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CEO Compensation at Publicly Traded Companies[1]

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תגמול המנכ"לים בחברות ציבוריות

מיטל גראם

תקציר

מטרת המחקר היא לבדוק מהם הגורמים שהשפיעו על התפתחות שכר המנכ"לים בחברות ציבוריות הנסחרות בבורסה בת"א בחמש עשרה השנים האחרונות. לשם כך נעשה שימוש במדגם הגדול ביותר שנאסף בישראל עד כה על נתוניהם האישיים ושכרם של המנכ"לים בחברות ציבוריות. הממצא המרכזי של המחקר הוא ששכר המנכ"לים מושפע חיובית מגודל החברה ומביצועיה (הן החשבונאיים והן הבורסאיים). יחד עם זאת, מתברר כי רגישות השכר לביצועים פוחתת עם השנים, עד כדי כך שבחמש השנים האחרונות לא היה ניתן להסביר את שכר המנכ"ל על ידי ביצועי החברות. המנכ"ל מתוגמל על ביצועיה היחסיים של החברה: אם זו מציגה רווחים נמוכים יחסית לחברות אחרות באותו הענף, שכר המנכ"ל יקטן, ולהפך – אם המנכ"ל יציג רווחים גבוהים מאלה של החברות האחרות בענף, שכרו יועלה. גמישות שכרו של המנכ"ל לביצועי החברה אינה תלויה בגודלה: אין, מבחינת הגמישות, הבדל בין חברות גדולות לקטנות. בבחינת ההבדלים בין מחזורי העסקים נמצא שרגישות השכר לביצועים גבוהה יותר דווקא בשנות שפל. עוד נמצא כי המנכ"ל לא מתוגמל על ביצועי החברה בטווח הארוך, אלא רק על ביצועיה בטווח הקצר (עד שנתיים). מחקר זה מציג לראשונה את נושא המנכ"לים המשותפים (Co-CEO). נמצאו פערי שכר בין שני מנכ"לים המכהנים באותה חברה ובאותה שנה; אלה מושפעים מהבדלים בהחזקות המנכ"לים, בוותק שלהם, בהשכלתם ובתפקידים בדירקטוריון. במחקר נבדק גם הקשר בין חילוף מנכ"לים לביצועי הפירמה. נמצא כי ירידה בביצועים החשבונאיים של הפירמה מגדילה את ההסתברות להחלפת המנכ"ל. לעומת זאת פועלים הביצועים הבורסאיים בכיוון ההפוך: המנכ"ל יעדיף לפרוש מהחברה "בשיא", כך שהוא יוכל להציג הישגים אישיים בפני החברה הבאה שינהל.

CEO Compensation at Publicly traded Companies

Meital Graham

ABSTRACT

The goal of this study is to examine the factors that have affected the trend in CEO compensation levels at companies traded on the Tel Aviv Stock Exchange during the last 15 years. To this end, we have made use of the largest sample of personal and compensation data gathered to date in Israel on CEOs at publicly traded companies. The main finding is that CEO compensation is positively correlated with the size of the firm's assets and its performance (in the stock market and according to its financial statements).

At the same time, it was found that the sensitivity of compensation to the firm's performance has declined over the years, to the point where during the last five years of the sample period, firms' performance did not explain CEO compensation. Moreover, the CEO is compensated for the firm's relative performance, such that if the firm's profit is low relative to other firms in the same industry, the CEO's compensation will decline and vice versa. In addition, the elasticity of CEO compensation with respect to a company's performance is not dependent on its size: There is no difference in elasticity between large and small companies.

With respect to the business cycle, we have found that the sensitivity of compensation to the firm's performance was in fact higher during recession years. We also found that CEOs are not compensated for the firm's long-term performance but only for its short-term performance (up to a two-year lag).

This study also examines, for the first time, the phenomenon of Co-CEOs. Disparities were found in compensation between two CEOs in the same company during the same period. The disparities are dependent on the CEOs' holdings, their seniority, their education and their functions on the Board of Directors.

Another area examined in the study is the correlation between CEO turnover and firm's performance. It was found that a decline in performance as reflected in the firm's financial statements increases the probability of replacement. In contrast, stock market performance has the opposite effect, such that a CEO will prefer to leave a company at its "peak" in order to present enhanced personal achievements to the next company he will be managing.

1. Introduction

The issue of CEO compensation in Israel and worldwide has featured prominently in public debate for the past thirty years. Senior executives shoulder a heavy burden of responsibility and are called to account for business and/or professional failures, and the level of investment required of them is higher than usual. The payment of a high salary to a CEO can increase the motivation of all those working under him, and thereby raise the firm's productivity since everyone will want to change places with him (even in an extreme situation where the manager's performance is utterly indifferent).[1]

Now, at the end of the one of the worst economic crises the world has ever known, public criticism is focused on whether the level of CEO compensation at publicly traded companies, a large part of whose ownership is in the hands of the public, is actually justified, and if it corresponds to the performance of the firms which they manage. Criticism is also directed at the issue of moral hazard, whereby company managers take high risks, produce impressive profits and draw good salaries but as soon as something goes wrong, appeal to the authorities to extricate them from the situation which they have encountered. Citizens pay the price through their taxes, but not only through their taxes: It should be remembered that the public's savings are invested in these companies, mainly in the form of pension funds, insurance plans and mutual funds. When publicly traded companies lose money, the public's savings are thereby eroded, with the public not being properly represented in any discussion that is aimed at determining the compensation of the companies' senior executives.

In order to reduce the risk that senior executives at companies will reduce the value of their assets and lead to their collapse, while causing losses to the shareholders, control should be imposed over the compensation structure and compensation policy for these executives, and a direct connection should be made between this compensation and company performance.

The question is currently being asked as to whether CEO compensation should be limited by means of legislation. The main criticism of such a measure is that it will create alternative and more problematic compensation tracks. Apart from legislation, proposed manager-motivation measures include the payment of a bonus based on measurable parameters such as profitability or increased efficiency, and options that can only be exercised to shares after a specific period of time, in order for managers to have the incentive to ensure that the price of the share will remain high over time.

This empirical study discusses the question of whether compensation policy for senior managers at companies whose shares were listed for trading on the Tel Aviv Stock Exchange during the years 1995–2009 was actually based on economic principles. Various empirical tests were made in order to examine the effect on CEO compensation of the company's size and (both accounting and stock-exchange) performance, and the performance of competing companies in the same industry/equities market. In addition, a unique sub-sample of Co-CEOs will be presented in an attempt to disclose the principal factors affecting pay disparities between them.

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[1] Efficient Wage theory (Lazear).

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The study is organized as follows: The second section reviews the theoretical background and the relevant literature. The third part enumerates the factors determining and affecting CEO compensation and notes the questions arising from the study. The fourth section presents the data base used for the statistical tests. The fifth section describes the empirical methods and provides an empirical analysis of the results of the estimation. The last section will be devoted to a summary and conclusions.

2. Theoretical background

The conflict between the interests of the shareholders of publicly traded companies and those of the companies' CEOs is a classic example of principal-agent risk,[2] the main approach employed in the financial literature to explain CEO compensation. The agent conflict approach is based on the assumption that the shareholders—the investors—commission an appointed manager over the management of the company, are not involved in on-going management and have limited control over his input. Each of the parties wishes to maximize its benefit function. The CEO for his part will aspire to maximize his personal earnings (tangible earnings such as salary and benefits, and intangible earnings such as improving his reputation),[3] while the investors will want to maximize the earnings of the firm.

For example, Baumol (1967) claimed that while the CEO usually acts to promote the shareholders' well-being, he is likely to seek a minimal level of profit that will satisfy them, and will also utilize the profits for his personal benefit. If the shareholders were to have complete information on the CEO's activities and the firm's investment opportunities, it would be possible to compile a contract that exposes and prices each action which the CEO takes or can take in any possible situation. Clearly, the actual reality differs from this utopian situation. The CEO's activities and the investment opportunities open to the firm are not fully exposed to the shareholders. Under this approach, the shareholders are usually unaware of the action which the CEO can take, or which form of action could increase their well-being.

In order to lead to a maximum overlap between the shareholders' interests and the CEO's interests, CEO compensation policy should include incentives that will motivate him to select and apply actions that will increase the shareholders' benefit (see for example, Jensen and Murphy [1990]). It should be noted, however, that a compensation policy such as this can also create an incentive for the manager to take risks that conflict with the interests of the shareholders. Holmstrom (1979) attempted to describe the terms for the optimal compensation contract for the CEO by means of a model in which a single shareholder wishes to formulate a contract whereby the manager's compensation will include motivation for acting to the benefit of the shareholder himself. A model of this type is not applicable at publicly traded companies with numerous shareholders.

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[2] Berle and Means (1932) were those who first claimed that without proper incentives, managers can operate in a manner harmful to shareholders at companies where a separation between management and ownership exists. See also Shleifer and Vishny, 1997.

[3] See for example, Morck, Wolfenzon and Yeung (2005).

La Porta et al (1999) found that in economies with a good enforcement system for protecting shareholders' rights[4], only a very small proportion of firms are held by a large number of shareholders. Moreover, many firms are held by families or by the state. In countries where separation between corporate ownership and management is common, such as in the US and the UK, the agent problem arises between the management and the owners. This is because when ownership is dispersed among numerous shareholders and the cost of supervision by the single investor is relatively high[5], the shareholders' ability to supervise the manager decreases. Investors' lack of opportunity to accurately measure the manager's personal contribution to the company's performance results in a solution whereby the manager's compensation is connected to the company's performance.

The question therefore needs to be asked as to why the potential conflicts of interest between the managers and the owners cannot be solved by at least partially combining their interests, by making the manager a part-owner. Zussman and Mehrez (1992) answer this question by noting that part of the conflicts of interest between the manager and the owners derives from their differing attitude to the company's risk: Since an investor will diversify his investment among numerous firms, the combined effect of the risk of all of the firms on his wealth will be less than if he invests in a single firm. On the other hand, a manager lends a large part of his human capital to a single firm. As a result, the success or failure of that firm will determine the proceeds for his human capital, and will be reflected in the appraisal he is accorded in the managers market as a whole (Fama, 1980). This means that the effect of the single firm's risk on the manager's wealth exceeds the effect of its risk on the shareholders' wealth.

Therefore, according to Zussman and Mehrez (1992), compelling the manager to become a shareholder in the firm which he manages will increase the effect of the company's risk on the manager's wealth and will actually be translated into an increase in the conflict of interests between the manager and the owners with respect to the desirable level of risk to which the firm should be exposed. However, Mehran (1994) found that the firm's performance is positively correlated to the percentage of capital held by the managers and the percentage of their compensation that is based on shares. Ofek and Yermack (2000) separated this relationship into two in their study, and found that CEO compensation by means of shares succeeds in increasing the incentive of managers with a low level of ownership, but not the incentive of managers with a high level of ownership. This is because the latter negate most of the effect of this incentive by selling shares (apparently in order to avoid holding too much of the equity of the company).

Kosenko (2007) found that during the years 1995–2009, 20 business groups in Israel, nearly all of them family-owned, controlled 160 public companies (out of the 650 companies that were traded on the Tel Aviv Stock Exchange in those years) and approximately half of the market segment during the period reviewed. In 2007 for example, at 48.4 percent of the companies a controlling group held over 50 percent of the

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[4] Based on the 27 wealthiest countries.
[5] This cost includes, *inter alia,* the cost of establishing and maintaining a network for the auditing and supervision of senior managers' activities, the direct costs of a system for reporting to the owners, costs to the investor of gathering information, and costs deriving from the need to interpret the signals which the manager provides regarding his performance.

voting rights. Such a concentrated ownership structure is common in non-Anglophone Western countries.[6] Under the winner-take-all-society theory[7], this structure can also be attributed to the spirit of the times. In an increasing number of economies and institutions worldwide, a very small number of "winners" who receive a great deal are at the top, while all the others are left with little.

In these countries, where the shareholder has a major incentive to supervise the CEO's activity, the agent problem is mainly between large shareholders and small shareholders, and less between the shareholders and the managers. Accordingly, if in countries with diversified ownership the CEO is likely to benefit at the shareholders' expense, in Israel, where ownership is more concentrated, the controlling owners together with the CEO can exploit the minority shareholders. The potential for a materialization of the conflict of interests between large and small shareholders increases as the large shareholders' control of the firm increases, and with it their power to promote their own interests, particularly when small investors are afforded little legal protection.

In a situation such as that in Israel where control groups abound, control by individuals is limited not only by a single company, but by numerous companies under that single company's control as well. This results from the creation of holding pyramids comprised of holding companies, financial institutions and non-financial companies, the use of cross-holdings, or the maximum separation between voting rights and equity rights. The large number of businesses controlled by interested parties and holding pyramids can often lead to the exploitation of tunneling—the transfer of resources between companies under the control of a single owner and the increased probability of exploitation of the minority shareholders by the same core of control. Since it is difficult for the minority shareholders to protect their interests, under this model the use of CEO compensation devices has the appearance of tunneling. This is because the cost to the controlling owner of each shekel of salary or other expense charged to the company is much lower. However, Jensen and Meckling (1976) claimed that the higher the controlling owners' equity holding, the greater the identity of interests between them and all the shareholders, and agency costs decrease (for example, managers' apprehensiveness over the possibility of a purchase offer). Mehran (1994) added that firms in which a higher percentage is held by interested parties provide less compensation in the form of shares, which connects with the preceding claim that firms with higher concentration are less likely to encounter the agent problem.

The phenomenon whereby principal shareholders place their own appointees in key positions in the company, especially in the position of CEO, is common in Israel.[8] An appointment such as this, in which the representative's personal loyalty to his patron plays an important role, is likely to reduce conflicts of interest, and thereby also reduce the need for instituting more effective supervision and control mechanisms, as well as the need to formulate a performance-sensitive contract as part of the effort to cope with the principal-agent problem (as mentioned in the previous paragraph). In this way, increasing the manager's salary generally serves as a substitute for drawing profits from the company

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[6] Mainly continental western European countries and Japan.
[7] Robert H. Frank and Philip J. Cook.
[8] Amzaleg and Mehrez (2002).

without involving minority shareholders in the process—a process by which the controlling owner can ensure that the serving CEO will manage the company in accordance with his own interests alone.

Another way of solving the principal agent problem is via Board of Directors activity aimed at supervising the managers to the benefit of the shareholders. According to the results of the study conducted by Core, Holthausen and Larcker (1999), companies with a less effective supervisory structure have more agency problems, their managers are more highly paid and their performance is inferior. However, there are those (Hermalin and Weisback [1996], for example) who claim that in most cases the managers are involved in selecting the directors and they can be expected to cooperate, without representation of a shareholders trustee. In a later article (2003), these authors added that a Board of Directors with a limited number of members and a high percentage of external directors reduces the principal agent problem to the benefit of the interests of all the shareholders.

In Israel, members of the board tend to be relatives or business partners of the CEO, who is also a party at interest, and the external directors are also usually appointed at the recommendation of the controlling owners.[9] This conforms to the approach whereby the CEOs are the ones who set their own salary: They exert pressure on the members of the Board of Directors to pay them a high salary and they themselves determine the compensation structure, exploiting their power and status. Bebchuk and Fried (2004) claim that the Management Council looks after the interests of the manager more than those of the shareholders. These authors state that the managers receive substantial loans from their corporations, which they do not usually have to repay, benefit from advanced study funds and generous pension funds, golden parachutes, complete independence in decision-making, the re-pricing of options when the price of the underlying share falls, and profits when the share price increases. Bebchuk and Fried claim that the main culprit behind the excessive salaries paid to CEOs is the Management Council[10], which is under control of the CEO, or the fact that the members of the Management Council have a social or business connection with the CEO.[11] In their opinion, managers earn more not because they are more adept at creating value for the shareholders, but because they are very adept at protecting their position at the summit. They call this approach the managerial power approach.[12]

Under such an approach, an optimal contract alone cannot adequately explain payment arrangements for the CEO, even for CEOs who exert considerable influence on the level of their salary. The greater the power of the manager, the more he will be able to "squeeze more money" and/or the lower the performance sensitivity of his salary will be. According to the previously mentioned authors, the manager's power increases if the board is weak or ineffective, if the company does not have external interested parties, if it has fewer institutional investors or if the managers are protected by anti-takeover arrangements. In

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[9] Barak, Cohen and Lauterbach (2007).

[10] Shleifer and Vishny (1997) previously also claimed that the CEO controls the compensation committee.

[11] In another example, Main et al (1995) examined how CEOs "control" the compensation committee in a manner that results in the payment of a higher salary to the CEO, and concluded that the external directors act more as partners to the effort that will lead to the firm's success, rather than as independent auditors of the CEO's performance.

[12] They first presented this approach in studies together with David Walker in 2001.

these situations, the directors have an incentive to favor the manager as the result of exigencies deriving from market forces and/or connections with outside players.

Nevertheless, restrictions on salary do of course exist. Bebchuk and Fried claim that salary is determined as the maximum amount that can be "carved off" from the company without evoking anger among the public or in the media, and without embarrassing the directors. The authors position this approach against the model called "arm's-length bargaining", whereby the members of the Board of Directors discuss with the managers the level of salary owing to them—discussions in which the manager tries to maximize his well-being, and the Board of Directors attempt to achieve the best deal for the shareholders. Under this model, CEO compensation will increase if the cost of managers' services increases, if the cost of keeping managers in the company increases and if the requirements of the CEO become more "expensive". In this respect, Hubbard (2000, 2005) claims that at a time of shocks in the market, the requirement for better managers increases and firms have to pay more in order to employ them. These two approaches are currently the principal approaches employed in explaining the relationship between CEO compensation and firms' market value.

3. Factors determining and affecting CEO compensation[13]

3a. The firm's performance

Criticism of CEO compensation is centered not only on the high salary itself, but also on the lack of relationship between the level of salary and the amount of profit—a phenomenon that is particularly notable when the company moves from a profit to a loss without this change being reflected in CEO compensation. In 1997, Amzaleg and Mehrez (2002) sampled 186 public companies traded on the Tel Aviv Stock Exchange, whose CEOs each earned over a million shekels in that year, and found that senior executives' salary is affected to a significant extent by the companies' financial results, on the basis of both accounting indices and the share performance index.[14] A relationship, but not a particularly strong one, between salary and the firm's performance was found in many other studies. Jensen and Murphy (1990), for example, found that CEO compensation changes by only $3.25 for a $1,000 change in the value of the share. According to these authors, this low sensitivity of compensation to performance derives from political forces—private and public. In a later study from 1999 which was based on large companies in the US included in the S&P 500 Index, Murphy found that CEO compensation sensitivity to share performance in the period 1990–1996 averaged 0.38. This means that for each 1 percent increase in the share's price, the salary of the American CEO rose by 0.38 percent.

Core, Holthausen and Larcker (1999) examined the sensitivity of salary to the firm's accounting performance, and found it to be limited and insignificant. Barak, Cohen and

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[13] A summary of the literature mentioned in this section can be found in the table in the appendices section.

[14] Kaplan (1994) also found a positive correlation between salary and the firm's performance at publicly traded companies in the US and in Japan. Rosen (1990) complements these findings by discovering a 0.2–0.25 sensitivity of salary to sales, 0.1 to accounting return and 0.15 to share return.

Lauterbach (2007) showed that CEO compensation is linked mainly, and at a high level of significance, to the performance of the company's shares. However, they found that CEO compensation sensitivity to the company's net profit or return on equity is limited and insignificant. Bebchuk and Fried (2004) claim that CEO compensation is not economic, and that the correlation between it and the company's performance is very weak. According to them, since CEOs are not compensated on the basis of the performance of the companies which they manage, they have no adequate incentive to increase the shareholders' value. Hermalin and Wallace (1997) claim that the manner in which they chose to examine the relationship between CEO compensation and the firm's performance is unsatisfactory. They note that all studies examining this relationship refer to all the firms in the same way, as if they all had the same compensation structure. They show in their research that when different compensation structures are used, reflecting the heterogeneity among the firms from several aspects, such as the management ability therein and those performance parameters that actually are informative regarding managerial performance, the correlation between salary and performance proves to be much greater.

Bertrand and Mullainathan (2001) analyze and estimate the pay-for-luck phenomenon among CEOs in the US, and find that the CEOs receive the same compensation on a dollar of added value for the company deriving from "luck" as on a dollar increment deriving from the CEO's real effort and proficiency. In these authors' opinion, either the managers are too highly paid or they are simply paid in an inefficient manner. In this respect, Bolton, Scheinkman and Xiong (2006) claim that the optimal CEO salary contract should place an emphasis on the short-term performance of the share at the expense of long-term value, in order to motivate the manager to persist in activities that increase the speculative component in the price of the share. For this reason, the high-tech bubble led to a rapid increase in CEO compensation at the end of the 1990s. During that period, shareholders were only interested in the prices of their shares, which rose, and managers' contracts were focused on share price-based incentives. These incentives took the form of large parcels of short-term options for the CEOs, which encouraged them to take measures that would increase the speculative component in the share price.

3b. <u>Size of the firm</u>

Numerous studies, such as Gabaix and Landier (2007), Talmor and Wallace (2003), Bliss and Rosen (2001), and Bar Yosef and Talmor (1997) found a significant positive correlation between company size and the level of CEO compensation.[15] Gabaix and Landier (2007) for example, showed that the large increase of over 500 percent in average real CEO compensation in the US during the years 1980–2003 can be attributed almost entirely to the rate of growth of the companies which the American CEOs managed. Under these authors' theoretical model, more proficient CEOs tend to manage larger companies and are more highly paid. The authors also claim that regardless of what we think of CEO compensation levels, this is only the result of a competitive process, and no

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[15] See also Hauser and Gizbar (1993), Zhou (2000) and Baker, Jensen and Murphy, which found that a firm expanding by 10 percent will pay its CEO some 3 percent more.

action should be taken in the matter against the managers or the Management Council. Since managerial proficiency is a rare commodity, those with such proficiency are highly paid. Gabaix and Landier also show that if CEOs are graded by proficiency and the CEO in 250th place is replaced with a better CEO (one who is positioned in first place), the market value of the company increases by only 16 basis points. Minimal differences in CEOs' proficiency are translated into major differences in their salary and in the size of the companies which they are appointed to manage.

It transpires that company size also affects the performance sensitivity of CEO compensation. Murphy (1999) and Schaefer (1998) found that the sensitivity of pay to performance at large companies is less than at smaller companies. According to Murphy, this finding is not surprising because risk-averse CEOs at large companies can be "owners" (in a manner that can be exercised) of only part of the company's cash flow, by means of shares, options and their various forms of payment.

3c. Ownership

Amzaleg and Mehrez (2002) found that an owner-CEO's compensation is considerably higher (by 30 percent) than that of a hired CEO. (Barak, Cohen and Lauterbach [2007] found an even greater difference of 50–60 percent)[16]. This finding complements the findings of Hauser, Solomon, Shohat and Tanchuma (1996), who showed that with the existing control structure in the capital market in Israel, there is a tendency to increase compensation and benefits for managers who are controlling owners at the expense of all the shareholders. Making a more accurate observation of the corporate holding structure, Holderness and Sheehan (1988) found that managers who hold 50 percent or more of a publicly traded company's equity are higher paid than other managers at such companies. Hubbard and Palia (1995) found *inter alia* that the performance sensitivity of owner-CEO compensation is less than that of a hired CEO.[17] However, on the basis of data from 234 companies in the manufacturing, trade and service industries and holding companies in the years 1991–1994, Bar Yosef and Talmor found that the relationship between owner-CEO compensation and the company's accounting earnings is actually stronger.

3d. CEO compensation by means of relative performance evaluation

The relative performance evaluation (RPE) theory developed by Holmstrom (1982) assumes that a firm's output or profit are a function of the manager's efforts. The manager for his part decides how much effort to invest according to the proceeds which he receives for his efforts. As a result, the benefit deriving from the monetary proceeds for investment of a unit of additional effort is equal to the decrease in his benefit deriving from the investment of this unit of effort. The greater his efforts, the more cash compensation the manager will demand for an additional unit of effort. One way to reduce the variability in the estimation of the manager's efforts on the basis of the firm's output is selection of the

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[16] Bar Yosef and Talmor (1997) and Ang, Hauser and Lauterbach (1997) also found differences in compensation in the owner-CEO's favor.

[17] See also Lee (2002).

profitability variable from which random effects were deducted. Basing the manager's compensation not only on the firm's output, but also on output in the industry will reduce the risk to the manager, and will motivate him to increase his efforts. When the profitability of the firm which he manages increases but the profitability of the other firms in the industry decreases, the manager's compensation is greater than in a situation where a growth in the firm's profitability (by the same rate) is part of an overall picture of increased profitability in the industry as a whole.

Zussman and Mehrez (1992) showed that the profitability (return on equity) of the other firms in the industry has an effect on executive compensation: For a given level of profitability at his company, high profits at other companies in the industry have the effect of reducing the manager's compensation, and low profits in the industry have the effect of increasing it. This finding is indicative of compensation methods that mitigate the effect of profitability "shocks" among all companies in the industry on the manager's compensation. Compensation for relative performance should reduce the risk affecting the manager's compensation (which is not under his control), and thereby motivate him to invest the maximum effort. However, Aggarwal and Samwick (1999) found empirical evidence for positive sensitivity of executive compensation to the performance of a competing company in the same industry. According to these authors, the need to soften the competition in the market for the firm's outputs creates an optimal compensation contract which confers a positive weight to the performance both of the company and of its competitors. They also found that firms belonging to more competitive industries attribute a higher weighting to the performance of competing firms. Apart from that, Smith and Watts (1992) found a significant correlation between CEO compensation and the company's industrial sector: Both salary and its performance sensitivity are higher in more complex and sophisticated industries.

Gibbons and Murphy (1990) also claimed that CEO compensation should be connected to the company's out-performance (that is, to its success relative to the average for companies in the economy), because only this performance can be attributed to the CEO; and the residual return is determined mainly by the state of the economy. The authors found that the returns of other companies in the industry affected the change in executive compensation. This finding was also obtained in the studies of Hubbard (2000, 2005). According to Hubbard, the reason for compensating managers for out-performance is that managers' external employment opportunities match the state of the industry. Bebchuk and Fried (2004) also referred to this subject. They claim that compensation committees and consultants tend to increase CEO compensation repeatedly on the basis of the competitive component ("because others are giving a raise, we also have to give a raise"). Since no Management Council wants to admit that the quality of its manager is below average, his compensation has to be above average—which always pushes up the average.

3e. The CEO's personal characteristics

The personal characteristics of the CEO also play a part in explaining his compensation:
Age: Finkelstein and Boyd (1998) found that no correlation exists between the CEO's compensation and his age. However, Lewellen and Huntsman (1971) and Amzaleg and Mehrez (2002) did find a positive correlation between the manager's compensation and age.
Education: Palia (2000) found that more highly educated managers find positions in more popular companies and at a higher salary.

Seniority: Kato and Rockel (1989) noted that a quarter of executives were appointed to the position of CEO after serving at least five years at the company.

Generally and according to Murphy and Zabonjnik's theory (2004), an increase in compensation is related to a change in the types of proficiency which firms require from their executives, from human capital specific to the company to general managerial proficiencies. Under this theory, as the relative importance of general proficiencies increases, average pay is expected to rise, firms will hire CEOs from outside, and the disparities between the CEO's compensation and the salary of the other managers at the company will increase continually. The two authors discussed the issue of the source location of the CEOs in a later article in 2007.

3f. Research questions

With the help of the sample representing publicly traded companies in the last decade, we will try to answer the following questions:
(1) The famous question: Is there a correlation between CEO compensation and the firm's performance (based both on share performance indices and on accounting performance indices) and the size of the firm? Does this sensitivity change over time? Does it vary between different sized companies?
   • The correlation between the firm's performance and CEO compensation is examined in a variety of ways in studies that were compiled in Israel on the issue of executive compensation.[18] The contribution of this study to research derives mainly from a more comprehensive and contemporary data base, which provides a better basis for examining this issue.[19] The examination will be conducted by means of an analysis of estimation equations that were presented in worldwide studies and which have so far not been applied to Israeli data. Moreover, it should be noted that studies in Israel have not examined the effect of the firm's size on the sensitivity of CEO compensation to the firm's performance.

(2) Is there a correlation between CEO compensation and the performance of the industry to which the company he manages belongs or the performance of the entire

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[18] The results of which have already been presented in the previous sections.
[19] The data base will be presented more extensively in the next section.

equities market in that year, beyond the absolute performance of the company under his management?

- Zussman and Mehrez (1992) examined the correlation between CEO compensation and the performance of the industry to which the company he manages belongs beyond the absolute performance of the company under his management in the years 1987–1991, while Hauser and Gizbar (1993) examined the correlation between CEO compensation and the performance of the entire equities market in the same year, beyond the absolute performance of the company under his management in 57 industrial companies in the years 1988–1990. In this study, we will examine these two relationships in 163 Tel Aviv stock exchange companies in the years 1995–2009 (a period in which the subject has yet to be examined).

(3) CEO turnover[20]
- This subject has never been examined in Israel, even though it has been studied extensively elsewhere.

(4) By means of a unique sub-sample of Co-CEOs, we will examine the effect of differences in CEOs' personal data on the pay disparities between them.
- To the best of my knowledge, this subject has not been studied in the past (either in Israel or abroad).

4. Characterization of the data base

The sample is built from the shares of 163 Israeli publicly traded companies, which were sampled randomly from all Tel Aviv stock exchange companies[21] in the years 1995–2009 (15 consecutive years). In this way, we were able to present a sample representative of all publicly traded companies, and not just companies belonging to a particular category.[22] The firms in the sample are firms listed for trading on the stock exchange in Israel or in Israel and the US together (dual-listed). The firms belong to 13 industries (as detailed below) in accordance with Tel Aviv stock exchange catalog of sub-industries. The sample is an unbalanced panel: Not all the firms appear in all the years. This is due to the de-listing of some firms from Tel Aviv stock exchange during the relevant period or because of the non-publication of periodic/financial reports. We would also note that at some of the companies (31 companies), in all or some of the years, more than one person served in the position of CEO, that is, Co-CEO. Details of the variables in the data base are presented in Table 1.

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[20] Part *E* in the appendices.
[21] We sampled 163 companies out of the full list of Tel Aviv stock exchange companies appearing on the web site of the Association of Public Companies.
[22] For example, if only companies traded in the Tel Aviv 100 list were to be examined, CEO compensation would be upward biased to a considerable extent and the examination would have ignored the largest group of companies on Tel Aviv stock exchange—SMEs.

Table 1: List of the variables in the sample

Symbol of the variable	Definition of the variable
NUM_FIRM	Company number (according to Stock Exchange symbol)
YEAR	Year
NAME_FIRM	Company name
CO_CEO	Is the CEO a partner - A dummy variable that is 1 if yes and 0 if no
CEO_NAME	Name of CEO
CEO_BIRTH	Year of birth
CEO_AGE	Age of CEO
CEO_EDUC	CEO's education - A dummy variable that is 0 if the CEO has 12 years of education, 1 if he has a Bachelor's degree, and 2 if he has a Master's degree or higher.
CEO_DIR	Director - A dummy variable that is 0 if the CEO is not a member of the Board of Directors, 1 if he is a member of the Board of Directors, and 2 if he is the Chairman of the Board of Directors
CEO_FAMILY	Family relation - A dummy variable that is 1 if he is a relative of a party at interest, and 0 if not.
CEO_START_COMPANY	Start of service in the company
CEO_START	Year of appointment as CEO
CEO_LAST_YEAR	Is this his last year - A dummy variable that is 1 if this is his last year of office as CEO and 0 if not.
HOLDINGS	The CEO's rate of holdings in the company
SALARY	Salary
SOCIAL	Social benefits
BONUS	Bonuses
SHARES_TASH	Share-based payments
SHARES	Number of shares held
TNAI_SHARES	Terms of the shares[1]
OPTIONS	Number of options held
TNAI_OPTIONS	Terms of the options[2]
ALUT_SAHR_N	Cost of salary in current prices
ROE	Return on Equity
ROA	Return on Assets
RET_STOCK	Annual yield of the company's shares on the Stock Exchange
ASSETS	Assets (in thousands of shekels)
ANAF_FIRM	The sector
TTAN_FIRM	The sub-sector to which the company belongs
EQUITY	Equity (in thousands of shekels)
NET PROFIT	Net profit (in thousands of shekels)
VALUE	Market capitalization (in thousands of shekels)
LEVERAGE	Financial leverage
TOBINSQ	Tobin's Q[3]
TA100	Does the company belong to the TA 100 index - A dummy variable that is 1 if yes and 0 if no
START_FIRM	Years traded on the Tel Aviv Stock Exchange
AFFIL_D	Does the company belong to a business group - A dummy variable that is 1 if yes, and 0 if no.

1) Type of share, where the share is traded, and its value
2) Type of option, tradable or not, terms of exercise
3) Method of calculation: (balance sheet total) / (equity - market capitalization + balance sheet total)

Sources of the data:

(1) The CEO's name, compensation, age, education, affiliation to the Board of Directors, holdings and relationship to the members of the Board of Directors were gathered manually from the periodic reports published each year for each of the companies appearing in the information bank of Ifat Business Services' *Ifat Hon Disk* web site.[23]

(2) The financial data of each of the companies, such as total balance sheet, net profit, shareholders' equity and activity environment (industry, sub-industry), were taken from the annual financial statements.[24]

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[23]We would like to thank Philip Yhelzon, Gila Weinberger, Sharon Teperberg, Avigal Caspi, Michael Revzin and Joshua Schneck for their help in gathering the data for the years 2008–2009.

[24] Since 2008, publicly traded companies have published their financial reports in accordance with International Financial Reporting Standards (IFRS). This is one of the reasons why a dummy variable for each year has been added to the estimation equations.

(3)   Stock exchange trading data that were gathered in order to calculate financial values, such as ROE, TQ and the share returns of stock exchange companies, were taken from the *Praedicta* information bank.

This panel is the largest and most contemporary sample that has been created in Israel on the subject. The most recent study of executive compensation published in Israel relates to the years 1994 –2001 (R. Barak, S. Cohen, S. and B. Lauterbach [2007]). All the studies prior to Barak et al (2007) analyzed a horizontal sample and compared CEO compensation at different companies in a specific year or average CEO compensation over three years. Moreover, Barak, Cohen and Lauterbach's study (2007) included in its sample only companies in which the CEO was not replaced during the sample period, which could bias the sample results for a particular type of company—for example, family-owned companies. However, the data base of this study includes companies whose CEOs were replaced during the period reviewed as well as those in which they were not replaced. The vast majority of studies compiled worldwide on executive compensation made no distinction between companies in which the CEO served throughout the entire period and those in which the CEOs were replaced during the period. In this way, importance can be attached to CEO replacement over the years, and the "seniority" variable can be added as one of the explanatory variables affecting compensation.

I will first examine whether this sample can indeed serve as a representative sample for all stock exchange companies. Table 2 presents sector-specific distribution according to number of companies and their market value (Table 2.a) for both the companies in the sample and for all stock exchange companies, and the principal characteristics of the companies (Table 2.b). From the standpoint of the number of companies belonging to each sector, the match between the sample and the actual sector-specific composition of the companies is almost complete: The industry to which the largest number of companies belongs is manufacturing, followed by trade and services, and the real estate and construction industry. However, from the standpoint of the weight of each industry in the economy's total market value, the sample is biased slightly in the direction of the trade and services industries, insurance, and holdings and investments industries, while the manufacturing industry's share in the sample is lower than in actuality. The companies' principal characteristics (multi-year average) are compared in the second part of Table 2. Here too, we can see that the average for the company data in the sample is quite similar to the average for all stock exchange companies. A notable figure in the table is the average annual rate of return of shares in the years 1995–2009: 23.7 percent in the sample and 20 percent actual. It is therefore possible to conclude that the sample is indeed capable of representing all stock exchange companies.[25] The overall market value of the sample (multi-year average) is equivalent to 30 percent of the total market value on the stock exchange (multi-year average). Similarly, when the volume of the companies' assets is examined, it is found that the overall balance sheet of the companies in the sample

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[25]We would also note that an annual average gap of NIS 80 thousand exists between the average salary found in this sample and Globes' findings. This is apparently due to the fact that the asset average of the companies sampled is higher than that of all Tel Aviv stock exchange companies and as can be seen later, there is a direct relationship between company size and CEO compensation.

accounts for 32 percent of the overall balance sheet of all stock exchange companies in the years 1995–2009.

| Table 2: Comparing the sample to all public companies traded on the Stock Exchange, multi-year average 1995-2009				
2a. Distribution of the companies by sector				
	By number of companies		By Market Capitalization	
Sector	Relative proportion in the sample	The sector's relative proportion on the Stock Exchange	Relative proportion in the sample	The sector's relative proportion on the Stock Exchange
Banks	2.2	2.2	12.1	14.3
Mortgage banks	0.0	1.1	0.0	1.2
Insurance	2.9	2.0	9.7	4.5
Commerce and servic	22.6	23.3	24.7	19.5
Construction and real	19.6	19.6	10.4	9.9
Manufacturing	37.3	34.5	22.8	35.0
Investments and holdir	14.6	15.7	20.2	15.0
Oil and gas exploratio	0.7	1.6	0.2	0.6
2b. Principal characteristics				
		In the sample	On Tel-Aviv Stock Exchange	
Equity (millions of shekels)		483	534	
Return on Equity (%)		5.7	8.3	
Financial Leverage (%)		65.2	86.2	
Market capitalization (millior		731	588	
Share yield (%)		23.7	20.0	

Increase in compensation

CEO compensation at each and every company is determined in a personal agreement, and not under a collective agreement, as is usual for employees below the level of senior management. In 1987 an amendment was made to the Companies Ordinance, requiring public companies to report on the compensation and the components of this compensation for the five most senior executives at the company. The reporting is based on Regulation 21 of the Securities (Periodic and Immediate Reports) Regulations, 5730–1970. The compensation presented in the periodic reports is salary including accompanying conditions to salary, such as vehicle maintenance, telephone, social benefits, provisions for the termination of employer-employee relations and all income that is charged to salary for a component granted to an employee. Until 2007, only a very small proportion of companies (approximately ten percent) detailed salary components (basic salary, social provisions, bonuses and share-based payments). In 2007 this proportion amounted to 16 percent while in the last two years, 2008–2009, nearly all companies presented these details. This was because in June 2008 the Securities Authority issued new regulations requiring companies to conform to specific requirements concerning executive compensation.[26] In the years 2008–2009 therefore, all companies presented share-based payment (the value of options granted to the CEO) as part of CEO compensation. In 2007

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[26] See the appendices section for an explanation of the change in the law.

only 16 percent, and before then just a few companies, stated that compensation included the value of options, while most companies did not refer to the matter at all. As a result, it is not possible to know with any certainty whether compensation included this component. It should be noted however than in 2009 only 25 companies reported on share-based payment as part of compensation, which accounted for an average of 35 percent of overall pay. After 2008, the respective figures amounted to 22 and 35 percent. It should also be taken into account that since 2008 the "share-based payment" component has been expressed in terms of the accounting expense that was recorded in the books, and not in terms of economic value as of the report date.

By how many percent therefore did average CEO compensation increase between 1995 and 2009? The answer is 104 percent—an average annual increase of 6 percent. The median compensation rose by only 46 percent. In 1995 average real CEO compensation at publicly traded companies amounted to NIS 1.2 million (with a median of NIS 0.9 million), while in 2009 it amounted to NIS 2.5 million (with a median of NIS 1.3 million) a year (in 2006 fixed prices). For the sake of comparison, average CEO compensation at public companies in 2002 is estimated at NIS 1.6 million ($0.3 million) while average CEO compensation in the US in that year is estimated at $2.25 million—the world's highest average CEO compensation.[27] The US was followed by Switzerland with $1.19 million and Germany with $954 thousand in third place. (Average CEO compensation at the largest companies in Europe was $804 thousand a year). Figure 1 presents average CEO compensation in the years 1995–2009. We can see that compensation rose more or less consistently, except for decreases in the average for the years 2000–2001 and 2008, which can be attributed to the recessions in those years. When each year is examined separately, we find that the largest increase in salary was in 2005 (18 percent in one year), followed by 1999 (15 percent), 1998 and 2006 (14 percent) and 2007 (13 percent). It should also be noted that within five years, in the period between 2002 and 2007, the average salary soared by 80 percent.

Figure 1: CEO compensation in the years 1995-2009
(in millions of shekels, 2006 fixed prices)

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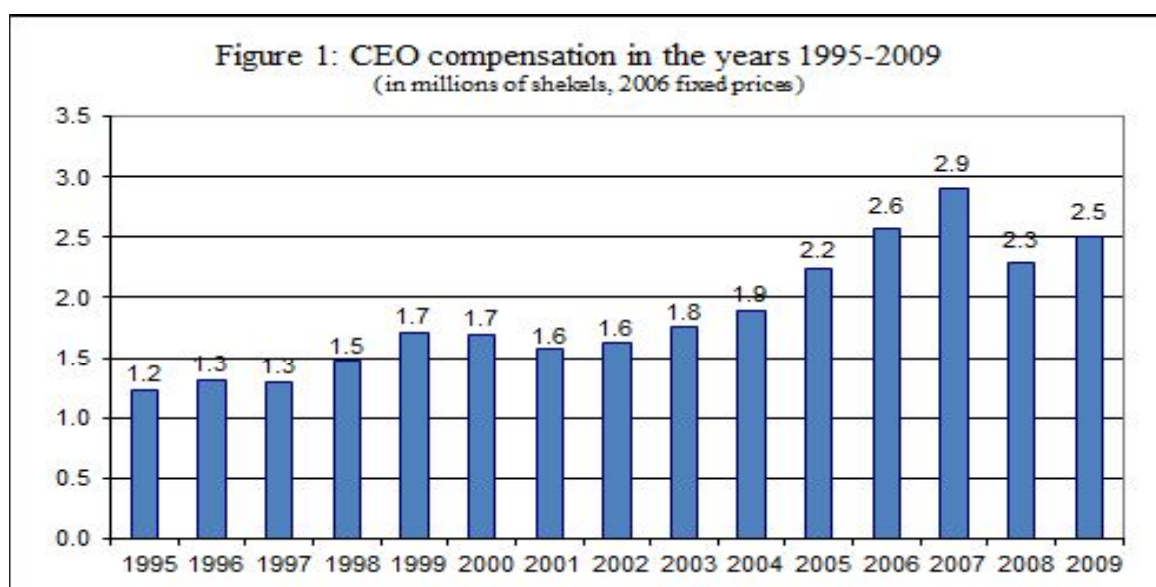
[27] According to a study conducted by the Towers Perrin research company.

Figure 2 presents average CEO compensation in the years 1995–2009 by industries[28]: Banks, Insurance, Real Estate, Trade and Services, Investments and Holdings, and Manufacturing. As expected, CEO compensation at banks and insurance companies is the highest[29] while it is the lowest in manufacturing. This order is the same as the order of size of the industries, which again serves to emphasize that company size is the main explanation for the level of CEO compensation.

Figure 2: CEO compensation by Industry
(annual average, thousands of shekels, 2006 fixed prices, 1995-2009)
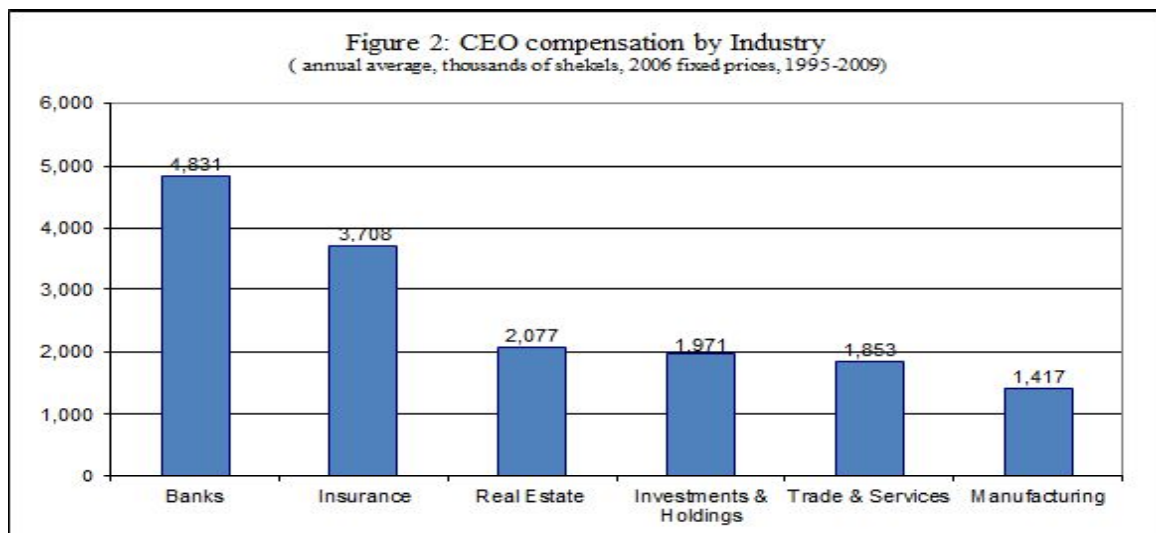
Figure 3 describes the increase in CEO compensation in each industry from 1995 to 2009. We can see that the largest increase was in the insurance industry—200 percent—followed by the real estate industry and the trade and services industry, where the increase amounted to 150 percent. Manufacturing, and investments and holdings were the industries in which CEO compensation rose the least.

Figure 3: Change in CEO compensation, by Industry
(2006 fixed prices, 1995-2009, 100=1995)

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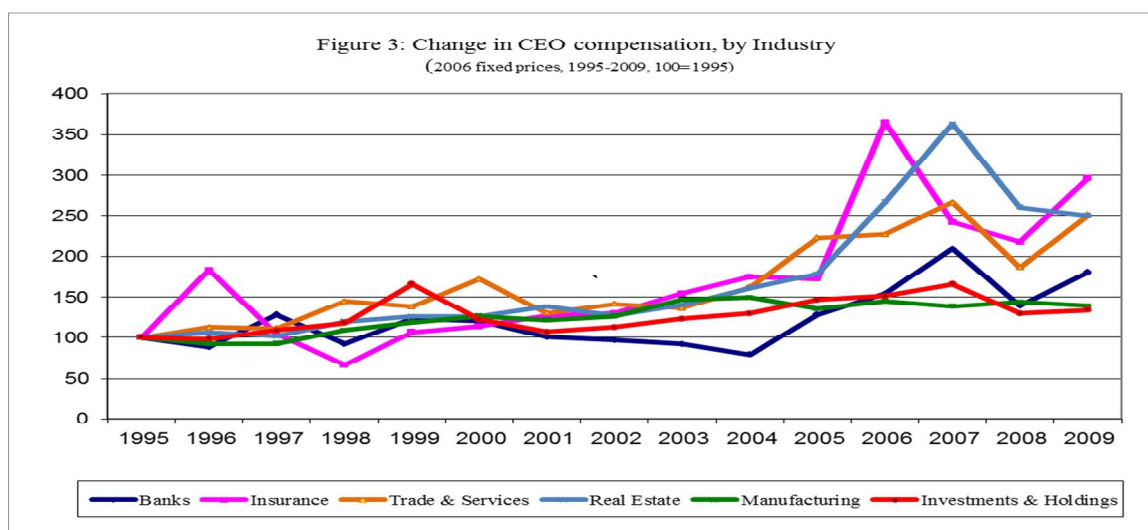
[28] Table 3 in Appendix C details the level of average compensation in the years 1995–2009 by sub-industries.

[29] The controlling owners of the banks and the insurance companies claim that finding candidates for the position of CEO is a difficult if not impossible task. These positions require professional proficiency as well as proven managerial ability in large organizations. In their opinion, the opportunity of finding a personal combination of these talents in the financial system is quite rare, which places candidates in a relatively convenient bargaining position against the owners regarding the terms of their employment.

One of the principal factors of CEO compensation is company size. Figure 4 describes the distribution of CEO compensation in 2009 at large companies—the upper quintile in size (calculated according to the company's total assets)—and at small companies, the lower quintile in size. First, we can see that average CEO compensation at the largest companies is four times higher than that at the smallest companies. Moreover, 37 percent of CEOs at the largest companies earned over NIS 6 million, while none of the CEOs at the smallest companies earned that amount. Taking the sample as a whole, only 9 percent of the CEOs in the 2009 sample earned over NIS 6 million.

Figure 4: Distribution of CEO compensation by size, 2009
(in thousands of shekels, 2009 current prices)

*Large companies are defined as the upper quintile—companies whose balance sheet exceeds NIS 6 billion
**Small companies are defined as the lower quintile—companies whose balance sheet is less than NIS 130 million
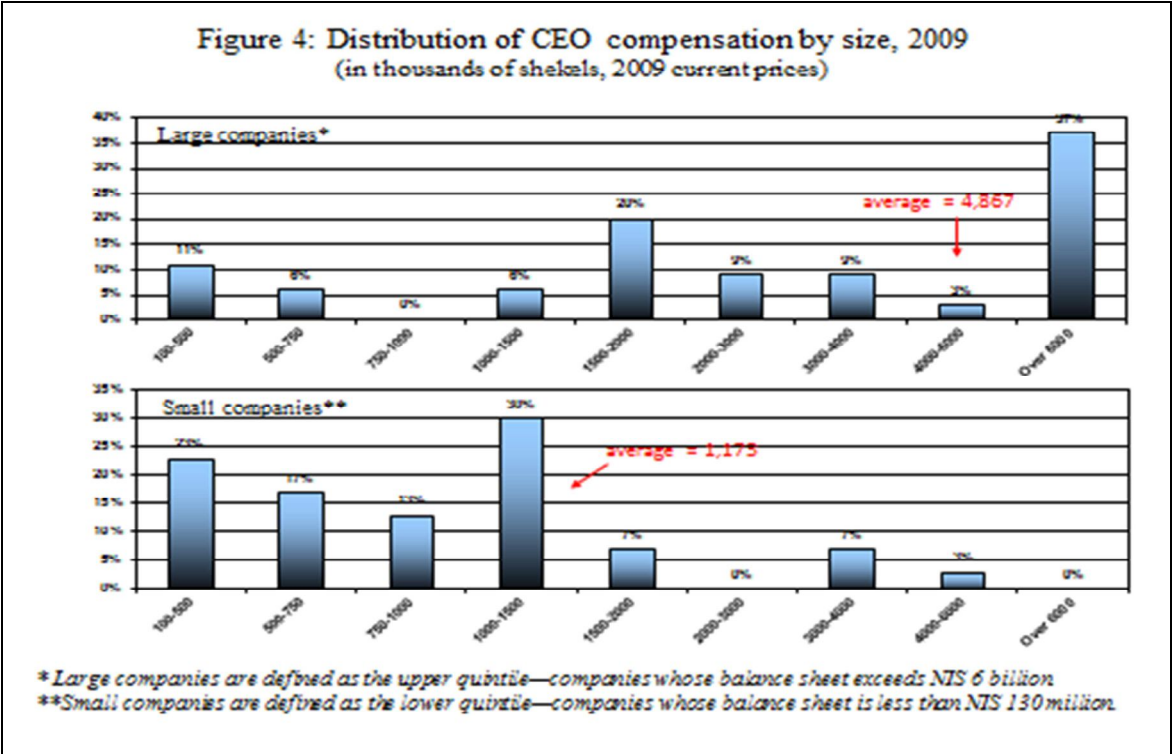
Table 3b compares the level of CEO compensation in the years 1995–2009 between companies included in the Tel Aviv 100 Index and those not included in it. Here too, we can clearly see that the CEOs of large companies are more highly paid. In the present sample 23 percent of the companies (on average) form part of the Tel Aviv 100 Index. Since 1995, CEO compensation at the larger companies has risen by 105 percent while that at smaller companies has increased by 81 percent. In each of the years, the CEO compensation at companies included in the Tel Aviv 100 Index rose by an average of 6.5 percent, while that at companies not included in the index increased by 4.8 percent.

3b. By attribution to Tel Aviv 100 Index		
	Belong to Tel Aviv 100 Index	Do not belong to Tel Aviv 100 Index
1995	2.2	1.0
1996	2.4	1.1
1997	2.2	1.1
1998	2.8	1.1
1999	3.2	1.3
2000	3.3	1.2
2001	2.7	1.2
2002	2.8	1.2
2003	3.0	1.2
2004	3.1	1.4
2005	3.9	1.6
2006	4.6	1.7
2007	5.7	2.1
2008	4.1	1.8
2009	4.5	1.8

In order to compare the trend in CEO compensation at publicly traded companies with the wage trend in the economy, Table 4 compares CEO compensation at those companies with the salaries of CEOs in the public service[30], and with the wage per employee post in the economy from 1995 to 2009.[31] We can see that the pay disparity between CEOs at publicly traded companies and public service CEOs expanded over time and in 2009 amounted to seven times more. The pay disparity between public company CEOs and the average wage per employee post also increased, from 18 times in 1995 to 29 times in 2009. Another notable figure in the table is that while CEO compensation rose by an annual rate of 5.2 percent over the past decade, the salary of public service CEOs went up by only 0.4 percent a year and the wage per employee post in the economy actually fell by 0.3 percent.

Table 4: CEO Compensation and Average Salary in the Economy				
In thousands of shekels, 2006 fixed prices				
	1995-2000	2001-2009	2009	Average annual change in the last decade
(1) CEOs of publicly traded companies on Tel-Aviv Stock Exchange	1,454	2,150	2,508	5.2%
(2) CEOs in the public service	346	389	384	0.4%
(1) / (2) ratio	4	6	7	
Salary for a salaried position	82	88	87	-0.3%
(1) / (3) ratio	18	24	29	

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[30] DEFINITION: Senior officials in the political system and its related systems: Knesset members, ministers, deputy ministers, the President, the Prime Minister, the Speaker of the Knesset, and the directors-general of government ministries and parallel bodies. SOURCE: Ministry of Finance and Bank of Israel calculations.
[31] Central Bureau of Statistics data.

The CEO's personal data

Table 5 summarizes personal CEO data in the years 1995–2009.[32] We can see that the average age of CEOs is 53 years while their average seniority at the company is 14 years. CEOs serve in their position for an average of 8 years. We can also see that the maximum number of years served by a CEO is 46, meaning ever since the company was established.[33] It should be noted that seniority at the company includes the years in which the CEO served as a director. Most of the companies do not give an accurate description of the CEO's past before he took up office, but do mention the places where serves as a director. The length of the CEO's service at the company is not always mentioned. From the companies that did report on when the CEO began to work as an employee and when he actually began to serve as CEO, it is possible to conclude that on average the person in question served at the company for only 8 years before becoming CEO. In addition, an average of 10 percent of all CEOs was replaced every year. The median age at which the CEO resigns from his position (either to outside of the company or to the position of company chairman) is 53. The year in which the largest percentage of CEOs were replaced was 2008 (16.1 percent). CEOs' average holding of the company's equity amounts to 15.9 percent.[34] However, the median holding amounts to only 1.8 percent, with the result that 45 percent of CEOs are parties at interest (holding at least 5 percent of equity).

Table 5: CEO personal data, multi-year average (1995-2009)						
Variable	Observations	Average	Median	Standard Deviation	Minimum	Maximum
Age	2416	53	52	9.0	29	81
Tenure (in years)	1771	14	13	9.1	0	56
Tenure as CEO (in years)	1791	8	5	8.3	0	46
CEO's holdings (percent)	2432	15.9	1.8	22.2	0	90
Percentage of CEOs who are family members of par	2425	45	45	6	35	55
Percentage of CEOs who were replaced during the y	2431	10.0	11.0	3.2	5.1	16.1

Figure 5 describes the CEO's affiliation to the Board of Directors as a member. We can see that in 1995 only 12 percent were not members of the board and over time, their proportion soared to 40 percent. From 1995 the percentage of CEOs serving as directors and those also serving as board chairman declined. In 2009, 38 percent were directors as well and 20 percent served as board chairman. This means that those CEOs are part of the body supervising them, which supposedly serves the interests of all the shareholders. It should be noted that in Israel there is no prohibition on the CEO serving as head of the company's Board of Directors. (The banks are an exception in this respect).

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[32] Table 5a in the appendices summarizes the principal data of the companies in the sample.
[33]The CEO's age in this case was 74 years.
[34] Holding without full dilution.

Figure 5: CEO Membership on the Board of Directors (1995-2009)
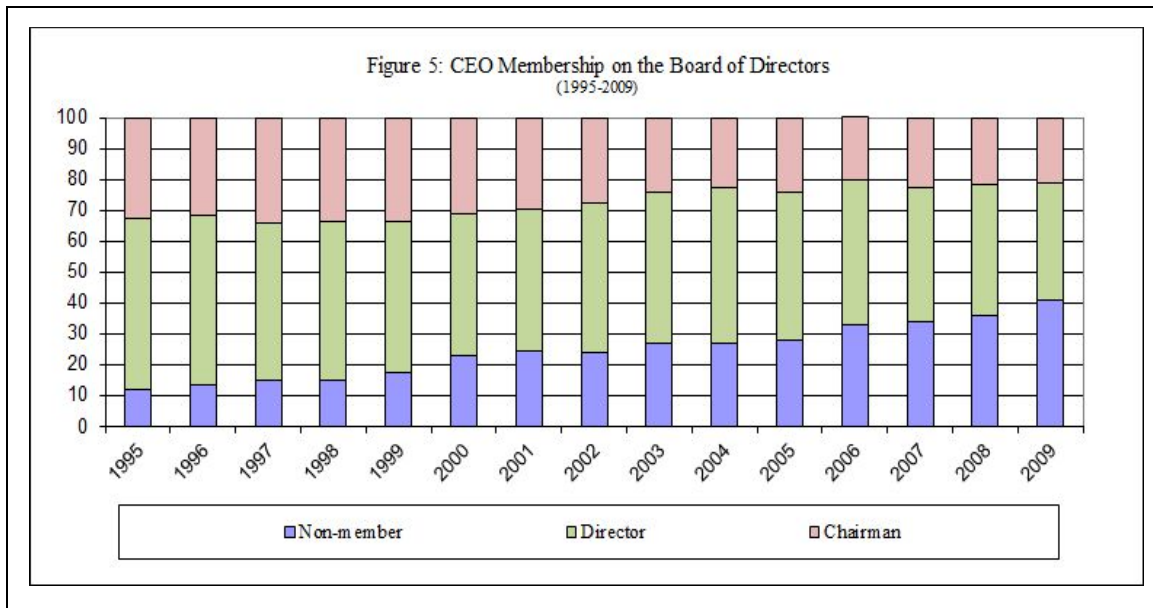
Figure 6 presents the distribution of CEOs by education. We can see that over the years, the percentage of CEOs holding a matriculation certificate alone has decreased while the percentage of those with a Master's degree and above has increased. In 1995, 30 percent of CEOs held a matriculation certificate alone. By 2009, this proportion had fallen to only 16 percent. However, the proportion of those with at least a Master's degree soared by over 100 percent, from 17 percent to 39 percent. This upsurge derived from both from a decrease in those with a high-school education only and from a decrease in the number of those with a Bachelor's degree only (from 52 percent to 45 percent).

Figure 6: Distribution of CEOs by Level of Education (1995-2009)
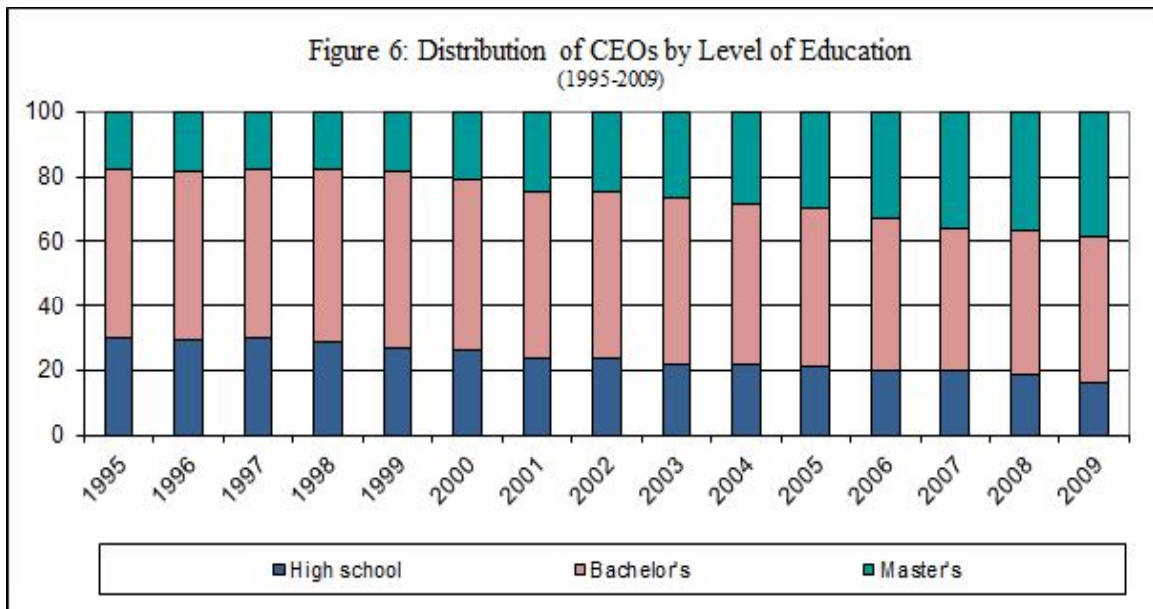
5. Estimation and results

a. <u>The relationship to the firm's performance</u>

According to the literature on the compilation of the optimal contract with the manager at a company,[35] the CEO takes action α in order to produce shareholders value, $x(\alpha)$, and receives compensation $w(x,z)$, and benefit, $u(w,a)$, where z is the vector of other measurable variables visible in the contract. The optimal contract $w(x,z)$ is supposed to maximize the shareholders' profit expectancy,[36] $E(x-w)$, which is subject to the exigency whereby the CEO will choose actions that will maximize his benefit, $u(w,a)$, and to the participation exigency (whereby the benefit of the contract for the CEO is supposed to exceed the benefit which he will obtain by not observing the contract).

Given the agent theory, the estimation equation in most of the empirical literature takes the following form:

$$y_{i,t} = \alpha_i + \alpha_t + \alpha_x * x_{i,t} + \beta * perf_{i,t} + \varepsilon_{i,t}$$

where $y_{i,t}$ is CEO compensation at firm i at time t, a_i is firm-fixed effects, a_t is time-fixed effects, $x_{i,t}$ are specific variables for the company and/or the CEO, such as the CEO's seniority or size of the company, and $perf_{i,t}$ is the index of the company's performance—where the coefficient β represents the strength of the relationship between CEO compensation and the firm's performance. The firm's performance can be measured via the company's net profit (accounting performance) and via the company's share return (stock exchange performance). In this study, we will use both.

In the CEO compensation model, the explanatory variables—the firm's performance for example—are likely to be endogenous. For example, the company is likely to pay more to a better CEO, which will most probably lead to better performance. Otherwise, there would be no reason to pay him more. Moreover, the compensation package can help to increase managers' motivation to achieve better performance. An initial examination was intended to verify whether the share return is higher at companies where the relationship between CEO compensation and the firm's performance is stronger. We found that the answer to this question was negative: At companies where the correlation between compensation and performance is stronger, performance is not necessarily better. A second examination which we conducted was aimed at answering the question of whether CEO compensation affect's the firm's future performance, that is, whether the performance of the company which the CEO manages will improve the more he is paid. The answer to this question was also negative. (The results of the examination can be found in Appendix D.) However, these results cannot be construed as totally ruling out the existence of endogeneity in the equation.

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[35] See for example Mirrlees (1974, 1976), Holmstrom (1979), Grossman and Hart (1983).
[36] On the assumption that they are indifferent to risk.

The first equation which we will estimate will examine whether the size and performance of the firm affect the level of compensation. Most studies[37] measure a firm's performance in ratios and not in absolute data (such as net profit or the firm's value. Accounting performance is measured via ROE and share performance via the share return. The equation which we will estimate is therefore:

$$Log(tot\_com_{i,t}) = \alpha_0 + \alpha_1 Log(tot\_assets_{i,t}) + \alpha_2 \cdot ROE_{i,t} + \alpha_3 \cdot ROE_{i,t-1} + \alpha_4 \cdot \operatorname{Re}turn_{i,t}$$
$$+ \alpha_4 \cdot \operatorname{Re}turn_{i,t-1} + TURNOVER + Yeardum + Inddum + f_i + \varepsilon_{i,t}$$

where the dependent variable is $Log(tot\_comp_{i,t})$ - compensation log

and the explanatory variables are $Log(tot\_assets_{i,t})$ - log of the firm's total assets at company i in year t

ROE_i – return on equity at company i in year t and in year t-1

$\operatorname{Re}turn_i$ – the share return of the firm at company i in year t and in year t-1

$TURNOVER$ – dummy variable, of 1 if the CEO is replaced and 0 if not.

$Yeardum$ – dummy variable for the years, $Inddum$ – dummy variables for the industry, f_i - firm fixed effects

As can be seen, in this equation we used both accounting performance indices and share performance indices (the company's market value). It is actually preferable to connect executive compensation to the interests of the shareholders as these are reflected in the value of the company's equity, which implies the firm's future profits. Nevertheless, connecting executive compensation to accounting profit also appears to be advantageous. Accounting profit is less subject to fluctuations that are not connected to the company's management or performance (Lambert, 1993). Apart from the firm's performance, a variable representing the company's size—the total balance sheet—was added to this regression. According to Gabaix and Landier (2007), the best proxy for company size is the total balance sheet (debt + shareholders' equity).[38] The average balance sheet is 20 times the median, which is indicative of a broad distribution of companies: Large firms bias the average upward even though they are small in number. The regression was run together with dummy variables for years and industries and with fixed effects for companies. FEs are used in order to neutralize unobserved effects caused by specific characteristics of the firm over time. The data presented are at 2006 prices. Standard deviations are corrected in respect of heteroscedasticity (by clustering).

The estimation results are presented in Table 6. Entered into Equation (1) were variables of company size, ROE and return per share, company size coefficient, and positive and significant performance coefficients, with the highest among them being

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[37] See for example Zhou (2000).
[38] Bebchuk and Grinstein (2005), however, used sales volume as a proxy for company size.

company size—0.25. Zhou (2000) claims that the elasticity of salary to the size of the firm is more or less fixed around a level of 0.25 (between 0.2 and 0.35) in such countries as the US, Japan, the UK and Canada. According to the present estimation, the elasticity ranges between 0.2 and 0.3 in Israel as well (the coefficient of log total assets). As an example, when the company's total assets increase by one standard deviation (NIS 17.4 billion), compensation will increase by NIS 65 thousand. The level of initial annual salary, irrespective of the company's size and performance, is NIS 53 thousand (exp [4.4]). The value of the company's size coefficient can be interpreted in the following manner: The larger the company, the more the ratio between CEO compensation and company size will decrease, at substantial rates: A one percent increase in company size will lead to a 75 percent decrease in that ratio. As expected, the coefficient of the dummy variable that was entered, which is indicative of CEO turnover, is significant and negative. A new CEO begins at a lower salary than a manager with at least a year's seniority. Under Equation (1), the percentage of the explained variability of log CEO compensation dependent by company size and performance is 20 percent.

The conclusion can also be drawn from the estimation that a positive correlation exists between the firm's performance and CEO compensation—with accounting performance, the correlation is to performance in the present year only while with equity performance, the correlation is also to the shares' performance in the previous year and is closer.[39] For example, a 100 percent increase in the price of the company's share leads to a 5 percent increase in CEO compensation in that year. Given no change in annual return in year t, a 100 percent increase in the price of the share in the previous year leads to an 8 percent increase in CEO compensation in the present year. If as an example the average increase in the share price in a year is 24 percent, the average salary will increase by 1.2 percent in that year.

Division into sub-periods: We divided Equation (1) into sub-periods: 1995–1999, 2000–2003 (the years identified as recession years), and 2004–2009. The results appear in the three right columns in Table 6. First, we can see that even though the number of observations increased between the periods, the percentage of the explained variability of CEO compensation dependent by the company's performance and size decreased over the years from 24 percent in the years 1995–1999 to only 16 percent in the years 2004–2009. Another notable figure is the cross-section—the level of salary that is not dependent on the company's size and performance—which increased considerably from 3.4 to 4.5 and eventually to 8.5, meaning from NIS 29 thousand a year to NIS 4.8 million a year. We can also see that the coefficient of company size decreased over time, that the ROE coefficient is insignificant in each of the periods, and that the share return coefficients are significant only in the first two periods and reach a higher level in the recession years 2000–2003. Over time therefore, CEO compensation became decreasingly dependent on company performance and size. As a result, in the years 2004–2009 no relationship existed between these variables and CEO compensation.

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[39] Hall and Liebman (1998): Since it was found empirically that CEO compensation is affected by the company's performance in the previous year as well, it is usual to use both performance in the year when the salary was paid and performance in the previous year as explanatory variables in the CEO compensation regression.

Entered into Equation (2) instead of the company's equity performance were relative share indices, meaning the return on the company's share minus the return of the industry to which the company belongs. We can see that the coefficients remained positive and significant at almost the same rate as in the first equation. One way to solve the endogeneity in the equation is to claim that it was not simultaneous performance that affected CEO compensation, but performance with a lag. In Equation (3) therefore, we left performance with a lag only. It can be argued that stock exchange performance coefficients with a lag of a year and of two years are significant and positive, that the coefficients of the other variables hardly changed at all, and that the percentage variability dependent actually fell slightly, from 20 percent to 19 percent.

Entered into Equation (4) was the variable of the CEO's tenure, as is and squared, in order to examine the marginal effect. We can see that the coefficient of the variable was found to be positive and significant, while the coefficient of the squared variable was found to be negative and significant. This means that the CEO's tenure positively affects his compensation, but its contribution to his compensation decreases over time. The CEO's other personal characteristics were not found to affect the level of CEO compensation beyond the size and performance of the firm.

The question arises as to whether the firm's size affects the sensitivity of CEO compensation to the company's performance. In order to examine this question, we added a dummy variable—*large*—which obtains a value of 1 for companies whose total assets exceed the median of the total assets of the companies in the sample and 0 for companies whose total assets are less than the median, as well as interaction variables between the *large* variable and each of the explanatory variables.[40] Equation (5) presents the results. We can see that all the explanatory variables remain significant, and the dummy variable for size and the interaction variables which we added are not significant, while the coefficients of the interaction variables are negative. Had they been significant, we could have said that the sensitivity of CEO compensation to the firm's performance and size are lower at larger companies. It should be noted that these results do not change even when the companies are divided into small, medium and large. It is possible to conclude from this finding that no empirical evidence exists for the hypothesis that the sensitivity of CEO compensation to the firm's performance and size changes with the size.[41]

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[40] See Zhou (2000).

[41] We added the *large* dummy variable in order to compare between small and large companies as Zhou (2000) did, and also in order to examine whether a significant different cross section exists between the two groups. In order to examine whether the sensitivity of CEO compensation to the company's performance changes generally with the company's size, it is obviously possible to simply create interaction variables of log total assets with the share return, and with ROE. In this exercise, we found that the coefficients of the interaction variables again did not prove to be significant.

Table 6: Explanation of CEO compensation by the company's performance and size							
Dependent variable: ln(total CEO compensation)							
	(1)	(2)	(3)	(4)	(5)	(1) - 1995-1999	(1) - 2000-2003	(1) - 2004-2009
ln (total assets)	0.249***	0.246***	0.229***	0.283***	0.280***	0.297***	0.175**	0.124**
	0.050	0.051	0.051	0.064	0.055	0.101	0.077	0.063
Return on equity	0.016*	0.019**	...	0.023***	0.018*	-0.128	-0.004	0.014
	0.009	0.008		0.007	0.010	0.241	0.023	0.009
Return on equity in t-1	...	...	0.001	...	...	...	...	...
			0.005					
Return on equity in t-2	...	...	0.009**	...	...	...	...	...
			0.003					
Return to common stock	0.048***	...	...	0.071***	0.065***	0.051**	0.076**	0.006
	0.014			0.020	0.022	0.023	0.038	0.019
Return to common stock in t-1	0.079***	...	0.072***	0.083***	0.070***	0.086*	0.051**	0.042
	0.017		0.017	0.016	0.025	0.048	0.022	0.032
Return to common stock in t-2	...	...	0.037**	...	...	...	...	...
			0.016					
Current net of industry return	...	0.052***	...	...	...	...	...	...
		0.016						
Current net of industry return in t-1	...	0.075***	...	...	...	...	...	...
		0.020						
Turnover	-0.220***	-0.219***	-0.224***	...	-0.222***	-0.017	-0.178**	-0.272***
	0.042	0.042	0.042		0.042	0.130	0.076	0.064
Tenure	...	...	...	0.026**	...	...	...	...
				0.011				
Tenure^2	...	...	...	-0.001**	...	...	...	...
				0.000				
Large	...	...	...	...	-0.131	...	...	...
					0.086			
Large_ln (total assets)	...	...	...	...	-0.002	...	...	...
					0.007			
Large_ROE	...	...	...	...	-0.005	...	...	...
					0.027			
Large_Return to common stock	...	...	...	...	-0.026	...	...	...
					0.027			
Large_Return to common stock in t-	...	...	...	...	0.017	...	...	...
					0.034			
Cons.	3.972***	4.433***	4.838***	4.098***	4.069***	3.376***	4.542***	8.477***
	0.658	0.727	0.826	1.014	0.764	0.716	0.959	1.009
Number of obs.	1,945	1,777	1,773	1,454	1,945	487	590	868
R^2	0.201	0.189	0.190	0.240	0.204	0.240	0.161	0.158

The data are in 2006 prices. The regressions were run with dummy variables for years and sectors, and with fixed effects for companies
The standard deviations are amended in respect of heteroscedasticity and appear under coefficients. *10% significance, **5% significance, ***1% significance.

Long-term performance: The main objective of CEO compensation is to motivate the CEO to manage the company effectively in order to maximize the value of the company in the long term. The currently prevailing claim is that CEOs are compensated for the short term only, which makes them take excessive risks in order to increase the price of the share. In the following estimation, we attempted to examine whether long-term performance (a term defined in the literature as 5 years and more) actually does affect CEO compensation. We measured the company's long-term performance by means of lags in the return of the company's share in years when the CEO was not replaced throughout the same period. The results of the estimation are presented in Table 7.

We can see that CEO compensation is sensitive to the company's share return in year t and with a lag of up to 2 years (at a significance of at least 5 percent), and that the percentage of the explained variability in this equation is the highest among the equations presented in Table 7. In the left column, when we entered into the equation the share return with a lag of 3 years as well, the only coefficient that remained significant was the share return with one lag. The other share return coefficients were significant at a level of only 10 percent. In the fourth and fifth equations, the coefficients of the share return with a lag of one year and the share return with a lag of 4 years are the only ones significant by 1 percent, while the others are significant at level of only 10 percent. Beyond the fifth year, none of the share performance coefficients are significant anymore. These findings show that short-to-medium-term performance (up to 2 years) can explain CEO compensation and that the performance of the share in the previous year explains it better than the performance in the present year.

Table 7: Explanation of CEO compensation by the firm's long-term performance					
Dependent variable: ln (total CEO compensation)					
	(1)	(2)	(3)	(4)	(5)
ln (total assets)	0.255***	0.251***	0.247***	0.205***	0.154***
	0.051	0.058	0.062	0.064	0.057
Return on equity	0.015	0.021***	0.018**	0.019***	0.014***
	0.010	0.006	0.009	0.006	0.005
Return to common stock	0.047***	0.037**	0.029*	0.040*	0.035
	0.015	0.015	0.016	0.020	0.023
Return to common stock in t-1	0.079***	0.073***	0.059***	0.062***	0.059***
	0.018	0.019	0.018	0.020	0.020
Return to common stock in t-2	...	0.045**	0.039*	0.044*	0.038
		0.019	0.020	0.026	0.024
Return to common stock in t-3	...	...	0.026*	0.035*	0.028
			0.015	0.018	0.020
Return to common stock in t-4	...	...	...	0.052***	0.040**
				0.020	0.016
Return to common stock in t-5	...	...	...	...	0.021
					0.016
Cons.	4.381***	3.814***	5.066***	4.815***	4.686***
	0.731	0.726	1.027	0.773	0.603
Number of obs.	1,779	1,474	1,228	1,022	836
R^2	0.208	0.238	0.209	0.152	0.118

The data are in 2006 prices. The regressions were run with dummy variables for years and sectors, and with fixed effects for companies
The standard deviations are amended in respect of heteroscedasticity and appear under coefficients. *10% significance, **5% significance, ***1% significance.

Differences equation: So far, the factors affecting compensation itself have been examined. We will now examine the factors affecting the change in CEO compensation.

In 1999 Murphy claimed that the sensitivity of salary to performance can be examined on the basis of the dollar change in CEO compensation and on the basis of the percentage change in CEO compensation. We will begin by examining the sensitivity of CEO compensation in percentages. While we will use the equation appearing in Table 6, this time we will use changes and not log of the levels: The dependent variable is the change in log salary from year $t-1$ to year t (We left only companies and years when the CEO was not replaced in year t), and the explanatory variables are the change in share performance, the change in accounting performance and the change in the log of the company's total assets. The estimation results are presented in Table 8.

The results of this estimation are not substantially different from the results of the estimation in Table 6. A correlation was found between the change in the company's performance and size, and the change in CEO compensation. The changes in the company's stock exchange performance in year t and in year $t-1$, as well as the change in accounting performance in year t positively affect the change in CEO compensation, while accounting performance in year $t-1$ was not found to affect the change in it. The coefficients of the changes in the performance of the company's share are greater than the coefficients of the changes in its accounting performance, with an increase of 10 percent in the change in share return leading to a 0.5 percent increase in the change in salary, while an increase of 10 percent in the change in ROE leads to an only 0.2 percent increase in the change in salary. We can also see that the percentage of the explained variability fell by 20 percent in the levels equation to 6 percent in the differences equation. Moreover, no permanent change in CEO compensation during the years was found, which was not related to changes in the company's performance and size (insignificant cross-section).

Table 8: Explanation of the change in CEO compensation by changes in the company's performance and the size of the company			
Dependent variable: d(ln(total CEO compensation))			
	(1)	(2)	(3)
d(ln (total assets))	0.118***	0.063	0.101***
	0.044	0.075	0.041
d(Return to common stock)	...	0.049***	0.048***
		0.011	0.012
d(Return to common stock in t-1)	...	0.051***	0.049***
		0.014	0.014
d(Return on equity)	0.016***	...	0.015***
	0.005		0.005
d(Return on equity in t-1)	-0.001	...	-0.002
	0.004		0.004
Cons.	-0.067	0.001	0.085
	0.108	0.170	0.100
Number of obs.	1,635	1,603	1,600
R^2	0.047	0.051	0.062

The data are in 2006 prices. The regressions were run with dummy variables for years and sectors, and with fixed effects for companies
The standard deviations are amended in respect of heteroscedasticity and appear under coefficients. *10% significance, **5% significance, ***1% significance.

Jensen and Murphy (1990) claimed that the change in CEO compensation (from year $t-1$ to year t), which constitutes a major part of his benefit, should be a function of shareholder wealth (profitability):

$$\Delta(CEO\_compensation)_t = a + b \cdot \Delta(shareholder\_wealth)_t + \varepsilon_t$$

where $\Delta(CEO\_compensation)_t$ is the change (in thousands of shekels) in CEO compensation,

$\Delta(shareholder\_wealth) = V_{t-1} * r_t$ is equal to the change in shareholder wealth and is calculated as the company's value in the previous year multiplied by that year's share return.

Table 9 presents the results of this equation. The data are in thousands of shekels at 2006 prices. The dependent variable is the change in CEO compensation (when again, only observations in which the CEO was not replaced in year t were left), while the explanatory variables are the change in shareholder wealth in year t, the change in shareholder wealth in year t-1 and the change in the company's total assets.[42]

In the first equation, the firm's performance is represented by the share's performance, while in the second equation it is represented by accounting performance. The difference between the two indices is that the change in shareholder wealth is more indicative of the current year's achievements, while the change in accounting performance is indicative of the firm's year-on-year performance, meaning that it shows whether the CEO is compensated for better performance in comparison with the previous year. As can be seen, and as expected, the coefficient of the change in shareholder wealth in year t is positive and significant, while the coefficient for year t-1 is not significant. On the basis of the coefficients in Equation (1), the CEO receives an average increment of 20 agorot for every NIS 1,000 increment to shareholder wealth.[43] Moreover, the managers in the median of the sample hold 1.8 percent of the company's equity (not including options). Accordingly, the value of the managers' holdings increases (in the median) by NIS 10.8 for every NIS 1,000 increase in the company's value. The overall assessment of compensation sensitivity to performance (with respect to salary and equity holdings) therefore amounts to NIS 11.[44] In the median, shareholder wealth increases by NIS 4.0 million each year, with the result that CEO compensation will increase by an average of NIS 800 thousand. We can also see that the change in the company's assets also affects the change in CEO compensation, although to a lesser extent.

Under Equation (2), the coefficient of the change in net profit is positive and significant at a level of 1 percent, and is greater than the coefficient of the change in shareholder wealth: Every NIS 1,000 increase in the company's net profit in year t will lead to a 99 agorot increase in CEO compensation beyond the effect of shareholder wealth (via the share performance indices). The change in net profit in the previous year also has a greater

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[42] Throughout the entire study, when t is written, the reference is to the value at the end of year t and not at the beginning of the year (and the same regarding t-1).

[43] Precisely by means of this calculation, Murphy and Jensen (1990) found that an increment of $1,000 to shareholder wealth lead to a 1.35-cent increment in CEO compensation. .

[44] With this overall assessment, Murphy and Jensen (1990) found that an increase of $1,000 in shareholder wealth leads to an increment of $3.25 in CEO compensation.

effect on CEO compensation than that of shareholder wealth. The average change in net profit is NIS 2.8 million, with the result that CEO compensation will rise by an average of NIS 2,700 under the impact of this increase. One possible reason for the low sensitivity of payment to performance is that since the Board of Directors has quite good information on the manager's activity, the importance which they attribute to output in defining the contract is less than that which they attribute to managerial inputs.

The currently prevailing claim is that it is much easier to demand and receive a pay raise in good times than to accede to pay cuts in times of pressure. If so, the question arises as to whether symmetry exists between the effect of an increase in profitability on a change in CEO compensation, and the effect of a decrease in profitability. Columns 3–5 in Table 9 present an answer to this question.

As can be seen, we conducted two tests. In the first test, we used dummy variable D-$value$, which obtains a value of 1 when shareholder wealth is positive and 0 when it is negative or equal to 0. In the second test, we divided the original equation into two equations: an equation that refers to the years when shareholder wealth increased, and an equation that refers to the years when shareholder wealth decreased or remained unchanged.

We will begin with an analysis of both equations. The estimation results are rather surprising: In years of profitability, no effect of company performance on the change in CEO compensation was found, either in year t or in year t-1, but a fixed change of NIS 866 thousand in a positive year was found. In negative years however, the sensitivity of pay to the firm's performance, both in the current year and with a lag, was found to be significant, and the fixed change in pay was even higher, at minus NIS 1,650 thousand. This means that CEO compensation falls when the share return is negative. In addition, we can see that although the number of observations for positive years is larger than for negative years, the percentage of the explained variability in negative years was higher (13 percent) than in positive years (1 percent).

When a dummy variable is used (Equation 3), we can see that the sensitivity of the change in CEO compensation to the firm's performance in year t differs considerably between positive and negative years. This could be indicative of the fact that the coefficient of the interaction variable between the dummy variable and the change in shareholder wealth in year t did not prove to be significant. Accordingly, a positive or negative change of NIS 1,000 in shareholder wealth in year t (when no change occurred in year t-1) leads to an increase or decrease of 17 agorot in CEO compensation. However, the effect of the previous year's performance on incremental CEO compensation differs between a positive and a negative year. In a negative year, the coefficient of the effect = 0.0004, that is, positive, while in positive years the sensitivity of pay to the previous year's performance is equal to the sum of the coefficients 0.0004 and -0.00048, meaning negative but not zero sensitivity. We can also see that the effect of performance in the previous year (as we saw in Equation 3) on the change in CEO compensation is greater than the effect of the current year's performance.

		(1)	(2)	(3)	(4)	(5)
Table 9: Explanation of the change in CEO compensation by the change in performance and size of the company (in shekels)						
Dependent variable: delta (total CEO compensation)						
		(1)	(2)	(3) The entire period	(4) Increase in profitability	(5) Decline in profitablity
delta (shareholder wealth)		0.0002***	...	0.00017***	0.00002	0.00012**
		0.000		0.000	0.000	0.000
delta (shareholder wealth) in t-1		0.00006	...	0.00040***	-0.00007	0.00034***
		0.000		0.000	0.000	0.000
d_value*delta (shareholder wealth)				-0.0001		
				0.000		
d_value*delta (shareholder wealth) in t-1				-0.00048***		
				0.0001		
d_value				210.97**		
				85.72		
delta (net profit)		...	0.00099***	...		
			0.000			
delta (net profit) in t-1		...	0.00040**	...		
			0.00016			
delta (total assets) in t		0.00003**	0.00002**	0.00003**	0.00002	0.00014***
		0.000	0.000	0.000	0.000	0.000
Cons.		449.9	4.5	95.5	865.8**	-1651.6***
		295.1	431.9	299.3	446.8	586.2
Number of obs.		1,600	1,638	1,760	1,016	744
R^2		0.0478	0.0533	0.0436	0.0149	0.1278

The data are in 2006 prices. The regressions were run with dummy variables for years and sectors.
The standard deviations appear under coefficients. *10% significance, **5% significance, ***1% significance.

The following table summarizes the overall effect of shareholder wealth in year t and in year $t-1$ on the change in salary in good years and in bad years. The results show that in bad years the CEO will be "penalized" for the negative performance of the same year, but if the year previous to the negative year was a positive year (60 percent of cases) he will be compensated for the positive performance of the previous year. Overall therefore, the direction of the change in his salary is not known. However, when the year preceding the negative year was also negative, CEO compensation will be cut twice—once because of the current year's performance and once because of the previous year's performance. But in positive years, the situation was somewhat different: The CEO will be compensated for the positive performance of the same year but if the year preceding the positive year was also positive (54 percent of cases), the positive performance of the previous year will actually lead to a minor decrease in the CEO's incremental salary relative to the previous year. Yet if the positive year was preceded by a negative year, the CEO will receive an additional pay increment for his success in achieving favorable performance after a negative year. The rule is: The extent of the reaction of salary to a change in the value of the company's share in the previous year when the value of the share fell is stronger than when its value increases. This means that a decrease in CEO compensation in respect to a decline in the value of the company's share is stronger than an increase in response to a rise in the value of the share.

Year t	Year t-1	Percentage of cases	Influence of year t	Influence of year t-1	Total
Positive year	Positive year	54%	+	(negligible) -	(+)+(-)
	Negative year	46%	+	(negligible) +	++
Negative year	Positive year	58%	-	+	(-)+(+)
	Negative year	42%	-	-	--

b. <u>CEO compensation based on Relative Performance Evaluation</u>

The firm's outputs are dependent on two main factors: First, they are exposed to macroeconomic and business factors that are not under the manager's control.[45] Second, they are dependent on the manager's unique inputs. Another question, which many authors ignore, is therefore whether CEO compensation is affected by factors beyond the performance of the specific company which he manages, by the performance of the other companies in the same industry and by factors in the same equities market.

In order to answer this question, we will estimate the following equation for each company:

$$\frac{(tot\_com_{i,t})}{(tot\_com_{i,t-1})} - 1 = \alpha_0 + \alpha_1 \text{Re}turn_{i,t} + \alpha_2 \cdot \text{Re}turn\_Ind_{-i,t} + \alpha_3 \cdot \text{Re}turn\_Market_{-i,t} + f_i + \varepsilon_{i,t}$$

This means that the dependent variable is the change in log salary, while the explanatory variables are the return on the company's share, the industry return (not including the return of the company's specific share) and the return of the equities market in the same year (again, not including the return of the company's specific share).

I calculated the return of the industry and the equities market in the following manner[46]:

$$\rho_{-i,t} = \frac{\sum_{k \neq i} \rho_{k,t} V_{k,t-1}}{\sum_{k \neq i} V_{k,t-1}}$$

V = The market value of each of the companies

k = All the companies belonging to the same industry/equities market in the same year.

The industry/market return is weighted by the market value of the company, and does not include the return on the company's share. In this way, we can examine the performance of companies in the same industry/equities market in addition to the performance of the company itself. The estimation results are presented in Table 10. We can see that the coefficient of the company's share return remains significant and positive at a confidence level of 1 percent, even when the industry return and the equities market return are

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[45] As found in the studies which we mentioned in Section 3.d.
[46] See also Aggrawal and Samwick (1999).

entered. This means that the CEO is compensated for taking actions that increase the company's value without connection to the performance of the market or the specific industry to which the company belongs. However, the coefficient of the industry return was found to be negative. Accordingly, if the company which the CEO manages presents low profits relative to other companies in the same industry, CEO compensation will decrease and vice versa: If the CEO presents higher profits than the other companies in the industry, his salary will be raised. In other words, when the profitability of the firm which he manages increases but the profitability of the other firms in the industry decreases, the CEO's compensation will be greater than in a situation in which the profitability of his firm increases (by the same rate), when the performance of the firms in the industry increases as well.

Zussman and Mehrez (1992) reached the same result, claiming that this is indicative of compensation methods that reduce the effect of shocks that are common to the profitability of all companies in the same industry on CEO compensation. Payment for relative performance is supposed to reduce the risk (not under his control) imposed on the manager's salary, and therefore motivates him to maximum effort. The market return coefficient is positive and larger than the coefficient of the share return and the industry return (0.4).[47] This finding may be indicative of the effect of the economic/stock exchange climate on CEO compensation. In years of prosperity, the CEO will be compensated favorably beyond the firm's performance, while in recession years his pay will decrease. When the share return, industry return and market return in a particular year and in the year previous to it are fixed, CEO compensation will increase by an annual average of 8.3 percent. It is therefore possible to conclude that CEOs are compensated for the relative performance of the market and the industry beyond the absolute performance of the firm itself.

Due to the high correlation between industry return and market return (over 80 percent), multicollinearity can be claimed. Although the coefficients of the variables are significant, in order to avoid a situation of multicollinearity between two variables that are found in the equation, instead of each variable standing alone, we entered the ratio of the variables -

$$\frac{\mathrm{Re}\,turn\_Ind_{-i,t}}{\mathrm{Re}\,turn\_Market_{-i,t}}.$$

In this way, we will attempt to examine the effect of industry return beyond market performance on CEO compensation. The estimation results are presented in the third column. We can see that in this case as well, the sign of the industry return coefficient (exclusive of the effect of the return of the equities market as a whole) is negative and the coefficient of the return of the company's share is positive. This means that the previously mentioned conclusion remains valid.

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[47] Gibbons and Murphy (1990) found that the coefficient of the industry return and the coefficient of the market return are both negative.

Table 10: Increase in compensation derived from the performance of competing companies in the same sector and in the same stock market			
Dependent variable - Rate of change in CEO compensation			
	(1)	(2)	(3)
Return to common stock	0.112***	0.112***	0.126***
	0.036	0.035	0.041
Return to common stock in t-1	0.038	...	...
	0.035		
Return to Industry	-0.224**	-0.289***	...
	0.108	0.112	
Return to Industry in t-1	0.439*	...	...
	0.252		
Return to Market	0.430**	0.403**	...
	0.188	0.183	
Return to Market in t-1	-0.273	...	...
	0.268		
Return to Industry / Return to Market	...	...	-0.031**
			0.013
Rate of change in total assets	0.0001	0.0065	0.0076
	0.029	0.034	0.034
Cons.	0.083***	0.131***	0.177***
	0.029	0.020	0.016
Number of obs.	1,771	1,910	1,910
R^2	0.0192	0.0122	0.0116

The data are in 2006 prices. The regressions were run with fixed effects for companies
The standard deviations are amended in respect of heteroscedasticity and appear under coefficients. *10% significance, **5% significance, ***1% significance.

So far, we have tried to answer the question of how the company's characteristics affect CEO compensation. Leonard (1990) found that at companies in the US, managers' human capital is a major factor in explaining the differences in their compensation. Age, seniority at the firm, seniority in the position and the number of years of education were found to contribute 28 percent of the variability in executive compensation. As we noted in Section 4, 31 of the companies mentioned in the sample have two or more CEOs (in either all or part of the sample years). We built a sub-sample containing only Co-CEOs. Since they serve in the same company, only the personal variables of each of them, such as seniority, age and holdings, can affect the pay disparities between them. The sub-sample contains 27 companies with two Co-CEOs, 4 companies with three Co-CEOs and 1 company with four Co-CEOs over a period of up to 15 years. The average for the 31 companies in the sample is 7 years. The purpose is to discern the factors, not related to the company's performance, affecting the pay disparities between two CEOs serving in the same company in the same year. In this way, we estimated the relationship between the CEO's personal characteristics and compensation at the level of the specific company, and not at the level of all companies.

The equation estimated is:

$$(compensation_{i,t,A} - compensation_{i,t,B}) = \alpha_0 + \alpha_1(X_{t,i,A} - X_{i,t,B})$$

where X is the vector of the variables characterizing each of the CEOs: the CEO's age, seniority at the company, tenure as CEO, education, membership and position on the board, whether he has a relative who is a party at interest, if he himself is a party at interest, and if this is his last year as CEO.

Characterization of the sub-sample:

- ❖ 9 out of the 31 companies (29 percent) are listed in the Tel Aviv 100 Index.
- ❖ Industry distribution of the companies: trade and services—19 percent, real estate—13 percent, manufacturing—39 percent, investments and holding—29 percent. It is therefore apparent that insurance companies and banks are not notable for Co-CEOs.
- ❖ The average pay disparity between two Co-CEOs is NIS 525,299, and the median pay disparity is equivalent to NIS 26,243. (The multi-year average pay of the Co-CEOs in the sub-sample is NIS 1.6 million).

Table 11 presents the equation that was estimated. The equation was estimated together with dummy variables for the years. In each equation we estimated part of the explanatory variable coefficients in a manner whereby we left the significant coefficients. First, we would like to note that since only a small number of observations are involved, the results should be viewed circumspectly. We would also like to point out that no such attempt at comparing Co-CEOs at the level of the specific company has yet been made in Israel or, to the best of my knowledge, worldwide either.

The results of the estimation are as follows:

(1) No fixed pay disparity was found between Co-CEOs beyond the effect of the CEOs' personal characteristics.

(2) As is apparent, given the CEO's personal characteristics, the most significant variable is the CEO's percentage of holdings in the corporation's equity. A Co-CEO whose holdings are higher earns more than the CEO serving with him in the same year. Each one percent increase in the difference between the CEOs' holdings contributes to growth of NIS 50 thousand in their pay disparity. For Equation (1), 24 percent of the (dependent) difference in the CEOs' pay can be attributed to the percentage difference in their holdings (that is, 17 percent of the pay disparities). The average difference between two Co-CEOs' rates of holding is 8.5 percent, and the standard deviation is high at 19.6 percent.

(3) In Equation (4), instead of the difference in the CEOs' holdings we entered the difference in the dummy variable which obtains the value of 1 if the CEO is a party at interest (holding at least 5 percent of the corporation's equity) and 0 if not. We can see that this variable is also significant at a level of 1 percent, and that its coefficient is high: The pay of a CEO who is a party at interest is NIS 2 million more than that of a CEO who is not a party at interest. It should be noted that when we entered the CEO's holdings variable in the performance equation (in the equation whose results

are presented in Table 6 for example), it was not found to be significant at all in any variation.

(4)   Another variable that was found to be significant only when the percentage difference in the CEO's holdings remained fixed is the difference in the dummy variable: This obtains the value of 1 if the CEO is a relative of a party at interest and 0 if he is not. Given the percentage difference in the CEO's holdings, the pay of a CEO who is a relative of a party at interest is lower than that of a CEO who is not.

(5)   When the difference in the CEO's percentage holding is omitted, the results change slightly: (a) The "CEO's seniority in his position" variable is positive and significant at a significance level of 5 percent. A difference of one year in the seniority of Co-CEOs contributes to pay disparity of NIS 67 thousand. This change in the results appears to occur because a CEO with more lengthy seniority will also have a higher percentage of holdings in the corporation's equity. (b) "Degree" gap: The dummy variable obtains a value of 1 if the CEO has a bachelor's/master's degree and 0 if not. We can see the pay of a CEO with a degree will be approximately a million shekels less than that of a CEO with only a high school education. In this case, the change in results derives from the fact that most CEOs with a higher percentage of holdings do not have a university education. (c) Another variable that became significant is membership in the Board of Directors (Director or Chairman of the Board). The pay of CEOs who are not board members is approximately NIS 1.7 million less than that of CEOs serving on the Board of Directors (even when two variables are entered— one for a member of the Board of Directors and one for board Chairman—both of them significant and positive). The reason for the significance of the variable that was obtained when the difference in the CEO's percentage of holdings was omitted is the high correlation (60 percent) between the CEO's percentage of holdings and membership in the Board of Directors).

(6)   The coefficient of the "age" variable is not significant even when the "seniority" variable is omitted. The average difference between the ages of Co-CEOs is 4 years, and the median is only 2 years. It should be noted that in the equations explaining pay by means of the firm's performance, the seniority/age coefficient was found to be positive and shrinking.

(7)   The coefficient of the "last year" variable is not significant either. This appears to be because in 88 percent of the companies in this sub-sample, the Co-CEOs do not serve in their last year or this is the last year for both of them.

Table 11: compensation gaps between co-CEOs
Dependent variable: The compensation differential in thousands of shekels

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d(age)	21.3	21.1	19.8	1.1	-23.1	...	-10.7
	21.0	20.9	21.2	22.2	23.9		12.3
d(tenure_ceo)	16.4	-1.4	16.0	42.2	67.2**	30.9	...
	30.1	32.9	30.2	32.1	35.0	26.5	
d(degree)	-134.3	...	-190.0	-712.4***	-1065.9***	-201.6	-190.8
	273.1		289.8	270.9	289.1	265.0	166.0
d(ba)	...	-380.0	...	...	...	...	...
		329.6					
d(ma)	...	114.8	...	...	...	...	...
		331.1					
d(mem_dir)	467.7	490.6	...	956.4**	1722.8***	524.5*	954.0***
	301.9	301.4		308.8	297.2	296.7	236.3
d(dir)	...	...	481.3	...	...		
			303.7				
d(ch_dir)	...	...	626.9	...	...	...	...
			405.8				
d(ceo_family)	-529.2**	-510.5*	-530.5**	-280.2	-300.4	-535.7**	-347.2**
	270.1	269.6	271.0	292.1	322.6	270.1	219.6
d(ceo_party_in_interest)	...	...	...	2001.8***	...	...	...
				395.5			
d(hodings)	54.3***	52.2***	51.3***	...	...	52.1***	41.6***
	7.4	7.6	9.1			7.1	5.1
d(ceo_last_year)	456.7	466.6	452.4	327.8	380.4	460.0	222.4
	341.9	340.8	343.0	372.2	410.9	341.9	236.7
Cons.	-500.7	-586.27	-497.53	-702.7	-410.7	-515.3	-110.0
	495.8	498.3	497.3	543.1	596.4	495.7	305.3
Number of obs.	130	130	130	133	133	130	207
R^2 Adjusted	0.734	0.739	0.736	0.651	0.560	0.733	0.660

The data are in 2006 prices. The regressions were run with dummy variables for years.
The standard deviations appear under coefficients. *10% significance, **5% significance, ***1% significance.

It would be interesting to examine the origins of the CEOs as well. In a study centered on the percentage of CEOs who came from within the company and those who came from outside and the resulting effect on their pay, Cremers and Grinstein (2008) found that most CEOs either come from companies in the same industry—which creates competition for CEO talent and pay hikes as a result—or from within the company itself.

6. Summary and conclusions

This empirical study is intended to provide a perspective on the development of CEO compensation in the last five years, and to answer the question of whether this compensation is based on economic principles. The study was conducted on 163

companies traded on the Tel Aviv Stock Exchange during the years 1995–2009, and presents the largest and most contemporary sample gathered to date in Israel of the personal characteristics and pay of CEOs at publicly traded companies.

Average CEO compensation increased by 104 percent in real terms during the period reviewed. As expected, it was found that the companies with the most highly paid CEOs are the banks, insurance companies and financial service companies. It was also found that the CEO is more highly paid at larger companies.

A positive and significant correlation was found between CEO compensation and the following variables:

(1) The firm's size, which is estimated on the basis of the company's total assets (balance sheet). Pay sensitivity to the firm's size is estimated at 0.3. For every 10 percent increase in company size in a particular year, CEO compensation increases by 2.6 percent in the following year. This sensitivity decreases over the years. In the differences equations as well, a correlation was found between the change in CEO compensation and the change in the company's size.

(2) The firm's performance, which is based on share performance indices in year t and in year $t-1$. For every 10 percent increase in share return in the particular year, CEO compensation increases by 0.5 percent. This correlation also weakens over the years and actually vanishes in recent years. A similar relationship was found in the differences equations. It was also found that pay sensitivity to share return in the previous year exceeded the sensitivity to share return in the current year.

(3) The firm's accounting performance (net profit/ROE) in year t and in year $t-1$. It should be noted that the percentage of the explained variability in the equations that included accounting performance was higher than in equations that included share performance only. For every 10 percent increase in the firm's ROE, CEO compensation increased by 1 percent. The correlation between the change in CEO compensation and the change in ROE is also estimated at 1 percent. No correlation between CEO compensation and ROE was found when dividing into sub-periods.

(4) CEO turnover. A CEO in his first year of office is paid less than a CEO with seniority of at least a year.

Additional findings:

(1) The CEO is compensated only for performance in the short term (up to two years), and is not compensated for the company's performance in the long term.

(2) The CEO is compensated for the company's relative performance: If the company which he manages presents low profits relative to other companies in the same industry, his pay will decrease and vice versa: If the CEO presents profits higher than those of the other companies in the industry, his pay will increase. However, in years when the market return is positive, the CEO will be favorably compensated to an extent in excess of the company's performance, but when the market return is negative his pay will decrease.

(3) The elasticity of CEO compensation to the company's performance at large companies is similar to the elasticity at small companies.

(4) Although the CEO's seniority at the company has a positive effect on his pay, the contribution of seniority to pay decreases over time. The CEO's other personal characteristics were not found to affect the level of his pay.

(5) A currently prevailing claim is that it is much easier to demand and receive a pay raise in good times than to accede to a pay cut in difficult times. In practice however, it was found that on average:

- CEO compensation decreases when the share return is negative.
- When the value of the share falls, the extent of compensation's reaction to this change in the following year is greater than its reaction to an upturn in the share. In other words, the decrease in CEO compensation in reaction to a decrease in the value of the company's share is greater in extent than a pay raise in reaction to an increase in the value of the share.

(6) Based on the sub-sample, which includes Co-CEOs only, we attempted to answer the question of what personal characteristics of CEOs explain the pay disparities between them. A Co-CEO whose holdings are high is also more highly paid: Every one percent increase in the difference between the CEOs' holdings contributes to a NIS 50 thousand increase in pay disparity. The "CEO's rate of holdings in the corporation's equity" variable has a high correlation with the CEO's tenure, academic degree and membership in the Board of Directors. When we omitted this variable, a number of other variables became significant: As expected, the CEO's tenure contributes to an increase in his pay; a CEO with an academic degree is actually paid less than a CEO who only has a high school education; and a CEO serving on the Board of Directors—as a Director or board Chairman—earns more than a CEO whose management of the company is his sole function.

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8. Appendices

A. The Amendment to the Securities Law was made in order to create a suitable climate that provides transparency for the public as a whole and for the shareholders in publicly traded companies in particular. There is a natural justification for assuring due disclosure regarding senior office holders at any company, including a full compensation component, which apart from salary, includes bonuses and options. These are details that are necessary for any reasonable reader of periodic and annual reports and of immediate reports concerning current events in the life of the company.

From the Note to the Securities Regulations (Periodic and Immediate Reports) (Amendment), 5768–2008:

"The financial reports of a corporation constitute a primary reporting device, which presents to all those using them quantitative and qualitative details concerning the corporation, in all matters relating to its financial position and operating results. The reliability of the financial reports is a vital element of proper activity in the capital market, and a deficiency in them undermines the public's confidence in that market and its willingness to invest in it. The disclosure directive stipulates that the directors' review in the periodic report and the directors' review in the quarterly reports should present details concerning the process of approval for their financial reports, specifying the identity of the entities in the corporation which are charged with overall control at the corporation and the processes adopted by them prior to approval of the financial reports. The disclosure required under this directive provides the public with transparency in all matters concerning the financial reports approvals process."

B. Summary of studies that examine the factors determining and affecting CEO compensation

The firm's performance		
Name of the study	**Findings**	**See also**
Amzaleg and Mehrez (2002)	A sample was compiled from 186 companies traded on the Tel Aviv Stock Exchange in 1997, whose CEO's earned over a million shekels each in that year. It was found that senior executive compensation is significantly affected by the company's financial results, as reflected both by accounting indices and by share performance indices.	
Kaplan (1994)	Found a positive correlation between pay and the firm's performance at publicly traded companies in the US and Japan.	
Rosen (1990)	Found a 0.2–0.5 sensitivity of pay to sales, 0.1 to accounting return and 0.15 to share return.	
Jensen and Murphy (1990)	Found that CEO compensation changes by only $3.25 for a change of $1,000 in share value.	
Murphy (1999)	Examined the sensitivity of CEO compensation to share performance at large companies in the US included in the S&P 500 Index, and found that the sensitivity of CEO compensation to share performance during the period 1990–1996 averaged 0.3. This means that for each one percent increase in the share price, the American CEO's pay rose by 0.38 percent.	
Core, Holthausen and Larcker (1999)	Examined the sensitivity of pay to the firm's accounting performance and found that it is limited and not significant.	
Barak, Cohen and Lauterbach (1999) (Hebrew)	Showed that CEO compensation is sensitive mainly, and at a high level of significance, to the performance of the company's share. However, they found that the sensitivity of CEO compensation to the company's net profit or ROE is limited and is not significant.	
Hermalin and Wallace (1997)	Criticized the manner in which the relationship between CEO compensation and firms' performance is examined.	
Bertrand and Mullainathan (2001)	Analyzed and estimated the "pay for luck" phenomenon among CEOs in the US, and found that the CEOs receive the same compensation for a dollar increment in the company's value deriving from "luck" as for a dollar increment in the company's value deriving from the CEO's real effort and proficiency.	
Bolton, Scheinkman and Xiong (2006)	Claimed that a CEO's optimal pay contract places an emphasis on the short-term performance of the share, at the expense of long-term value. This is in order to motivate the CEO to persist in activity that increases the speculative component in the price of the share.	

The firm's size

Name of the study	Findings	See also
Gabaix and Landier (2007)	Found a significant positive correlation between the company's size and the level of CEO compensation. These authors showed that a substantial increase (of 500 percent) in real average CEO compensation in the US during the years 1980–2003 can be attributed almost entirely to the 500 percent increase in the size of the companies which the American CEOs manage. Under their theoretical model, more talented CEOs get to manage larger companies and are more highly paid.	Bliss and Rosen (2001), Talmor and Wallace (2003). Bar-Yosef and Talmor (1993) (Hebrew), Hauser and Gizbar (1997) (Hebrew), Zhou (2000), Baker, Jensen and Murphy (1988)
Schaefer (1998)	Found that the sensitivity of pay to performance at larger companies is less than at smaller companies.	Murphy (1999)

Ownership

Name of the study	Findings	See also
Amzlag and Mehrez (2002) (Hebrew)	Found that owner-CEO compensation is significantly higher (by 30 percent) than the pay of a salaried CEO.	Bar-Yosef and Talmor (1997) (Hebrew), Ang, Lauterbach and Hauser (1997). Hauser, Solomon, Shohat and Tanchuma (1996) (Hebrew) also found differences in pay in favor of owner-CEOs.
Barak, Cohen and Lauterbach (2007)	Found an even larger difference between the pay of an owner-CEO and a salaried CEO—50 percent—60 percent.	
Holderness and Sheehan (1988)	Found that executives who hold five percent or more of a publicly traded company's equity are more highly paid than other executives.	
Hubbard and Palia (1995)	Found *inter alia* that owner-CEO compensation is less sensitive to performance than the pay of a salaried CEO.	Lee (2002)
Bar-Yosef and Talmor (1997)	On the basis of 234 companies from the manufacturing, trade and services industries and holding companies in the years 1991–1994, found that the relationship between the company's accounting compensation is actually closer for owner-CEOs.	

CEO compensation based on relative performance

Name of the study	Findings	See also
Holmstrom (1982)	Developed a Relative Performance Evaluation theory, which assumes that a firm's output or profit is a function of the executive's efforts. Under this theory, determination of executive compensation that is based both on the firm's output and on the output in the industry, and not only on the firm's output, will reduce the risk to the executive and will serve as an incentive for greater effort.	
Zussman and Mehrez (1992) (Hebrew)	Found that for a given level of profitability at his company, high profits at other companies in the industry have the effect of reducing the executive's pay while low profits in the industry have the effect of increasing his pay.	
Aggarwal and Samwick (1999)	Found empirical evidence of positive sensitivity of executive compensation to the performance of a competing company in the same industry.	
Smith and Watts (1992)	Found significant correlation between CEO compensation and the company's industrial sector: In more complex and sophisticated industries both pay and the sensitivity of pay to performance are greater.	
Gibbons and Murphy (1990)	Claimed that CEO compensation should be connected to the company's excess performance (meaning the company's success relative to the average for companies in the economy), because only this performance can be attributed to the CEO; residual yield is determined mainly by the state of the economy. In their study, the authors found that the yield of other companies in the same industry affects the change in executive compensation.	Hubbard (2000, 2005)
Bebchuk and Fried (2004)	Claim that compensation committees and consultants tend to increase CEO compensation persistently on the basis of the competitive component ("others are giving raises, so we have to give a raise as well"). Since no Management Council wants to admit that its manager is of lower than average quality, it must keep ahead, which always has the effect of increasing the average.	

Personal characteristics of the CEO

Name of the study	Findings	See also
Finkelstein and Boyd (1998)	Found that no relationship exists between the CEO's age and his pay.	
Lewellen and Huntsman (1971)	Actually did find that a positive relationship exists between executive pay and age.	Amzlag and Machrez (2002) (Hebrew)
Palia (2000)	Found that more highly educated executives are able to find employment at more prestigious companies and at higher pay.	
Kato and Rockel (1989)	Stated in their study that a quarter of executives were appointed as CEO after serving for less than five years at the company.	

| Murphy and Zabonjnik (2004) | According to their theory, pay increase is connected with the type of proficiency which the firm requires of its executives—from human capital specific to the company, to general managerial proficiency. Under this theory, it is expected that as general proficiency becomes more relatively important, average pay will increase, firms will employ more CEOs from outside, and the differences between CEO compensation and the pay of the other executives at the company will increase. Where the CEOs come from is discussed in a later study on the years since 2007. | |

C. Appendix tables

Table 3: Salary level, multi-year average (1995-2009), in millions of shekels, 2006 fixed prices

3a. By sectoral attribution

Sector	Observations	Average	Median	Standard Deviation	Minimum	Maximum
Banks	49	4.9	4.0	3.5	0.48	17.0
Insurance	65	3.7	3.0	3.3	0.09	23.9
Financial Services	55	3.1	2.0	2.4	0.77	11.3
Communications and Media	59	2.9	0.0	3.2	0.37	12.6
Construction and Real Estate	455	2.2	1.2	3.3	0.02	29.8
Investments and Holdings	396	2.0	1.3	1.8	0.02	11.5
Services	102	1.9	1.3	1.8	0.43	11.4
Fashion and Clothing	58	1.9	1.4	1.4	0.53	7.9
Chemicals, rubber and plastics	111	1.8	1.2	1.7	0.05	14.0
Commerce	188	1.7	1.4	1.3	0.23	10.9
Investments in manufacturing and various industries	53	1.5	1.5	1.3	0.50	8.0
Food	261	1.5	1.0	1.7	0.10	17.0
Hotels and Tourism	80	1.4	1.2	0.7	0.39	3.5
Computers	59	1.3	0.8	1.4	0.35	6.7
Electricity and Electronics	201	1.3	1.1	1.0	0.21	7.9
Building Supplies	66	1.1	1.0	0.5	0.53	2.7
Wood, paper and printing	44	1.1	0.9	0.6	0.26	2.7
Metals	125	1.1	1.0	0.4	0.40	2.4
Oil and gas exploration	15	0.6	0.7	0.2	0.42	0.9
Total	2442	2.0	1.4	1.6	0.02	29.8

Table 5a: Principal company data, multi-year average (1995-2009)						
Variable	Observations	Average	Median	Standard Deviation	Minimum	Maximum
Total assets (millions of shekels)	2,181	4,894	253	17,400	0.3	170,000
Market capitalization (millions of shekels)	2,139	744	105	1,878	2.1	22,800
Net profit (millions of shekels)	2,181	43.5	6.3	267	-4,609	4,114
Share yield (percent)	2,142	23.6	7.1	84	-97.4	1,475
Tobin's Q	2,139	0.6	0.6	0.7	0.01	25.2
Years traded on the Tel Aviv Stock Exchange	2,118	13.6	12	9.4	0	46
Does the company belong to a business group?[1]	2,186	21.0	21	3.2	16	26
1) According to the data base held by Konstantin Kosanko of the Bank of Israel's Research Department						

D. The relationship between CEO compensation and the firm's future performance

Another interesting question which we sought to answer is whether the future performance of the firm managed will improve the more the CEO is paid. In order to answer this question, we estimated the following equation regarding CEOs who were not replaced in the same period:

$$\mathrm{Re}\,turn_{i,t+1} = \alpha_0 + \alpha_1 \cdot Adj\_com_{i,t} + \alpha_2 \cdot Assets\_Growth_{i,t+1} + \alpha_3 \cdot ROE_{i,t+1} + \alpha_4 \cdot \mathrm{Re}\,turn_{i,t} +$$
$$\alpha_5 \cdot \mathrm{Re}\,turn_{i,t-1} + \alpha_6 \cdot \mathrm{Re}\,turn\_Market_{i,t} + Yeardum + Inddum + f_i + \varepsilon_{i,t}$$

where the dependent variable is the share return in time $t+1$ and the explanatory variables are:

$Adj\_com_{i,t}$ = pay adjusted to the company's size and industry[48] in year t;

$Assets\_Growth_{i,t+1}$ = the rate of growth in the firm's assets in year $t+1$;

$ROE_{i,t+1}$ = ROE in year $t+1$;

$\mathrm{Re}\,turn_i$ = the share's return in year t and in year $t+1$;

$\mathrm{Re}\,turn\_Market_{-i,t+1}$ = the market return in year $t+1$;

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[48] Pay is calculated as the difference between pay at company we and the median pay in the same industry and of the same size. We divided the companies in each industry into large companies (companies whose balance sheet is greater than the median balance sheet in the same industry in the same year) and small companies (companies whose balance sheet is less than the median balance sheet in the same industry in the same year).

The estimation equations were run with a dummy variable for years and industries and with Fixed Effects for companies.

The results of the estimation are presented in Table 12. In the first equation, we examined whether pay that is correlated to the company's size and industry in year t affects its performance in the following year—in $t+1$. We can see that no relationship exists between the two. This means that if the CEO is paid more today, the firm's performance next year will not necessarily be better. In the second equation, we examined the effect of pay two years previously. Here too, we reached the same result: Payment of a higher salary does not motivate the executive to achieve better performance for the company two years later.

| Table 12: Explanation of the company's future performance by CEO compensation		
Dependent variable: Return to common stock in t+1		
	(1)	(2)
Industry and size adjusted compensation in t	0.000	...
	0.000	
Industry and size adjusted compensation in t-1	...	0.000
		0.000
Return to common stock in t	-0.153***	-0.154***
	0.046	0.046
Return to common stock in t-1	-0.119***	-0.119***
	0.045	0.044
Return to Market	-166.5***	-166.4***
	27.242	27.301
Asset growth in t+1	0.269**	0.274***
	0.106	0.105
Return on equity in t+1	0.065**	0.067***
	0.026	0.026
Cons.	117.7***	117.6***
	19.092	19.134
Number of obs.	1,449	1,449
R^2	0.372	0.372

The data are in 2006 prices. The regressions were run with dummy variables for years and sectors, and with fixed effects for companies
The standard deviations are amended in respect of heteroscedasticity and appear under coefficients. *10% significance, **5% significance, ***1% significance.

E. CEO turnover

Another subject that we was able to study with the help of the data at my disposal is the relationship between the firm's performance and the probability that the CEO will be replaced—whether a CEO faces the threat of dismissal due to poor performance by the firm when he is compensated for the firm's performance in the form of salary, bonuses and additional benefits. We wish to emphasize that the decision to replace a CEO is one of the most important decisions which the Board of Directors has to make, because such a decision has long-term implications for the firm's investments, operation and performance.

As we mentioned in the section describing the sample, an average of 10 percent of all CEOs are replaced every year. The median age at which a CEO leaves his position (to outside of the company or to the position of Board Chairman) is 53. Figure 7 describes the percentage of CEOs who were replaced out of all the CEOs in the sample in the years

1995-2010. (The sample contains an average of 160 CEOs in each year.)[49] An uptrend in this percentage is apparent from 2001, from a substitution rate of 5.1 percent in 2001 to 12.3 percent in 2010. The peak was recorded in 2008 when 16 percent of CEOs were new CEOs. In this respect, Haddlock and Lumer (1997) found that in the years 1933–1941, the rate of CEO turnover was half that found by the authors in modern times.

Figure 7: Percentage of CEO turnover
(out of all the CEOs in the sample, 1995-2010)
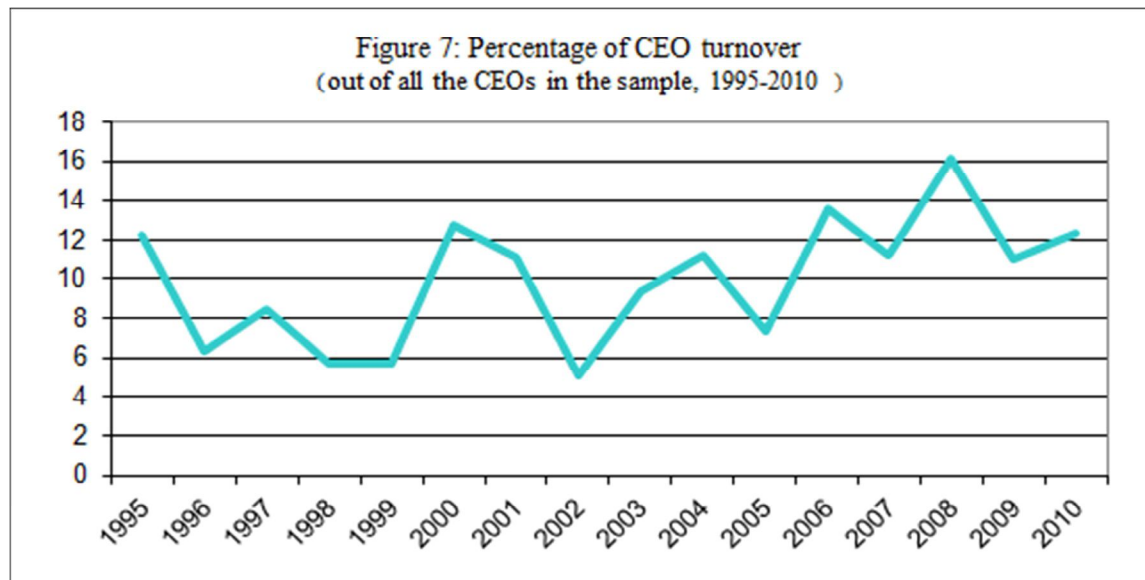
Jensen and Murphy (1990)[50] found a negative correlation between the firm's performance (exclusive of market performance) and the probability of CEO turnover: Executives' departure from the companies in which they serve after "bad" years is more common than in "good" years. In order to answer this question, the authors estimated the following relationship:

$$\ln[\frac{prob(turnover)}{1 - prob(turnover)}] = a + b_1(net - of - market\ return) + b_2(lagged\ net - of - market\ return)$$

where the dependent variable is the dummy variable, which obtains a value of 1 if this is the CEO's last year of service at the company and 0 otherwise, while the explanatory variable is the return on the company's share minus the weighted market return (on the basis of the company's market value)—both the present return and the return with a lag of a year. The results of the estimation are presented in column 1 of Table 13 below. We can see that no significant correlation was found between the firm's performance (exclusive of market performance) and CEO turnover.[51] In equations 2–4, the following relationships were examined: between CEO turnover and the return on the company's share minus the weighted industry return based on the company's market value (Equation 2); between the

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[49] The percentage of CEOs replaced is the percentage of new CEOs in the same year.

[50] Weisbach (1988), Warner, Watts and Wruck (1988), Coughlan and Schmidt (1985) and Zhou (2000) reached similar results.

[51] Zhou (2000) reached a similar result.

performance of the firm's share (Equation 3) and its accounting performance as reflected by ROE (Equation 4)—all this in the current year and in the previous year.[52] In Equations 2–3, no significant relationship was found at a level of at least five percent.[53,54] As is apparent, and in contrast to expectations, the coefficients of stock exchange performance are positive and not negative. However, a negative correlation was found between ROE in year t and CEO turnover. This means that when ROE is declining, the probability of the CEO being replaced increases. We can also see that the constant variable is negative and significant at a level of -2.2. With respect to Equation 1, it can therefore be said that if the CEO achieves a return equal to the market return in both the current year and the previous year, there is 0.09 probability that he will be replaced— $p = e^x /(1 + e^x)$. To further illustrate this point, with respect to Equation 4, when the average ROE is 5.6 percent a year, the probability of CEO turnover in such an average year (when ROE in the previous year was equal to 0) is 0.1.

***The equations were estimated by means of a Logit regression and the standard deviations appearing in parentheses are corrected for heteroscedasticity.

Table 13: The connection between CEO turnover and the company's performance				
Dependent variable: CEO turnover				
	(1)	(2)	(3)	(4)
	0.137			
Current net of market return	0.090	...	...	...
	0.070			
Current net of market return	0.124	...	...	...
Current net of industry return	...	0.091	...	...
		0.097		
Current net of industry return	...	0.009	...	...
		0.134		
Return to common stock in t	...	...	0.117*	...
			0.068	
Return to common stock in t-1	...	...	-0.001	...
			0.102	
ROE in t	...	...	...	-0.094**
				0.045
ROE in t-1	...	...	...	-0.080
				0.105
Number of CEO turnovers	203	203	203	203
Cons.	-2.264***	-2.244***	-2.258***	-2.224***
	0.097	0.093	0.094	0.089
Number of obs.	1,947	1,781	1,781	1,981
R^2 Adjusted	0.002	0.001	0.002	0.005

Logit Regression
The standard deviations are amended in respect of heteroscedasticity and appear under coefficients. *10% significance, **5% significance, ***1% significance.

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[52] See for example, Huson, Parrino and Starks (2001) and Kaplan (1994).
[53] When accounting performance as reflected by the firm's net profit was used, no significant relationship was found either.
[54] Haddlock and Lumer (1997) also reached this result.

Another way of estimating proposed by Gibbons and Murphy (1990) was to estimate the following relationship:

$$\ln[\frac{prob(turnover)}{1 - prob(turnover)}] = \alpha + \beta(Shareholder \ \mathrm{Re}\,turn) + \gamma(Industry \ and / or \ Market \ \mathrm{Re}\,turn)$$

In this manner, we will examine the relationship of the probability of CEO turnover to the performance of companies in the same industry/equities market beyond the performance of the company itself. According to Relative Performance Evaluation theory, $\beta < 0$-ו $\gamma > 0$, that is, it is more likely that CEOs will be dismissed after years when the company's performance was not good, but it is likely that they will leave after bad years in the industry or in the entire economy. The results of the estimation appear in Table 14 below. There appears to be no relationship between the probability of CEO turnover and the relative performance of the industry/entire equities market.[55] Because of the multicollinearity between industries' performance and market performance, we added the ratio between the industry return and the market return (column 5). In this way, we can see that a significant relationship exists between the probability of CEO turnover and the performance of the firm's shares exclusive of industries' performance and market performance. The coefficient of the variable is positive and not negative as expected: Positive performance leads to a higher probability of CEO turnover. This can possibly be dependent by deliberate resignation whereby the CEO will prefer to leave after achieving good results for the company. In other words, he will leave at a time of peak performance, in order to be able to present personal achievements to the next company which he manages.

***The equations were estimated by means of a Logit regression and the standard deviations appearing in parentheses are corrected for heteroscedasticity.

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[55] However, Gibbons and Murphy (1990) found a significant relationship between the dependent variable and the three independent variables appearing in Table 14.

Table 14: The connection between CEO turnover and the performance of competing companies in the same sector and in the same stock market

Dependent variable: CEO turnover					
	(1)	(2)	(3)	(4)	(5)
Return to common stock	0.115*	0.088	0.100	0.091	0.159**
	0.065	0.086	0.088	0.088	0.076
Return to Industry	...	0.390*	...	0.429	...
		0.225		0.418	
Return to Market	...		0.401	-0.064	...
			0.286	0.534	
Return to Industry / Return to Market					0.017
					0.045
Cons.	-2.305***	-2.370***	-2.362***	-2.367***	-2.328***
	0.092	0.108	0.105	0.106	0.109
Number of obs.	2,132	1,969	1,969	1,969	1,969
R^2 Adjusted	0.002	0.006	0.004	0.006	0.003

Logit Regression
The standard deviations are amended in respect of heteroscedasticity and appear under coefficients. *10% significance, **5% significance, ***1% significance.

To conclude, on the basis of a sample containing 163 publicly traded companies in the years 1995 to 2009, a negative correlation was found between the probability of CEO turnover and the firm's accounting performance, and a positive correlation was found with stock market performance excluding the industry return and the market return. This means that firms in Israel tend to replace the management when their accounting performance is deficient. It should be noted that these conclusions were reached on the basis of a relatively small number of turnovers at the companies in the sample during the review period (203 in all).