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and Private Firms in Denmark -
CEO and Firm Characteristics

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Abstract

In this study we are the first to draw on longitudinal matched employer-employee data to study CEO turnover. Using this data we contribute to the existing literature by examining the effect of previously unstudied individual characteristics on CEO turnover. Additionally, we are able to examine CEO turnover across a variety of firm types that differ with respect to the corporate governance issues they face. Our simple methodology to define CEO turnover results in turnover rates similar to those found previously. Our results indicate that CEO characteristics are an important factor in explaining CEO turnover. Finally, the inverse relationship between firm performance and CEO turnover only exists in LLL firms (larger limited liability firms, both publicly and privately held), where agency costs are assumed and found to be highest.

JEL classifications: G34, M51
Keywords: CEO turnover, Corporate governance, Ownership structure

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1 Introduction

Most firms will at some point experience a change in who is CEO of the firm. For any firm this will be a major event, regardless of whether the occurrence of CEO turnover is due to dismissal, resignation, retirement, or death of the CEO. Not only is the event itself disruptive and potentially costly given severance packages, it is also highly likely that the replacement of the CEO will have consequences for the future performance and strategy of the firm. Indeed, Bertrand & Schoar (2003) find that the individual manager has an impact on a wide range of corporate decisions. In spite of these costs and consequences, CEO turnover is not as rare of an event as one might think. In fact, a recent study by the public relations and public affairs firm Burson-Marsteller (2006) finds that CEO departures have reached record levels. Since 2000 nearly half of the Fortune 1000 companies have welcomed a new CEO. However, in spite of the frequency and importance of CEO turnover, our knowledge of its causes is rather weak.

The vast majority of our understanding of the causes of CEO turnover comes from the corporate governance literature, which focuses on whether poor firm performance leads to turnover. These studies consistently find evidence of an inverse relationship between firm performance and CEO turnover (see for example Coughlan & Schmidt (1985), Weisbach (1988), and Warner, Watts & Wruck (1988)). This relationship can be interpreted as evidence that CEO turnover functions as an effective internal control mechanism, where corporate boards replace CEOs responsible for poor firm performance. However, in spite of the numerous measures of firm performance that have been used in the literature, the explanatory power of firm performance with regards to CEO turnover is rather limited. This observance leads Brickley (2003) to conclude that a point of diminishing returns has been reached with respect to focusing on the relationship between CEO turnover and firm performance. Instead, he calls for the pursuit of other issues in order to enhance our understanding of the causes of CEO turnover. Thus, the purpose of this paper is to provide a first step in this direction, by examining the relationship between CEO turnover and characteristics of the former CEO and firm, including firm performance.

This study draws on unique Danish data to provide new evidence and contribute to the existing literature. The data that we use is a panel data set that, in addition to information on firm performance, includes demographic and income information for all employees in all Danish firms with more than 20 employees. Thus, we can track CEOs in both firms that experience turnover and firms that do not. Additionally, our data set is not restricted to listed firms. Instead it covers a variety of different types of firms that by construction differ with respect to the severity of the corporate governance issues they face. Contrary to this, previous studies have generated samples by identifying turnovers in for example the *Wall Street Journal* or *Forbes* magazine. As Giambatista, Rowe & Riaz (2005) note in their review, this generates a bias towards large and well-known firms. Our study addresses this potential bias in the previous literature by using this comprehensive Danish data. This also enables us to examine how the relationship between firm performance and CEO turnover differs across dif-

ferent types of firms that vary with regards to the corporate governance issues they face.

This paper, therefore, contributes to the existing literature along two dimensions. First, we enhance our understanding of the causes of CEO turnover by examining how previously unexplored characteristics of the CEO and firm affect CEO turnover. Second, we examine whether the previously mentioned finding that poor firm performance results in an increased chance of CEO turnover also exists among the different firm types and how it differs across them. Indeed, if corporate governance issues are the explanation for the inverse relationship between prior firm performance and CEO turnover, we would not expect to find this relationship for all Danish firm types, since some by construction face very few corporate governance problems. There are two previous Danish studies that have examined this relationship with conflicting results. Lausten (2002) confirmed the inverse relationship between firm performance and CEO turnover using a small sample of medium-sized and large Danish firms. In a larger sample including a broader variety of firms Eriksson, Madsen, Dilling-Hansen & Smith (2001) found no evidence that poor firm performance resulted in increased CEO turnover. They did not, however, examine what impact the different types of firms had on this relationship. These conflicting results thus provide further indication that an examination of the relationship across different firm types is of interest.

Our results indicate that many of the previously unexplored CEO characteristics indeed are significant in explaining CEO turnover. As in previous studies, the probability of CEO turnover is significantly increased if the CEO is over the age of 59. However, our results indicate that the relationship between age and CEO turnover is more complicated than previously assumed, since we also find a significant increase in the probability of turnover if the CEO is under 40 and a significantly positive coefficient to age measured continuously. Female CEOs have a higher probability of turnover, which is increased further if they are the CEO of a poorly performing firm. This, surprisingly, indicates that female CEOs have higher voluntary and involuntary turnover. Married CEOs have a lower probability of CEO turnover as do CEOs with a higher level of education, while CEOs in poor health have a significantly higher probability of turnover. There is a significantly negative relationship between tenure and CEO turnover, indicating that Danish CEOs become entrenched with tenure. Likewise, there is a significantly negative relationship between CEO compensation and turnover. Finally, we find a significant increase in the probability of CEO turnover if the CEO has positive wealth and a significantly negative relationship between CEO turnover and positive wealth measured continuously. With regards to our second contribution, we only find an inverse relationship between firm performance and CEO turnover in LLL firms (larger limited liability firms, both publicly and privately held). Additionally, we find evidence supporting our a priori expectation that agency costs are highest in this type of firm. Thus, our findings are consistent with the corporate governance notion that CEO turnover is an internal control mechanism used to punish CEOs for poor firm performance caused by agency costs arising from the separation of

ownership and control.

2 Previous Literature

There is a vast literature on CEO turnover that spans several research fields. The management literature has mainly focused on determinants and characteristics of the successor as well as consequences of the succession (see Kesner & Sebora (1994) and Giambatista et al. (2005) for a review). As previously mentioned, the finance literature has focused on CEO turnover as an internal control mechanism and therefore mostly examined how CEO turnover is affected by firm performance prior to the turnover and characteristics of the board of directors. Additionally, Denis & Denis (1995) and Huson, Malatesta & Parrino (2004) also examine firm performance following CEO turnover.

In this paper we will focus on the causes of CEO turnover. As Harrison, Torres & Kukalis (1988) note, an analysis of the causes of CEO turnover can be based on individual characteristics of the incumbent, characteristics of the firm, or characteristics of the firm's environment. While they focus on the latter two in their study, we will focus on all three here with special emphasis on the individual characteristics. In the following we will review relevant literature for each of the three areas.

2.1 Individual Characteristics

2.1.1 Age

One potential and natural reason that a firm experiences CEO turnover is retirement. Thus, although retirement occurs at different ages, we would expect the likelihood of CEO turnover to increase once the CEO reaches a certain age. Indeed, this has proven to be the case in studies that control for this effect. Parrino (1997) and Huson et al. (2004) find that having a CEO above the age of 60 has a significantly positive impact on the probability that the firm experiences turnover. Likewise, Murphy (1999) finds a 30 percent increase in the probability of experiencing turnover if a CEO is over the age of 64 compared to if he is younger.

2.1.2 Tenure

Tenure is another CEO characteristic that has been examined in previous literature. Allgood & Farrell (2000) find that the likelihood of forced turnover decreases with CEO tenure, while the likelihood of voluntary turnover increases with CEO tenure. Their first finding is consistent with the idea that a CEO's power increases with tenure, thereby increasing his ability to resist forced turnover. It seems likely that their second finding reflects a positive relationship between CEO turnover and age, given the presumed high correlation between CEO tenure and age and the fact that there is no control for age in their estimations. After controlling for firm performance and age, Kim (1996) finds that

turnover is less likely in the first years as CEO and after 10 years of tenure as CEO. Lausten (2002), on the other hand, finds a positive association between tenure and CEO turnover. However, since CEO age is not controlled for, it seems likely that this result reflects the positive association between voluntary turnover and CEO tenure found in Allgood & Farrell (2000).

2.1.3 Compensation

Coughlan & Schmidt (1985) include the portion of the change in CEO compensation not explained by stock price performance as an explanatory variable for CEO turnover. For CEOs under 64 they argue that this variable proxies for factors other than stock price performance that the board considers when setting compensation. Thus, a large value indicates that the board reached a favorable assessment of CEO performance. Therefore, it is expected that this variable will be inversely related to CEO turnover for CEOs younger than 64. For older CEOs this variable is also expected to reflect compensation events related to mandatory retirement such as retirement bonuses. The residual compensation is therefore expected to be positively related to turnover for CEOs 64 years of age or older. Their empirical findings confirm these expectations. Additionally, Harrison et al. (1988) conclude that compensation is a neglected issue in studies of CEO turnover and an area that warrants further investigation.

In addition to examining the effect of age, tenure, and compensation on CEO turnover, the present paper also analyzes how CEO turnover is affected by the CEO's gender, marital status, education, health, wealth, and whether or not the CEO has children. To the best of our knowledge these latter individual characteristics have not been examined previously.

2.2 Firm Characteristics

2.2.1 Firm Performance

The agency problems that arise from the separation of ownership and control in a firm are the theoretical basis for the proposed inverse relationship between CEO turnover and firm performance. The notion is that the right of the board of directors to hire and fire top management functions as a corporate governance mechanism that helps to alleviate agency problems. If this internal control mechanism functions effectively, then we would expect to find that poor firm performance leads to increased CEO turnover.

Indeed, this has empirically proven to be the case with numerous studies finding an inverse relationship between CEO turnover and firm performance.[1] Additionally, this result is robust to the use of different performance measures, since it is found regardless of whether performance is measured using accounting or stock market data. While most studies have used US data, Kaplan (1994*a*) and Kaplan (1994*b*) brought an international perspective to the literature by

[1] See for example Coughlan & Schmidt (1985), Weisbach (1988), Warner et al. (1988), Jensen & Murphy (1990), Parrino (1997), and Huson et al. (2004).

finding that an inverse relationship between CEO turnover and firm performance also exists in Japan and Germany, respectively. However, in contrast with this general consensus in the literature, the Danish evidence has been mixed. While the results of Lausten (2002) were in line with the general consensus, Eriksson et al. (2001) found no evidence that poor firm performance resulted in increased CEO turnover.

All of the above mentioned non-Danish studies have been conducted on data consisting only of public firms, where agency costs are prevalent. By definition agency costs vary systematically across different ownership structures, which is verified empirically by Ang, Cole & Lin (2000). Therefore, it is interesting to examine the relationship between CEO turnover and firm performance across both public and private firms, since ownership structure variability is maximized in such a sample. Unfortunately, this is fairly difficult to undertake due to lack of data availability for private firms. Indeed, to the best of our knowledge Coles, Lemmon & Naveen (2003) is the only study to relate CEO turnover to firm performance for both public and private firms. Their findings indicate that private firms are significantly less profitable than public firms. They explain this with their additional finding of no evidence that CEO turnover is more sensitive to firm performance in private than public firms.

Several studies have also suggested that there are factors that have an impact on the relationship between performance and CEO turnover. Jensen & Murphy (1990) expect that the likelihood that a CEO is fired is higher when the CEO is young than when he is close to normal retirement age. They find evidence consistent with this, in that the impact of performance on the likelihood of turnover is higher for younger CEOs. Allgood & Farrell (2000) argue that the relationship between performance and forced turnover varies over a CEO's tenure. One reason for this could be that CEOs become entrenched, which would cause the performance-forced turnover relation to decline over tenure. A second possibility is that it takes time for the board to learn about the CEO's true ability. If this is the case, then we would expect the performance-forced turnover relation to increase with tenure. Since these two effects go in opposite directions, they argue that the dominant effect is determined by whether a CEO begins as an outside hire, inside hire, or a founder. Their empirical evidence indicates that CEO tenure has an impact on the performance-forced turnover relation for founders and outside hires.

2.2.2 Firm Size

Another firm characteristic that has often been associated with CEO turnover is firm size. Although Weisbach (1988) finds no significant relationship between CEO turnover and firm size, several other studies find a significantly higher probability of CEO turnover in large firms (see for example Warner et al. (1988), Harrison et al. (1988), Parrino (1997), and Huson et al. (2004)). As in other studies, Parrino (1997) reasons that this can be explained by the fact that larger firms have more outsiders on their board of directors, have CEOs with less fractional ownership, and are more complex organizations with greater managerial

depth. All of these factors point in the direction of a higher probability of CEO turnover and therefore support the empirical finding of a significantly positive relationship between CEO turnover and firm size. Lausten (2002) and Eriksson et al. (2001) also find this relationship using Danish data.

2.2.3 Leverage

Harrison et al. (1988) argue that leadership is expected to be more tenuous in firms experiencing greater financial risk. They, therefore, expect higher CEO turnover in firms that are more levered. However, their results do not support this notion, since they find no significant relationship between CEO turnover and the capital structure of the firm. Contrary to this, the results in Eriksson et al. (2001) are supportive. They find that a low solvency rate is associated with a significantly higher probability of CEO turnover.

2.3 Characteristics of the Firm's Environment

2.3.1 Competition

Harrison et al. (1988) propose that industries with higher levels of competitive uncertainty will experience higher levels of CEO turnover, since the uncertainty puts more pressure on CEOs and makes their job more difficult. Additionally, they expect competitive uncertainty to be highest in industries with intermediate concentration. Their results, however, do not lend support for a positive relationship between competitive uncertainty and CEO turnover. Eriksson et al. (2001) argue that increased competition leads to a higher probability of CEO turnover, but do not find empirical evidence that this is the case.

3 Corporate Governance in Denmark

As mentioned in the introduction, one purpose of this paper is to enhance our understanding of the inverse relationship between CEO turnover and firm performance by examining how this relationship varies across different firm types that by construction face different corporate governance issues. We will, therefore, here give a brief description of corporate ownership and governance in Denmark based mainly on Munck & Kristensen (2002). Since our data contains the entire population of firms with at least 20 employees, we focus on the four types of firms encountered in these data.

The most common firm type in Denmark is the single owner (SO) firm (in Danish *enkeltpersonsvirksomheden*). This type of firm is 100% owned by one person, who has full liability. Generally, this person is also the CEO of the firm. Therefore, by construction this type of firm has no agency costs, since there is no separation of ownership and control. Although common, these firms are naturally often very small. A second important type of firm in Denmark is the cooperative (COOP) (in Danish *anpartsselskabet*). The main purpose of these COOPs is to either sell goods produced by the owners or supply the owners

with goods. Although some of Denmark's largest companies are organized as COOPs, most COOPs are in fact quite small.

There are two types of limited liability firms in Denmark, the small limited liability (SLL) firm (in Danish *anpartsselskabet*) and the large limited liability (LLL) firm (in Danish *aktieselskabet*). One of the main differences between these two types is the minimal capital requirement. While SLL firms are required to have 125,000 DKK in capital, LLL firms must have a minimum of 500,000 DKK in capital. Thus, SLL firms are often smaller and have less dispersed ownership compared to LLL firms. A second important difference between SLL and LLL firms regards the legal regulation of their governance. LLL firms are by law required to have a two-tier governance system with a management board and a board of directors consisting of at least 3 directors. SLL firms, on the other hand, are not required to have this two-tier system. They can choose to have either a management board, a board of directors, or both. However, if the number of employees exceeds 35, then the SLL firm must have a supervisory board, on which the employees are entitled representation. Finally, it should be mentioned that only LLL firms can be publicly held, although the majority of them are privately held.

From the recent literature in corporate governance on the ownership structure of firms, it is evident that there are only a few countries in which the description of firms as widely held, first given in Berle & Means (1932), is valid. Indeed, for Danish firms it is also the case that ownership in all firm types is fairly concentrated. The evidence presented in La Porta, Lopez-De-Silanes & Shleifer (1999) and Pedersen & Thomsen (1997) indicates that the equity of Danish public firms is seldom widely held, and instead it is common that there is a significant owner of the firm. Additionally, this significant owner is often a family that holds management positions in the firm. Given this, it seems likely that agency costs arising from the separation of ownership and control are low in many Danish firms. However, as noted in Shleifer & Vishny (1997) and La Porta, Lopez-De-Silanes, Shleifer & Vishny (2000) this does not mean that an agency problem does not exist. Instead, Shleifer & Vishny (1997) and La Porta et al. (2000) argue that agency problems can arise between the controlling shareholders and minority shareholders, since the former have the control to implement policies that benefit themselves at the expense of the latter. For our four types of firms we assume that both agency problems are most prevalent in LLL firms, and therefore expect to find that the sensitivity of CEO turnover to performance is greatest in these firms. We will test both this assumption and expectation in section 5.5.1.

4 Data and Methodology

4.1 Data

The data set used in this study is created by matching an employer database containing financial and other firm level information with an employee database

containing personnel information. The latter is drawn from the Integrated Data Base for Labor Market Research (IDA) created by Statistics Denmark (SD). The IDA data originates in 1980 and is a longitudinal database with annual observations for all employees employed in the private and public sector in Denmark. In addition to containing detailed demographic information for each employee, the employee is matched with their workplace and details on the employment relationship such as compensation and position are also included in the data. Since we are only interested in the private sector, the starting point for our data set is the subset of individuals from the IDA database who are employed in the private sector.

Unfortunately, the IDA database itself does not contain financial information on firm performance. Instead, the SD Account database contains yearly financial data from 1992 to 1997 for firms where the annual full-time worker equivalents for at least one year exceeds 20. It thus covers approximately 7000 Danish firms, and can be merged onto the IDA database. Our starting point for generating the data for our analysis is therefore the intersection between the IDA and SD Account databases. Unfortunately, the financial data in the SD Account database is not complete for all firms. We thus have data for 3314 firms in the period from 1992 to 1997. Using this we study CEO turnovers that occur in the period from 1994 to 1997, thereby ensuring the availability of financial data from two years before the turnover.

To the best of our knowledge, this is the first study on CEO turnover to draw on longitudinal matched employer-employee data. This type of data is quite different from the manually constructed data sets based mostly on the *Wall Street Journal* or *Forbes* magazine used in previous literature. As mentioned previously, this longitudinal data has many benefits. First, it allows us to study CEO turnover in many different types of firms that are both publicly and privately held. Second, it includes detailed demographic information on each employee in the firm, enabling us to expand our understanding of the causes of CEO turnover. However, there are also drawbacks to using this data, the greatest being that all employees and firms are anonymous. In the database they are only identified by a random identification number, which is constant through time. As explained below, we devise a procedure to identify the CEO of a firm for each year and instances of CEO turnover. The anonymity of our data does not allow us to verify the turnovers with for example newspaper articles. Likewise, we are unable to determine whether the turnover is involuntary or voluntary. This, however, is not unique to the present study, and is a common problem in the literature (see for example Jensen & Murphy (1990), Kaplan (1994*a*), and Kaplan (1994*b*)). Finally, it should be mentioned that these drawbacks seem inherently tied to the benefits of this data. It is only in this longitudinal data that it is possible to study turnovers in small, privately held firms, since there is little public information or newspaper coverage of turnover events for such firms. We therefore believe that there are significant benefits from using this novel type of data that at least partially offset the drawbacks. In particular, there is certainly evidence to be obtained from the additional firms, which complements that obtained previously by looking at large, publicly traded firms

exclusively. We therefore expect to be able to provide a contribution to the existing knowledge of CEO turnover.

4.2 Variable Construction

4.2.1 CEO Turnover

The first step in identifying instances of CEO turnover is defining the CEO of the firm. The IDA database contains a variable indicating the employee's occupation. For each year the starting point is to identify employees in a given firm where the occupation variable indicates "Manager". If there is only one employee with this title, then he/she is classified as the CEO. In instances where several employees hold the title of manager, we classify the manager with the highest compensation as CEO. Finally, there are firms where no employee is indicated as manager by the occupation variable. For these firms the CEO is defined as the employee in the firm who receives the highest compensation.

Thus, for each year we have identified the CEO of each firm. As an additional measure to ensure correct identification of turnovers, we also employ the following rule. If the CEO of a firm in year t is not the CEO in year $t+1$, but later again appears as CEO of the same firm, then he is also classified as CEO of the firm in year $t+1$ given that he is employed in the firm that year. After employing this rule, CEO turnovers can be identified as instances where the CEO of a firm in year t is not the same person as the CEO in year $t+1$. Thus, for each year the CEO turnover variable is 1 if the firm experiences turnover and 0 otherwise.

Finally, we delete all observations for any firm that experiences more than two turnovers in the four year period we study. This is done since a turnover rate this high seems unrealistic. This process leaves us with a sample of 13,136 observations of which 1,858 are turnovers.

4.2.2 Individual Characteristics

The birth year is available for each CEO and from this the CEO's *age* is constructed. Additionally, $age > 59$ is equal to one if the CEO is over the age of 59 and zero otherwise. Likewise, $age < 40$ equals one if the CEO is younger than 40 years of age and zero otherwise. *Female* equals one if the CEO is female and zero otherwise. The IDA database contains several variables indicating the number of children an employee has in different age groups. These are used to construct *children*, which is equal to one if the CEO has children under the age of 18 and zero otherwise. *Married* equals one if the CEO is married and zero otherwise.

The IDA database contains detailed educational information on each individual. Based on this we define *Education*, which equals one if the individual has a higher education of short, medium or long duration. The data also includes information on the amount of sickness pay an individual receives per year. This information allows us to proxy for the CEO's health by creating *health,* which

equals one if the CEO receives sickness pay in a given year and zero otherwise. The database contains each individual's assets and debt obtained from tax registries. With this information we create the variable *wealth*, which is equal to the difference between the assets and debt of the CEO. We take the logarithm of this variable for positive values and set negative values to zero. Additionally, $wealth > 0$ is created, which assumes the value one when wealth is positive and zero otherwise. *Pay* indicates the compensation received by each CEO from the firm.

Finally, the data allows us to measure each CEO's tenure in the firm, since we can trace the employment of each individual starting in 1980. Thus, *tenure* indicates the number of consecutive years that the CEO has worked for the firm. Unfortunately, this variable is truncated from above given that our data starts in 1980. Therefore, the largest value it can assume is the number of years passed since 1980.

4.2.3 Firm Characteristics

As mentioned, a proposed key component in explaining CEO turnover is firm performance. The previous literature has used a variety of accounting and stock market variables to measure firm performance. Since the majority of our firms are not listed we will rely on an accounting measure of firm performance. Our simple measure of firm performance is *Net Income*, which is equal to one if the firm's net income is negative and zero otherwise. Kaplan (1994*b*) examines a variety of accounting measures of firm performance on German data and only finds significant results with this simple measure, therefore we use it here. Additionally, we measure firm performance continuously using the *profit to sales* ratio as in Lausten (2002) and Eriksson et al. (2001). As mentioned, previous literature has examined whether firm size and leverage has an impact on CEO turnover. We measure *firm size* using the logarithm of sales, while *leverage* is measured as the ratio of debt to assets. Additionally, we create a dummy variable for each of the 4 firm types and 6 industries.

4.3 CEO Turnover Patterns from the Data

Table I presents CEO turnover rates and the sample distribution across firm types. Examining the latter first, we see that approximately 80% of the firms in our sample are LLL firms. This is higher than the 42% LLL proportion in Eriksson et al. (2001). Since larger Danish firms most often are LLL firms, this seems an inherent effect of the SD Account database only covering firms where the annual full-time worker equivalents exceed 20. Therefore, when comparing our results to those found in Eriksson et al. (2001) it should be kept in mind that our firms on average are larger. Finally, it should be mentioned that the effect of this is that our results are on the conservative side, i.e. the bias is towards finding no difference across the different firm types.

Insert Table I here

Given our new approach to defining CEO turnover, it is interesting to compare the patterns in CEO turnover with those found in earlier studies. Using a smaller and different sample Lausten (2002) finds CEO turnover rates in 1994 and 1995 of 12.7% and 14.7%, respectively. These are not unlike the corresponding finding of 13.1% and 9.7% in our data. For LLL firms the CEO turnover rates in all years but 1996 are also similar to the annual CEO turnover rate of 14.3% that Eriksson et al. (2001) finds in LLL firms from 1996-1998. However, for SLL firms we generally find higher turnover rates than the 9.1% found in Eriksson et al. (2001). One possible explanation for this, given previous literature's finding that CEO turnover and firm size are positively related, is that our sample by construction only captures the largest SLL firms. This is also likely to be the explanation behind our finding of a higher turnover rate in COOP firms compared to Eriksson et al. (2001). The turnover rates for CEOs from SO firms seem rather high. Unfortunately, we have no previous studies to compare our rates to. To examine what effect this might have we will later model CEO turnover in LLL, SLL, and SO firms separately. Likewise, the turnover rates across all firm types in 1996 seem quite high. To attempt to account for this we will include time dummies as control variables in the following analysis. Additionally, we will also model CEO turnover on data where observations for 1996 are deleted. However, aside from these two problems, the CEO turnover rates we uncover using a new methodology on a longitudinal data set seem comparable to those found in previous literature.

Table II presents relevant descriptive statistics separately for firms that experience CEO turnover and those that do not. Starting with the CEO characteristics, it is relevant to note that while the average age and tenure of our CEOs are relatively comparable to those found in Lausten (2002), the average pay is not. In our sample, CEOs on average earn $\frac{1}{2}$ million DKK, while Lausten (2002) finds an average compensation for CEOs of approximately 1.1 million DKK. This, however, is most likely due to our sample including smaller firms. While the average number of employees in Lausten (2002) is 713, the average firm in our data has 65 employees. Indeed, if we construct a sample from our data with an average number of employees similar to that in Lausten (2002), we find average compensation close to 1 million DKK. Thus, the characteristics of the CEOs in our data seem comparable to those in Lausten (2002). Again this serves to verify the results of the methodology we use to define CEOs and CEO turnover. Second, it is interesting to see that the differences in means between CEOs that leave the firm and those that stay are significant for all CEO characteristics. For example, while 7% of leaving CEOs are female, the proportion of females among the staying CEOs is significantly lower at 4%.

Insert Table II here

Likewise, when comparing the characteristics of firms that experience turnover to those that do not, there are significant differences in the means. This is true for all of the examined firm characteristics except the profit to sales ratio. For example, although 23% of the firms experiencing CEO turnover had negative

net income in the previous year, this was only the case for 18% of the firms whose CEO stayed. This is a first indication of a negative relation between firm performance and CEO turnover. From the table we also see that the majority of firms are in the manufacturing industry. Additionally, there are significant differences in the turnover rates across industries, underscoring the importance of controlling for industry when modelling CEO turnover. Finally, many of these variables are naturally related, which a univariate analysis can not capture. We therefore now turn to a multivariate analysis of CEO turnover.

4.4 Methodology

In the following we will uncover which CEO and firm characteristics are related to CEO turnover. Since the dependent variable, CEO turnover, is a dichotomous variable, we model CEO turnover using the logit model

$$\ln(\frac{P(CEO\ turnover)}{1-P(CEO\ turnover)}) = \alpha + x\beta + y\gamma + \varepsilon\ ,$$

where $P(CEO\ turnover)$ is the probability of CEO turnover, x and y are vectors of individual and firm characteristics, respectively, while β and γ are vectors of coefficients on these vectors.

The left-hand side of this equation is the log-odds ratio. Since it is this ratio that is linear in the explanatory variables, it is important to realize that the coefficients themselves should be interpreted as the marginal effect on the log-odds ratio, and not as the marginal effect on the probability of CEO turnover. This latter marginal effect can instead be calculated, and we will do so in the following.[2] This is especially important when there are interaction effects among the explanatory variables, since the sign and significance of the interaction variable's marginal effect can differ from that of its coefficient, see Powers (2005).

[2] The logit model is given as

$$P(y=1 \mid x) = \frac{\exp(x\beta)}{1+\exp(x\beta)} = G(x\beta) \equiv p(x),$$

where x is 1 x K, β is K x 1, and the first element of x is unity. If x_j is continuous its marginal effect is

$$\frac{\partial p(x)}{\partial x_j} = \frac{\exp(x\beta)}{[1+\exp(x\beta)]^2}\beta_j = g(x\beta)\beta_j.$$

If x_K is a binary explanatory variable, then the partial effect of changing x_K from zero to one holding all other variables fixed is

$$G(\beta_1 + \beta_2 x_2 + ... + \beta_{K-1}x_{K-1} + \beta_K) - G(\beta_1 + \beta_2 x_2 + ... + \beta_{K-1}x_{K-1}).$$

If K=4, x_2 and x_3 are binary explanatory variables, and $x_4 = x_2 x_3$ then the change in the marginal effect of $x_2(x_3)$ on the expected value of y as $x_3(x_2)$ changes is given as

$$[G(\beta_1 + \beta_2 + \beta_3 + \beta_4) - G(\beta_1 + \beta_3)] - [G(\beta_1 + \beta_2) - G(\beta_1)].$$

The standard errors of these marginal effects can be calculated using the delta method (see Wooldridge (2002) and Powers (2005)).

5 Results

Table III presents the coefficients and marginal effects from our logit model of CEO turnover. The marginal effects are calculated at the median value of the variables. While model 1 contains all of our variables of interest, in model 2 we have tested the model down stepwise by removing the most insignificant variables first until only significant variables remain. We will here comment on the latter starting with the examined individual characteristics.

Insert Table III here

As Brickley (2003) calls for, we have tested and found a more complicated relationship between age and CEO turnover than previous literature. First, there is a highly significant increase in the probability of CEO turnover for CEOs age 60 or older. Indeed, being over the age of 59 increases the probability that the median CEO experiences turnover by 10%. This is the highest marginal effect in our model. This corresponds to the natural association between retirement and CEO turnover and is in line with previous literature. Second, CEOs under the age of 40 also have a significantly higher probability of experiencing turnover. Given that we control for other factors such as tenure, we believe this result reflects that voluntary turnover is more likely among young CEOs with a long career ahead of them. Additionally, it is plausible that young CEOs also have a higher probability of involuntary turnover. This is consistent with the finding in Jensen & Murphy (1990) that performance had a higher impact on the probability of turnover for young CEOs. We will examine this relationship in more detail later when we add interaction effects to the model. Finally, there is also a significantly positive association between age measured continuously and CEO turnover.

We find a significantly higher probability of turnover for female CEOs. This result is surprising given the numerous other individual characteristics that we control for. Initially, if any relationship existed, we would have expected it to be negative. Since there are so few female CEOs, it seems likely that the unmeasurable ability of women who make it to the top is very high, which would result in a lower probability of involuntary turnover. Likewise, if the few female CEOs have faced tough obstacles in making it to the top, this would likely result in less voluntary turnover. Our results, however, are not consistent with these a priori expectations. Thus, female CEOs are not only rare, but also face a higher probability of turnover. Later, we will attempt to uncover whether this relationship is due to female CEOs having a higher probability of voluntary turnover, involuntary turnover or both, by examining whether the relationship between firm performance and CEO turnover is stronger for female CEOs.

Our results indicate that married CEOs have a significantly lower probability of turnover. We believe this reflects that married CEOs have a higher desire for stability, since they must take their spouse and family into account when making career decisions. Thus, this finding likely reflects lower voluntary turnover for married CEOs.

There is a significantly negative relationship between tenure in the firm and the probability of turnover. This result is similar to the finding in Allgood & Farrell (2000) that the likelihood of forced turnover decreases with CEO tenure. At the same time our results contradict those in Lausten (2002). However, this is perhaps not surprising given that we, in contrast to Lausten (2002), control for age, and recalling that Allgood & Farrell (2000) find that the probability of voluntary turnover increases with tenure when age is not controlled for. Thus, we interpret our results as evidence that Danish CEOs become entrenched with tenure, thereby increasing their ability to resist involuntary turnover.

We find a significantly negative relationship between education and turnover. Therefore, CEOs with a higher level of education have a lower probability of experiencing turnover. In contrast, CEOs in poor health have a significantly higher probability of turnover, which is perhaps not surprising.

Consistent with Coughlan & Schmidt (1985), we find that the probability of CEO turnover is significantly decreasing in CEO compensation. This finding likely reflects two effects. First CEOs earning a high compensation are less likely to look for and find more favorable employment elsewhere, thus decreasing the likelihood of voluntary turnover. Additionally, the high compensation reflects that the firm has assessed the ability of the CEO to be high, indicating a lower probability of involuntary turnover.

When measured continuously positive wealth has a negative impact on the probability of CEO turnover. Additionally, we find that having positive wealth significantly increases the probability of turnover by 6%. We believe the latter can be explained as follows. CEOs with negative wealth are likely more risk averse in their career and management decisions, inducing a lower probability of voluntary and involuntary turnover, respectively. Thus, this results in an increase in the probability of turnover if the CEO has positive wealth. At the same time, it is quite likely that some of this positive wealth is tied to the firm in some manner, i.e. stock compensation plans. Thus, higher wealth would reflect greater incentive alignment leading to a lower probability of forced turnover. This last effect is in line with our finding that positive wealth measured continuously has a negative impact on the probability of CEO turnover.

Turning now to the firm characteristics, we see that the probability of CEO turnover is significantly increased when the net income of the previous year is negative. This result is consistent with the findings of previous literature and supports the corporate governance explanation of forced turnover. Thus the CEOs of poorly performing firms experience higher turnover, indicating that one of the internal control mechanisms used in Danish firms is forced turnover. We will later examine whether this relationship exists across the different firm types.

Again consistent with previous literature we find a significantly positive relationship between turnover and firm size, measured as the logarithm of sales. Thus, the probability of CEO turnover is higher in large firms. Additionally, even after controlling for size, CEOs in SLL firms have a lower probability of turnover than those in the other firm types.

Finally, many of the firm characteristics examined are insignificant. This is

the case for negative net income in $t-2$, the profit to sales ratio, and leverage. In contrast to this the majority of the examined individual characteristics are significant with only children and tenure squared being insignificant. This seems to underscore the importance of individual characteristics when explaining CEO turnover.

5.1 Firm Performance and Firm Type

We now turn to examining how the relationship between firm performance and CEO turnover differs across firm type. However, first it is interesting to consider our a priori expectations regarding this relationship. As mentioned, the corporate governance prediction of an inverse relationship between firm performance and CEO turnover relies on the agency costs that arise from the separation of ownership and control. By definition such agency costs are zero in firms that are 100% owned by the manager. Additionally, Ang et al. (2000) propose and find empirical evidence supporting that (i) agency costs are inversely related to the manager's ownership stake and (ii) agency costs are an increasing function of the number of nonmanager shareholders. Given this and our previous description of the Danish firm types, we propose that agency costs are zero in SO firms, where the manager most likely is also the 100% owner. Since LLL firms in general have more dispersed ownership and managers who own less of the firm compared to SLL firms, we expect agency costs to be highest in LLL firms.

We test these expectations regarding agency costs across the different firm types using the two measures of agency costs from Ang et al. (2000). The first is the ratio of operating expenses to sales, which measures management's efficiency in controlling operating costs. This ratio is increasing in agency costs. Their second measure of agency costs is the ratio of annual sales to assets, which measures the efficiency with which management deploys the firm's assets. Contrary to the first measure, this ratio is inversely related to agency costs. Since agency costs are expected to be zero in SO firms, we set this to be the base case and regress our two measures of agency costs on dummy variables for each of the remaining three firm types, COOP, SLL, and LLL. Additionally, we follow Ang et al. (2000) and control for firm size and industry. The results of these regressions are shown in Table IV.

Insert Table IV here

From the results in the table, we see that the ratio of operating expenses to sales is indeed higher for LLL firms compared to the other firm types. However, there is no indication that SO, SLL, and COOP firms differ significantly with respect to the size of their ratio of operating expenses to sales. Thus, the results, when measuring agency costs using the ratio of operating expenses to sales, support our initial expectation that agency costs are highest in LLL firms. Examining regression (4) in Table IV, we see that at a 1% significance level the sales to assets ratio is significantly lower in LLL firms compared to COOPs and SOs, while SLL firms have a significantly lower sales to asset ratio than COOPs

and SOs at a 5% significance level. Although the coefficient of SLL firms is larger in magnitude than that of LLL firms as we expected, this difference is not significant. Thus, when taken together we interpret this evidence as support for our expectation that agency costs are highest in LLL firms.

In order to examine how the effect of firm performance on CEO turnover differs across the firm types, we interact the dummy variable for negative net income with dummy variables for the different firm types and include these in the logit model for CEO turnover. Additionally, we include interactions between negative net income and the variables indicating a female CEO, a CEO younger than 40, and a CEO with a higher education. Table V presents the results of this analysis. As before model 1 contains all of our variables of interest, while model 2 is tested down stepwise by removing the most insignificant variables first until only variables significant at the 10% level remain.

Insert Table V here

From Table V, we first see that except for the variable indicating negative net income, all of the significant variables from the analysis presented in Table III remain significant. Additionally, only two of the interaction effects introduced are significant. The coefficient for the interaction effect indicating a negative net income firm with a CEO under the age of 40, is insignificant. Thus, in contrast to Jensen & Murphy (1990) we find no indication that firm performance has a higher impact on the probability of CEO turnover for young CEOs. This finding seems to indicate that the higher turnover for CEOs under the age of 40 is mostly due to voluntary turnover.

Firstly, the coefficient for the interaction effect indicating a firm with a female CEO and negative net income in the previous year is significantly positive. Thus, although a female CEO in general experiences a higher probability of turnover than a male CEO, the probability of turnover is even greater if the female is the CEO of a poorly performing firm. Indeed, at the median the probability of experiencing turnover is 2.1% higher for a female CEO, and is increased by an additional 5.7% if the female CEO's firm is performing poorly. This seems to indicate that both voluntary and involuntary turnover are higher for female CEOs.

Finally, when examining the impact of firm performance on CEO turnover across firm types, it is only the interaction effect between LLL firms and negative net income that is significant. Thus, given that the negative net income variable is no longer significant in and of itself, the well documented inverse relationship between firm performance and the probability of CEO turnover is only present in LLL firms. Recalling that these were the firms found to have highest agency costs, this result supports the notion that CEO turnover is an internal control mechanism used to mitigate agency problems.

5.2 Sensitivity Analysis

As mentioned previously, we will conduct two sensitivity analyses here. First, we delete all observations from 1996, since Table I indicated an abnormally high CEO turnover rate in this year. Additionally, we also model CEO turnover separately for the SO, SLL, and LLL firms.

Insert Table VI here

Table VI presents the results of excluding all observations from 1996. While there are many similarities with the results for all years presented in Table V, there are also some differences. First, the continuous variable for age is no longer significant. However, the age of the CEO still has an effect on the probability of CEO turnover, since the two variables indicating a CEO over 60 or under 40 years of age remain significant. Second, there is no longer a significantly higher probability of turnover for female CEOs. Instead, the entire effect of being a female CEO has been moved to the case where the female is CEO of a poorly performing firm. Thus, the variable indicating a female CEO of a poorly performing firm is highly significant as is the marginal effect, which is also greater in magnitude than earlier. This result, again, seems to indicate higher involuntary turnover for female CEOs. Third, the variable indicating a married CEO is no longer significant, while the variable indicating a CEO with children under 18 now is significant at a 5% level. It seems likely that these two variables are proxying for the same desire of stability that leads to less voluntary turnover. Thus, the switch in the significance of these two variables does not raise alarm. Fourth, the variable indicating poor health of the CEO is no longer significant. Finally, in addition to the significant interaction effects from Table V, there is now also a significantly higher probability of turnover if the CEO of a poorly performing firm has a high level of education. Since it is plausible that firms that hire CEOs with a high level of education also utilize corporate governance mechanisms more intensely, this is perhaps not too surprising. Thus, although the results do change slightly when observations from 1996 are deleted, it seems that the main effects are still present. We therefore conclude that our results are robust to deleting observations from 1996, where CEO turnover seems abnormally high.

The results of analyzing CEO turnover separately by firm type are given in Tables VII-IX. From these tables we see that there is in fact quite a difference in which factors explain CEO turnover for the various firm types.

Insert Table VII here

SO firms (Table VII) have the fewest significant factors explaining CEO turnover, which is perhaps not that surprising, since SO firms are smaller and less complex than the other firm types. Thus, the variables from our general model that remain significant when studying SO firms are the continuous variable for age, the indicator for children under 18, the logarithm of pay, and our

measure of firm size. The effects of these variables all go in the same direction as in the general model. Additionally, we also find a significantly higher probability of CEO turnover for CEOs under 40 in poorly performing firms at a 10% significance level. This is a surprising result, given that we would not have expected to find any connection between firm performance and CEO turnover in SO firms with zero agency costs. One possible explanation could be that even though it is most likely that the 100% owner is also the manager this is not always the case. Thus, it could be that CEOs under 40 in SO firms are often not the owner of the firm. If this is the case then it is quite plausible that poor firm performance will cause CEO turnover. Another possible explanation is that this is a result of our method used for defining the CEO and CEO turnover. Thus, in instances where the firm is performing poorly the CEO as the owner of the firm may choose to pay less compensation to himself. However, since he can not adjust the compensation of his employees as promptly and drastically, one of his employees might be earning a higher salary than him, causing us to define him as the new CEO. Although we have attempted to construct the procedure for defining the CEO so this does not occur, it is possible that these CEOs under 40 in poorly performing firms represent the remaining cases. Likewise this could explain the rather high turnover rates in SO firms. Unfortunately, our data does not allow us to explore these possible explanations further.

Insert Table VIII here

The model of CEO turnover for SLL firms is presented in Table VIII**.** Again we see that there are fewer significant explanatory variables for CEO turnover in SLL firms than in the general model from Table V. As in the general model the probability of CEO turnover is significantly higher if the CEO is over 59 years of age, while it is significantly lower if the CEO has a higher education. Likewise, there is an inverse relationship between the probability of CEO turnover and tenure, the logarithm of pay, and the logarithm of wealth. Interestingly, as for SO firms there is also a significantly higher probability of turnover for CEOs under 40 in poorly performing firms. However, this is perhaps not as surprising for SLL firms, where agency costs are not expected to be zero. Thus, as for SO firms, one possible explanation for the result that the inverse relationship between CEO turnover and firm performance only exists when the CEO is under 40, is that agency costs are higher and management entrenchment lower in these firms.

Insert Table IX here

Finally, Table IX presents the CEO turnover model for LLL firms. This model is very similar to our general model from Table V with respect to the significance of the different variables. Therefore, we will only comment on the differences here. First, the continuous variable for age is not significant for LLL firms. However, age still has an effect on the probability of CEO turnover in that the two dummy variables indicating a CEO over 59 and under 40 years of age, respectively, are still highly significant. Second, while the variable indicating a

married CEO is no longer significant, the variable indicating that the CEO has children under 18 years of age is. Again, we interpret this as due to the two variables proxying for the CEO's desire for stability due to family considerations and leading to less voluntary turnover. Third, at the 10% level the coefficient for the interaction effect indicating a highly educated CEO in a poorly performing firm is significantly positive, although the marginal effect at the median is not significantly different from zero. Finally, the interaction effect indicating a CEO under 40 in a poorly performing firm is significantly negative as is the marginal effect. This is a bit surprising, and indicates that at the median the positive marginal effect that being a CEO under 40 has on the probability of CEO turnover is reduced if the CEO's firm is performing poorly.

Comparing the models of CEO turnover across the different firm types we see that SO firms have the fewest explanatory factors, while LLL firms have the most. It seems plausible that this is caused by the increasing complexity of firms when moving from SO firms over SLL firms to LLL firms. Only two effects that explain CEO turnover are common across all firm types. The first is age, which is an oft proposed cause of CEO turnover. The second is the CEO's compensation, which is quite interesting given the little attention that this variable has received in previous literature. Finally, it is only in LLL firms that negative net income in and of itself results in an increased probability of CEO turnover. This result is in line with our expectations given the higher level of agency costs in LLL firms compared with SO and SLL firms. Again, this supports the corporate governance notion that CEO turnover is an internal control mechanism used to mitigate agency problems.

6 Conclusion

In this paper we draw on Danish longitudinal employer-employee matched data to study CEO turnover. To the best of our knowledge, we are the first to study CEO turnover using this type of data. This unique approach allows us to contribute to existing literature along two dimensions. First, we expand our knowledge of the causes of CEO turnover by including a wide variety of CEO characteristics in the analysis. Second, we provide new evidence on the inverse relationship between CEO turnover and firm performance by conducting the study on a variety of firm types that differ with respect to the severity of the corporate governance issues they face.

We find a wide variety of previously unexplored CEO characteristics that are significant in explaining CEO turnover. The first characteristic we study is the CEO's age. As in previous studies the probability of CEO turnover is significantly increased if the CEO is over the age of 59. However, in addition to this effect we also find a significant increase in the probability of turnover if the CEO is under 40 and a significantly positive coefficient to age measured continuously. Thus, it seems that the relationship between age and CEO turnover is more complicated than previously assumed. Second, we find that female CEOs have a higher probability of turnover, which is increased further if they are

the CEO of a poorly performing firm. This, surprisingly, indicates that female CEOs have higher voluntary and involuntary turnover. Married CEOs have a lower probability of CEO turnover as do CEOs with a higher level of education, while CEOs in poor health have a significantly higher probability of turnover. There is a significantly negative relationship between tenure and CEO turnover, indicating that Danish CEOs become entrenched with tenure. Likewise, there is a significantly negative relationship between CEO compensation and turnover. Finally, we study the effect of CEO wealth. We find a significant increase in the probability of CEO turnover if the CEO has positive wealth. Thereafter, there is a significantly negative relationship between CEO turnover and positive wealth measured continuously. Thus, our results indicate that CEO characteristics indeed are an important factor in explaining CEO turnover.

The well documented inverse relationship between firm performance and CEO turnover from previous literature is only present in LLL firms. Additionally, we find evidence supporting our a priori expectation that agency costs are highest in this type of firm. Thus, our findings are consistent with the corporate governance notion that CEO turnover is an internal control mechanism used to punish CEOs for poor firm performance caused by agency costs arising from the separation of ownership and control.

While this study focuses on the determinants of CEO turnover, the consequences of CEO turnover are also of great interest. This is an area that has only recently received attention in the finance literature with Denis & Denis (1995) and Huson et al. (2004) examining firm performance following CEO turnover, and Fee & Hadlock (2004) studying the consequences of turnover for the future employment of the CEO. Given the great importance of CEO turnover and its increasing frequency, we believe that this is an area that warrants further investigation in future research.

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Table I: CEO Turnover in Danish Firms

The data is constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occuring in the period from 1994-1997. LLL and SLL firms are limited liability firms. LLL firms are by law required to have a two-tier governance system and have a minimal capital requirement of 500,000 DKK. SLL firms are required to have 125,000 DKK in capital and can choose to have either a management board, board of directors, or both. SOs are 100% owned by one person, who has full liability. COOPs are cooperatives.

	1994	1995	1996	1997	Total
Turnover rates by firm type					
LLL	13.0%	9.7%	21.6%	11.9%	14.1%
SLL	12.6%	7.7%	19.2%	11.9%	12.8%
SO	16.7%	17.4%	25.2%	19.6%	19.7%
COOP	18.2%	16.7%	25.0%	0.0%	14.9%
Other	25.0%	0.0%	40.0%	0.0%	20.0%
Total	13.1%	9.7%	21.5%	12.2%	14.1%
Number of observations					
LLL	2,650	2,671	2,700	2,697	10,718
SLL	483	453	426	420	1,782
SO	144	144	143	143	574
COOP	11	12	12	12	47
Other	4	3	5	3	15
Total	3,292	3,283	3,286	3,275	13,136

Table II: Descriptive Statistics on Danish CEOs and Their Firms

The data is constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occurring in the period from 1994-1997. The two columns for staying CEOs give the mean and standard deviation of the CEO, firm, and industry characteristics for firms that do not expereince CEO turnover in a given year. Likewise, the two columns for leaving CEOs give the mean and standard deviation for firms that experience CEO turnover. The final column presents the Z-statistic from a test of whether the difference between the means of leaving and staying CEOs is zero.

	Staying CEOs		Leaving CEOs		Mean Diff.
	Mean	St. Dev.	Mean	St. Dev.	Z-Statistic
CEO Characteristics					
Age	47.91	8.56	47.92	10.48	0.05
Female	0.04	0.20	0.07	0.26	4.78
Married	0.85	0.36	0.80	0.40	-4.56
Education	0.30	0.46	0.23	0.42	-6.25
Tenure	8.71	4.74	7.23	4.85	-12.20
Pay (Million DKK)	0.53	0.29	0.45	0.25	-13.07
Wealth (Million DKK)	2.49	10.44	1.85	6.70	-3.53
Firm Characteristics					
Number of Employees	63.85	119.75	72.65	119.19	2.95
Sales (Million DKK)	69.20	150.60	84.42	203.59	3.09
Neg. Net Income$_{t-1}$	0.18	0.39	0.23	0.42	4.73
Neg. Net Income$_{t-2}$	0.20	0.40	0.22	0.42	2.61
Profit/Sales in $t-1$	0.03	0.11	0.02	0.17	-0.61
Debt/Asset	0.73	0.77	0.75	0.24	2.05
Industry					
Manufacturing	0.42	0.49	0.40	0.49	-1.17
Construction	0.15	0.35	0.12	0.32	-3.60
Trade, Hotel & Restaurants	0.33	0.47	0.33	0.47	0.41
Transportation & Communications	0.05	0.23	0.08	0.28	4.20
Finance, Insurance, Real Estate & Business Services	0.05	0.21	0.06	0.24	1.90
Public Administration & Services	0.01	0.09	0.01	0.08	-0.17
Number of Observations	11,278		1,858		

Table III: Logit Analysis of CEO Turnover

Coefficient estimates and marginal effects with standard errors given in parentheses for logit models estimated using data constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occuring from 1994-1997. The dependent variable equals one if the CEO changes and zero otherwise. Model 1 presents results where all variables are included, while model 2 presents results where variables insignificant at a 10% level are removed sequentially.

	Model 1				Model 2			
	Coefficient	(S.E.)	Marginal Effect	(S.E.)	Coefficient	(S.E.)	Marginal Effect	(S.E.)
Intercept	4.677***	(0.955)	-	-	4.178***	(0.840)	-	-
Age	0.010*	(0.006)	0.001*	(0.000)	0.014**	(0.006)	0.001**	(0.000)
Age $>$ 59	0.870***	(0.112)	0.098***	(0.022)	0.865***	(0.112)	0.097***	(0.021)
Age $<$ 40	0.298***	(0.109)	0.027*	(0.014)	0.305***	(0.109)	0.027**	(0.014)
Female	0.369***	(0.110)	0.034**	(0.016)	0.365***	(0.109)	0.034**	(0.015)
Married	-0.128*	(0.073)	-0.011	(0.011)	-0.157**	(0.070)	-0.013	(0.011)
Children	-0.097	(0.063)	-0.007	(0.010)				
Tenure	-0.080***	(0.023)	-0.006***	(0.002)	-0.047***	(0.006)	-0.004***	(0.001)
Tenure^2/100	0.201	(0.136)	0.016	(0.010)				
Education	-0.228***	(0.065)	-0.016*	(0.009)	-0.229***	(0.065)	-0.016**	(0.008)
Health	0.538**	(0.252)	0.053	(0.033)	0.535**	(0.252)	0.053*	(0.032)
Log(pay)	-0.883***	(0.066)	-0.070***	(0.007)	-0.885***	(0.065)	-0.070***	(0.006)
Log(wealth)	-0.122***	(0.018)	-0.010***	(0.002)	-0.122***	(0.017)	-0.010***	(0.002)
Wealth $>$ 0	1.254***	(0.236)	0.060***	(0.009)	1.247***	(0.234)	0.060***	(0.009)
Net Income$_{t-1}<$ 0	0.266***	(0.074)	0.023*	(0.012)	0.283***	(0.064)	0.025**	(0.010)
Net Income$_{t-2}<$ 0	0.045	(0.069)	0.004	(0.011)				
Log(1 + (profit/sales)$_{t-1}$)	-0.064	(0.347)	-0.005	(0.027)				
Log(sales)	0.295***	(0.031)	0.023***	(0.003)	0.299***	(0.031)	0.024***	(0.003)
Leverage	-0.079	(0.103)	-0.006	(0.008)				
LLL	-0.108	(0.367)	-0.009	(0.033)				
SLL	-0.271	(0.374)	-0.019	(0.025)	-0.155*	(0.082)	-0.012	(0.009)
SO	-0.180	(0.384)	-0.013	(0.027)				
Time dummies		Yes				Yes		
Industry dummies		Yes				Yes		
N		13,136				13,136		
N(turnover)		1,858				1,858		
-2 log likelihood		9,721.63				9,728.52		
Prob. coefficients= 0		$<$.0001				$<$.0001		

*, **, and *** denote significance of coefficients at the 10%, 5%, or 1% levels (two-tailed test), respectively.

Table IV: Agency Cost Analysis across Firm Types

Coefficient estimates for regressions estimated using data constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. The data covers 3314 Danish firms from 1994-1997. The dependent variables are proxies for agency costs. In columns (1) and (2) agency costs are proxied using the ratio of operating expenses to sales. Columns (3) and (4) proxy agency costs using the sales to asset ratio. LLL is a dummy variable equal to one if the firm is an LLL firm and zero otherwise. Likewise for the SLL and COOP variables. Columns (1) and (3) present results where all explanatory variables are included in the regression, while the regressions in columns (2) and (4) only include variables significant at the 10% level. Standard errors are given in parentheses.

Dependent variable	Operating exp./Sales		Sales/Assets	
	(1)	(2)	(3)	(4)
Intercept	0.555***	0.557***	0.250	3.571***
	(0.016)	(0.016)	(2.132)	(0.526)
LLL	0.011**	0.008***	-1.853***	-1.557***
	(0.004)	(0.002)	(0.557)	(0.530)
SLL	0.003		-1.557**	-1.404**
	(0.005)		(0.617)	(0.600)
COOP	0.025*		-1.945	
	(0.015)		(1.994)	
Log(sales)	-0.024***	-0.024***	0.226*	
	(0.001)	(0.001)	(0.123)	
Time dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
N	13,136	13,136	13,133	13,133
Adjusted R^2	0.113	0.113	0.001	0.001

*, **, and *** denote significance of coefficients at the 10%, 5%, or 1% levels (two-tailed test), respectively.

Table V: Logit Analysis of CEO Turnover with Interaction Effects

Coefficient estimates and marginal effects with standard errors given in parentheses for logit models estimated using data constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occurring from 1994-1997. The dependent variable equals one if the CEO changes and zero otherwise. Model 1 presents results where all variables are included, while model 2 presents results where variables insignificant at a 10% level are removed sequentially.

	Model 1				Model 2			
	Coefficient	(S.E.)	Marginal Effect	(S.E.)	Coefficient	(S.E.)	Marginal Effect	(S.E.)
Intercept	4.800***	(0.964)	-	-	4.032***	(0.824)	-	-
Age	0.011*	(0.006)	0.001*	(0.000)	0.014**	(0.006)	0.001**	(0.000)
Age > 59	0.871***	(0.112)	0.099***	(0.018)	0.868***	(0.112)	0.097***	(0.017)
Age < 40	0.311***	(0.114)	0.028**	(0.011)	0.306***	(0.109)	0.027**	(0.011)
Female	0.257**	(0.127)	0.023*	(0.012)	0.247**	(0.126)	0.021*	(0.012)
Married	-0.127*	(0.073)	-0.011*	(0.006)	-0.156**	(0.070)	-0.013**	(0.006)
Children	-0.097	(0.063)	-0.007	(0.005)				
Tenure	-0.080***	(0.023)	-0.006***	(0.002)	-0.047***	(0.006)	-0.004***	(0.001)
$\text{Tenure}^2/100$	0.200	(0.136)	0.016	(0.011)				
Education	-0.287***	(0.075)	-0.020***	(0.005)	-0.225***	(0.065)	-0.016***	(0.005)
Health	0.528**	(0.253)	0.052*	(0.031)	0.542**	(0.252)	0.053*	(0.030)
Log(pay)	-0.886***	(0.066)	-0.071***	(0.007)	-0.883***	(0.065)	-0.069***	(0.006)
Log(wealth)	-0.123***	(0.018)	-0.010***	(0.002)	-0.123***	(0.017)	-0.010***	(0.002)
Wealth > 0	1.259***	(0.236)	0.061***	(0.008)	1.263***	(0.234)	0.060***	(0.007)
Net $\text{Income}_{t-1} < 0$	-0.832	(1.186)	0.017**	(0.009)				
Net $\text{Income}_{t-2} < 0$	0.044	(0.070)	0.004	(0.006)				
$\text{Log}(1 + (\text{profit/sales})_{t-1})$	-0.043	(0.349)	-0.003	(0.028)				
Log(sales)	0.298***	(0.031)	0.024***	(0.003)	0.306***	(0.031)	0.024***	(0.003)
Leverage	-0.077	(0.100)	-0.006	(0.008)				
LLL	-0.236	(0.385)	-0.021	(0.037)				
SLL	-0.371	(0.394)	-0.025	(0.023)				
SO	-0.309	(0.403)	-0.022	(0.025)				
Gender*Neg. Net Income_{t-1}	0.486**	(0.247)	0.018	(0.046)	0.489**	(0.240)	0.057*	(0.031)
Education*Neg. Net Income_{t-1}	0.245*	(0.144)	0.019***	(0.007)				
Age < 40*Neg. Net Income_{t-1}	-0.068	(0.160)	-0.018	(0.016)				
LLL*Neg. Net Income_{t-1}	1.033	(1.188)	0.075	(0.065)	0.293***	(0.069)	0.026***	(0.007)
SLL*Neg. Net Income_{t-1}	0.909	(1.199)	0.052	(0.047)				
SO*Neg. Net Income_{t-1}	1.049	(1.246)	0.062	(0.053)				
Time dummies		Yes				Yes		
Industry dummies		Yes				Yes		
N		13,136				13,136		
N(turnover)		1,858				1,858		
-2 log likelihood		9,713.79				9,725.88		
Prob. coefficients= 0		<.0001				<.0001		

*, **, and *** denote significance of coefficients at the 10%, 5%, or 1% levels (two-tailed test), respectively.

Table VI: Logit Analysis of CEO Turnover without 1996

Coefficient estimates and marginal effects with standard errors given in parentheses for logit models estimated using data constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occurring from 1994-1997. Obervations for 1996 are excluded due to abnormally high turnover rates this year. The dependent variable equals one if the CEO changes and zero otherwise. Model 1 presents results where all variables are included, while model 2 presents results where variables insignificant at a 10% level are removed sequentially.

	Model 1				Model 2			
	Coefficient	(S.E.)	Marginal Effect	(S.E.)	Coefficient	(S.E.)	Marginal Effect	(S.E.)
Intercept	3.120***	(1.202)	-	-	3.098***	(0.922)	-	-
Age	0.002	(0.008)	0.000	(0.001)				
Age > 59	0.966***	(0.141)	0.117***	(0.024)	0.996***	(0.106)	0.125***	(0.017)
Age < 40	0.313**	(0.139)	0.029**	(0.014)	0.279***	(0.083)	0.027***	(0.009)
Female	0.179	(0.159)	0.016	(0.015)				
Married	-0.085	(0.090)	-0.007	(0.008)				
Children	-0.121	(0.078)	-0.009	(0.006)	-0.148**	(0.071)	-0.012**	(0.006)
Tenure	-0.070**	(0.028)	-0.006***	(0.002)	-0.047***	(0.008)	-0.004***	(0.001)
$\text{Tenure}^2/100$	0.145	(0.167)	0.012	(0.014)				
Education	-0.372***	(0.096)	-0.026***	(0.007)	-0.382***	(0.094)	-0.028***	(0.007)
Health	0.325	(0.308)	0.031	(0.033)				
Log(pay)	-0.630***	(0.081)	-0.052***	(0.008)	-0.647***	(0.079)	-0.055***	(0.007)
Log(wealth)	-0.161***	(0.022)	-0.013***	(0.002)	-0.165***	(0.021)	-0.014***	(0.002)
Wealth > 0	1.773***	(0.285)	0.074***	(0.008)	1.808***	(0.280)	0.077***	(0.007)
Net $\text{Income}_{t-1} < 0$	-0.010	(1.303)	0.024**	(0.011)				
Net $\text{Income}_{t-2} < 0$	0.006	(0.083)	0.001	(0.007)				
$\text{Log}(1 + (\text{profit/sales})_{t-1})$	-0.122	(0.437)	-0.010	(0.036)				
Log(sales)	0.209***	(0.039)	0.017***	(0.003)	0.218***	(0.035)	0.019***	(0.003)
Leverage	-0.033	(0.077)	-0.003	(0.006)				
LLL	-0.023	(0.537)	-0.002	(0.045)				
SLL	-0.182	(0.547)	-0.014	(0.039)				
SO	0.020	(0.555)	0.002	(0.047)				
Gender*Neg. Net Income_{t-1}	0.608**	(0.281)	0.072	(0.090)	0.832***	(0.229)	0.099***	(0.036)
Education*Neg. Net Income_{t-1}	0.408**	(0.169)	0.029**	(0.014)	0.417**	(0.166)	0.031**	(0.014)
Age < 40*Neg. Net Income_{t-1}	-0.144	(0.181)	-0.015	(0.023)				
LLL*Neg. Net Income_{t-1}	0.272	(1.306)	0.025	(0.109)	0.244***	(0.094)	0.023**	(0.009)
SLL*Neg. Net Income_{t-1}	0.308	(1.318)	0.025	(0.104)				
SO*Neg. Net Income_{t-1}	0.039	(1.391)	0.003	(0.114)				
Time dummies		Yes				Yes		
Industry dummies		Yes				Yes		
N		9,850				9,850		
N(turnover)		1,151				1,151		
-2 log likelihood		6,597.28				6,606.46		
Prob. coefficients= 0		<.0001				<.0001		

*, **, and *** denote significance of coefficients at the 10%, 5%, or 1% levels (two-tailed test), respectively.

Table VII: Logit Analysis of CEO Turnover for SO Firms

Coefficient estimates and marginal effects with standard errors given in parentheses for logit models estimated using data constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occurring from 1994-1997. CEO turnover is modelled for SO firms, which are firms that are 100% owned by one person with full liability. The dependent variable equals one if the CEO changes and zero otherwise. Model 1 presents results where all variables are included, while model 2 presents results where variables insignificant at a 10% level are removed sequentially.

	Model 1				Model 2			
	Coefficient	(S.E.)	Marginal Effect	(S.E.)	Coefficient	(S.E.)	Marginal Effect	(S.E.)
Intercept	0.541	(6.374)	.	-	3.509	(5.257)	.	-
Age	0.016	(0.027)	0.001	(0.002)	0.023*	(0.012)	0.003*	(0.001)
Age > 59	0.032	(0.866)	0.003	(0.078)				
Age < 40	-0.076	(0.444)	-0.006	(0.038)				
Female	-0.131	(0.342)	-0.011	(0.028)				
Married	0.103	(0.308)	0.009	(0.025)				
Children	-0.423	(0.261)	-0.044	(0.031)	-0.378*	(0.221)	-0.051*	(0.030)
Tenure	-0.127	(0.095)	-0.011	(0.008)				
Tenure^2/100	0.635	(0.599)	0.056	(0.050)				
Education	-0.310	(0.452)	-0.024	(0.034)				
Health	-0.076	(0.770)	-0.007	(0.064)				
Log(pay)	-0.754*	(0.455)	-0.066	(0.045)	-0.939**	(0.400)	-0.110**	(0.047)
Log(wealth)	-0.047	(0.097)	-0.004	(0.009)				
Wealth > 0	0.572	(1.146)	0.040	(0.070)				
Net Income$_{t-1} < 0$	0.276	(0.627)	0.027	(0.068)				
Net Income$_{t-2} < 0$	-0.410	(0.492)	-0.031	(0.035)				
Log(1 + (profit/sales)$_{t-1}$)	3.407	(3.161)	0.300	(0.282)				
Log(sales)	0.396**	(0.190)	0.035	(0.022)	0.349**	(0.141)	0.041**	(0.016)
Leverage	-0.006	(0.416)	-0.001	(0.037)				
Gender*Neg. Net Income$_{t-1}$	-0.418	(1.281)	-0.038	(0.103)				
Education*Neg. Net Income$_{t-1}$	1.517	(1.018)	0.222	(0.199)				
Age < 40*Neg. Net Income$_{t-1}$	0.898	(0.848)	0.126	(0.138)	1.151*	(0.639)	0.195	(0.139)
Time dummies		Yes				Yes		
Industry dummies		Yes				Yes		
N		574				574		
N(turnover)		113				113		
-2 log likelihood		532.52				547.14		
Prob. coefficients= 0		0.332				0.002		

*, **, and *** denote significance of coefficients at the 10%, 5%, or 1% levels (two-tailed test), respectively.

Table VIII: Logit Analysis of CEO Turnover for SLL Firms

Coefficient estimates and marginal effects with standard errors given in parentheses for logit models estimated using data constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occurring from 1994-1997. CEO turnover is modelled for SLL firms, which are limited liability firms that are required to have 125,000 DKK in capital and can choose to have either a management board, board of directors, or both. The dependent variable equals one if the CEO changes and zero otherwise. Model 1 presents results where all variables are included, while model 2 presents results where variables insignificant at a 10% level are removed sequentially.

	Model 1				Model 2			
	Coefficient	(S.E.)	Marginal Effect	(S.E.)	Coefficient	(S.E.)	Marginal Effect	(S.E.)
Intercept	6.031*	(3.135)	-	-	8.482***	(2.617)	-	-
Age	0.012	(0.018)	0.001	(0.001)				
Age $>$ 59	0.993***	(0.374)	0.087*	(0.050)	1.114***	(0.264)	0.115***	(0.039)
Age $<$ 40	0.166	(0.318)	0.010	(0.020)				
Female	0.270	(0.304)	0.017	(0.022)				
Married	-0.270	(0.201)	-0.017	(0.014)				
Children	0.008	(0.176)	0.000	(0.010)				
Tenure	-0.177***	(0.068)	-0.010***	(0.004)	-0.198***	(0.066)	-0.013***	(0.004)
Tenure^2/100	0.579	(0.404)	0.033	(0.021)	0.702*	(0.392)	0.045**	(0.022)
Education	-0.650**	(0.308)	-0.028**	(0.012)	-0.892***	(0.295)	-0.040***	(0.011)
Health	0.777	(0.594)	0.062	(0.065)				
Log(pay)	-0.803***	(0.228)	-0.045***	(0.017)	-0.720***	(0.207)	-0.046***	(0.014)
Log(wealth)	-0.129**	(0.052)	-0.007**	(0.003)	-0.052***	(0.012)	-0.003***	(0.001)
Wealth $>$ 0	1.058	(0.684)	0.039**	(0.018)				
Net Income$_{t-1}$ $<$ 0	-0.298	(0.277)	-0.015	(0.013)				
Net Income$_{t-2}$ $<$ 0	0.248	(0.199)	0.016	(0.014)				
Log(1 + (profit/sales)$_{t-1}$)	-1.999	(1.438)	-0.113	(0.088)				
Log(sales)	0.202*	(0.115)	0.011	(0.007)				
Leverage	-0.544	(0.381)	-0.031	(0.022)				
Gender*Neg. Net Income$_{t-1}$	0.746	(0.548)	0.054	(0.051)				
Education*Neg. Net Income$_{t-1}$	-14.446	(656.400)	-0.018	(0.016)				
Age $<$ 40*Neg. Net Income$_{t-1}$	0.862**	(0.411)	0.062	(0.038)	0.733**	(0.298)	0.065*	(0.034)
Time dummies		Yes				Yes		
Industry dummies		Yes				Yes		
N		1,782				1,782		
N(turnover)		228				228		
-2 log likelihood		1,175.30				1,203.46		
Prob. coefficients= 0		$<$.0001				$<$.0001		

*, **, and *** denote significance of coefficients at the 10%, 5%, or 1% levels (two-tailed test), respectively.

Table IX: Logit Analysis of CEO Turnover for LLL Firms

Coefficient estimates and marginal effects with standard errors given in parentheses for logit models estimated using data constructed from the intersection of the SD Account database and the IDA database, which is a longitudinal matched employer-employee database. We employ a simple procedure to define the CEO of the 3314 Danish firms in each year and thereafter identify CEO turnovers occurring from 1994-1997. CEO turnover is modelled for LLL firms, which are limited liability firms that are required to have 500,000 DKK in capital and a two-tier governance system. The dependent variable equals one if the CEO changes and zero otherwise. Model 1 presents results where all variables are included, while model 2 presents results where variables insignificant at a 10% level are removed sequentially.

	Model 1				Model 2			
	Coefficient	(S.E.)	Marginal Effect	(S.E.)	Coefficient	(S.E.)	Marginal Effect	(S.E.)
Intercept	4.510***	(0.934)	-	-	4.987***	(0.870)	-	-
Age	0.011	(0.007)	0.001	(0.001)				
Age > 59	0.881***	(0.122)	0.097***	(0.019)	1.018***	(0.090)	0.125***	(0.015)
Age < 40	0.452***	(0.129)	0.042***	(0.014)	0.327***	(0.089)	0.031***	(0.009)
Female	0.355**	(0.157)	0.032**	(0.016)	0.360**	(0.156)	0.034**	(0.017)
Married	-0.111	(0.083)	-0.009	(0.007)				
Children	-0.104	(0.072)	-0.008	(0.005)	-0.160**	(0.066)	-0.012**	(0.005)
Tenure	-0.061**	(0.026)	-0.005**	(0.002)	-0.042***	(0.007)	-0.003***	(0.001)
$\text{Tenure}^2/100$	0.113	(0.152)	0.009	(0.011)				
Education	-0.254***	(0.079)	-0.018***	(0.005)	-0.252***	(0.078)	-0.019***	(0.006)
Health	0.549*	(0.307)	0.053	(0.036)	0.562*	(0.306)	0.058	(0.039)
Log(pay)	-0.906***	(0.071)	-0.070***	(0.007)	-0.912***	(0.071)	-0.075***	(0.007)
Log(wealth)	-0.118***	(0.020)	-0.009***	(0.002)	-0.114***	(0.019)	-0.009***	(0.002)
Wealth > 0	1.207***	(0.265)	0.057***	(0.009)	1.159***	(0.263)	0.060***	(0.009)
Net $\text{Income}_{t-1} < 0$	0.254**	(0.100)	0.022**	(0.009)	0.259***	(0.091)	0.024***	(0.009)
Net $\text{Income}_{t-2} < 0$	0.034	(0.076)	0.003	(0.006)				
$\text{Log}(1 + (\text{profit/sales})_{t-1})$	0.028	(0.367)	0.002	(0.028)				
Log(sales)	0.306***	(0.034)	0.024***	(0.003)	0.305***	(0.033)	0.025***	(0.003)
Leverage	-0.047	(0.077)	-0.004	(0.006)				
Gender*Neg. Net Income_{t-1}	0.488*	(0.294)	0.078*	(0.044)	0.513*	(0.293)	0.087*	(0.047)
Education*Neg. Net Income_{t-1}	0.294**	(0.150)	0.021	(0.014)	0.290*	(0.150)	0.022	(0.014)
Age < 40*Neg. Net Income_{t-1}	-0.366**	(0.183)	-0.033*	(0.019)	-0.373**	(0.182)	-0.035*	(0.018)
Time dummies		Yes				Yes		
Industry dummies		Yes				Yes		
N		10,718				10,718		
N(turnover)		1,507				1,507		
-2 log likelihood		7,875.17				7,881.75		
Prob. coefficients= 0		<.0001				<.0001		

*, **, and *** denote significance of coefficients at the 10%, 5%, or 1% levels (two-tailed test), respectively.

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