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# CEO turnover and firm performance between public and private firms

Evidence from Europe

## Abstract

This study compares CEO turnover-performance sensitivity between public and private firms from 2006 to 2019. I use a European sample of public and private firms and analyze if public firms face more CEO turnovers and have greater turnover-performance sensitivity than private firms. Furthermore, I examine how the performance has developed after the CEO turnover in public and private firms. My findings show that public firms have a higher turnover rate and face more CEO turnovers in my period. I also find that public firms have greater turnover-performance sensitivity than private firms. In addition, I present that the performance has improved in both public and private firms after the CEO turnover.

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# 1. Introduction

The change of the chief executive officer (CEO) is a significant event for the company, which may shape its future for many years. The corporate board directs and supervises the company's management and operations, and the change of the CEO is ultimately their decision. According to Gao et al. (2017), hiring and firing a CEO may be the most important job of a corporate board. Furthermore, the poor performance of a firm is usually a significant factor behind the decision to fire the CEO. Jenter & Kanaan (2015) find that CEO turnover is more likely to happen after bad performance caused by factors beyond the control of the CEO, such as bad industry performance. To avoid making these suboptimal CEO turnover decisions, studying the CEO turnover cases and the role of the performance of the firm in them is essential.

I examine the differences in CEO turnover between public and private firms in this event study. My focus is on analyzing the sensitivity of turnover related to the profitability and growth measures of the firm. Thus, I use return on assets (ROA) and revenue growth as performance measures. My sample consists of 674 public and private firms in Europe and involves 701 CEO turnover cases between 2006-2019. The motivation of the study is to find out first if public firms face more turnovers than private firms and then if the performance of the firm has a greater impact on public firm CEO turnovers than private firm ones. In addition, I investigate if the decision of the CEO turnover has been rewarding and analyze the profitability and growth changes of the firm three years after the CEO turnover. Furthermore, I aim to explain my findings through prior literature and evaluate them critically.

Based on my research, public firms face more CEO turnovers and have greater CEO turnover-performance sensitivity in terms of profitability and growth than private firms. This indicates that the board of public firms may practice tighter monitoring and be more willing to fire the CEO in the case of bad performance than private firms. When it comes to the performance after the CEO turnover, both public and private firms have an improvement in profitability and growth. However, my research suggests that public firms improve more on growth and private firms improve more on profitability. This may be explained by the fact that the private firm sample has greater growth performance, and the public firm sample has greater profitability performance at first. Thus, the new CEO focuses on improving the aspect that has more room for improvement.

## 1.1 Literature review

CEO turnover-performance relation is a highly researched topic in prior academic literature, and the interest in the case and its different aspects is increasing. Previous older work has focused on examining public firms primarily because of the available data. Coughlan & Schmidt (1985) are the first to investigate the performance of the firm concerning management changes. Their study shows empirically that corporate boards control top management behavior by making termination decisions related to the stock performance of the firm. Weisbach (1988) found out further in his study that a board dominated by outside directors is significantly more likely than a board dominated by inside directors to change the CEO based on performance. Warner et al. (1988) continue the research by examining the association between stock price performance and top management changes for 269 NYSE and AMEX firms. They find an inverse relationship between the probability of a top management change and stock performance. However, their logit regression model cannot show predictive ability unless extreme stock performance.

These prior studies concentrate on public firms and use the stock return of the firm as a performance measure, which differs from my research. Gao et al. (2017) study compares CEO turnover between public and large private firms in the U.S. through several perspectives and analyses. I replicate some of their analysis using a European sample and thus expand the field of research on CEO turnover also from the point of view of private firms. Coles et al. (2003) provided the first detailed analysis and comparison of large private firms versus large publicly traded firms obtained from the Forbes 1994 list. They find no evidence that the CEO turnover in a private firm is more sensitive to change in performance than in a public firm and conclude that CEO turnover-performance sensitivity to align managerial and shareholder interest is not a prominent feature of a private firm. Cornelli et al. (2013) examine how boards monitor CEOs and whether monitoring improves performance. It is one of the previous studies that correspond to my own in the context of European firms. Using a large sample of private equity-backed firms, they find interestingly that soft information about the ability of the CEO is much more important than hard data about the performance in the CEO turnover decisions. Another study concerning firms in Europe is conducted by Lel et al. (2014). They find that public firms are more likely to replace poorly performing top managers than private firms and explain their findings by information production and monitoring role of stock markets.

More recent work related to the topic is, for example, a study conducted by Edward Fee et al. (2018), which examines the robustness of empirical models and findings concerning CEO turnover. They conclude that the relation between CEO turnover and abnormal firm performance is strong and evident no matter their modeling choices. However, the association between turnover and industry performance is much weaker. Thus, they state that industry performance plays a minor role in most CEO removal decisions. Jenter & Lewellen (2021) introduce the concept of performance-induced CEO turnover, defined as turnover that would not have occurred had performance been "good." They estimate that 38%-55% of all CEO turnovers are performance-induced and that turnover remains sensitive to performance even late in CEO tenure and declines only slowly with it. Ma (2022) offers an exciting perspective on the topic by examining gender differences in CEO turnover-performance sensitivity in Chinese listed companies. The study provides evidence that the forced turnover of female CEOs is more sensitive to changes in performance than their male counterparts. Thus, it suggests that compared with male CEOs, female CEOs are evaluated more unfavorably when they underperform. These recent studies prove that there is still much to explore around the relationship between CEO turnovers and firm performance topic and new perspectives to discover.

## 1.2 Differences between public and private firms

Including the private firms in my research offers a benchmark group to which I can compare public firms to. Private firms differ from public firms in several critical aspects. By exploring their differences, I can provide results on private-firm CEO turnover and deliver insights into the factors determining CEO turnover in general (Gao et al., 2017). According to Lel et al. (2014), one of the major differences between public and private firms is that public firms often have diffused ownership, which can lead to substantial agency conflicts as it makes it more challenging to replace poorly performing CEOs. On the other hand, they state that private firms typically have concentrated ownership and control but are less likely to be subject to governance mechanisms associated with public equity markets. This concentrated ownership of private firms lowers agency costs between the owners and CEO, and therefore monitoring is more effortless, which may lead to higher CEO turnover (M. C. Jensen & Meckling, 1976).

Another difference between public and private firms is the phenomenon of managerial myopia, to which public firms are more likely to be exposed. Stein (1988) argues that takeover pressure, which comes from the undervalued stock price, can be damaging because it leads managers to sacrifice long-term interests to boost current profits. If stockholders are imperfectly informed, temporarily low earnings may cause the stock to become undervalued and increase the fear of being bought out. In addition, managers operating with short horizons can also behave myopically, even though market participants are rational (Stein, 1989). These ideas behind this theory of Stein are extended by Gao et al. (2017), who argue that public-firm boards can choose to signal a change in strategy by myopically firing the CEO when facing a takeover-driven loss of valuable board seats. On the contrary, they state that private firm boards and managers can afford to take a long-term view, knowing they will not be penalized for poor short-term performance. Furthermore, the takeover risk can arise from those competing CEOs who perceive the opportunity to eliminate the inefficiencies and offer target shareholders a higher-valued alternative than the current management, causing a CEO turnover at the same time (M. C. Jensen & Ruback, 1983).

Subrahmanyam & Titman (1999) conclude that public financing is preferred in a large, liquid public market. This implies that public firms can raise capital easier than private firms, and the amounts can be more extensive. Pagano et al. (1998) find when examining private firms in Italy that going public also enables firms to borrow more cheaply and increases the willingness of the banks to lend to them. These differences in financing the firm give public firm CEOs more room to improve the performance of the firm. Gao et al. (2017) argue that public-firm boards can observe both stock price and accounting performance, which may decrease their weight on accounting performance. On the other hand, they state that with more media and analyst scrutiny, public firm performance measures may be more informative of CEO quality and effort, leading public-firm turnover to be more sensitive to performance.

## 1.3 Hypothesis

My research includes three hypotheses based on the prior study conducted by Gao et al. (2017), who examined public and private firms in the U.S. using a period from 2001 to 2011. Their study found that public firms are more likely to experience turnover than private firms. This finding serves as the first hypothesis of my research, and I aim to prove the following:

H1: Public firms face more CEO turnovers than private firms.

Another finding of Gao et al. (2017) is that public firms have greater CEO turnover-performance sensitivity (TPS) compared with their private-firm counterparts. They find that public firms have greater TPS in both profitability and growth. Thus, my second hypothesis is the following:

H2: Public firms have greater CEO turnover-performance sensitivity than private firms.

In addition, I investigate the performance after the CEO turnover with the third hypothesis that the performance improves when the "poor" performed CEO is replaced with a better one. Gao et al. (2017) find that public and private firms improve performance after CEO turnover, but the improvement is more pronounced in private firms. The third hypothesis is the following:

H3: Performance improves in public and private firms after the CEO turnover.

# 2. Data and Descriptive statistics

## 2.1 Sample formation

The data I am using is collected from Capital IQ Pro, which provides global information on public and private firms. The database includes, for example, balance sheet and income statement items, as well as information on the company and its manager. Most importantly, Capital IQ Pro provides event data, which includes CEO changes. Thus, it is an especially suitable database for my study of European CEO turnover in public and private firms. The timeline of my sample is from 2006 to 2019, although Capital IQ Pro has provided detailed information on CEO turnover since 2001, such as why a CEO is replaced, who the new CEO is, and what the new CEO's background is (Gao et al., 2017). However, I noticed in my European firm sample that there were few CEO turnover observations in either public or private firms between 2001-2005. Thus, I decided to remove these years from my selection.

I collected the data separately for public and private firms. The criteria for the screening of public and private firms were that the firm is located geographically in developed Europe[1] and they had at least one CEO change event between 2001-2019[2]. However, I wanted to make firms more comparable in size and include only private firms with 1 million in total assets for at least one year between 2001-2019. The European setting provides a unique opportunity because EU accounting regulation is based on a firm's legal form rather than listing status (Burgstahler et al., 2006). Thus, private limited companies face broadly the same accounting standards as publicly traded corporations. These public firms of my sample are traded, for example, on London Stock Exchange (LSE), Swiss Exchange (SIX), or other European stock exchanges. It is noteworthy that Capital IQ Pro has more private firms in its database, which eliminates the possibility of adding criteria concerning public firms. All in all, I ended up having 214 public firms and 460 private firms in my sample.

In addition, both samples consist of firms operating primarily in real estate, healthcare, consumer products, and financial industries. Some firms are also included whose industry is unclassified by Capital IQ Pro. This makes my sample a bit narrow industry-wise. However, it still contains 48 different two-digit Standard Industrial Classification (SIC) codes, indicating that firms still have different general economic characteristics. SIC codes come from Capital IQ Pro, which reports them as 4-digit numbers. I decided to divide the sample using just two-digit SICs. Industry definitions based on three-digit or four-digit SIC groupings do not capture similarity among firms concerning sales changes, profit margins, or stock returns better than a two-digit definition (Clarke, 1989). This SIC code analysis provides additional information for my sample. It helps me identify that my sample consists of more firms operating in heterogeneous industries than in homogeneous industries based on the industry list of Parrino (1997) with decreasing homogeneity. Parrino (1997) states that the likelihood of CEO turnover increases with industry homogeneity because CEO appointments are less costly, and the performance measures are more precise. Thus, I might have more CEO turnover cases with the sample of more firms operating in homogeneous industries.

[1] The countries that Capital IQ Pro classified as Developed Europe are Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Finland, France, Germany, Gibraltar, Greece, Greenland, Iceland, Ireland, Italy, Liechtenstein, Luxemburg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and Vatican City.

[2] I removed firm-year observations between 2001-2005 after the screening and data collection, which lead to excluding 14 public firm CEO turnover cases, and 38 private firm CEO turnover cases.

## 2.2 Summary of public and private firm samples

Table 1 presents CEO turnover cases during my period between 2006-2019. I calculate firm-year observations based on total assets to exclude the observations with missing total assets. When I figured out the number of CEO turnovers in public firms, I excluded CEO changes that happened 12 months after the IPO of the firm. It is common for firms to change their top management in the case of an IPO; therefore, public firms could have more frequent CEO turnover because of these events (Kaplan et al., 2009). I ended up excluding 10 CEO changes that were associated with IPO. In addition, CEO changes in the public firm sample before the IPO date (41 changes) are also removed. The private firm sample, in turn, has cases where the firm has been public at the time of the CEO change. I identify these cases by looking at the IPO date and de-listing date of the firm and exclude 122 CEO change cases between these dates. Furthermore, I require sample CEOs to have a minimum tenure of 12 months to avoid including interim CEO appointments. Thus, I have 2580 public firm-year observations involving 292 CEO turnover cases and 4587 private firm-year observations with 409 CEO turnover cases.

## Table 1: CEO turnover cases in public and private firms

Table 1 presents CEO turnover cases from 2006 to 2019 for public and private firms. The data from Capital IQ consists of firm-year observations with non-missing values in total assets. I exclude CEO turnover cases that happened before the IPO of the public firm and 12 months after it. For private firms, I exclude the CEO turnover cases between the IPO date and the de-listing date of the firm. Furthermore, I required CEOs to have a minimum tenure of 12 months. Thus, my sample consists of 2580 public firm-year observations involving 292 CEO turnover cases and 4587 private firm-year observations with 409 CEO turnover cases.

| | Panel A. Public Firms | | | Panel B. Private Firm | | |
|---|---|---|---|---|---|---|
| Year | Firms | CEO turnovers | % of firms with CEO turnover | Firms | CEO turnovers | % of firms with CEO turnover |
| 2006 | 151 | 13 | 8.61 % | 325 | 26 | 8.00 % |
| 2007 | 161 | 14 | 8.70 % | 327 | 31 | 9.48 % |
| 2008 | 165 | 13 | 7.88 % | 325 | 40 | 12.31 % |
| 2009 | 171 | 15 | 8.77 % | 341 | 32 | 9.38 % |
| 2010 | 179 | 18 | 10.06 % | 328 | 30 | 9.15 % |
| 2011 | 182 | 18 | 9.89 % | 324 | 28 | 8.64 % |
| 2012 | 190 | 19 | 10.00 % | 349 | 39 | 11.17 % |
| 2013 | 195 | 20 | 10.26 % | 339 | 28 | 8.26 % |
| 2014 | 200 | 18 | 9.00% | 338 | 20 | 5.92 % |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2015 | 200 | 23 | 11.50 % | 345 | 28 | 8.12 % |
| 2016 | 199 | 23 | 11.56 % | 337 | 28 | 8.31 % |
| 2017 | 197 | 27 | 13.71 % | 322 | 24 | 7.45 % |
| 2018 | 195 | 32 | 16.41 % | 301 | 27 | 8.97 % |
| 2019 | 195 | 39 | 20.00 % | 286 | 28 | 9.79 % |
| Total | 2580 | 292 | 11.32 % | 4587 | 409 | 8.92 % |

Table 1 summarizes the annual frequency of CEO turnovers for public and private firm samples. I show that H1 holds, and public firms face more CEO turnover cases during my period as the average turnover rate for public firms is 11.32%, while for private firms, it is 8.92%. CEO turnover cases are increasing, especially in public firms through the years, peaking in the latest observed year 2019 with 39 cases. This may be explained by intense competition, which increases forced CEO turnovers (Dasgupta et al., 2018). On the other hand, the number of firms is also increasing every year up to 2013, which can explain some part of the increase in CEO turnover cases during the period. Furthermore, Taylor (2010) identifies three potential reasons why boards rarely fire CEOs. One of the reasons is that if there is not much difference between a good CEO and a bad CEO, then there is not much reason to replace one CEO with another. This may be more unlikely nowadays if we assume that the trend toward more external candidates becoming CEOs and shorter tenures for CEOs has continued (Hermalin, 2005).

There is no similar increase in the number of private firms or the CEO turnover cases of private firms. However, one aspect that can be detected from the private firm sample is that the CEO turnover cases peaked between 2008-2012, including the financial and European debt crises. Gao et al. (2017) find similar peaking in the private-firm sample during the financial crisis period between 2008-2010. The highest turnover rate of 12.31% is in 2008 when the financial crisis broke out in Europe. In addition to the financial crisis, Europe experienced the European debt crisis on top of it. Of the countries in my sample, Cyprus, Greece, Ireland, Portugal, and Spain were in the middle of the crisis. The crisis was at its worst in 2012, reflecting the turnover rate of private firms as it is 11.17% for the year. Campello, Graham, and Harvey (2010) show that financially constrained firms (private firms) are more negatively impacted by the most recent crisis than unconstrained firms (public firms), which supports my findings.

Table 2 presents a comparison of the public and private firm sample variables. I included assets, revenue, revenue growth, ROA, debt, and leverage in the comparison table. I have reshaped the samples so that there are no missing values in any variable. Thus, the public firm sample contains 2079 firm-year observations, and the private firm sample contains 2159 firm-year observations. All the continuous variables are winsorized at the 1st and 99th percentiles so that the outliers are changed to be closer to other values on the sample. I have done the t-Test and Wilcoxon test in the two last columns to compare the significance of the difference between public and private firms.

## Table 2: Variables of public and private firm samples

Table 2 presents a comparison of the public firm Panel A and private firm Panel B variables. Both samples are reshaped so that any variable has no missing values. The public firm Panel A contains 2079 firm-year observations, and the private firm Panel B contains 2159 firm-year observations. All the continuous variables are winsorized at the 1st and 99th percentiles. Furthermore, the last two columns present the tests of differences in means and medians between the panels with *, **, and *** indicating significance at the 10%, 5%, and 1% levels, respectively. Definitions of all variables are provided in the Appendix.

| | Panel A. Public Firms | | | | Panel B. Private Firms | | | | Test of differences | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variables | N | Mean | Median | Std. Dev. | N | Mean | Median | Std. Dev. | t-Test | Wilcoxon test |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | (2) - (6) | (3) - (7) |
| Assets (millions€) | 2079 | 2755 | 1112 | 4236 | 2159 | 1227 | 364 | 2088 | 1528*** | 748*** |
| Revenue (millions€) | 2079 | 736 | 189 | 2002 | 2159 | 362 | 114 | 793 | 374*** | 76*** |
| Revenue growth | 2079 | 15.87 % | 6.29 % | 61.30 % | 2159 | 20.88 % | 3.75 % | 114.94 % | -5.01 %* | 2.54 %*** |
| 2-year Revenue growth | 2079 | 46.52 % | 13.80 % | 153.71 % | 2159 | 55.24 % | 8.53 % | 246.25 % | -8.72 % | 5.27 %*** |
| Lagged Revenue growth | 2079 | 26.88 % | 7.15 % | 104.89 % | 2159 | 34.47 % | 4.65 % | 177.32 % | -7.59 %* | 2.50 %*** |
| ROA | 2079 | 3.42 % | 3.35 % | 7.37 % | 2159 | 1.96 % | 2.21 % | 7.84 % | 1.46 %*** | 1.14 %*** |
| 2-year ROA | 2079 | 7.76 % | 6.83 % | 13.88 % | 2159 | 4.61 % | 4.46 % | 14.57 % | 3.15 %*** | 2.37 %*** |
| Lagged ROA | 2079 | 3.79 % | 3.44 % | 7.75 % | 2159 | 2.19 % | 2.29 % | 7.84 % | 1.60 %*** | 1.16 %*** |
| Debt (millions€) | 2079 | 1248 | 384 | 1732 | 2159 | 472 | 78 | 937 | 777*** | 305*** |
| Leverage | 2079 | 37.87 % | 38.11 % | 20.89 % | 2159 | 34.52 % | 32.45 % | 28.30 % | 3.35 %*** | 5.66 %*** |

Based on the comparison table, the public firm sample differs from the private firm sample in size since the public firm sample has a significantly higher mean of total assets than private firms. However, this difference (€1,528 million) would be much higher without the worth of €1 million total assets criteria concerning the private firms. Public firms also have significantly greater revenue and more debt than private firms. When it comes to operating performance, my public firm sample has a greater return on assets (ROA) as a profitability measure, but the private firm sample, in turn, has greater revenue growth, which indicates the growth of my sample firms. This is consistent with Kaplan et al. (2009), who find dramatic growth in their sample of unprofitable VC-financed companies. In addition, unlike Gao et al. (2017), my public firms are more levered than the private firms, although the difference in means is only 3.35%. These differences can also be interpreted as a starting point for my analysis of public and private firms.

# 3. CEO turnover-performance sensitivity in public and private firms

## 3.1 Turnover-performance sensitivity regression

I construct a logit regression for my analysis of TPS between public and private firms. Logistic regression is needed because I am explaining a categorical variable, CEO turnover, by performance measures. This categorical variable takes a value of 1 if there is a CEO turnover case in the firm-year observation and 0 otherwise. I estimate the following equation 1 of logit regression:

$$(1) \qquad P(CEO\ turnover) = \alpha + \beta_1 ROA + \beta_2 Revenue\ growth + \beta_3 LN(Revenue) + \beta_4 Leverage + Industry\ fixed\ effects + Year\ fixed\ effects + \epsilon$$

The dependent variable of the regression is the probability of CEO turnover. Gao et al. (2017) use 2-year cumulative ROA and 2-year cumulative sales growth as the two performance measures in their baseline regression. I will use the same measures in version 1 of the logit regression and refer to them as ROA and Revenue growth from now on. LN(Revenue) controls the size effect in the regression, and Leverage, in turn, controls the different capital structures that the firms may have. In addition, industry-fixed effects defined by two-digit SIC codes and year-fixed effects are

included in the regression to filter out the factors unrelated to the CEO effort or ability (Edward Fee et al., 2018; Jenter & Kanaan, 2015). Table 3 presents the results of the logit regression.

## Table 3: TPS between public and private firms (Version 1)

Table 3 presents version 1 of the logit regression model that examines the difference in CEO turnover-performance sensitivity between public and private firms. It reports the marginal effects of logit regression, where the dependent variable is CEO turnover. The explanatory performance measure variables included in the interaction terms are 2-year ROA and 2-year Revenue growth in this version 1. The marginal effects for continuous variables are computed when all the independent variables are at their mean values. The marginal effects for indicator variables are computed when the indicator variables change from 0 to 1. Industry and year-fixed effects are included in the regressions, and heteroskedasticity-consistent standard errors are reported in the square brackets. There are three samples for regressions: the public firm sample that consists of 2134 public firm-year observations with 238 CEO turnover cases, the private firm sample that consists of 2263 private firm-year observations with 169 CEO turnover cases, and the full sample that consists of 4397 firm-year observations with 407 CEO turnover cases. All the continuous variables are winsorized at the 1st and 99th percentiles. Furthermore, *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively. Definitions of all variables are provided in the Appendix.

| | Public firm sample | Private firm sample | Full sample | |
|---|---|---|---|---|
| Variables | 1 | 2 | 3 | 4 |
| Public | | | 0.0377*** [0.116] | 0.0466*** [0.125] |
| Public x ROA | | | | -0.1200* [0.786] |
| Public x Revenue growth | | | | -0.0057 [0.050] |
| 2-year ROA | -0.2180*** [0.709] | -0.0040 [0.591] | -0.0931*** [0.424] | -0.0251 [0.597] |
| 2-year Revenue growth | -0.0074 [0.054] | -0.0002 [0.025] | -0.0016 [0.023] | 0.0009 [0.027] |
| LN(Revenue) | 0.0089** [0.047] | 0.0014 [0.047] | 0.0047* [0.033] | 0.0046* [0.033] |
| Leverage | -0.0362 [0.445] | 0.0221 [0.307] | 0.0009 [0.246] | -0.0011 [0.247] |
| Industry and Year fixed effects | Yes | Yes | Yes | Yes |
| Number of observations | 2134 | 2263 | 4397 | 4397 |
| Pseudo-$R^2$ | 3.78 % | 2.81 % | 2.86 % | 3.06 % |

## 3.2 TPS regression results and public firm effect

Columns 1 and 2 of Table 3 present the marginal effects of the public and private firm samples. Marginal effects make the effects of variables of the nonlinear model more intuitively meaningful (Williams, 2012). Marginal effects show how the probability of the categorical variable CEO turnover changes from 0 to 1 after controlling the other variables in the model. There are different ways of controlling for the other variables in the model, but I use marginal effects at the means (MEM) in my model. Thus, the marginal effect for a variable is computed using the mean values for the other variables. I show that the ROA has a significant negative effect at the 1% level respectively on the probability of CEO turnover in public firms. The negative relation between performance and the probability of CEO turnover in a public and private firm is evident since all marginal effects of performance measures are negative. In addition, ROA and Revenue growth effects are greater on CEO turnover in public firms, indicating that public firms may have greater turnover-performance sensitivity.

Furthermore, I find similar results from LN(Revenue) marginal effects to Gao et al. (2017) and conclude that in the public firm sample, large firms are significantly more associated with high CEO turnover than in the private firm sample. In addition, in the private firm sample, higher leverage is associated with higher CEO turnover, whereas lower leverage is associated with it in the public firm sample. This indicates that the boards of private firms do not appreciate the debt financing and riskiness, while for public firm boards, it is even advisable. Columns 3 and 4 of Table 3 present the marginal effects of the following equation 2 of full-sample regression, where the indicator variable Public and the interaction terms between indicator variable Public and performance measures ROA and Revenue growth are included.

$$(2)\quad P(CEO\ turnover) = \alpha + \beta_1 Public + \beta_2 Public \times ROA + \beta_3 Public \times Revenue\ growth + \beta_4 ROA + \beta_5 Revenue\ growth + \beta_6 LN(Revenue) + \beta_7 Leverage + Industry\ fixed\ effects + Year\ fixed\ effects + \epsilon$$

Column 3 presents the regression marginal effect results without the interaction terms. I show that the Public indicator variable has a significantly positive (0.0377) marginal effect on the CEO turnover at the 1% level respectively, which supports H1 in my sample. The positive marginal

effect indicates that the probability of CEO turnover in public firms is 3.77 percentage points higher than in private firms. Column 4 of Table 3 presents the marginal effects with interaction terms included in the full regression. The marginal effects of the interaction terms are both negative, which indicates that public firms have greater turnover-performance sensitivity and H2 holds. The interaction term between indicator variable Public and ROA is significant at the 10% level, respectively, which strongly supports H2. However, the interaction term between the indicator variable Public and Revenue growth is insignificant, which prevents the statement of the significantly negative relation between performance measures and CEO turnover. Based on the negative interaction terms, I still conclude that H2 holds and CEO turnover-performance sensitivity is greater in public firms than private firms.

# 4. Performance after the CEO turnover

## 4.1 Post-turnover sample formation

The board of the firm expects the performance to improve due to the CEO change. I wanted to analyze further the outcome of the CEO turnover considering performance. This post-turnover performance can reveal if the choice of the board to change the CEO has been optimal and if there are differences between public and private firms. Huson et al. (2004) find that return on total assets (ROA) increases significantly after the CEO turnover and argue that the increase is due to improved managerial quality. Gao et al. (2017) present similar results and construct the performance analysis after the CEO turnover using 2-year cumulative ROA and 2-year cumulative sales growth as operating performance measures. I continue also using these same performance measures in my analysis and keep referring to them as ROA and Revenue growth.

My analysis begins by identifying turnover firms with no missing values on ROA and Revenue growth from the turnover year to two years after the turnover. I add years 2020 and 2021 to my sample to get the values after the CEO turnover for the firms facing a turnover in 2019. This procedure leaves me doing a post-turnover analysis that includes 166 CEO turnover cases in the public firm sample and 192 in the private firm sample. I then pick a control firm with the closest ROA (Revenue growth) with the turnover firm in the corresponding turnover year. I require the

same period (from year 0 to year +2) without missing values and CEO turnover from the control firm, and if these do not hold, I pick the next closest one to be the control firm. Furthermore, the same procedure is done separately for public and private firms. Khorana (1996) uses a similar approach in his study, where he compares the performance of the mutual funds that had a managerial replacement during the period between the mutual funds that did not. In addition, Gao et al. (2017) use the same profitability (growth) matching technique for ROA (Revenue growth).

### 4.2 Performance measure matching and results

Table 4 presents the performance of the public and private firms after the CEO turnover. Performance is control-adjusted by subtracting the control firm ROA (Revenue growth) from the turnover firm one in the same year. This adjustment provides the benchmark to examine the effect of a CEO change on the performance of the firm more effectively. Performance matching adjusts for the mean reversion tendency and prevents the conclusion that firms performing abnormally well before the turnover subsequently experience poor performance (Barber & Lyon, 1996). The control-adjusted performance is followed three years after the CEO turnover, the same period Boone & Ivanov (2012) used when examining firm performance after the bankruptcy announcement. Matching CEO turnover firms and control firms by turnover year performance measures provide an excellent basis to analyze performance after the CEO turnover.

### Table 4: Control-adjusted performance in public and private firms

Table 4 presents the performance improvements of the public and private firms after CEO turnover. Two performance measures that reflect performance improvement are 2-year ROA and 2-year Revenue growth. Both are control-adjusted by selecting the control firm for every turnover firm-year observation and subtracting the performance measure of the control firm from the turnover firm one. The public firm sample in Panel A includes 166 CEO turnover cases, and the private firm sample in Panel B consists of 192 CEO turnover cases. Columns 1 and 2 present the mean and median results for public firms. Columns 3 and 4 show the same results for private firms. Furthermore, the last two columns present the tests of differences in means and medians between the samples with *, **, and *** indicating significance at the 10%, 5%, and 1% levels, respectively. Definitions of all variables are provided in the Appendix.

| | Panel A. Public Firms | | Panel B. Private Firms | | Test of differences | |
|---|---|---|---|---|---|---|
| Variables | Mean 1 | Median 2 | Mean 3 | Median 4 | t-Test (1) - (3) | Wilcoxon test (2) - (4) |
| Control ROA in year 0 | -0.40 % | -0.02 % | -0.16 % | 0.00 % | -0.23 % | -0.02 %** |
| Control ROA in year 1 | -0.48 % | -0.27 % | 0.43 % | -0.20 % | -0.91 % | -0.07 % |
| Control ROA in year 2 | -1.05 % | -0.49 % | 4.62 % | 1.04 % | -5.67 %*** | -1.53 %** |
| Control ROA in year 3 | 1.05 % | 0.37 % | 6.39 % | 1.29 % | -5.34 %* | -0.92 % |
| Control Revenue growth in year 0 | 3.94 % | 0.00 % | 0.24 % | 0.00 % | 3.71 % | 0.00 % |
| Control Revenue growth in year 1 | 4.74 % | 1.63 % | -1.03 % | -6.79 % | 5.76 % | 8.42 % |
| Control Revenue growth in year 2 | 4.95 % | 3.24 % | -0.02 % | -1.54 % | 4.96 % | 4.79 % |
| Control Revenue growth in year 3 | 8.14 % | 5.83 % | 5.06 % | 9.02 % | 3.08 % | -3.20 % |

The results of Table 4 indicate that the matching was successful since control-adjusted performance measures are close to 0 in the turnover year, except for the public Control Revenue growth, which is 3.94% and not that close to 0. All the performance measures are positive in year 3, and thus both public and private firms that change CEOs improve their profitability and growth more than the ones that do not in that year. This implies that H3 holds at least when looking at the end of the 3-year period. On the other hand, there are negative values in public sample profitability and private sample growth until the third year. This negative development of performance measures indicates that the firms that do not change CEO improve performance more for the first two years and make H3 more questionable. Gao et al. (2017) show that performance improvement is more pronounced for private firms than for public firms. I get similar significant results for the Control ROA in years 2 and 3 when private firms have 5.67% and 5.34% greater improvement than public firms. Otherwise, the performance change differences are not significant. The interesting finding is that private firms have consistently greater improvement in ROA than public firms, whereas public firms have the same thing with Revenue growth during the period. This may indicate that public firms focus more on growth after the CEO turnover, while private firms work more on profitability. Table 2 shows that the public firm sample has greater profitability, and the private firm sample has greater growth supporting the difference in the improvement of these performance measures in the sense that both public and private firms focus on the aspect where is more room for improvement.

## 4.3 Performance change regression

The results of Table 4 do not specify if the performance of the public and private firms has improved after the CEO turnover on both performance measures. I want to do additional testing to conclude if H3 holds in my sample. Thus, to further analyze performance changes in ROA and Revenue growth, I construct the following equation 3 of linear regression:

$$(3) \quad ROA\ (Revenue\ growth)\ change = \alpha + \beta_1 Public\ turnover + \beta_2 Private\ turnover + \beta_3 LN(Revenue) + \beta_4 Leverage + \beta_5 Lagged\ ROA + \beta_6 Lagged\ revenue\ growth + Industry\ fixed\ effects + Year\ fixed\ effects + \epsilon$$

The dependent variable of the regression is ROA (Revenue growth) change, which is computed by subtracting turnover year (year 0) control-adjusted ROA (Revenue growth) from the average of year +1 to +3 control-adjusted ROA (Revenue growth). Public (private) turnover is an indicator variable that takes a value of 1 if a public (private) firm changes the CEO in the corresponding year and 0 otherwise. Lagged performance variables are added to the regression to control the pre-turnover effect on the performance change. By doing so, differing post-turnover performance improvement between public and private firms cannot be attributed to differences in the observed pre-turnover performance (Gao et al., 2017). After removing missing values from the full sample, I end up with 3909 public and private firm-year observations, including 358 CEO turnover cases. The results from the regression are presented in Table 5 below.

## Table 5: Performance change in public and private firms

Table 5 presents the linear regression of dependent variables ROA change and Revenue Growth change which reflect post-turnover performance. Public (private) turnover are indicator variables that take a value of 1 if a public (private) firm changes the CEO in the corresponding year and 0 otherwise. Lagged performance variables are included to capture the possible pre-turnover effect. In addition, industry and year-fixed effects are included in the regression. The sample for the linear regression consists of 3909 public and private firm-year observations, including 358 CEO turnover cases. Heteroskedasticity-consistent standard errors are reported in the square brackets. All the continuous variables are winsorized at the 1st and 99th percentiles. Furthermore, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Definitions of all variables are provided in the Appendix.

| Variables | ROA change<br>1 | Revenue Growth change<br>2 |
|---|---|---|
| Public turnover (a) | 0.0112<br>[0.007] | 0.1293<br>[0.142] |
| Private turnover (b) | 0.0114<br>[0.008] | 0.0279<br>[0.156] |
| LN(Revenue) | 0.0022**<br>[0.0008] | -0.1931***<br>[0.016] |
| Leverage | 0.0071<br>[0.006] | 0.1461<br>[0.127] |
| Lagged 2-year ROA | -0.2882***<br>[0.011] | 0.1615<br>[0.209] |
| Lagged 2-year Revenue growth | -0.0019***<br>[0.0005] | -0.1904***<br>[0.010] |
| Intercept | -0.0530*<br>[0.027] | 1.9987***<br>[0.534] |
| Industry and Year fixed effects | Yes | Yes |
| Number of observations | 3909 | 3909 |
| Adjusted R2 | 25.04 % | 11.97 % |
| F-test (a) = (b) | 2.3869 | 0.8337 |

The first column in Table 5 presents the regression coefficients when ROA change is the dependent variable, and column 2 presents them with Revenue growth change as a dependent variable. The most interesting coefficients concerning public and private turnover are insignificant in both ROA and Revenue growth changes. F-tests also fail to reject the equality of the effect of public and private turnover. This confirms that I cannot state that private firms have greater performance improvement after the CEO turnover. However, the relation between public and private turnover indicators and performance change is positive in all coefficients, which supports H3. ROA change coefficients of Public and Private turnover are close to each other. The difference is much clearer between them when looking at the Revenue growth change coefficients. Public turnover increases the Revenue growth change more than Private turnover. Pre-turnover performance measures are held constant when evaluating the post-turnover performance changes, and they are significantly negative. This may be reasonable because the lower performance before the turnover means room for improvement. Overall, both Public and Private turnover indicator variable coefficients are positive, which makes H3 hold. In addition, Table 4 shows that the performance measures have been greater in year 3 for public and private firms that change the CEO.

# 5. Critical evaluation of results

## 5.1 Data-related concerns

As noted before, Capital IQ Pro provides limited data for European companies and industries. Gao et al. (2017) construct similar analyses with much bigger samples of the U.S. public and private firms obtained from Capital IQ Pro. In addition, the obtained data consists of many missing values, which I removed while doing the analyses. For example, due to the missing values of the private firm sample, equations 1 and 2 consist of only 169 CEO turnover cases in private firms, whereas Table 1 reports 409 cases in private firms. One additional concern regarding the CEO changes is that I manually collected them from the Capital IQ data. Thus, I have used my criteria-based judgment when collecting cases, and there is also the possibility of missing the case. Furthermore, Capital IQ only provides just some of the information on European firms that Gao et al. (2017) use in their analyses. For instance, CEO and board characteristics, cashflows, accruals, and the number of employees data are not provided in Capital IQ Pro for European firms, or there are too many missing values to include in the analyses.

Stock return is a variable that is also missing from my data. Especially, older studies use stock return as a performance measure. However, I decided to leave it out of my analyses since I study private firms also. In addition, other studies, such as Coles et al. (2003) and Gao et al. (2017), have found that including the stock return to the public firm analyses does not remove the effect of accounting measures on CEO turnover. Furthermore, I run the regressions of equations 1 and 2 by replacing 2-year cumulative performance measures with lagged and one-year cumulative performance measures to avoid accounting measure selection bias. The results are provided in Tables 6 and 7 in the Appendix. Results show that being a public firm increases the probability of CEO turnover and that public firms have greater turnover-performance sensitivity than private firms. Thus, Tables 6 and 7 support the findings of Table 3 and show that the performance measure selection does not have much of an impact on my sample.

## 5.2 Other explanations

Dividing CEO turnover cases into voluntary and forced cases could have given additional results on the turnover-performance sensitivity of public and private firms. However, Jensen (1990)

argues that it is impossible to accurately distinguish whether the CEO was fired, quit, or retired when examining public firms. Furthermore, Jenter & Lewellen (2021) find that the turnovers typically classified as voluntary are significantly more frequent at lower performance levels, suggesting that many of them may have been performance-related and forced in that sense. They recommend identifying CEO turnover cases as forced or voluntary ones if the research focuses on the firing decisions by boards, which is not the focus of my study. However, they argue that identifying forced turnover is still tricky as it is usually in the interest of both the board and the CEO to make departures look voluntary.

Another possible explanation for my results is the differences in CEO, board, and ownership characteristics. Gao et al. (2017) find that public firm CEOs experience higher turnover rates and exhibit greater TPS even with CEO power, board characteristics, and ownership structure involved in the analysis. Lel et al. (2014) present similar results on ownership structure with a European firm sample. This indicates that these variables, which are not included in my analysis due to data limitation, do not significantly impact my results. Mark R. Huson and Robert Parrino (2001) argue that better monitoring as a board characteristic can result in the appointment of superior replacement CEOs, which can boost the post-turnover performance measures. On the other hand, they state that better monitoring can permit more rapid and accurate assessments of incumbent manager quality, which may increase CEO turnovers. Gao et al. (2017) find that the founder CEOs face lower TPS, whereas CEOs with high salaries have greater TPS. This CEO information is available in Capital IQ Pro for European firms but consists of many missing values, especially among private firms.

# 6. Conclusion

Firing a CEO is a decision by the board that can have several reasons behind it. One of the reasons for CEO turnover is the close turnover-performance relation which has been researched extensively in prior literature. However, the literature has focused mainly on examining public firms. This study analyzes the differences in CEO turnover-performance sensitivity between public and private firms based on findings that Gao et al. (2017) present when examining the U.S. firm sample. This is relevant since CEO turnover in private firms has not been studied as much, and it

can reveal new aspects of the CEO turnover event in general. My sample consists of public and private firms from Europe. I use the profitability and growth measures to analyze the performance of the firms. In addition, I investigate if the decision to change the CEO has been optimal by examining the subsequent performance.

My main findings are as follows. First, public firms face more CEO turnovers based on the higher turnover rate than private firms, and the cases have increased in recent years. Second, public firms also have greater CEO turnover-performance sensitivity, and the decrease in profitability significantly affects the probability of public firm CEO turnover. My third finding concerns the analysis of profitability and growth measures after CEO turnover. Both public and private firms have an improvement in both measures after turnover. However, my research suggests that the growth of a public firm improves more than a private firm, whereas the profitability of a private firm improves more than a public firm.

The study contributes to the prior comparisons done by Gao et al. (2017) and Coles et al. (2003) between public and private firms in the U.S. and Lel et al. (2014) between public and private firms in Europe. My results indicate that public firm CEOs may experience tighter and more performance-related monitoring by the board and shareholders than private firms, which leads to a higher turnover rate and turnover-performance sensitivity (Lel et al., 2014). After the turnover, it seems that the new CEO concentrates on improving performance measures with more room for improvement. For public firms, it is growth, and for private firms, it is profitability. Overall, the results indicate that the boards make CEO turnover decisions based on poor performance. However, since the performance improvements are insignificant and even negative for some time after the CEO turnover, the decisions may be suboptimal and due to something beyond the CEO competence (Jenter & Kanaan, 2015). Furthermore, it could be interesting to study how the results of this analysis of CEO turnover-performance sensitivity turn out when European and U.S. samples of public and private firms are compared.

# References


Barber, B. M., & Lyon, J. D. (1996). Detecting abnormal operating performance: The empirical power and specification of test statistics. *Journal of Financial Economics*, *41*(3), 359–399. https://doi.org/10.1016/0304-405X(96)84701-5

Burgstahler, D. C., Hail, L., & Leuz, C. (2006). The Importance of Reporting Incentives: Earnings Management in European Private and Public Firms. *The Accounting Review*, *81*(5), 983–1016. https://www-jstor-org.eur.idm.oclc.org/stable/4093095

Campello, M., Graham, J. R., & Harvey, C. R. (2010). The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics*, *97*(3), 470–487. https://doi.org/10.1016/j.jfineco.2010.02.009

Coles, J. L., Lemmon, M. L., & Naveen, L. (2003). A Comparison of Profitability and CEO Turnover Sensitivity in Large Private and Public Firms. *SSRN Electronic Journal*, *100*, 1–47. https://doi.org/10.2139/ssrn.391103

Cornelli, F., Kominek, Z., & Ljungqvist, A. (2013). Monitoring Managers : Does It Matter ? *Journal of Finance*, *68*(2), 431–481.

Coughlan, A. T., & Schmidt, R. M. (1985). Executive compensation, management turnover, and firm performance. *Journal of Accounting and Economics*, *7*, 43–66.

Dasgupta, S., Li, X., & Wang, A. Y. (2018). Product market competition shocks, firm performance, and forced CEO turnover. *Review of Financial Studies*, *31*(11), 4188–4231. https://doi.org/10.1093/rfs/hhx129

Edward Fee, C., Hadlock, C. J., Huang, J., & Pierce, J. R. (2018). Robust models of CEO turnover: New evidence on relative performance evaluation. *Review of Corporate Finance Studies*, *7*(1), 70–100. https://doi.org/10.1093/rcfs/cfx018

Gao, H., Harford, J., & Li, K. (2017). CEO Turnover-Performance Sensitivity in Private Firms. *Journal of Financial and Quantitative Analysis*, *52*(2), 583–611. https://doi.org/10.1017/S0022109017000126

Hermalin, B. E. (2005). Trends in Corporate Governance. *Journal of Finance*, *LX*(5). https://doi.org/10.4324/9781315564791-11

Huson, M. R., Malatesta, P. H., & Parrino, R. (2004). Managerial succession and firm performance. *Journal of Financial Economics*, *74*(2), 237–275. https://doi.org/10.1016/j.jfineco.2003.08.002

Jensen, M. C. and K. J. M. (1990). *Performance Pay and Top-Management Incentives.pdf* (Vol. 98, Issue 2, pp. 225–264).

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*, 305–360. https://doi.org/10.1177/0018726718812602

Jensen, M. C., & Ruback, R. S. (1983). The Market for Corporate Control: The Scientific Evidence. *Journal of Financial Economics*, *11*, 5–50. https://doi.org/10.1057/9781137451743_8

Jenter, D., & Kanaan, F. (2015). CEO Turnover and Relative Performance Evaluation. *Journal of Finance*, *70*(5), 2155–2183.

Jenter, D., & Lewellen, K. (2021). Performance-Induced CEO Turnover. *Review of Financial Studies*, *34*(2), 569–617. https://doi.org/10.1093/rfs/hhaa069

Kaplan, S. N., Sensoy, B. A., & StrÖmberg, P. (2009). Should investors bet on the jockey or the horse? Evidence from the evolution of firms from early business plans to public companies. *Journal of Finance*, *64*(1), 75–115. https://doi.org/10.1111/j.1540-6261.2008.01429.x

Khorana, A. (1996). Top management turnover: An empirical investigation of mutual fund managers. *Journal of Financial Economics*, *40*(3), 403–427. https://doi.org/10.1016/0304-405X(95)00852-6

Lel, U., Miller, D. P., & Reisel, N. (2014). Differences in Agency Problems between Public and Private Firms: Evidence from Top Management Turnover. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2404539

Ma, M. (2022). Gendered performance evaluation in CEO turnover. *Journal of Corporate Finance*, *8.5.2017*, 2003–2005.

Pagano, M., Panetta, F., & Zingales, L. (1998). Why Do Companies Go Public? An Empirical Analysis. *Journal of Finance*, *53*(1), 27–64.

Parrino, R. (1997). CEO turnover and outside succession. *Journal of Financial Economics*, *46*, 165–197.

Stein, J. C. (1988). Takeover Threats and Managerial Myopia. *Journal of Political Economy*, *96*, 61–80.

Stein, J. C. (1989). Efficient Capital Markets , Inefficient Firms. *The Quarterly Journal of Economics*, *104*(4), 655–669.

Subrahmanyam, A., & Titman, S. (1999). The Going-Public Decision and the Development of Financial Markets. *The Journal of Finance*, *54*(3), 1045–1082.

Taylor, L. A. (2010). Why Are CEOs Rarely Fired ? *Journal of Finance*, *65*(6), 2051–2087.

Warner, J. B., Watts, R. L., & Wruck, K. H. (1988). Stock prices and top management changes. *Journal of Financial Economics*, *20*(C), 461–492. https://doi.org/10.1016/0304-405X(88)90054-2

Weisbach, M. S. (1988). Outside directors and CEO turnover. *Journal of Financial Economics*, *20*, 431–460. https://doi.org/10.1111/fima.12069

Williams, R. (2012). Using the margins command to estimate and interpret adjusted predictions and marginal effects. *Stata Journal*, *12*(2), 308–331. https://doi.org/10.1177/1536867x1201200209

# Appendix.

## Variable definitions:

*2-year Revenue growth*: 2-year cumulative revenue growth [Revenue (t) / Revenue (t – 2) – 1].

*2-year ROA*: 2-year cumulative return on assets [(1 + ROA (t)) × (1+ ROA (t – 1)) – 1].

*Assets*: Assets owned by the company as of the date indicated, as carried on the balance sheet, and defined under the indicated accounting principle (Capital IQ Pro definition).

*Control Revenue growth*: For each CEO turnover event firm, I pick a control firm among the firms that do not face a CEO turnover in that corresponding year. The control firm is selected based on the closest 2-year Revenue growth. Finally, the Control Revenue growth is computed by subtracting the 2-year Revenue growth of the control firm from the CEO turnover event firm one.

*Control ROA*: For each CEO turnover event firm, I pick a control firm among the firms that do not face a CEO turnover in that corresponding year. The control firm is selected based on the closest 2-year ROA. Finally, the Control ROA is computed by subtracting the 2-year ROA of the control firm from the CEO turnover event firm one.

*Debt*: Aggregate unpaid principal balance owed under financial obligations to other parties, required to be paid by a specified date or on demand (Capital IQ Pro definition).

*Lagged Revenue growth*: Revenue (t – 1) / Revenue (t – 2) – 1.

*Lagged ROA*: Return on assets in year t – 1, computed by Capital IQ Pro as EBIT / Total Assets.

*Lagged 2-year Revenue growth*: Lagged 2-year cumulative revenue growth [Revenue (t – 1) / Revenue (t – 3) – 1].

*Lagged 2-year ROA*: 2-year cumulative return on assets [(1 + ROA (t –1)) × (1+ ROA (t – 2)) – 1].

*Leverage*: Debt / Assets.

*LN(Revenue)*: Natural logarithm of Revenue.

*Private turnover*: An indicator variable that takes a value of 1 if a private firm faces CEO turnover in a year and 0 otherwise.

*Public*: An indicator variable that takes a value of 1 if a firm is a public firm in a year and 0 otherwise.

*Public turnover*: An indicator variable that takes a value of 1 if a public firm faces CEO turnover in a year and 0 otherwise.

*Revenue*: Revenue attributable to the ongoing operations (Capital IQ Pro definition).

*Revenue growth*: Revenue (t) / Revenue (t – 1) – 1.

*Revenue growth change*: Average of 2-year Revenue growth in year t + 1 to t + 3 – 2-year Revenue growth in year t.

*ROA*: Return on assets in year t, computed by Capital IQ Pro as EBIT / Total Assets.

*ROA change*: Average of 2-year ROA in year t + 1 to t + 3 – 2-year ROA in year t.

## Table 6: TPS between public and private firms (Version 2)

Table 6 presents version 2 of the logit regression model that examines the difference in CEO turnover-performance sensitivity between public and private firms. It reports the marginal effects of logit regression, where the dependent variable is CEO turnover. The explanatory performance measure variables included in the interaction terms are ROA and Revenue growth in this version 2. The marginal effects for continuous variables are computed when all the independent variables are at their mean values. The marginal effects for indicator variables are computed when the indicator variables change from 0 to 1. Industry and year-fixed effects are included in the regressions. There are three samples for regressions: the public firm sample that consists of 2169 public firm-year observations with 240 CEO turnover cases, the private firm sample that consists of 2375 private firm-year observations with 181 CEO turnover cases, and the full sample that consists of 4544 firm-year observations with 421 CEO turnover cases. All the continuous variables are winsorized at the 1st and 99th percentiles. Furthermore, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Definitions of all variables are provided in the Appendix.

| | Public firm sample | Private firm sample | Full sample | |
|---|---|---|---|---|
| Variables | 1 | 2 | 3 | 4 |
| Public | | | 0.0364*** | 0.0419*** |
| Public x ROA | | | | -0.2082* |
| Public x Revenue growth | | | | -0.0061 |
| ROA | -0.4341*** | -0.0285 | -0.1972*** | -0.0824 |
| Revenue growth | -0.0061 | -0.0005 | -0.0024 | 0.0007 |
| LN(Revenue) | 0.0091** | 0.0016 | 0.0048* | 0.0048* |
| Leverage | -0.0415 | 0.0069 | -0.0121 | -0.0141 |
| Industry and Year fixed effects | Yes | Yes | Yes | Yes |
| Number of observations | 2169 | 2375 | 4397 | 4544 |
| Pseudo-$R^2$ | 3.98 % | 2.65 % | 2.86 % | 3.10 % |

## Table 7: TPS between public and private firms (Version 3)

Table 7 presents version 3 of the logit regression model that examines the difference in CEO turnover-performance sensitivity between public and private firms. It reports the marginal effects of logit regression where the dependent variable is CEO turnover. The explanatory performance measure variables that are included in the interaction terms are Lagged ROA and Lagged Revenue growth in this version 3. The marginal effects for continuous variables are computed when all the independent variables are at their mean values. The marginal effects for indicator variables are computed when the indicator variables change from 0 to 1. Industry and year-fixed effects are included in the regressions. There are three samples for regressions: the public firm sample that consists of 2092 public firm-year observations with 236 CEO turnover cases, the private firm sample that consists of 2180 private firm-year observations with 160 CEO turnover cases, and the full sample that consists of 4272 firm-year observations with 396 CEO turnover cases. All the continuous variables are winsorized at the 1st and 99th percentiles. Furthermore, *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Definitions of all variables are provided in the Appendix.

| | Public firm sample | Private firm sample | Full sample | |
|---|---|---|---|---|
| Variables | 1 | 2 | 3 | 4 |
| Public | | | 0.0390*** | 0.0463*** |
| Public x ROA | | | | -0.1538 |
| Public x Revenue growth | | | | -0.0120 |
| Lagged ROA | -0.2642** | 0.0056 | -0.1234* | -0.0297 |
| Lagged Revenue growth | -0.0067 | 0.0024 | 0.0008 | 0.0064 |
| LN(Revenue) | 0.0072 | 0.0025 | 0.0045 | 0.0045 |
| Leverage | -0.0208 | 0.0233 | 0.0055 | 0.0049 |
| Industry and Year fixed effects | Yes | Yes | Yes | Yes |
| Number of observations | 2092 | 2180 | 4272 | 4272 |
| Pseudo-$R^2$ | 3.13 % | 2.69 % | 2.74 % | 2.90 % |