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**Effects of a CEO turnover event on
firm's operational performance:
Evidence from the Portuguese Market**
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Effects of a CEO turnover event on firm's operational performance:
Evidence from the Portuguese Market

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Abstract

CEO turnovers are inevitable events of great importance on a firm's life. Current literature provides us with a vast analysis of the potential impacts of such event. However, most of the studies focus on share price trends and their impact on investors' reaction.

The goal of this dissertation is to contribute to the current literature by analyzing the behavior of a set of profitability, liquidity and risk indicators, to measure the impact of a CEO turnover on a firm's performance. Our study is based on the Portuguese market, more precisely, on the PSI-20 listed firms, from 2002 to 2017, with at least one CEO turnover event. These events were then grouped by type of succession (i.e., internal or external) and departure (i.e., voluntary or forced).

Our database includes 20 firms who have originated 24 workable events. For each firm, eleven ratios were calculated on an annual basis. The ratios cover several operational aspects of a firm, from profitability, to liquidity and risk. Our empirical strategy is based on the difference-in-difference econometric model applied by Genakos and Danchev (2015).

Overall, we concluded that a CEO turnover have a negative impact on the selected ratios, particularly on profitability and risk ratios. While this evidence is stronger for internal successions, for forced departures firm performance seems to increase, especially when taken into account the profitability and liquidity ratios.

Although, CEO turnover is inevitable, these results show that firms should avoid internal successions and carefully monitoring their CEO's work, since forced departures seems to bring positive benefits to the companies.

Keywords: CEO turnover; Corporate governance; Event Studies

JEL codes: G14; G34

Abstract

Mudanças de CEO's são eventos inevitáveis e de grande importância na vida de uma empresa. A literatura corrente, proporciona uma ampla análise aos potenciais impactos deste evento. No entanto, muitos dos estudos focam-se na evolução do preço das ações e seu impacto na reação dos investidores.

O objetivo desta dissertação é contribuir para a literatura corrente analisando o comportamento de um conjunto de indicadores de rentabilidade, solvabilidade e risco para medir o impacto de uma mudança de CEO nos resultados de uma empresa. O nosso estudo centra-se no mercado português, mais precisamente, nas empresas listadas no PSI-20 entre 2002 a 2017, com pelo menos uma mudança de CEO. Estes eventos foram agrupados por tipo de sucessão (i.e., Interna ou externa) e saída (i.e., voluntária ou forçada).

A nossa base de dados é composta por 20 empresas que deram origem a 24 eventos. Para cada empresa foram calculados 11 rácios, numa base anual. Os rácios abrangem vários aspetos operacionais de uma empresa. Estes, foram categorizados de acordo com a rentabilidade, liquidez e risco. A nossa estratégia empírica é baseada no modelo econométrico difference-in-indifference, aplicado por Genakos and Danchev (2015).

De forma geral, concluímos que uma mudança de CEO produz um impacto negativo nos rácios selecionados, em particular, nos rácios de rentabilidade e risco. Esta evidência é mais forte para casos de sucessão interna. Por sua vez, para os casos de saídas forçadas os rácios tendem a melhorar, especialmente para os rácios de rentabilidade e liquidez.

Apesar das mudanças de CEO serem inevitáveis, os resultados mostram que as empresas deveriam evitar sucessões internas e monitorizar cuidadosamente o trabalho dos seus CEOs, uma vez que casos de saídas forçadas parecem trazer benefícios positivos para as empresas.

Palavras-chave: CEO turnover; Corporate governance; Event Studies

Códigos JEL: G14; G34

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Abbreviation List

CEO	Chief Executive Officer
CMVM	Comissão de Mercado de Valores Mobiliários
BoD	Board of Directors
USD	United States Dollars
OLS	Ordinary Least Squares
PSI 20	Portuguese Stock Index for the twentieth largest companies
PSI all shares	Portuguese Stock Index for all listed companies
USA	United States of America
UK	United Kingdom
WSJ	Wall Street Journal

1. Introduction

Financial theory states that firms are managed with the ultimate goal of maximizing shareholders' wealth. However, the value creation process is complex, as it is not always clear what is the best way to achieve this objective. Many factors can influence firm's profitability, liquidity and risk position, as well as the stock market value.

Ultimately, firm management depends on the strategic vision of the board of directors (BoD), which could be represented by the Chief Executive Officer (CEO), who often has a disproportional share of power and influence over the strategic orientation of the firm Reinganum (1985). In representation of the BoD, the CEO chooses fundamental strategic policies, and takes decisions that are sensitive and affect all aspects of the firm: investors' expectations; financial, operational and market performance; cash flow evolution and even the behavior of the employees.

There seems to be a consensus in the financial literature regarding the critical role of the CEO in pursuing and achieving certain corporate objectives. For instance, Rhim et al. (2006) sustain that a CEO plays a key role in determining the firm's strategy, design, performance and corporate culture. Furtado and Karan (1990) state that the CEO can act as the ultimate manager, whose responsibilities are to achieve performance objectives. For Schwartz and Menon (1985), a CEO may promote change and thereby influence on performance.

Additionally, the CEO role is dynamic, as it is not indefinitely held by a single person, and uncertain, as the security of this position is highly dependent on the circumstances of the market. As a result, the individual playing the role of CEO often changes over time.

In light of the central role of the CEO in corporate management, it is crucial to understand the reasons behind higher or lower turnover rates and to understand the impact of turnover on firms' performance.

There are several reasons that may explain the turnover rate of CEOs. According to the Wall Street Journal (WSJ)¹, these reasons may include poor historical performance, constant market pressure for better performance, new position proposals, control change,

¹ Cited in Costa (2013)

or even political reasons. Rhim, Peluchette & Song (2006) find that two aspects may trigger a CEO turnover. First, the increasing demand from institutional investors for improved management practices and, second, the greater pressure for corporate accountability from the public. However, CEO turnover can also be the result of the natural course of life, retirement or even death. Furtado & Rozeff (1987) link causes of turnover to essentially four types of departure – retirement, resignation, dismissal, and death.

Given the importance of having an adequate CEO for a company to thrive, hiring and firing a CEO can be an internal mechanism that produces great impacts on the results of a firm. This link between CEO turnover and business performance is well documented in the literature – see Manne (1965), Alchian and Demsetz (1972) and Fama (1980). Huson, Parrino, and Starks (2001) go further and state that the decision of replacing a CEO is the most important decision made by a BoD.

CEO turnover is also a phenomenon with increasing visibility. Booz & Company (2013) originally published a study by Strategy&² on which they analyzed the CEO turnover for the 2500 largest companies in the world. They concluded that the rate of CEO turnover raised from 12.9% in 2009 to 14.9% in 2016, (figure 1). However, according to the same study, CEO turnovers, for this sample of firms, decreased from its record high of 16.6% in 2015 to 14.9% in 2016, largely due to the drop in mergers and acquisitions.

² This report was originally published by Booz & Company in 2013. Data were gathered from an updated online database of the same report, not from the original report.
<https://www.strategyand.pwc.com/ceosuccess>

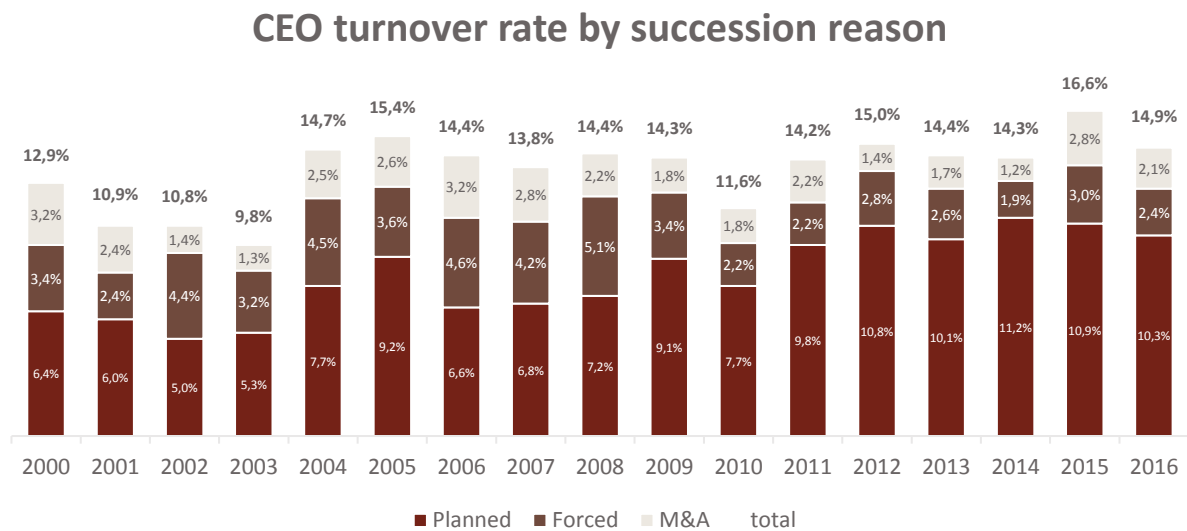


Figure 1 - Evolution of CEO turnover rate by succession reason

Along with the current trend for an increased turnover of CEOs, new ethical issues have been raised. One of them, the gender balance in the choice of CEOs. The same study finds that of the sample, 12 female CEOs were appointed in 2016, 3.6 percent of the incoming class. This value, despite very low, marks a slow return of the trend towards greater diversity, when compared with 2015 with 2.8 percent.

While recent interest on CEO turnover has led to a growing literature on the topic, an unsurprising tendency is the disproportional high number of studies available for the US and the UK markets, possibly because these are the markets where data are more easily available. Regarding the Portuguese market, to the best of our knowledge, Costa (2013) is the only study that has been conducted.

As a result, the purpose of this dissertation is to shed some light on the importance of CEO turnovers in the Portuguese market by using new data to test the hypothesis that CEO turnover influences the performance of a firm. Moreover, this thesis contributes to the existing literature by implementing a robust empirical model that, as far as we know, has not been used to analyze the effects of CEO turnover.

With this purpose in mind, we gathered a sample of listed companies operating in the Portuguese market, all of which have had at least one CEO turnover. The selected companies belong to the PSI-20 at any given year between 2002 and 2017. We then apply a differences-in-differences econometric model to analyze the impacts of a CEO turnover on a series of ratios that measure profitability, liquidity and risk. We conclude that a CEO turnover have a negative impact on the selected ratios, especially for internal successions. Forced departure, however, seem to improve firm's performance, particularly, for profitability and liquidity ratios.

The remaining of the dissertation is structured as follows. The next chapter reviews the existing literature on CEO turnover, providing an overview of the main conclusions and results from other studies. Chapter 3 explains the research methodology and how the model was built. Chapter 4 discusses the main findings obtained using the empirical model. Lastly, chapter 5 summarizes the main conclusions.

2. Literature review

Over the past decades, the topic of CEO turnover has raised the attention of many researchers who have dedicated substantial time and effort to understand its causes and effects.

The first studies date back from the 1980's, when two major lines of thought emerged. On one hand, several authors have found statistical evidence suggesting that CEO changes influence markets and firm's performance. On the other hand, some other studies failed to identify this correlation, as we will present on this chapter.

The inconsistency of results may be partially explained by differences in data quality, time period and type of methodology. In this regard, Bonnier and Bruner (1989) state that results may vary due to a confounding information effect associated with the announcement of the turnover.

The earliest relevant studies we identified, led us to Reinganum (1985). In his paper, from 1978 to 1979, the author focus on US companies that announced CEO turnover and, at the same time, the successor as well. By using three variables, the size of the firm, the origin of the successor and the disposition of the predecessor, Reinganum states that the announced would produce positive impacts in cases where the new executive is an outsider, the firm is considered small and the previous officeholder departs from the firm. Reinganum concluded that the effects of this event were more related to the combination of these three factors than to the origin of the newly appointed person, i.e., an insider or an outsider.

Contrary to Reinganum, in the same year, Borstadt³ (1985) also analyzes this event for companies where the replacement occurred without an announcement. The author reports a significantly negative market reaction if the announcement was not made, supporting some mistrust by investors.

Later on, Furtado and Rozeff (1987) proposes a different approach regarding this subject. As mentioned before, they presented four categories of departure to examine changes in equity value when the BoD points and dismisses top-level managers. According to the study, the evidence suggests that management changes signals shifts in a company

³ Cited in Furtado and Karan (1990)

policy and raises shareholder wealth. They also found that (a) the impact of these changes reduces as firm size decreases and (b) dismissal is not the best option to handle underperformance but is associated with stock prices increases when used. With this study the authors have shown that capital markets react to news concerning management appointments and dismissals, and when dismissals do occur, shareholder wealth tends to increase, as it reported significantly positive returns with CEO turnovers, suggesting that the market values CEO's succession.

These results contrast with the work of Beatty and Zajac (1987) who classifies the type of succession as internal or external. They find a significant reduction on firm value, for large firms, at management change announcement, for poorly managed successions, both for insider and outsider successions.

Inversely, Warner et al. (1988) study the relation between poor stock performance and the frequency of management turnover. The authors find a significant relation between those two variables but no significant excess returns to shareholders at the turnover announcement (announcements made on Wall Street Journal, between 1963 and 1978). Except if an external successor was announced at the same time, resulting in a positive effect for share price variation.

Johnson et Al. (1985) focuses on a less obvious type of departure, deaths. They report that markets will have an insignificant positive share price reaction to successions due to this cause. On the other hand, Sant (1988)⁴ finds a significantly negative reaction to CEO resignations in the US between 1980 and 1986. With a similar study, Furtado (1985)⁵ also finds the same result while also reporting that dismissal and appointment announcements induce significantly evidence for abnormal returns, where retirements appear to cause no market reaction.

Weisbach (1988) examines CEO departures announced in the Wall Street Journal, excluding retirements, to find a positive reaction of market share price. The author also points out that firms may not announce the true reason behind a CEO resignation due to its negative signal.

⁴ Cited in Furtado and Karan (1990)

⁵ Cited in Furtado and Karan (1990)

Regardless of the departure or succession type, Dahya, Lonie and Power (1988) find a significant positive reaction from markets to CEO turnovers, suggesting that the board may remove the CEO as a mechanism to reverse a declining trend in financial performance.

Bonnier and Bruner (1989) study the excess returns to shareholders at the announcement of a senior management. To reduce the negative information component, the authors choose a set of distressed firms. They find that excess returns are significantly positive, reinforcing the corporate control hypothesis, which states that management change following poor performance is associated with gains to shareholders. These gains are related with the new ideas and strategies and the possibility of breaking past policies that an outside appointment might bring.

Denis and Denis (1995) report that operating performance will significantly decline right before a CEO turnover, followed by significant improvements right after, especially for forced turnovers.

Align with Weisbach (1988), Kang and Shivdasani (1996) find poor financial performance on firms before turnover events and suggests that firms give a different appearance to the true reason for a new CEO arrival.

Goyal and Park (2002) analyze whether the position of CEO and the Chairman responsibilities on one individual is enough to affect the decision of a BoD to dismiss an unsuccessful CEO. The results indicate that it is difficult for the board to remove poorly performance managers when these two positions, CEO, and Chairman, belong to the same individual.

Dedman and Lin (2002) study the share price behavior on announcements of CEO departures from the UK listed firms. They found that firms that choose not to announce CEO departures and have poor performance records and higher chances of failure than those who officially announce CEO turnover. This might also explain the results presented by Borstadt (1985). The authors also find a negative market reaction to announcements of top executive departures especially when the CEO is dismissed or leaves to take another job. The authors analyzed this event regarding the voluntary disclosure of CEO departure information issued to find that half of the management departures in the sample were not announced officially to the London Stock Exchange. To mitigate the negative effect of CEO

departure, the authors also find that companies issue other “good news” around the same time, which is aligned with Weisbach (1988) and Kang and Shivdasani (1996) findings.

By studying how investors react to a relay succession, Shen, Albert, and Cannella (2003) find positive reactions for heir promotion and negative reactions for non-relay inside succession.⁶ The results indicate that investors prefer relay succession since the process is ease and prepares the heir for the new position, thus reducing investors’ uncertainties. The results are supported by Beatty and Zajaz (1987).

Fee and Hadlock (2003) investigate the managerial labor market from large publicly traded firms by analyzing top executives who changed firms. The authors find that an outsider CEO is selected from firms with above normal stock returns suggesting markets anticipate better performance from those than inside succession, which indicate that a good market performance increases an executive's external opportunities.

Dahya and McConnell (2005) investigate the composition of UK company boards in order to test whether an increase in outside appointments of the board will affect future board decisions towards a CEO appointment. The results suggests a positive market reaction to outside directors from the board or even outside the board. Turnover events also produce positive market reaction if an outside is pointed out. These results show that markets seem to perceive outsiders as good options.

Neumann and Voetmann (2005) study 81 turnovers of Copenhagen Stock Exchange listed firms and their relation with performance. The authors state that, while bad performances increase the probability of turnovers and forced replacements usually increase value, voluntary resignations normally have the opposite effect. The authors also focused on institutional investors ability to affect the decision of CEO turnovers. They found that the increasing equity holdings by these third party does not lead to an increasing influence on corporate decisions and, therefore, influenced a CEO turnover.

⁶ A relay succession is a planned succession in which the successor to the CEO position, called heir apparent, is predefined before the event occur.

Rhim et al. (2006) investigate the effects of a CEO succession on stock and financial performance of large publicly held firms between 1977 and 1994. The authors find that the stock market responded more favorably to the announcement of succession caused by unanticipated events than to announcements of anticipated succession. Likewise, firms with inside CEO succession tend to perform better than firms with an outside one.

In a more recent study, Setiawan (2008), measure the impact of the CEO turnover announcement in less well-known markets. The author takes into account two major variables, the origin of the successor (which we will use later for our study) and the process of succession, i.e., routine or non-routine. By using 59 firms from 1992 to 2003, Setiawan concludes that the Indonesian market responds positively to all CEO turnover announcements. More specifically, the market has a positive reaction to routine changes and do not react to non-routine changes. Furthermore, the author also concludes that the market reacts positively to successions for inside appointments. The results show that investor tends to prefer the smooth process of succession where they can reduce uncertainty instead of more unpredictable turnovers.

Adams and Mansi (2009) study the impact of CEO turnover announcements on bondholders and stockholders wealth and on the overall firm value, on listed companies dating from 1973 to 2000. The authors find that CEO turnover events are associated with lower bondholder values and higher stockholder values. Additionally, the authors concluded the firm value and riskiness of the firm's debt will change according to the turnover type (forced *versus* voluntary) and form of replacement (outside *versus* inside successor). These findings indicate that there is a sort of wealth transfer from bondholders to stockholders and that poor performance may lead to a turnover.

Evans, Nagarajan, and Jason (2010) study the benefits of retaining a CEO on the board of directors as another option to consider when a mandate ends. They find that firms may benefit from a CEO retention because former CEO had intrinsic knowledge of the firm's business which can be used as an advantage to monitor and advise. The authors also conclude that the probability of retaining the CEO is higher when performance is good.

Peters and Wagner (2014) propose a different approach to the CEO turnover event. Instead of analyzing the impact on stock prices or operational results, they investigate the idea of a turnover risk being priced on the CEO compensation. The volatility of the industry

and other adverse conditions can trigger a CEO turnover. Aware of this, a CEO may ask for higher wages to cover his job risk as a natural response in a competitive labor market. The investigation concludes that CEO turnover risk is significantly positively when associated with a compensation.

Schepker, Kim, and Patel (2017) state that a CEO succession is normally seen either as a disruption or adaptation perspective. The former suggests that CEO turnover imposes costs on organizations, which will influence short-term performance. The latter perspective states that time is an important variable for effects to appear, arguing for temporal lag on performance effect. The author analyzed 60 samples from 1972 to 2013 and concluded that a CEO succession influences performance negatively in the short-term and has no significant direct influence on the long-term. Instead, this long-term period, is often influenced by strategic change and by the origin of the new CEO. At the same time, the authors also measure the effects of forced and non-forced departures concluding they are not related to short or long-term performance.

From this literature review, we noted that many important studies are from the decades of the 1980's and 1990's. The number of relevant studies seems to have slowed down over the recent years. Additionally, there seems to be geographically concentration of studies on the US and UK markets, which might be triggered by data availability and simply because this markets are largest markets in the world.

We also notice that, the methodologies used are neither similar nor tend to follow the same guidelines. Different approaches such the size of the company, financial conditions, current and prior performance, and ownership structure are normally require to address this event. Moreover, almost all the studies mentioned use different event-time windows and data cleansing process, which brings us to our the last note: different starting points and methods may lead to very different conclusions.

Notwithstanding, despite all the above, these studies also prove that, regardless of the signal, CEO turnover announcements may have information content relevant enough to change the investors perspective towards a firm.

3. Research methodology

3.1. Introduction

Most of the reviewed literature focus on testing the impact of a CEO turnover in share prices. Typically, the conducted tests are around the announcement date with a spectrum of days just before and after the event. In this research, however, we analyze the impact of a CEO turnover according to several key performance ratios.

The objective is not to analyze the market reaction towards the event but rather, to analyze the behavior of an important set of ratios, regarding profitability, liquidity and risk. By using this approach, we are able to detect if and how a CEO turnover influences firms' performance.

Due to data availability, our ratios are calculated in years⁷. In this regard, we believe that, even if we had access to a higher data frequency (such as quarterly or semiannually data), changes in operational performance would not be captured, as they usually take time to be visible.

We follow a difference-in-difference econometric model proposed by Genakos and Danchev (2015). In short, this model compares a sample group, called “control group”, with a tested group, called “treated group”. Assuming that both groups are similar, this method allow us to isolate the effects of an event – in our case, a change in the CEO – by analyzing the differences between the control group, firms without a CEO turnover, and the treated group, firms with a CEO turnover.

3.2. Sample

We departure from Costa (2013), the only study available for the Portuguese market. On this work, the author builds a sample with all Portuguese firms listed on PSI with a CEO turnover event from 2002 to 2012. We updated the database and collected data from 2013 to 2017, ending up with 16 observable years, for the Portuguese market.

Even though the initial database included all the listed Portuguese companies, we opted to look only at companies listed in PSI-20 from 2002 to 2017, due to the lack of

⁷ Note that it would be more difficult to collect all relevant accounting information for smaller periods

available information for periods before 2005, especially for firms listed on PSI. In the end, only 30 firms remained, 17 of which are still currently in the index. Of this 30, eight did not have a CEO turnover, one entered into solvency and another one did not have any workable information available. This cleaning process provided us with 20 out of 30 possible firms to analyze, as presented in Table 6.

From 2002 to 2017, these 20 firms had 45 CEO turnovers events. However, 3 were excluded because they took place in 2017, which makes it impossible to analyze their impact as we do not have information on future outcomes. Additionally, 2 firms had 2 CEO turnover events in the same year, so we excluded the first turnover of each year of each firm. In the end, we reach 40 workable CEO turnovers events, from 2002 to 2017 for all PSI-20 listed firms, as presented on Table 7.

From the previous section, we noted that CEO departures and successions might better explain differences in results. In fact, they actually can add more information to the results obtained. Hence, we decided to incorporate both categories in our investigation. Based on the annual reports of each firm and news from credible sources, we were able to identify two types of departures (voluntary or forced) and succession (internal or external). Voluntary departures are defined as any departure caused by a promotion, retirement, death, or any other type of departure in which the CEO keeps a non-executive position in the firm. By exclusion, any departure not fitting these criteria was labeled as forced. Regarding the type of succession, an internal succession corresponds to any case where the new CEO had already a previous position in the firm. Otherwise, it is defined as an external succession. The results are presented in table 7.⁸

As we may observe from table 7, from 40 CEO turnovers, we classified 14 as forced turnovers (35%) and 26 as voluntary turnovers (65%). This might be either a factor of a less opened market than the average or a result of a good CEO performance. Regarding the succession type, we found 20 external successions (50%) and 20 internals succession (50%), a significant balance between the two options.

⁸ Note that, regardless of our efforts to define, as precise as possible, these two concepts, there is a certain level of subjectivity that was solved with our judgement since it was not always possible to find clear information with the degree of detail we needed to classify.

Interestingly, until 2007, the first 5 years of the sample, the average turnover event per year is 1.4. This low value may be related with the period of economic growth right before the crisis. Between, 2007 to 2017, the average turnover event is 3 per year, reflecting a period of many changes somehow related with the uncertainty triggered by the global financial crisis, which contributed to the Portuguese economic Crisis. 2007 is the second year with more CEO turnover events, 6, preceding 2015 with 8 events. During the first half of the sample period, from 2002 to 2009, 47.5% of all turnover events occurred, which reflects a well distribution of functions.

From the descriptive statistics analysis, we believe that our sample is well balanced both in terms of functions per years, even with critical events in between, and in terms of categories, reducing the likelihood that our results might be biased by a certain event.

3.3. Data Collection

The goal of this study is to measure the impact of a CEO change on a firm's operational performance. However, the performance itself can be quite subjective and measured with different methods. To overcome this issue we used different kinds of ratios, covering all essential business areas. We categorized each ratio according to its financial nature, resulting in three categories, profitability, liquidity and risk.

The first category helps us understanding the general way operations are managed, i.e., if a firm is creating value and whether the business itself is sustainable. The selected ratios for this category focus on 1) Sales, 2) EBITDA and 3) Net Income.

The second category is used to analyze how a business responds to its current obligations, and how cash is generated and managed. To address this topic we choose set of liquidity ratios focusing on 1) cash flow and 2) working capital.

Finally, the third category gives us an idea of the risk embedded in the business, given the current management process. For that matter, we consider ratios such as 1) financial leverage, 2) debt to equity ratio and 3) interest coverage ratio. All ratios are summarized in Table 8.

Although the selected ratios are not specifically based on literature, they are usually found on several financial and accounting reports as indicators to measure performance.

Taking into account the aforementioned above, for the last step of data collection, we assembled all the necessary accounting data in order to calculate the ratios for each firm. we also added data from 2018 to avoid losing observations, as some of the turnovers events happened on the later years of our sample. This way, it is possible to provide a better and more substantial analyze of post turnover event behaviors.

At this stage, however, we had a few setbacks. First, not every firm had its annual report available for all years in its own website nor CMVM. Second, the standard accounting norms of the Portuguese market suffered some changes between 2007 and 2008⁹. This means that there might be a significant statistical break in the time series around 2007/2008, which implies that the period of 2002 to 2007 is not entirely comparable with the period of 2008 to 2017 in terms of accounting rules.

Additionally, we needed to guarantee that every firm from the “treated group” had a match, as similar as possible, from the “control group”, to assurance the correct application of the difference-in-difference model. In this regard, we used the industry type and size of a firm to find its proper match for each firm from the “treated group”.

However, pairing each firm from the “treated group” was rather challenging because the Portuguese market is not particularly big as the main worldwide leading markets, which gave us very few choices. To overcome this issue, we had to simplify the pairing process. Our first measure was to replace years into periods of n , being “period n ” the year of a CEO turnover. $n-1$, $n-2$ and $n-3$ represent the first second and third year before the event. The same logic is applied to $n+1$ to $n+5$. This assumption allowed us to compare CEO turnover events that did not occur in the same actual year but, nevertheless, are from similar firms and have the same number of observation before and after the event. Moreover, we were able to capture more than one observation per firm for those with distinct CEO turnover event periods. Finally, as we gathered information from 2002 to 2018, some firms add workable information both for the treated group and for the control group.

This solution brought us the last assumption needed to arrange data, the number of years we should used in our period. We needed to balance between increasing the number of years before and after the CEO turnover event, or the number of events in order to

⁹ According to the annual reports analyzed, many firms change their accounting standards around this period. However, SNC accounting rules are being officially applied since January 1, 2010, Silva (2014).

maximize the total number observations. To address this matter, we took into account that 1) generally a CEO mandate has a lifespan of three years and, 2) performance ratios need longer periods of time to demonstrate a trend. We choose a 5 year period, since this time-frame is used in most of the analyses found on annual reports, trend analysis and other financial reports.

To summarize, we end up considering three-year span, converted into periods, before the event (n-3; n-2 and n-1), the period of the event itself (n), and five years, converted into periods, after event (n+1, n+2, n+3, n+4 and n+5). This gave us a total of 9 periods per firm and 24 CEO turnover events fitting all the requirements, with an equivalent control group. For each period and each of the 48 firms, we calculated 11 ratios based on all accounting information available. The results are shown on table 10.

3.4. Test statistics

The econometric model used in this investigation follows the methodology proposed by Genakos and Danchev (2015), which is based on the difference-in-difference framework. For all ratios, the difference-in-difference model will analyze changes, between firms from the “treated group” and the “control group”.

To formalize the argument, we call C the “control group” and T the “treated group”. The dummy variable D_g equals unity for those of the treatment group, and zero otherwise. Concerning the periods, we have essentially two major different sets of periods, period 0, for pre CEO turnover years, and period 1, for the years post a CEO turnover event. To distinguish them, it is also used another dummy variable, D_p , that assumes 1 for periods after the CEO turnover event and zero otherwise.

With these two variables, the standard empirical specification for analyzing the impact of a CEO turnover event is:

$$R_{jft} = \beta_0 + \beta_1 D_g + \beta_2 D_p + \beta_3 D_p * D_g + \mu \quad (1)$$

Where the dependent variable, R_{jft} , is ratio j, in firm f, in period t. The period dummy, D_p , captures aggregate factors that affect R over time, in the same way for both groups, T and C. The main variables, D_g , alone, captures possible differences between T and C. The coefficient of interest, β_3 , multiplies the interaction of $D_p * D_g$, which is the dummy

variable equal to the unity for all observations from 'T' group in period 1, after a CEO turnover event occurred. The estimation was based on the ordinary least squares method.

However, apart from measuring the impact of a CEO turnover itself, we are also interested in capturing the influence of the different types of succession and departures. In respect to this intent, we extended our initial assessment into 5 distinct new ones. The first assessment uses equation (1) for our general sample. Then we selected the observations according to the type of succession (internal or external), and the type of departures (voluntary or forced), thus having four new sub-samples.

Finally, we applied the difference-in-difference econometric model to test whether the dummy variable linked to β_3 , captures the impact on the selected ratios triggered by a CEO change and if the impact is statistically significant. The results are summarized in the next chapter.

4. Empirical results

In this section, we present the main findings and our interpretation taking into account the firm sample, the selected ratios and the current theories already developed in previous studies. For organizational purposes, the results are divided into subsections, each one dedicated to a specific type of assessment.

First, we considered the total sample. Then, we analyze how this coefficient changes according to the succession type (assessments 2 and 3) and departure type (assessments 4 and 5).

4.1. Results for a CEO turnover: General sample - treated group vs control group

The findings for the total sample are rather interesting. 7 out of 11 ratios present a statistically significant value and almost all of those ratios, 5 out of 7, demonstrate a negative impact triggered by a CEO turnover event. Only debt to equity ratio and ROE have a positive sign, both presenting a *p-value* under 1%.

Additionally, all 7 ratios present relative high values for the corresponding betas, especially for profitability ratios, in particular, asset efficiency and ROA, which indicates the impact on those ratios is strong. Since the signal is negative, this might imply that the balance between revenues and expenses trends to get worse after a CEO turnover event.

We also found that risk ratios evolve unfavorably after a CEO turnover event. Debt-to-equity ratio tend to have a small positive increase, meaning that a firm might be losing capacity to face their own obligation. Regarding financial-leverage ratio, we can see a small and negative impact, which is in line with the previous ratio. Despite being perceived to be a positive sign to increase the overall firm value, it could be also an indicator of higher financial risk, particularly if read all together with other indicators. Finally, the interest-coverage ratio also shows a small negative impact statistically significant at 5%. The weight of interest expenses over EBIT seem to rise after a CEO turnover event.

Our understanding is that firms may face more difficulties covering their responsibilities with operational results. This in turn can be linked to the first set of ratios (i.e., profitability ratios) to assume that a CEO turnover event may soften operational results, which in turn may add some additional risk. New strategy alignment, the implementation of

a new organizational culture, with new rearrangements of teams and new ways to operate as well as all costs related to firing and hiring it may add new start-up operations costs (OPEX) and might reduce the company's own short term productivity.

Overall, a CEO turnover event has a negative impact on the evolution of the ratios. The results are shown on Table 1.

Table 1 - Results of the first assessment – general Sample

1º Assessment: General Sample - Treated vs control firms													
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	AE	CF	CURRENT	DE	EBITDAM	FL	ICOV	OE	QUICK	ROA	ROE		
C	0,477562***	-5146,31***	0,802748***	2925,838***	0,121721***	0,262527***	1597,266***	0,079908***	0,631360***	0,020267***	0,075483***		
	0,020	1058,787	0,067	0,090	0,006	0,008	0,222	0,023	0,053	0,001	0,005		
DG	0,073009***	-39238,75***	0,004	-0,091	0,079195***	0,003440	0,420	-0,040101*	-0,032192	-0,001429***	-0,01558***		
	0,010	1327,987	0,036	0,105	0,013	0,005	0,385	0,022	0,020	0,000	0,002		
DP	0,014160	2661,227**	0,043224	-0,486440***	-0,017414**	0,024411***	-0,281	0,016	0,027878	0,001900	0,000		
	0,027	1265376,000	0,071	0,181	0,009	0,008	0,258	0,026	0,056	0,002	0,008		
DP*DG	-0,034437**	8897,986	-0,071011*	0,435366***	0,020	-0,027982***	-0,869813**	-0,019	-0,015509	-0,002265***	0,022239***		
	0,015	9031,315	0,043	0,160	0,015	0,006	0,395	0,025	0,024	0,001	0,006		

4.2. Results for CEO turnover: Sub-sample 1: external successions

The second assessment takes into account only the observations with an external succession, regardless of the type of departure. This filtering process resulted in 10 out of 24 observations.

Using this smaller sample, an external succession seems not to be relevant enough to ascertain if a CEO turnover affects the ratios, either positively or negatively. Interestingly, this might indicate that results from the first assessment were not induced by external successions, as they alone are not statistically relevant for our investigation. In particular, only 3 out of 11 ratios present a *p-values* below 10%: debt-to-equity, financial-leverage and EBITDAM ratio.

The first two ratios have the same signals and the same significance level of the first assessment, both with *p-values* under 1%. This suggests that a CEO turnover event with an external succession affects negatively risk indicators. EBITDAM is statistically significant at 1% with a high positive beta value of 900 basis points. We infer that a new CEO, external to the firm, will be more focus on showing good operational results to the executive board and to shareholders, by cutting some OPEX, than to invest and plan new and expensive strategies. A new external CEO, could also bring new ideas, know-how, leadership, motivation and enthusiasm that might help pursuit good results as well. Table 2 summarizes the results.

Table 2 - Results of the second assessment – Sub-sample: internal succession

2 ^o Assessment: Sub Sample - Treated vs control firms with a external Succession													
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	AE	CF	CURRENT	DE	EBITDAM	FL	ICOV	OE	QUICK	ROA	ROE		
c	0,357889***	-10535,75***	0,815821***	3341,861***	0,254513***	0,252446***	3308,339***	0,101002***	0,726188***	0,021607***	0,045566***		
	0,007	3604,474	0,121	0,369	0,028	0,015	0,436	0,036	0,114	0,001	0,004		
DG	0-0,047126***	-69988,95***	-0,095	-0,579388***	-0,033	0,002364	-1167,884	-0,052068*	-0,049917	-0,008843***	-0,019611***		
	0,008	3202,588	0,096	0,160	0,031	0,008	0,754	0,031	0,079	0,002	0,003		
DP	-0,007345	6141,326	-0,011919	-1022,612**	-0,0865*	0,003630	-0,349	0,024	-0,019419	0,000582	0,012		
	0,011	3723,611	0,131	0,497	0,032	0,015	0,598	0,043	0,123	0,002	0,008		
DP*DG	-0,022088	19487,62	0,017294	0,567268***	0,098296***	-0,026572***	-0,143	-0,014	-0,023096	0,000398	0,010		
	0,022	17748,920	0,108	0,215	0,035	0,010	0,893	0,041	0,085	0,003	0,011		

4.3. Results for CEO turnover: Sub-sample 2: internal successions

The third assessment follows the same logic of the last one. From the general sample, we filter observations with internal successions, regardless of the type of departure. We end up reaching 14 out of 24 possible outcomes.

From this sub-sample, we found that 6 out of the 11 ratios are statistically significant. The results are very similar with the general sample, supporting that internal succession have a stronger effect on operational ratios when a CEO turnover occurs.

In line with sub-chapter 4.1, our intuition is that a CEO from an external succession will be less willing to invest as much as a CEO selected within the executive broad. While the former might be focus on operational results and restraining expenses, the later, possibly for having more inside information and more support by the board of directors has a different and riskier approach to proceed with the firm plans. Results presented on Table 3.

Table 3 - Results of the third assessment – Sub-sample: external successions

3 ^o Assessment: Sub Sample - Treated vs control firms with a internal Succession													
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	AE	CF	CURRENT	DE	EBITDAM	FL	ICOV	OE	QUICK	ROA	ROE		
c	0,726629***	-3719,266***	0,792902***	2618523***	0,082901***	0,269120***	1977,29***	0,060243***	0,542740***	0,018610***	0,113299***		
	0,049	3633,029	0,046	0,090	0,000	0,007	0,637	0,024	0,032	0,002	0,005		
DG	-0,003	-9134,915*	0,090164***	0,14862***	0,069962***	0,018886**	0,632	-0,019	0,040804**	0,003339***	-0,032568***		
	0,053	5349,926	0,024	0,022	0,004	0,009	0,645	0,023	0,020	0,001	0,001		
DP	-0,033971	2076,093**	0,056406	-0,096680	-0,007251*	0,039230***	0,032	0,015	0,039222	0,003682	-0,025346***		
	0,071	8877,176	0,054	0,127	0,004	0,007	0,673	0,027	0,042	0,003	0,008		
DP*DG	0,049061	6514,662	-0,062103*	0,300180***	-0,005	-0,025319**	-1411,86**	-0,019	-0,012887	-0,005292***	0,048586***		
	0,072	5579,904	0,033	0,086	0,008	0,010	0,701	0,026	0,026	0,001	0,005		

4.4. Results for CEO turnover: Sub-sample 3: voluntary departure

For the fourth assessment, we use a sub-sample with all CEO turnover with a voluntary departure, regardless of the type of succession. We reach 17 observations out of 24.

Result shows a smaller impact due to a voluntary CEO turnover event when compared to the general sample. Only 4 out of 11 ratios were found to be statistically significant at 5% or lower, all of them with a negative betas. The ratios comprehend profitability ratios: (i) operational-efficiency ratio and (ii) ROA, and risk ratios: (iii) financial-leverage and (iv) interest-coverage ratio.

From the results, we can observe a CEO turnover event, preceding a voluntary departure, affects negatively the firm's performance in some key performance indicators. Debt seems to rise, as there is a reduction of financial leverage, as well as expenses, due to the behavior of operational efficiency. Inevitably, ICOV also decreases, in line with the behavior of the first two ratios, which in turn shows an added difficulty for a firm to match its obligations. Asset efficiency also seems to decrease regarding the negative evolution of ROA.

Despite all the above, the other 7 ratios seem to behave as the control group ratios, which indicates that a CEO turnover under the conditions of a voluntary departure may not be relevant enough to cause a substantial impact on performance. Our reading is that, when the departure is voluntary, the process of change is managed with enough time for a company to incorporate on its own strategy and activity, all key aspect to keep its performance. Table 4 exhibits the results.

Table 4 - Results of the fourth assessment – Sub-sample: voluntary departures

4 th Assessment: Sub Sample - Treated vs control firms with a voluntary departure														
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	AE	CF	CURRENT	DE	EBITDAM	FL	ICOV	OE	QUICK	ROA	ROE			
c	0,606934***	-4756,762***	0,739776***	3121,31***	0,076699***	0,259409***	1782,542***	0,024708***	0,547159***	0,014353***	0,067496***			
	0,040	4153420,000	0,062	0,279	0,002	0,010	0,367	0,010	0,035	0,001	0,011			
DG	-0,036	-9248,352***	0,092295***	-0,605	0,111398***	0,031954***	0,949351*	0,015715*	0,056883***	0,007539***	0,030466***			
	0,029	9941556,000	0,033	0,419	0,006	0,012	0,499	0,008	0,010	0,000	0,010			
DP	-0,009890	2603,577***	-0,033062	-0,698480**	-0,007	0,038376***	-0,173	0,046994***	-0,043599	0,003324**	0,000			
	0,059	6961,017	0,070	0,336	0,005	0,010	0,480	0,015	0,045	0,001	0,012			
DP*DG	-0,014827	-8089,048	-0,017446	0,561378	0,006	-0,026061*	-1607,447***	-0,049613***	0,001552	-0,005885***	0,001			
	0,046	2606860,000	0,048	0,437	0,011	0,013	0,597	0,014	0,023	0,001	0,011			

4.5. Results for CEO turnover: Sub-sample 2: forced departure

For the last assessment, we used a sub-sample with only forced departures, regardless of the type of succession. This is the smallest sub-sample with only 7 observations out of 24. Nevertheless, the results are somewhat expressive.

The impact from a CEO turnover gets stronger with 5 out of 11 ratios with *p-values* under 10% or less. Another differentiating aspect is the signal of the betas, which are positive except for financial leverage. Our results indicates that a CEO turnover preceding a forced departure tend to have a positive impact on a firms performance. Another aspect of this sub-sample is the significance of Cash-flow and quick-ratio, both with positive signs and with a *p-value* under 5% and 10%, respectively.

In this sample, liquidity ratios improve, which indicates more cash. Likewise, profitability ratios such asset efficiency and operational efficiency also have a strong positive impact showing an increase on assets and a reduction of the weight of expenses. Our intuition is that better solvency results may happen if, previously, the firm struggle to reach good results, which in turn may have been the foremost reason for the forced departure to happen. Results shown on Table 5.

This assessment has the most asymmetric results compared to the total sample. The investigation led us to believe that, generally, a CEO turnover produces negative impacts on firms' performance. However, if this event is triggered by a force departure, statistical evidence indicates performance can improve over, especially for liquidity and profitability ratios.

Table 5 - Results of the fifth assessment – Sub-sample: forced departures

5º Assessment: Sub Sample - Treated vs control firms with a forced departure													
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependent variable	AE	CF	CURRENT	DE	EBITDAM	FL	ICOV	OE	QUICK	ROA	ROE		
c	0,346188*** 0,004	30440,290 23057,200	1299,743*** 0,183	2909,144*** 0,065	0,31084*** 0,025	0,264124*** 0,002	3855,371*** 0,690	0,142794*** 0,023	1029,672*** 0,180	0,031964*** 0,002	0,091753*** 0,014		
DG	-0,028581* 0,015	-166062,2*** 21274,750	-0,559753*** 0,112	0,418 0,295	-0,106842** 0,043	-0,013916*** 0,002	-2962,436** 1226,620	-0,124076*** 0,015	-0,431178*** 0,107	-0,023346*** 0,004	-0,057409** 0,026		
DP	-0,007559 0,009	-14382,12 27612,330	-0,172229 0,200	0,040185 0,104	-0,053854* 0,029	-0,008028 0,007	-0,337 0,731	-0,037 0,026	-0,149337 0,190	-0,002250 0,003	0,002 0,017		
DP*DG	0,037693* 0,021	89588,51** 36573,120	0,216228 0,134	-0,383993 0,308	0,058 0,046	-0,014054** 0,006	0,626 1241,905	0,05334*** 0,020	0,235323* 0,121	0,007427 0,005	0,008 0,030		

5. Conclusions and further discussion

The subject of CEO turnovers is broadly investigated due to the importance and key role of this position on firms. However, a great number of studies focus on share price evolution, to measure the impact of this event. This research aims to enrich the current literature by proposing a new approach and by using novel data.

We aim to understand the impact of a CEO turnover on firm's performance, using a set of 11 operational ratios with the following categories: profitability, liquidity and risk. Our empirical model is based on the methodology proposed by Genakos and Danchev (2015), which is based on the difference-in-difference framework.

This approach shown that there is enough statistical evidence to witness impacts on operational performance. However, the results are rather surprising and somewhat puzzling to understand. According to our analysis, a turnover event seems to have a statistically significant negative impact on operational performance. This result seems to contradict the standard theory regarding share price evolution. To better understand the results, we divided the CEO event regarding the succession and departure type.

While CEO turnovers preceding external succession did not present any major statically significant impact on ratios, internal successions seems to have a negative impact on them. As for departures, there is enough statistical evidence to indicate that CEO turnovers preceding force departures produce strong positive impact on performance, whereas voluntary departures do not have as much statistical power and produce negative impacts.

Notwithstanding, a clear result emerges: regardless of the time frame, succession or departure, the beta coefficients associated with the dummy variables tend to always generate some type of impact.

To the best of our knowledge, this is the first study that tests the impact of a CEO change on operational results. Therefore, several topics would be interesting to further investigate.

First, it would be interesting to add to this type of investigation other critical ratios that might be a better fit to the different types of industries and add the accounts that decompose those ratios. The aim would be to have a clearer view of the sample, enabling to filter outliers from the rest of the sample and to understand deeply beta signals. Secondly, in accordance to the first point, the firm sample could be amplified and classified by type of industry, mainly

to help comparisons and to understand which ratio best describes each industry. Additionally, dividing the sample by industries should allow us to separate isolate external effects. Thirdly, this methodology could be replicate to other markets to see whether the negative results found for Portugal hold. Lastly, to increase robustness, of the difference-in-indifference model, some control variables, as GDP growth, could be introduced.

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Appendixes

Table 6 - Firms under scope

Internal Code	Firm Name	BvD ID number	Internal Name	Internal Code
E1	banco comercial português, sa	PT 501 525 882	BCP	E1
E2	banco bpi sa	PT 501 214 534	BPI	E2
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	PT 500 722 900	CIMPOR	E3
E4	edp - energias de portugal, s.a.	PT 500 697 256	EDP	E4
E5	galp energia, sgps, s.a.	PT 504 499 777	Galp	E5
E6	impresa - sociedade gestora de participações sociais, s.a.	PT 502 437 464	IMPRESA	E6
E7	inapa - investimentos, participações e gestão, s.a.	PT 500 137 994	INAPA	E7
E8	jerónimo martins - sgps, s.a.	PT 500 100 144	JERONIMO MARTINS	E8
E9	grupo média capital - sgps, s.a.	PT 502 816 481	MEDIA CAPITAL	E9
E10	caixa economica montepio geral	PT 500 792 615	MONTEPIO	E10
E11	mota - engil, sgps, s.a.	PT 502 399 694	MOTA ENGIL	E11
E12	novabase - sociedade gestora de participações sociais, s.a.	PT 502 280 182	NOVABASE	E12
E13	the navigator company, s.a.	PT 503 025 798	THE NAV. COMP.	E13
E14	meo - serviços de comunicações e multimédia, s.a.	PT 504 615 947	PT	E14
E15	ren - redes energéticas nacionais, sgps, s.a.	PT 503 264 032	REN	E15
E16	semapa - sociedade de investimento e gestão, sgps, s.a.	PT 502 593 130	SEMAPA	E16
E17	sonae - sgps, s.a.	PT 500 273 170	SOANE	E17
E18	sonae capital, sgps, s.a.	PT 508 276 756	SONAE CAP	E18
E19	sonae indústria, sgps, s.a.	PT 506 035 034	SONAE IND	E19
E20	sonaecom - s.g.p.s., s.a.	PT 502 028 351	SONAECOM	E20

Table 7 - CEO turnover events from selected firms

Company code	Company	Old CEO	New CEO	Year	Month	Sucession	Departure
E1	banco comercial português, sa	Paulo T. Pinto	Filipe Pinhal	2007	Agosto	Internal	Forced
E1	banco comercial português, sa	Filipe Pinhal	Carlos S. Ferreira	2008	Janeiro	External	Forced
E1	banco comercial português, sa	Carlos S. Ferreira	Nuno Amado	2012	Janeiro	External	Voluntary
E10	caixa economica montepio geral	Tomás Correia	Félix Morgado	2015	Agosto	External	Forced
E11	mota - engil, sgps, s.a.	António Mota	Jorge Coelho	2008	Abril	External	Voluntary
E11	mota - engil, sgps, s.a.	Jorge Coelho	Gonçalo Moura Martins	2013	Abril	Internal	Voluntary
E12	novabase - sociedade gestora de participações sociais, s.a.	Rogério Carapuça	Luís Paulo Salvado	2009	Maio	Internal	Voluntary
E13	the navigator company, s.a.	Jorge Armindo	José Honório	2004	Junho	External	Forced
E13	the navigator company, s.a.	José Honório	Luís Alberto Caldeira Deslandes	2014	Fevereiro		
E13	the navigator company, s.a.	Luís Alberto Caldeira Deslandes	Diogo Silveira	2014	Abril	External	Forced
E14	meo - serviços de comunicações e multimédia, s.a.	Miguel Horta e Costa	Henrique Granadeiro	2006	Abril	Internal	Forced
E14	meo - serviços de comunicações e multimédia, s.a.	Henrique Granadeiro	Zeinal Bava	2007	Setembro	Internal	Voluntary
E14	meo - serviços de comunicações e multimédia, s.a.	Zeinal Bava	Armando Almeida	2014	Agosto	External	Forced
E14	meo - serviços de comunicações e multimédia, s.a.	Armando Almeida	Paulo Neves	2015	Julho	External	Forced
E14	meo - serviços de comunicações e multimédia, s.a.	Paulo Neves	Claudia Goya	2017	Julho		
E14	meo - serviços de comunicações e multimédia, s.a.	Claudia Goya	Alexandre Fonseca	2017	Novembro		
E15	ren - redes energéticas nacionais, sgps, s.a.	José Penedos	Rui Cartaxo	2009	Novembro	Internal	Forced
E15	ren - redes energéticas nacionais, sgps, s.a.	Rui Cartaxo	Rui Vilar	2014	Abril	External	Voluntary
E15	ren - redes energéticas nacionais, sgps, s.a.	Rui Vilar	Rodrigo Costa	2015	Fevereiro	External	Voluntary
E16	semapa - sociedade de investimento e gestão, sgps, s.a.	Pedro Queiroz Pereira	João Castello Branco	2015	Julho	External	Voluntary
E17	sonae - sgps, s.a.	Belmiro Azevedo	Paulo de Azevedo	2007	NA	Internal	Voluntary
E18	sonae capital, sgps, s.a.	Belmiro Azevedo	Paulo de Azevedo	2015	NA	Internal	Voluntary
E19	sonae indústria, sgps, s.a.	Carlos B. de Aguiar	Rui Correia	2011	Julho	Internal	Voluntary
E19	sonae indústria, sgps, s.a.	Rui Correia	Belmiro Azevedo	2012	Março	Internal	Voluntary
E19	sonae indústria, sgps, s.a.	Belmiro Azevedo	Duarte Paulo Teixeira de Azevedo	2015	Março	Internal	Voluntary
E2	banco bpi sa	Artur S. Silva	Fernando Ulrich	2003	Dezembro	Internal	Voluntary
E2	banco bpi sa	Fernando Ulrich	Pablo Forero	2017	Abril		
E20	sonaecom - s.g.p.s., s.a.	Paulo Azevedo	Ángelo Paupério	2007	Março	External	Voluntary
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	Pedro Teixeira Duarte	Jorge Salavessa Moura	2009	Maio		
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	Jorge Salavessa Moura	Ricardo Bayão Horta	2009	Dezembro	Internal	Forced
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	Ricardo Bayão Horta	Francisco Lacerda	2010	Março	External	Forced
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	Francisco Lacerda	Ricardo Lima	2012	Julho	External	Voluntary
E4	edp - energias de portugal, s.a.	Francisco Fuente Sanchez	João Talone	2003	Maio	External	Voluntary
E4	edp - energias de portugal, s.a.	João Talone	António Mexia	2006	Janeiro	External	Forced
E5	galp energia, sgps, s.a.	António Mexia	Marques Gonçalves	2005	Maio	External	Voluntary
E5	galp energia, sgps, s.a.	Marques Gonçalves	Manuel Ferreira de Oliveira	2007	Janeiro	Internal	Voluntary
E5	galp energia, sgps, s.a.	Manuel Ferreira de Oliveira	Carlos Nuno Gomes da Silva	2015	Março	Internal	Forced
E6	impresa - sociedade gestora de participações sociais, s.a.	Pinto Balsemão	Pedro Norton	2012	Outubro	Internal	Voluntary
E6	impresa - sociedade gestora de participações sociais, s.a.	Pedro Norton	Francisco Pedro Pinto Balsemão	2016	Março	Internal	Voluntary
E7	inapa - investimentos, participações e gestão, s.a.	Vasco Pessanha	José Félix Morgado	2007	Março	Internal	Forced
E7	inapa - investimentos, participações e gestão, s.a.	José Félix Morgado	Diogo Rezende	2015	Junho	External	Voluntary
E8	jerónimo martins - sgps, s.a.	Luis p. da Silva	Pedro S. dos Santos	2010	Abril	Internal	Voluntary
E9	grupo média capital - sgps, s.a.	Miguel Pais do Amaral	Manuel Polanco	2005	Novembro	External	Voluntary
E9	grupo média capital - sgps, s.a.	Manuel Polanco	Bernardo Bairrão	2009	Fevereiro	Internal	Voluntary
E9	grupo média capital - sgps, s.a.	Bernardo Bairrão	Rosa Collell	2011	Julho	External	Voluntary

Table 8 - List of ratios by category

Ratio Category	Ratio Name	Ratio Code	Formula
Profitability ratios	EBITDA Margin	EBITDAM	EBITDA / Sales
Profitability ratios	ROA	ROA	Net income / Total assets
Profitability ratios	ROE	ROE	Net income / Total equity
Profitability ratios	Operational efficiency	OE	Net income / Sales
Profitability ratios	Asset use efficiency	AE	Sales / Total assets
Liquidity Ratios	Cash-flow	CF	Net income - Amortizations and depreciations - Provisions
Liquidity Ratios	Current Ratio	CURRENT	Total current assets / Total current liabilities
Liquidity Ratios	Quick ratio	QUICK	(Total current assets - Inventory) / Total current liabilities
Risk ratios	Financial Leverage	FL	Total equity / Total assets
Risk ratios	Debt to equity ratio	DE	Total liabilities / Total equity
Risk ratios	Interest coverage ratio	ICOV	EBIT / Interest expenses

Table 9 - CEO turnover by year and firm – general Sample

Comp code	Firm Name	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
E1	banco comercial português, sa						2007	2008				2012						3
E2	banco bpi sa		2003															1
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.								2009	2010		2012						3
E4	edp - energias de portugal, s.a.		2003			2006												2
E5	galp energia, sgps, s.a.				2005		2007								2015			3
E6	impresa - sociedade gestora de participações sociais, s.a.											2012				2016		2
E7	inapa - investimentos, participações e gestão, s.a.						2007								2015			2
E8	jerónimo martins - sgps, s.a.									2010								1
E9	grupo média capital - sgps, s.a.				2005				2009		2011							3
E10	caixa economica montepio geral														2015			1
E11	mota - engil, sgps, s.a.							2008					2013					2
E12	novabase - sociedade gestora de participações sociais, s.a.								2009									1
E13	the navigator company, s.a.			2004														2
E14	meo - serviços de comunicações e multimédia, s.a.					2006	2007							2014	2015			4
E15	ren - redes energéticas nacionais, sgps, s.a.								2009					2014	2015			3
E16	semapa - sociedade de investimento e gestão, sgps, s.a.														2015			1
E17	sonae - sgps, s.a.						2007											1
E18	sonae capital, sgps, s.a.														2015			1
E19	sonae indústria, sgps, s.a.										2011	2012			2015			3
E20	sonaecom - s.g.p.s., s.a.						2007											1
		0	2	1	2	2	6	2	4	2	2	4	1	3	8	1	0	40

Table 10 - Turnover event by periods of n

Comp code	Firm Name	n-3	n-2	n-1	n	n+1	n+2	n+3	n+4	n+5	Sucession	Departure	Action
E1	banco comercial português, sa	2004	2005	2006	2007	2008	2009	2010	2011	2012	Internal	Forced	Not use
E1	banco comercial português, sa	2005	2006	2007	2008	2009	2010	2011	2012	2013	External	Forced	Not use
E1	banco comercial português, sa	2009	2010	2011	2012	2013	2014	2015	2016	2017	External	Voluntary	Use
E2	banco bpi sa	2000	2001	2002	2003	2004	2005	2006	2007	2008	Internal	Voluntary	Use
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	2006	2007	2008	2009	2010	2011	2012	2013	2014	Internal	Forced	Not use
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	2007	2008	2009	2010	2011	2012	2013	2014	2015	External	Forced	Not use
E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	2009	2010	2011	2012	2013	2014	2015	2016	2017	External	Voluntary	Use
E4	edp - energias de portugal, s.a.	2000	2001	2002	2003	2004	2005	2006	2007	2008	External	Voluntary	Not use
E4	edp - energias de portugal, s.a.	2003	2004	2005	2006	2007	2008	2009	2010	2011	External	Forced	Use
E5	galp energia, sgps, s.a.	2002	2003	2004	2005	2006	2007	2008	2009	2010	External	Voluntary	Not use
E5	galp energia, sgps, s.a.	2004	2005	2006	2007	2008	2009	2010	2011	2012	Internal	Voluntary	Use
E5	galp energia, sgps, s.a.	2012	2013	2014	2015	2016	2017	2018	2019	2020	Internal	Forced	Use
E6	impresa - sociedade gestora de participações sociais, s.a.	2009	2010	2011	2012	2013	2014	2015	2016	2017	Internal	Voluntary	Use
E6	impresa - sociedade gestora de participações sociais, s.a.	2013	2014	2015	2016	2017	2018	2019	2020	2021	Internal	Voluntary	Not use
E7	inapa - investimentos, participações e gestão, s.a.	2004	2005	2006	2007	2008	2009	2010	2011	2012	Internal	Forced	Use
E7	inapa - investimentos, participações e gestão, s.a.	2012	2013	2014	2015	2016	2017	2018	2019	2020	External	Voluntary	Not use
E8	jerónimo martins - sgps, s.a.	2007	2008	2009	2010	2011	2012	2013	2014	2015	Internal	Voluntary	Use
E9	grupo média capital - sgps, s.a.	2002	2003	2004	2005	2006	2007	2008	2009	2010	External	Voluntary	Not use
E9	grupo média capital - sgps, s.a.	2006	2007	2008	2009	2010	2011	2012	2013	2014	Internal	Voluntary	Not use
E9	grupo média capital - sgps, s.a.	2008	2009	2010	2011	2012	2013	2014	2015	2016	External	Voluntary	Use
E10	caixa economica montepio geral	2012	2013	2014	2015	2016	2017	2018	2019	2020	External	Forced	Use
E11	mota - engil, sgps, s.a.	2005	2006	2007	2008	2009	2010	2011	2012	2013	External	Voluntary	Not use
E11	mota - engil, sgps, s.a.	2010	2011	2012	2013	2014	2015	2016	2017	2018	Internal	Voluntary	Use
E12	novabase - sociedade gestora de participações sociais, s.a.	2006	2007	2008	2009	2010	2011	2012	2013	2014	Internal	Voluntary	Use
E13	the navigator company, s.a.	2001	2002	2003	2004	2005	2006	2007	2008	2009	External	Forced	Use
E13	the navigator company, s.a.	2011	2012	2013	2014	2015	2016	2017	2018	2019	Internal	Voluntary	Use
E14	meo - serviços de comunicações e multimédia, s.a.	2003	2004	2005	2006	2007	2008	2009	2010	2011	Internal	Forced	Not use
E14	meo - serviços de comunicações e multimédia, s.a.	2004	2005	2006	2007	2008	2009	2010	2011	2012	Internal	Voluntary	Use
E14	meo - serviços de comunicações e multimédia, s.a.	2011	2012	2013	2014	2015	2016	2017	2018	2019	External	Forced	Not use
E14	meo - serviços de comunicações e multimédia, s.a.	2012	2013	2014	2015	2016	2017	2018	2019	2020	External	Forced	Use
E15	ren - redes energéticas nacionais, sgps, s.a.	2006	2007	2008	2009	2010	2011	2012	2013	2014	Internal	Forced	Use
E15	ren - redes energéticas nacionais, sgps, s.a.	2011	2012	2013	2014	2015	2016	2017	2018	2019	External	Voluntary	Not use
E15	ren - redes energéticas nacionais, sgps, s.a.	2012	2013	2014	2015	2016	2017	2018	2019	2020	External	Voluntary	Use
E16	semapa - sociedade de investimento e gestão, sgps, s.a.	2012	2013	2014	2015	2016	2017	2018	2019	2020	External	Voluntary	Use
E17	sonae - sgps, s.a.	2004	2005	2006	2007	2008	2009	2010	2011	2012	Internal	Voluntary	Use
E18	sonae capital, sgps, s.a.	2012	2013	2014	2015	2016	2017	2018	2019	2020	Internal	Voluntary	Use
E19	sonae indústria, sgps, s.a.	2008	2009	2010	2011	2012	2013	2014	2015	2016	Internal	Voluntary	Not use
E19	sonae indústria, sgps, s.a.	2009	2010	2011	2012	2013	2014	2015	2016	2017	Internal	Voluntary	Use
E19	sonae indústria, sgps, s.a.	2012	2013	2014	2015	2016	2017	2018	2019	2020	Internal	Voluntary	Not use
E20	sonaecom - s.g.p.s., s.a.	2004	2005	2006	2007	2008	2009	2010	2011	2012	External	Voluntary	Use

Table 11 - Firms under scope for the econometric model

#	Company Code	Company Name	Industry	Year of change	Sucession	Departure
1	E1	banco comercial português, sa	Banking	2012	External	Voluntary
2	E2	banco bpi sa	Banking	2003	Internal	Voluntary
3	E3	cimpor - cimentos de portugal, s.g.p.s., s.a.	Industry / ciment	2012	External	Voluntary
4	E4	edp - energias de portugal, s.a.	Energy	2006	External	Forced
5	E5	galp energia, sgps, s.a.	Energy	2007	Internal	Voluntary
6	E5	galp energia, sgps, s.a.	Energy	2015	Internal	Forced
7	E6	impresa - sociedade gestora de participações sociais, s.a.	Media	2012	Internal	Voluntary
8	E7	inapa - investimentos, participações e gestão, s.a.	Industry / paper	2007	Internal	Forced
9	E8	jerónimo martins - sgps, s.a.	Retail	2010	Internal	Voluntary
10	E9	grupo média capital - sgps, s.a.	Media	2011	External	Voluntary
11	E10	caixa economica montepio geral	Banking	2015	External	Forced
12	E11	mota - engil, sgps, s.a.	Industry / building	2013	Internal	Voluntary
13	E12	novabase - sociedade gestora de participações sociais, s.a.	Software	2009	Internal	Voluntary
14	E13	the navigator company, s.a.	Industry / paper	2004	External	Forced
15	E13	the navigator company, s.a.	Industry / paper	2014	Internal	Voluntary
16	E14	meo - serviços de comunicações e multimédia, s.a.	Telecommunications	2007	Internal	Voluntary
17	E14	meo - serviços de comunicações e multimédia, s.a.	Telecommunications	2015	External	Forced
18	E15	ren - redes energéticas nacionais, sgps, s.a.	Energy / infrastructures	2009	Internal	Forced
19	E15	ren - redes energéticas nacionais, sgps, s.a.	Energy / infrastructures	2015	External	Voluntary
20	E16	semapa - sociedade de investimento e gestão, sgps, s.a.	Industry / paper / ciment	2015	External	Voluntary
21	E17	sonae - sgps, s.a.	Financial Services	2007	Internal	Voluntary
22	E18	sonae capital, sgps, s.a.	Financial Services	2015	Internal	Voluntary
23	E19	sonae indústria, sgps, s.a.	Retail	2012	Internal	Voluntary
24	E20	sonaecom - s.g.p.s., s.a.	Telecommunications	2007	External	Voluntary

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