1999; Conyon and Murphy, 2000), we first estimate by OLS separate cross-section models in 1996-2002 for the following loglinear equation:

(1) $\ln\left(CEO\ salary\ and\ bonus_i\right) = \alpha + \beta\ln(Sales_i) + \varepsilon_i,\ \text{i=1,...,N},\ \varepsilon_i \sim iid(0,\sigma^2).$

In Equation (1) subscript *i* indexes individual CEOs at firm *i*. We estimate Equation (1) separately for CEO salary and bonus, and for CEO total compensation. In addition, when studying the link between CEO compensation and firm size, one needs to control for corporate governance and other factors which may affect CEO compensation. One such factor is the *CEO's age*, since it seems reasonable to believe that an executive's age is positively correlated with experience, integrity and skills. Second, *the size of the board* may affect CEO compensation (e.g. Core, Holthausen and Larcker, 1999). For example, a sizeable board can lead to a higher compensation due to the CEO's increased rent-seeking opportunities (e.g. Bebchuk, Fried, and Walker, 2002). Third, *shareholders' ownership*

concentration can affect CEO compensation. A large, dominant shareholder may monitor a CEO's actions more effectively, i.e. mitigate potential agency costs, compared to a situation where a firm's ownership is dispersed widely among several shareholders. Therefore, the presence of a dominant shareholder implies lower compensation (e.g. Shleifer and Vishny, 1986). Fourth, *foreign ownership* may affect CEO compensation.[31] For example, foreign investors were perhaps more familiar with option schemes than Finnish shareholders in the past, imposing options on Finnish firms (e.g. Jones, Kalmi and Mäkinen, 2006). As a second model, we pool the data and estimate the following specification:

$$\ln\left(CEO\ pay_{it}\right) = \alpha + \beta_1 \ln(Sales_{it}) + \beta_2 CEO\ Age_{it} + \beta_3 Size\ of\ board_{it} +$$

(2) $\quad \beta_4 Dominant\ shareholder(\%)_{it} + \beta_5 Foreign\ ownership(\%)_{it} + \beta_6 ROA(\%)$

$$\beta_7 Industry\ dummies + \beta_8 Year\ dummies + \varepsilon_{it}, \ \text{i=1,...,N}, \ \varepsilon_i \sim iid(0, \sigma^2).$$

Our key interest in Equation (2) is on the point estimate of β_1. As a control for firm performance, we use the percentage of ROA (Return on Assets). To control for a possible industry-specific variation in CEO pay, we use three industry dummies: ICT, manufacturing and service. We also add time dummies to control for effects that are common to all firms in a given year. Since the previous empirical studies have used both contemporaneous and once lagged sales as a proxy for firm size, we estimate both contemporaneous and lagged specifications for Equation (2). As in Equation (1), we estimate Equation (2) separately for CEO salary and bonus, and for total compensation. To control for possible omitted variable inconsistency, as a third model we estimate the fixed effects estimator for Equation (2).[32]

Besides focusing on CEO pay-for-firm size elasticity, the literature has explored intensively the relationship between CEO pay and firm performance. According to Conyon and Leech (1994), the Principal-Agent model gives at least a partial theoretical justification for using linear models in this context. Therefore, we next describe briefly the classi-

cal Principal-Agent model, where executive compensation is understood as a mechanism to align monetary interests between risk neutral shareholders and risk-averse executives.[33] For example, Holmström and Milgrom (1987) demonstrate that the optimal managerial contract is linear under the assumptions of absence of income effects in an exponential utility function, and an independent and identical distributed error term. The agent's total compensation $\tilde{W}$ includes a constant base salary α and the share β of stochastic output $\tilde{X}$, i.e. $\tilde{W} = \alpha + \beta \tilde{X}$. The power of incentives, i.e. an incentive coefficient β, is decreasing with respect to uncertainty[34], the agent's risk aversion and the agent's effort. Under some restrictive assumptions[35], it is possible to derive the optimal sharing rule

$$(3) \qquad \beta^* = \frac{1}{1 + r\sigma^2 c(e)''} \text{, where}$$

r is the agent's absolute risk aversion, σ^2 is variance of output (uncertainty) and $c(e)$ is the agent's convex disutility of effort, i.e. $c' > 0, c'' \geq 0$. The optimal sharing rule β^* is one, when output $\tilde{X}$ is certain (i.e. $\sigma^2 = 0$) or the agent is risk-neutral (i.e. $r = 0$). Under these circumstances the principal should sell a firm to the agent, which gives the agent maximum monetary incentives. However, when output $\tilde{X}$ is uncertain or the agent is risk-averse, Equation (3) implies that the optimal linear sharing rule β^* should be positive in the $0 < \beta^* < 1$ range.

In the literature on *CEO pay-for-firm performance sensitivity*, a commonly estimated specification is in first-differences. Thus, instead of estimating models in terms of levels, we focus on the growth of CEO pay, and estimate the following pooled OLS-estimator in terms of first-differences:

$$\Delta \ln(CEO\ pay_{it}) = \alpha + \beta_1 \Delta \ln(Firm\ performance)_{it} + \beta_2 \Delta Size\ of\ board_{it} +$$

(4) $\beta_4 \Delta Dominant\ shareholder(\%)_{it} + \beta_5 \Delta Foreign\ ownership(\%)_{it} +$

$$\beta_6 Industry\ dummies + \beta_7 Year\ dummies + \varepsilon_{it}, \ i=1,...,N, \ \varepsilon_i \sim iid(0,\sigma^2).$$

In Equation (4) the dependent variables are the growth of salary and bonuses, and separately, the growth of total compensation. As explained in Section 4.1, we use shareholder wealth and stock return as the measures for firm market-based and the percentage of ROA as an accounting-based performance measures. By doing this, we follow e.g. Lambert and Lackert (1987), who estimated pay-for-firm performance models using both accounting and stock market-based firm performance measures. Finally, some researchers focus on a contemporaneous relationship between CEO pay and firm performance (e.g. Conyon and Murphy, 2000), whereas others use firm performance in period t and in the previous period t-1 (e.g. Hall and Liebman, 1998).[36] Therefore, we also estimate Equation (4) by using both contemporaneous and once lagged firm performance measures.

5. Estimation Results

CEO pay-for-firm size results

Tables 4-6 present the elasticity of CEO compensation with respect to firm size. Table 4 reports cross-section estimates over the period 1996-2002. The estimated elasticity coefficients for CEO cash compensation, i.e. salary and bonuses, with respect to firm sales are all statistically highly significant at the 1% level.[37] The coefficients are in the 0.26-0.34 range supporting the findings of e.g. Baker, Jensen and Murphy (1988) and Rosen (1990) that estimated elasticities do not differ remarkably from 0.3. When focusing on total compensation, the elasticity estimates are in the range of 0.25-0.38. There seems to be a moderate increase in the

CEO pay-for-firm size elasticity estimates over time: in the period 1996-1998 the point elasticity estimate for salary and bonuses was 0.29, whereas in 1999-2002 it was 0.32. Similar developments can be noticed for CEO total compensation, where the point elasticity estimate was 0.32 in 1996-1998, whereas it was 0.36 in 1999-2002.[38] The peak years are 1999 (0.38) and 2000 (0.36).

Table 4. CEO pay-for-firm size elasticity in the U.S., U.K. and Finland.

	Elasticity of CEO pay with respect to firm sales	# of CEOs
U.S., 1997		
Salary and bonus	0.316	1,666
Total pay	0.413	1,666
U.K., 1997		
Salary and bonus	0.197	510
Total pay	0.217	510
FINLAND, 1996		
Salary and bonus	0.263	43
Total pay	0.249	43
FINLAND, 1997		
Salary and bonus	0.291	54
Total pay	0.299	54
FINLAND, 1998		
Salary and bonus	0.286	62
Total pay	0.335	62
FINLAND, 1999		
Salary and bonus	0.301	74
Total pay	0.376	74
FINLAND, 2000		
Salary and bonus	0.312	82
Total pay	0.364	82
FINLAND, 2001		
Salary and bonus	0.335	78
Total pay	0.350	78
FINLAND, 2002		
Salary and bonus	0.326	71
Total pay	0.330	71
FINLAND, 1996-1998		
Salary and bonus	0.285	159
Total pay	0.305	159
FINLAND, 1999-2002		
Salary and bonus	0.321	305
Total pay	0.357	305

1. The estimated model is $\ln(\text{CEO salary and bonus}_i)=\alpha+\beta\ln(\text{firm sales}_i) + \varepsilon_i$.
2. All estimated coefficients for Finnish CEOs are statistically significant at the 1% level, based on robust standard errors (i.e. Huber-White-sandwich estimator of variance). The Breusch-Pagan test implied heteroskedasticity in salary and bonus estimations for years 2001 and 2002, and in total pay estimations for years 1998-2000.
3. The elasticity estimates for the U.S. and the U.K. are from Conyon and Murphy (2000).

When comparing our findings to that of Conyon and Murphy (2000), Table 4 suggests that in 1997 a 10% rise in firm sales increased, ceteris paribus, CEO cash compensation approximately 3.2% in the U.S., 2.9% in Finland, and 2.0% in the U.K. Similarly, ceteris paribus, a 10% rise in sales increased CEO total compensation 4.1% in the U.S., 3.0% in Finland and 2.2% in the U.K. The finding suggests that CEO pay-for-firm size elasticity was higher in Finland than in the U.K. but smaller than in the U.S. in 1997, keeping in mind that the number of observations differs between the studies.

Table 5 shows CEO pay-for-firm size elasticity estimation results for Equation (3), when standard errors are adjust for intragroup correlation. Contrary to Table 4, we now use the pooled OLS estimator and control for CEO age, foreign ownership, ownership concentration, the size of the board, ROA(%), and industry of the firm. In columns (1)-(6) we use sales in period *t* and in columns (7)-(12) in period *t-1* as proxies for firm size. The key finding is that CEO pay-for-firm size elasticity point estimates are close to the range of 0.2-0.3.

There are also some other interesting findings in Table 5. For example, in line with our prior expectations, we find statistically significant evidence that CEO age, foreign ownership, the size of the board, and ROA(%) are positively related to the compensation level. The positive effect of age, approximately 1.0-1.6%, seemed to be transmitted to the base salary and bonus rather than to total compensation. On the contrary, foreign ownership affects both base salary and bonus as well as total compensation. The effect on the former is 0.2-0.4% and on the latter 0.7-1.0%. The effect of ROA% on compensation is moderate, being in the range of 0.5-0.7% for base salary and bonus and in the range of 1.3-1.7% for total compensation. The findings for the size of the board indicate about 7% effect on compensation levels. The presence of a dominant shareholder has about a 0.5% negative effect on compensation levels, being also in the line of prior expectations.

To control for unobservable fixed effects, we re-estimate Equation (3) using the fixed effects estimator. The estimation results are presented in Table 6. In columns (1)-(6) of Table 6 the firm size elasticity estimates are in the range of 0.26-0.46. When using sales in the period t-1 as a proxy for firm size, the elasticity estimates are in the range of 0.21-0.36. However, in our preferred models in columns (5) and (6), where we have controlled for foreign ownership, dominant shareholder, the size of board and ROA%, the elasticity estimates are 0.3 for base salary and bonus, and 0.46 for total compensation.[39]

Table 5. CEO pay-for-firm size elasticity (the pooled OLS estimator) 1996-2002.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)
Constant	5.136 *** (0.248)	4.507 *** (0.381)	5.650 *** (0.284)	5.596 *** (0.392)	5.756 *** (0.268)	5.436 *** (0.429)	5.355 *** (0.248)	5.417 *** (0.308)	5.799 *** (0.284)	5.849 *** (0.409)	6.067 *** (0.278)	5.805 *** (0.460)
ln (sales)$_t$	0.308 *** (0.010)	0.363 *** (0.022)	0.285 *** (0.013)	0.299 *** (0.021)	0.247 *** (0.012)	0.270 *** (0.025)	-	-	-	-	-	-
ln (sales) $_{t-1}$	-	-	-	-	-	-	0.311 *** (0.010)	0.372 *** (0.024)	0.283 *** (0.013)	0.295 *** (0.023)	0.246 *** (0.013)	0.269 *** (0.029)
ROA, %	0.005 *** (0.002)	0.013 *** (0.004)	0.004 ** (0.002)	0.015 *** (0.004)	0.006 *** (0.002)	0.015 *** (0.004)	0.006 *** (0.002)	0.014 *** (0.004)	0.006 *** (0.002)	0.016 *** (0.004)	0.007 *** (0.002)	0.017 *** (0.004)
CEO age	0.014 *** (0.004)	0.005 (0.005)	0.016 *** (0.004)	0.009 * (0.006)	0.016 *** (0.004)	0.012 ** (0.006)	0.010 *** (0.004)	-0.001 (0.006)	0.012 *** (0.004)	0.004 (0.006)	0.013 *** (0.004)	0.006 (0.007)
Foreign owner-ship, %	-	-	0.003 *** (0.001)	0.009 *** (0.002)	0.002 * (0.001)	0.007 *** (0.002)	-	-	0.004 *** (0.001)	0.010 *** (0.002)	0.003 ** (0.001)	0.009*** (0.002)
Dominant shareholder's ownership, %	-	-	-0.004 *** (0.001)	-0.006 *** (0.001)	-0.004 *** (0.001)	-0.006 *** (0.001)	-	-	-0.003 *** (0.001)	-0.006 *** (0.002)	-0.004 *** (0.001)	-0.006 *** (0.002)
Board size	-	-	-	-	0.076 *** (0.013)	0.071 *** (0.022)	-	-	-	-	0.065 *** (0.014)	0.068 *** (0.026)
Manufacturing	-	-	-	-	0.059 (0.040)	0.109 ** (0.052)	-	-	-	-	0.068 (0.044)	0.129 ** (0.060)
ICT	-	-	-	-	-0.059 (0.054)	0.131 (0.088)	-	-	-	-	-0.044 (0.055)	0.170 * (0.094)
R^2	0.75	0.61	0.71	0.60	0.76	0.62	0.75	0.59	0.73	0.60	0.76	0.61
Firms	87	87	86	86	82	82	87	87	86	86	79	79
Observations	453	453	415	415	377	377	376	376	354	354	318	318

1. The dependent variable is in natural logarithms. All monetary variables are deflated by an industry-specific gross-output deflator in 2000 Euros.
2. Standard errors are adjusted for intragroup correlation in the parentheses. ***, **, * statistically significant at 1%, 5% and 10% levels, respectively.
3. All models include a full set of year dummies. Service sector is a reference group for industry dummies.

Table 6. CEO pay-for-firm size elasticity (the fixed effects estimator) 1996-2002.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)	ln(salary and bonus)	ln(total pay)
$\ln(\text{sales})_t$	0.266 *** (0.038)	0.304 *** (0.066)	0.266 *** (0.043)	0.361 *** (0.097)	0.323 *** (0.050)	0.503 *** (0.125)	-	-	-	-	-	-
$\ln(\text{sales})_{t-1}$	-	-	-	-	-	-	0.237 *** (0.038)	0.264 *** (0.084)	0.179 *** (0.045)	0.194 ** (0.100)	0.248 *** (0.057)	0.316 *** (0.129)
Foreign owner-ship, %	-	-	0.003 * (0.002)	0.010 *** (0.004)	0.003 * (0.002)	0.011 *** (0.004)	-	-	0.003 * (0.002)	0.010 *** (0.004)	0.006 *** (0.002)	0.017 *** (0.005)
Dominant shareholder's ownership, %	-	-	-0.001 (0.002)	0.002 (0.003)	-0.001 (0.002)	0.004 (0.003)	-	-	-0.001 (0.002)	0.000 (0.004)	-0.000 (0.002)	0.004 (0.005)
CEO age	-	-	0.035 *** (0.006)	0.050 *** (0.010)	0.033 *** (0.005)	0.054 *** (0.011)	-	-	0.032 *** (0.007)	0.047 *** (0.017)	0.032 *** (0.007)	0.052 *** (0.016)
Board size	-	-	-	-	0.030 ** (0.015)	-0.009 (0.030)	-	-	-	-	0.030 ** (0.017)	-0.000 (0.037)
ROA, %	-	-	-	-	0.009 *** (0.002)	0.017 *** (0.005)			-	-	0.009 *** (0.003)	0.017 *** (0.006)
R^2 (within)	0.51	0.30	0.52	0.32	0.56	0.36	0.49	0.20	0.49	0.22	0.52	0.27
Firms	87	87	86	86	82	82	87	87	86	86	79	79
Observations	464	464	422	422	377	377	377	377	355	355	318	318

1. The dependent variable is in natural logarithms. All monetary variables are deflated by an industry-specific gross-output deflator in 2000 Euros.
2. Robust standard errors in the parentheses. ***, **, * statistically significant at 1%, 5% and 10% levels, respectively.
3. All models include a full set of year dummies.

Table 7. CEO pay-for-firm performance sensitivity (the pooled OLS estimator in first-differences).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Δln(salary and bonus) POLS 1996-2002	Δln(total pay) POLS 1996-2002	Δln(salary and bonus) POLS 1996-2002	Δln(total pay) POLS 1996-2002	Δln(salary and bonus) POLS 1996-2002	Δln(total pay) POLS 1996-2002	Δln(salary and bonus) POLS 1996-2002	Δln(total pay) POLS 1996-2002	Δln(salary and bonus) POLS 1996-2002	Δln(total pay) POLS 1996-2002	Δln(salary and bonus) POLS 1996-2002	Δln(total pay) POLS 1996-2002
Constant	0.090 ** (0.040)	0.200 ** (0.087)	0.092 ** (0.040)	0.207 (0.088)	0.039 (0.069)	-0.012 (0.082)	0.070 (0.062)	0.166 (0.122)	0.032 (0.077)	-0.019 (0.092)	0.091 * (0.049)	0.186 (0.105)
Δ(shareholder wealth)$_t$	0.00684 *** (0.003)	0.02185 *** (0.006)	-	-	-	-	-	-	-	-	-	-
Δ(shareholder wealth)$_{t-1}$	-	-	-	-	-	-	0.00348 (0.003)	0.01533 ** (0.007)	-	-	-	-
Δ(stock return)$_t$	-	-	0.0931 ** (0.037)	0.2781 *** (0.082)	-	-	-	-	-	-	-	-
Δ(stock return)$_{t-1}$	-	-	-	-	-	-	-	-	0.0480 (0.039)	0.1828 ** (0.082)	-	-
Δ(ROA)$_t$	-	-	-	-	0.001 (0.002)	0.010 (0.010)	-	-	-	-	-	-
Δ(ROA)$_{t-1}$	-	-	-	-	-	-	-	-	-	-	0.002 (0.004)	0.015 * (0.008)
Δ(foreign ownership), %	0.002 (0.002)	0.008 (0.005)	0.002 (0.002)	0.008 (0.005)	0.004 * (0.002)	0.014 *** (0.005)	0.001 (0.003)	0.009 (0.006)	0.003 (0.002)	0.010 * (0.005)	0.005 (0.004)	0.017 ** (0.008)
Δ(dominant shareholder's ownership), %	-0.002 (0.003)	-0.001 (0.005)	-0.002 (0.003)	-0.001 (0.005)	-0.006 (0.004)	-0.006 (0.005)	-0.011 ** (0.005)	-0.013 * (0.007)	-0.006 (0.004)	-0.004 (0.005)	-0.010 * (0.005)	-0.008 (0.008)
Δ(board size)	0.010 (0.020)	-0.024 (0.026)	0.010 (0.020)	-0.024 (0.027)	0.012 (0.021)	-0.021 (0.028)	-0.022 (0.018)	-0.049 * (0.028)	0.011 (0.021)	-0.021 (0.028)	-0.002 (0.020)	-0.023 (0.029)
Manufacturing	0.054* (0.031)	0.095 * (0.051)	0.055 * (0.031)	0.097 * (0.052)	0.050 (0.033)	0.069 (0.052)	0.033 (0.034)	0.063 (0.063)	0.040 (0.032)	0.075 (0.054)	0.020 (0.031)	0.047 (0.057)
ICT	0.079 * (0.044)	0.221 * (0.126)	0.076 * (0.044)	0.208 * (0.125)	0.044 (0.047)	0.179 (0.117)	0.014 (0.034)	0.109 (0.160)	0.037 (0.045)	0.128 (0.120)	0.048 (0.052)	0.191 (0.164)
R^2	0.05	0.11	0.05	0.10	0.06	0.09	0.11	0.10	0.05	0.08	0.11	0.12
Firms	77	77	77	77	77	77	65	65	77	77	70	70
Observations	301	301	301	301	294	294	225	225	299	299	231	231

1. All monetary variables are deflated by an industry-specific gross-output deflator in 2000 Euros.
2. All models include a full set of year dummies.
3. Standard errors are adjusted for intragroup correlation in the parentheses. ***, **, * statistically significant at 1%, 5% and 10% levels, respectively.
4. The service sector is a reference group for industry dummies.

We again find statistical evidence that foreign ownership is significantly and positively related to CEO compensation, especially to total compensation. For base salary and bonus the effect is in the range of 0.3-0.5%, whereas for total compensation it is in the 0.9-1.6% range. These numbers are close to those of reported in Table 5. Also, the firm performance measure ROA(%) is positively associated with compensation, and the estimates are close to those of reported in Table 5, indicating a relative robust finding. However, contrary to Table 5, the effect of the size of the board remains significant only for salary and bonus. The estimate indicates about 4% effect of the size of the board on CEO salary and bonus, being about half of that found in Table 5. Ownership concentration is statistically insignificant.[40]

CEO pay-for-firm performance results

Table 7 presents estimation results for CEO pay-for-firm performance sensitivity, i.e. the model presented in Equation (4). The estimator is the pooled OLS estimator in first-differences, and standard errors are adjust for intragroup correlation. In columns (1)-(6) we use contemporaneous performance measures and in columns (7)-(12) once lagged measures, i.e. firm performance in the previous year.

We find clear statistical evidence on the contemporaneous link between CEO compensation (especially total compensation) and firm stock market performance. For example, our shareholder wealth measures in columns (1) and (2) suggest that the wealth change in CEO salary and bonus is €6.84 per €1,000 change in shareholder wealth. Respectively, the change in CEO total compensation is €21.85 per €1,000 change in shareholder wealth.[41]

In columns (3) and (4), where we use the stock market return as a measure for firm performance, we find that CEO compensation is positively and significantly associated with firm stock return. The parameter estimates are 0.09 for CEO salary and bonus, and

0.28 for total compensation. The estimate 0.09 is close to the range of 0.10-0.15 which Rosen (1990) reports in his survey of several independent studies on CEO compensation. On the contrary, we did not find statistically significant evidence on the association between CEO compensation and firm accounting-based performance in columns (5) and (6).

When using one-year lagged accounting and stock market-based measures for firm performance in columns (8), (10) and (12), we find that it is CEO total compensation that is positively and significantly associated with firm performance. In sum, the empirical findings in Table 7 indicate a significant contemporaneous link between CEO compensation and firm stock market performance, but not with accounting-based performance. However, when using one-year lagged performance measures, we find that only CEO total compensation is positively associated with firm performance. It would be tempting to argue that causality goes from CEO compensation to firm performance. Unfortunately, we cannot answer this question with the current data. It is naturally possible that the causality affects from compensation to performance, but the direction may as well go vice versa. Therefore, we need to be cautious with causality interpretations.

There are also some other interesting findings in Table 7. We find some evidence in columns (5), (6), (10) and (12) that foreign ownership can be positively associated with CEO compensation. Also, in columns (7) and (8), our findings indicate that firm ownership concentration can be negatively related to CEO compensation. Unfortunately, these findings appear to be sensitive to a model specification.

6. Conclusions

This paper studies how CEO pay is related to firm performance and to firm size in Finland between 1996 and 2002. We utilize new hand-collected individual-level CEO compensa-

tion data from the Finnish tax authorities' registers. By providing new empirical evidence from a very different institutional context than the U.S. and the U.K., we hope to increase our understanding on CEO compensation practices across different countries.

When comparing CEO average pay levels to that of average worker compensation in different countries, the evidence suggests that the ratio is substantially higher in the U.S. than in Europe. For example, the ratio was 475 in the U.S. in 1999, whereas in Europe it ranged from 11 in Switzerland to 24 in the U.K. Based on our CEO compensation data, the estimated ratio in Finland (16) in 1999 exceeds the ratio reported in Germany (13), Sweden (13) and France (15), but it is somewhat smaller than in the Netherlands (17), Spain (17) and Belgium (18). When focusing on the recent dynamics of the ratio in Finland, the estimated ratio was 7 in 1996, but peaked at 24 in 2000, likely due to a few executives' exercised stock options during the stock market boom. Thereafter the ratio has fallen to 13 in parallel with the stock market bust in 2000-2002.

It clearly emerges from the data that the level of average CEO compensation increased considerably between 1996 and 2002 in Finland. For example, CEO mean salary and bonus (in real terms) was €165,878 (median €147,113) in 1996, whereas it was €279,733 in 2002 (median €207,856). The percentage increase from 1996 to 2002 is 69% (median 41%). Respectively, CEO mean total compensation increased from €180,190 to €356,863 (98%), whereas median total compensation increased from €155,142 to €232,750 (50%). Since the number of CEOs per year varies in the data, we also calculated the percentage change of the cohort 1996 (from 1996 to 2002). The increase was 74% for both mean and median salary and bonus, and, respectively, 105% (median 74%) for total compensation. In addition, the change in CEO compensation differs notably from that of industrial worker total pay change (11%) from 1996 to 2002.

When focusing on CEO pay-for-firm performance estimates, we find clear statistical evidence that CEO compensation, and especially total compensation, is significantly associated with firm stock market performance. For example, our shareholder wealth measure, which is close to that of Jensen and Murphy (1990), suggests that the contemporaneous change in CEO salary and bonus is €6.84 per €1,000 change in shareholder wealth. Respectively, the change in CEO total compensation is €21.85 per €1,000 change in shareholder wealth. The estimated change in CEO total compensation, i.e. €21.85, is likely to be biased upwards, due to a few large stock option exercises.

Our second stock market-based measure for firm performance, annual stock return, corroborates the previous findings: the change in CEO compensation can be associated with the change in firm performance. For example, for CEO salary and bonus the elasticity estimate is 0.09, and for total compensation it is 0.28. However, when using accounting-based firm performance measure, i.e. ROA%, we do not find statistically significant evidence of the link between compensation and firm performance. However, when using one-year lagged accounting and stock market-based measures for firm performance, we find that total compensation is significantly and positively associated with these performance measures.

Turning to CEO pay-for-firm size elasticity estimates, the estimates do not differ substantially from 0.3, after controlling for CEO age, industry of the firm, ROA%, and three corporate governance indicators (the size of the board, foreign ownership and ownership concentration). An interesting finding is that the elasticity parameter estimates for firm size (proxied by firm sales) are considerably larger than estimates for other explanatory variables. Thus, although the compensation level is positively associated with CEO age, ROA%, foreign ownership and the size of the board, it seems to be firm size that is a key factor in explaining the CEO compensation level. This being the case, our finding sup-

ports the CEO compensation-based view for sometimes very active mergers and acquisitions booms, as suggested by Baker, Jensen and Murphy (1988), although naturally other important factors may substantially affect merger and acquisition decisions.

There are also some interesting corporate governance findings. First, the share of foreign ownership is positively and significantly associated with the CEO compensation level. Also, in the most specifications, the foreign ownership parameter estimate is about three times larger for total compensation than for salary and bonus. One possible reason may be that foreign investors are more familiar with equity-based incentives, such as stock options, than Finnish investors. Second, ownership concentration is negatively related to the CEO pay level in the pooled model, supporting the view that a large shareholder can play a substantial role in monitoring CEOs activities. Third, the size of the board is positively related to the CEO pay level, especially to the level of base salary and bonus. This may indicate potential inefficiency, rent-seeking and free-rider issues that can be associated with the functioning of a sizable board.

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Endnotes

[1] In a modern company, which saw daylight in the industrial revolution, ownership is usually separated from control. As a consequence, executives have more information than shareholders about a firm's possible risks and returns.

[2] Fama (1980), and Fama and Jensen (1983) have also emphasised the principal-agent problem and the separation of ownership from control.

[3] The size of the board, the voting share of a largest shareholder, and the share of foreign ownership have been used as proxies for corporate governance in the literature.

[4] Jensen (1993) outlines four categories for corporate governance mechanisms: legal and regulatory, internal, external and product market competition. Since these categories are not perfectly distinct, as he also underlines, we use only two categories: internal and external mechanisms, where external mechanisms include both legal and regulatory and product market competition mechanisms. For more comprehensive discussion of corporate governance mechanisms, see e.g. Monks and Minow (2001).

[5] As a company form, a modern public limited company substantially reduces uncertainty of sharing returns and risks among stakeholders. For example, corporate legislation determines how firm profits should be shared among stakeholders. However, despite carefully enacted corporate legislation, a modern firm cannot remove all the uncertainty between stakeholders. The principal-agent problem between shareholders and executives will always exist due to asymmetric information.

[6] The Helsinki Stock Exchange, the Central Chamber of Commerce of Finland and the Confederation of Finnish Industry and Employers appointed a working group on February 2003 to clarify the need of reviewing the corporate governance recommendation that was issued by the Central Chamber of Commerce of Finland and the Confederation of Finnish Industry and Employers in 1997. The working group published the revised recommendations on December 2003. These recommendations can be found in http://www.keskuskauppakamari.fi/kkk/en_GB/etusivu/ (13.3.2006).

[7] This should not be confused with the concept of maximising shareholders profits in the short run, since then a firm's total value will not be maximised. As argued by Jensen, Murphy and Wruck (2004), the objective for firm total value maximising says that e.g. employees' satisfaction and product quality should be increased to a point where a future marginal increase in each reduces firm value.

[8] Therefore, from a risk management viewpoint, it appears to be important that the best codes of corporate governance practices are implemented if executives are awarded equity-based incentives. Naturally, there is no executive compensation policy that "equally fits for all firms". Instead, coherent executive remuneration policy requires both an understanding of a firm's strategy, goals, and vision, and knowledge of feasible compensation possibilities and corporate governance practices.

[9] For a more detailed exposition of law and financial changes related to corporate governance in Finland, see e.g. Hyytinen, Kuosa and Takalo (2003).

[10] See e.g. Kiander and Vartia (1996), and Honkapohja and Koskela (1999).

[11] See e.g. Jones, Kalmi and Mäkinen (2006).

[12] See e.g. Piekkola (2005).

[13] See e.g. Ylä-Anttila, Ali-Yrkkö and Nyberg (2004).

[14] Murphy (1999) provides empirical support for the key role of stock options: "... our analysis shows that pay-performance sensitivity has nearly doubled to $6.0 per $1,000 change in shareholder value by 1996. The increase in pay-performance sensitivities has been driven almost exclusively by stock option grants."

[15] For example, in the U.S. it is compulsory for publicly listed firms to disclose information on the top five executives' compensation. Also, nowadays the trend in corporate governance regulations in other countries is more often to recommend that publicly listed firms disclose detailed information on CEO compensation.

[16] In addition, findings in the previous literature are based on CEO compensation data from publicly listed firms.

[17] To obtain individual CEO annual compensation data from the Finnish tax authorities' registers, we needed to have a social security number for each CEO. All possible identity numbers were hand-collected from different sources, such as from the National Board of Patents and Registration of Finland's public registers. Though our CEO compensation data set is not a random sample from the population of listed firms' CEOs, we believe it fairly well presents the compensation pattern of Finnish CEOs in the listed firms, since the number of our CEOs encompasses around 50% of listed firms' CEOs.

[18] A description of these handbooks may found in http://www.porssitieto.fi/index.html (22.3.2005). We thank Iikka Kuosa for providing some sample data he had collected.

[19] Therefore, we are able to separate a CEO's actual compensation obtained from his firm and from other sources.

[20] Typically, a CEO's compensation package may include a company car, a mobile phone, lunch benefits etc. We do not observe individual CEO compensation contracts from our compensation data, but we do perceive the yearly taxation value for these benefits. According to our calculations these benefits vary typically between €10.000 and €20.000 per year. We set the "critical limit value" to be clearly higher, i.e. €35.000 per year over the period 1996-1999, than the typical taxation value. Thus, we believe that the exercised stock options are almost surely the only reason for the values that are greater than €35.000. From 2000 onwards we have observed directly the value of exercised stock options.

[21] Unfortunately, CEO compensation data does not contain any information on granted but not exercised options. Therefore we have to bypass the possible incentive effects of unvested stock options. We also ignore all incentive effects from firm stocks, because we do not have information on CEOs' stock ownership. However, typically a Finnish CEO owns a quite moderate amount of stocks of his employer. This complicates comparison to Jensen and Murphy (1990), who used the information of stock ownership, unvested options etc. by summing eight CEO pay components in estimating total pay-for-performance sensitivity.

[22] See e.g. Conyon and Murphy (2000).

[23] See e.g. Conyon and Leech (1994).

[24] See e.g. Rosen (1990), and Kato and Kubo (2005).

[25] That is to say the number of CEOs encompasses 47-59% of the firms listed on the Helsinki Stock Exchange (one firm-one CEO), depending on the year.

[26] Information on other European countries is based on The Economist (2000).

[27] Although the U.S. ratio has fallen close to 160 in 2004, there seems still to be a remarkable difference in the ratios between the U.S. and Europe.

[28] The median EBIT in real 2000 euros has also increased, but the percentage change from 1996 to 2002 is only 2%. This might be explained by the skewed EBIT distribution to the right.

[29] Unfortunately, our compensation data do not reveal if a CEO has unexercised stock options. However, a typical exercise pattern in Finland is that CEOs exercise their options very soon after the first possible exercise day.

[30] Compensation data on Norway and Sweden is based on Randøy and Nielsen (2002). The number of CEOs varies between Finland, Norway and Sweden in Table 3, which may exacerbate the comparison of compensation levels.

[31] This measures the percentage of firm shares held by foreign citizens and institutions. Unfortunately, we are unable to identify the home country of foreign shareholders.

[32] The classic example is the ability bias in estimating the effects of education on individual earnings. The fixed effects estimator, however, allows us to control for unobserved time-invariant effects to the extent that their effect on the conditional mean is the same in each year. Second, there is a potential correlation between an observable explanatory variable and an unobservable individual effect. This also supports the use of the fixed effects estimator, since the estimator produces asymptotically consistent parameter estimates regardless of the correlation between an observable explanatory variable and an unobservable individual effect. Note, however, that this robustness has a substantial cost: there needs to be individual and time-variation in an explanatory variable or we cannot distinguish the effect of this variable from the effect a constant unobservable variable.

[33] Theoretically this approach utilises the contract theory and the moral hazard (or hidden action) models highlighting the trade-off between insurance (a fixed wage) and incentives (a variable component in a wage contract). The models typically assume that a principal does not observe an agent's effort.

[34] Prendergast (2002) documents the results of 11 empirical studies for the trade-off of uncertainty and incentives for executives. The empirical results are mixed, i.e. there may be a statistically negative, zero or positive relationship between the increase of uncertainty and pay for performance (incentives).

[35] See e.g. Holmström and Milgrom (1987), Murphy (1999).

[36] The reason is that the bonus part of compensation is typically determined in the end of a year reflecting a contemporaneous link between CEO compensation and firm performance. On the contrary, the reason for using a once lagged firm performance measure is that CEO salary is commonly set at the beginning of the year, being sensitive to firm performance in the previous year.

[37] Standard errors are Huber-White-sandwich heteroskedastic robust estimates. All estimations are made using the STATA/SE 9.1 statistical package.

[38] Note that these findings are indicative, since the elasticity estimates are point estimates.

[39] These are somewhat higher than the estimates based on the pooled OLS estimator in columns (5) and (6) of Table 5, but also the models are different, e.g. we cannot control for industries in Table 6.

[40] One reason might be a modest variation of ownership (and the size of board) over time t, though we have plenty of variation over individuals i.

[41] The estimated change in CEO total compensation, i.e. €21.85, is likely to be biased upwards, due to a few large stock option exercises.

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