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Cédric van Appelghem, Pascal Nguyen

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Cédric VAN APPELGHEM
LITEM
Université d'Evry Val d'Essonne
Université Paris Saclay
91025 Evry FRANCE
Cedric.vanappelghem@univ-evry.fr

Pascal NGUYEN
Université de Montpellier
Institut de Management (MOMA)
Rue Vendémiaire - Bât. B
34960 Montpellier Cedex 2
pascal.nguyen@umontpellier.fr

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DO CEO-BOARD TIES AFFECT THE FIRM'S COST OF EQUITY?

The education of the French elite within a restricted circle of prestigious schools leads to strong social ties inside the boardroom. This paper examines the impact of these ties on a firm's cost of equity. Our results show that the strength of CEO-Board ties is associated with a higher cost of equity due to the risk of managerial opportunism induced by weaker board monitoring. This effect is amplified when the CEO is firmly entrenched due a longer tenure or dual role as chairman of the board. It is however moderated when other control mechanisms, such as the presence of a large controlling shareholder or extensive analyst following, can substitute for deficient board monitoring. Overall, our results highlight the cost arising from the existence of social networks in the boardroom.

Keywords: Social networks, opportunism, agency conflicts, monitoring, cost of capital

LA PROXIMITÉ ENTRE LE DIRIGEANT ET LES ADMINISTRATEURS A-T-ELLE UN IMPACT SUR LE COÛT DES FONDS PROPRES ?

La formation des élites françaises au sein d'un petit nombre de grandes écoles entraîne l'existence d'une certaine proximité entre dirigeants et administrateurs fondée sur le partage d'un même diplôme. Dans cet article, nous analysons l'effet de cette proximité sur le coût des fonds propres de l'entreprise. Les résultats montrent que la proximité se traduit par un coût des fonds propres plus élevé en raison d'un risque de comportement opportuniste du dirigeant lié à l'affaiblissement du contrôle disciplinaire du conseil d'administration. Cet effet est amplifié lorsque le dirigeant est fortement enraciné du fait d'une longue période en poste ou d'un cumul de mandat avec la présidence du conseil d'administration. Il est en revanche atténué lorsqu'il existe des mécanismes pouvant compenser une défaillance du conseil d'administration, comme la présence d'un gros actionnaire dans le capital de la firme ou un suivi plus important par les analystes financiers. Dans l'ensemble, notre étude met en avant le coût résultant de l'existence de liens sociaux entre le dirigeant et les administrateurs.

Mots clés : Relations sociales, opportunisme, conflits d'agence, contrôle disciplinaire, coût du capital

Introduction

On 5 March 2002, Vivendi Universal announced a huge loss of 13.6 billion euros that the media and communications group surpassed the following year with a still more astounding loss of 23.3 billion euros which, to this day, is the absolute record for a French company. There is now no longer any doubt that the origin of this debacle was the external growth strategy pursued by Jean-Marie Messier, the firm's CEO, when the price of acquired assets reached astronomical levels.[1] In these conditions, how can we explain the fact that the board did nothing to contain the excessive ambition of its young CEO? How do we also explain that for a long time it supported J.-M. Messier and rejected the idea of dismissing him, even though the firm had lost market confidence and was fighting to avoid a default on its debt?

An examination of the composition of the group's board just before the acquisition of Seagram, the parent company of Universal, in June 2000, provides a hint. Out of the 14 board members, two were part of the senior management team: Jean-Marie Messier and his right-hand man, Eric Licoys. The group also included three foreign directors. Leaving aside these five directors, the nine remaining members were distinguished by a prestigious educational background, very similar to that of Jean-Marie Messier, because we can list three graduates of Ecole Polytechnique, four graduates of ENA, also inspectors of finances, and two HEC graduates. As a result, seven of the nine outside French directors shared a common degree with Jean-Marie Messier, himself a graduate of the Ecole Polytechnique and a graduate of ENA, and also an inspector of finances.

The ties established by sharing an elite education and, consequently, common membership of a powerful alumni network could be the reason for Vivendi's disaster. Indeed, it is possible to ask if the similarity of their profiles did not contribute to a certain complacency by the firm's directors with regard to J.-M. Messier. In this respect, a recent study by Gompers et al. (2016) highlights the risks associated with such connections. First, the study confirms that venture capital managers with degrees from the same prestigious universities tend to invest jointly, which is not surprising. As expected, the success rate of their investments is also linked to the quality of their university education. However, and it is perhaps here that we find the most interesting result, the probability of success of investments made jointly is significantly lower when the two managers attended the same university.

In this article, we analyze the effect of the educational ties between the CEO and the directors on a firm's cost of equity. If these ties are likely to lead to a more or less serious failing in the firm's system of governance, we can expect that they are associated with a higher cost of equity. Agency theory (Jensen and Meckling 1976; Fama and Jensen 1983) suggests an obvious explanation. Ties between the CEO and the directors weaken the capacity of the board to monitor the CEO who can then become entrenched (Nguyen 2012; Kramarz and

[1] In an article dated 7 March 2002 ("Vivendi Universal pays the price for its expansion"), Le Monde points out "Over the last four years, no less than thirty acquisitions, representing more than 100 billion euros, have been made. Undertaken in the midst of the stock market euphoria, these acquisitions were often paid for at a high price". In an article with a title that is equally explicit ("Vivendi's golden purchases"), La Tribune dated 11 March 2002 underlines that "these mergers were carried out at the height of the stock market bubble".

Thesmar 2013), extract a higher salary (Hwang and Kim 2009; Kramarz and Thesmar 2013), or engage in accounting fraud (Bruynseels and Cardinaels 2013; Khanna et al. 2015).

In general, the CEO is expected to enjoy greater freedom to take opportunistic decisions that can harm the interests of shareholders and make the firm run the risk of significant losses, as in the case of Vivendi. The result is that CEO-Board ties are associated with lower firm valuation (Fracassi and Tate 2012). In a similar way, Ashbaugh-Skaife et al. (2009) show that investors require a higher risk premium from firms whose governance structure appears to be deficient. Bhojraj and Sengupta (2003) also find that the quality of governance has a positive effect on a firm's credit rating, which allows the firm to decrease its cost of debt.

Our study involves a sample of 1,276 observations corresponding to 110 non-financial firms for the period 2006-2017. Ties between the firm's CEO and directors are measured, as in Fracassi and Tate (2012), by the proportion of directors sharing a common education with the CEO. A second measure is more specifically concerned with directors who are formally described as independent. The cost of equity is calculated according to Pastor et al.'s (2008) procedure. This consists in starting with two-year earnings forecasts by financial analysts and making their expected profit growth rate converge towards the long-term growth rate of the economy. The flow of available dividends, after reinvestment of part of the earnings, is valued by discounting the cash flows at the cost of equity, which can therefore be inferred by matching the present value of the expected dividends to the current share price.

The results show that CEO-Board ties are associated with a higher cost of equity. This finding is confirmed by the endogeneity tests carried out using instrumental variable regressions. In addition, we show that the effect of CEO-Board ties on the cost of equity is stronger in the absence of a large investor but becomes negligible in the presence of such a shareholder. Similarly, the detrimental effects of CEO-Board ties are exacerbated when the CEO is more entrenched. This is the case when the CEO chairs the board of directors or has been in place for a long time. In contrast, the effect appears to be mitigated by a more intense monitoring by financial analysts. Agency theory offers an intuitive interpretation to these results. The favorable bias that the CEO enjoys with some board members because of their shared education is a risk to shareholders that is especially significant when the CEO is entrenched, and when this entrenchment is not balanced by other disciplinary mechanisms, such as the presence of a large shareholder or monitoring by financial analysts.

Our study makes several contributions to the literature. First, we show that close ties between the CEO and the directors may have real effects on the economy. While Gompers et al. (2016) draw attention to the fact that educational ties between co-managers decrease the probability of success in venture capital investments, we show that these ties increase the cost of equity, the effect of which is to penalize corporate investments and to curb the firm's growth. Second, we confirm the results of Kramarz and Thesmar (2013) concerning the negative wealth effect associated with the appointment of directors who are graduates of Ecole Polytechnique or ENA when the CEO is also a graduate of one of these schools. The fall in the share price that the two authors observe can be interpreted as investors demanding a higher risk premium. The impact that we observe on the cost of equity confirms this interpretation and is consistent with

the negative effect of CEO-Board ties on firm value that Fracassi and Tate (2012) have reported. Third, our study complements the results obtained by Upadhyay (2014). In his case, the lack of social diversity on the board, which he characterizes by a low number of women and ethnic minorities among directors, translates into a higher cost of capital, mainly because of the risk of developing groupthink. In our case, the homogeneity of profiles resulting from sharing the same education results, for reasons that are probably similar, in an increase in the cost of equity.

Furthermore, our study contributes to the analysis of the link between the quality of accounting information and the cost of capital. Botosan (1997) and Francis et al. (2008) highlight the benefit of disclosure in decreasing the cost of equity. The reason is that transparency reduces the risk of opportunistic behavior by the CEO.[2] In our case, we show that CEO-Board ties increase this risk by weakening the board's control over the CEO, which explains the increase in the cost of equity. In addition, we show that alternative control mechanisms, such as the presence of a large shareholder or monitoring by financial analysts, help to reduce this risk, while greater CEO entrenchment increases this risk. Finally, our study contributes to the analysis of social networks in the field of accounting. In their review paper, Jeanjean and Marmousez (2019) observe that most of the work in this field deals with inter-firm connections based on interlocking directorship.[3] The question consequently concerns the diffusion of accounting and tax practices between firms sharing common directors. Only Krishnan et al. (2011) and Bruynseels and Cardianels (2013) look at intra-firm connections and show that ties between the CEO and the directors translate into a decrease in the quality of financial reporting because of the weakening of the board's monitoring of the CEO. By pointing out the existence of an unfavorable effect on the cost of equity, our study emphasizes that investors do take into account the fact that these ties increase the risk of questionable accounting practices by the CEO.

This article is organized as follows. Section 1 develops the hypothesis that social ties between the CEO and the directors due to their shared education have the consequence of increasing the firm's cost of equity. Several moderating effects based on the firm's characteristics and governance are also proposed. Section 2 details the research methodology and presents the specificities of the French context. We present and analyze the results in Section 3, before concluding in Section 4.

1. Analytical framework, literature review, and hypotheses

1.1. An analytical framework based on agency theory

The board can be viewed as a body designed to control management decisions and to prevent opportunistic behavior by the CEO (Jensen and Meckling 1976; Fama and Jensen 1983). With

[2] The risk here refers to the probability of an event. Accordingly, the increased risk of opportunistic behavior means that such behavior has more chances of happening, which increases the cost that investors expect to incur. Hence the increase in the risk premium demanded by investors.
[3] This configuration is known as "*board interlock"*.

the aim of enabling directors to fulfill their mission in a dispassionate and objective manner, the Sarbanes-Oxley Act (2002) in the United States recommends that a majority of directors are external to the firm and free from any conflict of interest. These are known as independent directors. Codes of good governance, like the AFEP-MEDEF (2008) code in France, specify the conditions for directors to be described as independent. In particular, they should "not be, or not have been during the previous five years, an employee or a director of the firm or of a consolidated subsidiary, not have a significant business relationship with the firm, not have any close family relationship with a representative of the firm, and not hold more than 10% of capital or voting rights".

However, the specific criteria are far from taking all the possible conflicting situations into account (Jeanjean and Marmousez 2019). While considered as independent, some directors may in fact be close to the CEO (Hwang and Kim 2009; Crespi-Cladera and Pascual-Fuster 2014). This particularly concerns the largest French firms (Eminet et al. 2009). Krishnan et al. (2011) point out an increase in this phenomenon in the United States since the SOX Act came into force. By appointing independent directors who are close to them, CEOs can increase their power over their boards while maintaining the impression that they are evaluated objectively (Westphal and Zajac 1995). In fact, this process leads to an alignment of most directors with the CEO's positions while the views of dissenting directors are marginalized (Mullen et al. 1992; Hewstone et al. 2002).

In the context of agency theory, such a situation is interpreted as a weakening of the board's monitoring function. In fact, the lack of directors' impartiality which results from their ties to the CEO allows the latter to receive an unusually high compensation (Belliveau et al. 1996; Hwang and Kim 2009; Hoitash 2011) and to carry out acquisitions that destroy shareholder value (Kramarz and Thesmar 2013). This situation also allows CEOs to retain their positions despite unconvincing results (Nguyen 2012; Kramarz and Thesmar 2013) or to appoint new directors who are loyal to them (Westphal and Zajac 1995).

1.2. The effect of CEO-Board ties on the cost of equity

One of the key principles in finance is that the cost of capital, and in particular the cost of equity, reflects investors' exposure to risk. This risk can have exogenous causes, such as a dependence of the firm on volatile product markets. However, it can also result endogenously from opportunistic behavior by the CEO. For example, the latter can choose investments aimed at increasing his entrenchment (Shleifer and Vishny, 1989) or choose to expend less effort (Bertrand and Mullainathan, 2003) without worrying about the consequences for the firm's performance. The result is that the cost of capital is closely linked to the quality of the firm's governance and ability to control the opportunism of its CEO (Bhojraj and Sengupta 2003; Bedard and Johnstone 2004; Ashbaugh-Skaife et al. 2006; Kim and Zhang 2014).

When the power of shareholders is weakened, the CEO has more freedom to take decisions that can result in a deterioration in the firm's performance and even threaten its survival. In fact, the lack of shareholder control encourages CEO entrenchment and allows him to make

choices that are beneficial to him, but which give little help to the firm to develop and create value. In particular, the concern is that investments are undertaken with the sole aim of strengthening the CEO's prestige (Jensen 1986) or reinforcing his legitimacy (May 1995) or making it more difficult to dismiss him (Shleifer and Vishny 1989). This is why the board should show real independence in order to be able to better control the CEO and, in particular, judge his performance objectively and offer appropriate compensation (Chhaochharia et Grinstein 2009). This independence is also critical to enable the board to dismiss the CEO in case of insufficient performance (Weisbach 1988; Guo and Masulis 2015).

The reason why the Sarbanes-Oxley Act in the United States and the AFEP-MEDEF code in France require a majority of independent directors vis-à-vis the CEO is that the independence of the board is linked to better quality accounting information (Beasley 1996; Klein 2002; Peasnell et al. 2005), while the lack of board independence is associated with questionable accounting practices (Uzun et al. 2004; Agrawal and Chadha 2005), putting investors at risk of a collapse in the firm's share price (Hutton et al. 2009).

The hypothesis that we are putting forward in this paper is that the ties between the CEO and the directors undermine the board's independence and make it less able to defend the interests of shareholders, which imposes a significant risk on the latter. In fact, Fracassi and Tate (2012) show that the existence of social ties between the CEO and the directors leads to a decrease in the value of the firm and to costly acquisitions.[4] Similarly, Ishii and Xuan (2014) note that social ties between the management and the board of the two firms involved in a merger is associated with a destruction of value for the acquirer's shareholders.

Social ties between the CEO and the directors also lead to a decrease in the quality of accounting information (Bruynseels and Cardinaels 2013), as well as a deterioration in the quality of internal control (Carcello et al. 2011). Lee et al. (2014) and Khanna et al. (2015) show that this increases the likelihood of fraudulent accounting. The result is that CEO-Board ties are linked to a higher risk of seeing the CEO engage in opportunistic practices. Similarly, Upadhyay (2014) notes that the lack of ethnic or gender diversity within the board results in a higher cost of capital because of the lesser application of directors in exercising their role of monitoring the CEO.

Accordingly, we can put forward the following hypothesis:

Hypothesis 1: CEO-Board ties are associated with a higher cost of equity.

1.3. Moderating effects

1.3.1. Moderating effect of the presence of a large shareholder

If it is true that ties between the CEO and the directors impose a higher risk on shareholders, it is also likely that the presence of a large shareholder helps to limit the discretionary power of

[4] In the sense that acquisition announcements are associated with negative abnormal returns.

the CEO and thus the risk resulting from opportunistic behavior. In fact, we know that the quality of governance and the protection of shareholders are linked to the firm's ownership structure (La Porta et al. 2000). Shleifer and Vishny (1986) explain that large shareholders, in particular institutional investors, have the power and incentives to ensure active control of the firm. Their significant stake in the firm's ownership gives them the means to be heard by the management team. By exercising their voting rights, blockholders can also force the departure of a nonperforming CEO and impose a rethink of the firm's strategy.

Aggarwal et al. (2011) note that the presence of large shareholders, and in particular of institutional investors, is associated with a higher valuation of the firm. Barclays and Holderness (1991) note that the reallocation of blocks of shares to investors known to be active in monitoring is associated with a significant increase in the firm's share price. This revaluation is explained by the fact that large shareholders favor high quality governance, which leads to a higher long-term performance (Appel et al. 2016). In this respect, Kang et al. (2018) observe that, in the presence of blockholders, CEO turnover is strongly determined by the firm's poor performance.

Large shareholders are also associated with better quality accounting information (Velury and Jenkins 2006; Burns et al. 2010; Boone and White 2015), as well as a lower occurrence of fraudulent accounting activities (Sharma 2004). In addition, firms undertake better acquisitions and withdraw more readily from deals that do not receive the support of investors. Hence, the control exerted by large shareholders can balance the weakness of the board (Desender et al. 2013 Chhaochharia and Grinstein 2009). In these conditions, the ties between the CEO and the directors would not have such a strong implication for the cost of equity. The result is the following hypothesis:

Hypothesis 2: The presence of a large shareholder in the ownership structure moderates the influence of CEO-Board ties on the cost of equity.

1.3.2. Moderating effect of CEO entrenchment

The more the CEO is entrenched, the more important it is that the board demonstrates its independence, if it wants to avoid giving free rein to the CEO and allowing him to decide for instance on his own compensation (Ryan and Wiggins, 2004). In effect, the CEO could easily convince himself of the validity of his demands and impose these on the directors (Lorsch et Maclver, 1989; Walsh and Seward, 1990). In this context, the board should have the ability to resist the CEO's pressures and be able to form its own opinion, independently, without being influenced by the CEO.

Without this independence, it is unlikely that the board can contain the exuberance of the CEO and convince him to change the firm's strategy, which is a risk for investors, the consequence of which is a less favorable credit rating and a higher cost of debt (Liu and Jiraporn 2010). However, it is known that social ties between the CEO and the directors

undermine the independence of the board and damage its judgment capacity (Mullen et al. 1992; Hewstone et al. 2002) in a context where this independence is essential.

As the results of Gompers et al. (2016) show, the similarity of profiles is likely to dull critical thinking. This may explain why social ties facilitate the development of fraudulent accounting practices (Chidambaran et al. 2015; Khanna et al. 2015). Social ties also result in greater opacity, as if the board feels less responsible for protecting the interests of minority shareholders. This is why investors should expect a higher risk of activities that are contrary to their interests, which should automatically be reflected in a higher cost of equity.

Two indicators are typically used to characterize CEO entrenchment: being both CEO and chairman of the board (duality) and length in post (tenure).

It is easy to imagine that holding the title of CEO with that of chairman of the board promotes CEO entrenchment. Moreover, combining the responsibilities of management and control of the firm weakens and perverts the function of the board. In this respect, Goyal and Park (2002) show that duality contributes to the entrenchment of the CEO by making him less likely to be dismissed in case of poor performance. Besides, Hill and Phan (1991) point out that the CEO's compensation becomes less correlated with the performance of the firm. In addition, Tuggle et al. (2010) observe that duality leads to a decline in directors' attention, which seems to come from the fact that they are less able to control the agenda of board meetings. This could explain why firms where the CEO also chairs the board are more likely to engage in fraudulent accounting activities (Sharma 2004) and why they disclose less information voluntarily (Gul and Leung 2004).

CEO tenure leads to similar effects. Hermalin and Weisbach (1998) explain that CEO entrenchment increases with the length in post due to the fact that the CEO has participated in the appointment of a larger number of directors. The subordination of those directors implies a weakening of the disciplinary function of the board. Relaxing the directors' vigilance and the constraints which they have to deal with in exercising their responsibilities therefore results in a number of perverse effects.

Walters et al. (2007) emphasize that CEO tenure is associated with greater entrenchment that is evidenced by poor quality acquisitions. However, this result can be mitigated by a greater vigilance by the board. In addition, Dikolli et al. (2014) show that the likelihood of replacing the CEO following poor performance decreases with his length in post. Finally, Altunbas and al. (2018) show, using a sample of banks, that the increase in the CEO's tenure is associated with a higher incidence of criminal activities.

We can then formulate the following hypothesis.

Hypothesis 3: The entrenchment of the CEO, measured by a longer tenure or holding the dual responsibility of chief executive and chairman of the board, strengthens the influence of CEO-Board ties on the cost of equity.

1.3.3. Moderating effect of monitoring by financial analysts

Just like control by the board of directors, monitoring by financial analysts is a disciplinary mechanism relating to the CEO (Chung and Jo, 1996; Lang et al., 2004; Chen et al., 2015). This monitoring imposes greater transparency and forces the CEO to explain his strategy and decisions. This accountability reduces the CEO's discretionary power and thus discourages opportunistic behavior. Although they might not directly force the departure of a CEO, unfavorable analysts' evaluations increase the pressure on the board to take steps in this direction. Furthermore, the evaluations produced by analysts can cause a drop in the value of the firm's shares, which weakens the CEO's position and can precipitate his dismissal.

This explains that there is a rise in a firm's share price when analysts start covering the firm. Lang et al. (2004) show that this effect is more significant in the case of firms whose quality of governance is poor. Yu (2008) and Cormier et al. (2010) note that monitoring by analysts is associated with less earnings management. Chen et al. (2015) emphasize that it is easier for the CEO to engage in opportunistic behavior that is harmful to small shareholders in the case of weak monitoring by financial analysts. In addition, Jiraporn et al. (2012) note that analysts facilitate the dissemination of information concerning management, thus leading to a reduction in agency conflicts.

The disciplinary effect produced by analyst monitoring is consequently far from negligible, which allows us to put forward the following hypothesis:

Hypothesis 4: Monitoring by financial analysts mitigates the influence of CEO-Board ties on the cost of equity.

2. Methodology

2.1. Sample and data source

Our sample consists of listed French firms, including most of the constituents of the SBF 120 index, for the period 2006-2017. As the phenomenon of elite concentration mainly concerns large firms, the fact of limiting the study to the major listed firms appears to be justified. Moreover, collecting data concerning the education of directors becomes difficult beyond the largest firms. Finally, financial companies, insurance companies and real estate companies are excluded from the sample because the regulatory constraints which surround their activities imply that their cost of equity is determined by specific factors.

Earnings forecasts by financial analysts which are needed to estimate the cost of equity are sourced from the Factset database. This is also the case with accounting and financial data. Governance data come from the annual reports of each firm. The entry into force from 2007 of European Directive 2007/36/EC requiring complete disclosure on their governance helped with this information gathering. The data concerning the CEO's relational capital come from manual data collection, which makes our work original because, to our knowledge, such an analysis has never been carried out in France before. These data come from the biographical

dictionary Who's Who in France, the annual reports of each firm, and the Bloomberg website. In the case of missing data, the observation was removed. This is the case with a few observations at the beginning of the sample period. Ultimately, the sample consists of 1,276 observations representing 110 firms over the 12 years of the study period.

2.2. Empirical measures

2.2.1. Cost of equity estimation

The cost of equity is estimated using the dividend discount model proposed by Pastor et al. (2008). In this approach, dividends derive from the estimated earnings and the reinvestment rate needed to support subsequent earnings growth. For the first two years, the earnings are given by the median of earnings forecasts provided by financial analysts. Beyond that, it is necessary to come up with a suitable growth rate. Pastor et al. (2008) propose to use the growth rate projected by financial analysts and to make this rate converge towards the average growth rate of GDP in the economy after 15 years. This procedure has the merit of not leading to unreasonably high earnings forecasts.[5]

The pattern of future earnings requires a specific reinvestment rate which also depends on the return on equity, which we assume applies to new investments. By assuming a fixed return, let us say 10%, we obtain the reinvestment rate and, therefore, the distributable earnings.

Beyond the horizon of 17 years, the firm is expected to no longer be able to create value. Consequently, the terminal value can be calculated as if earnings were fully distributed, and is obtained by the constant growth formula in which the final earnings (at year 18) are divided by the return on equity (assumed from the start to be 10%). By discounting all the dividends and the terminal value, we obtain the value of equity or the price of shares if the earnings are calculated per share. As the return on equity used in this calculation is arbitrary, the estimated price has no reason to correspond to the observed price. It should therefore be adjusted in order to obtain the correct price. The Solver function in Excel can be used to easily compute the correct return on equity. Appendix 1 puts forward a more detailed description.

Overall, the method proposed by Pastor et al. (2008) provides good results. The average risk premium is reasonable since it is around 5.5%. Furthermore, this premium is positively correlated with the firm's return volatility. By comparison, the other methods of calculating the cost of equity result in risk premiums that are often absurd (Mehra and Prescott 1985).

One example can help to better understand the procedure for estimating the cost of equity of a firm. Table 1 provides the detailed calculations for IT consultancy Capgemini. For 2018 (t+1) and 2019 (t+2) the median earnings forecasts by financial analysts were 6.2293 euros and 6.78 euros per share, respectively. The earnings growth rate was projected at 9.016%, given the firm's recent strong performance. As this growth rate is not tenable, Pastor et al. (2008) recommend making it converge towards the long-term growth rate of the French economy,

[5] Due to a high growth rate during an exceedingly long period.

namely 1.5%.This is how this rate (in column 2) decreases from 9.016% in t+3 to 1.5% in t+17. The earnings per share of t+3 to t+17 (in column 3) derive directly from the growth rate calculated in column 2.

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Table 1

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The reinvestment rate of earnings (in column 4) is initially estimated at 64.286%. This comes from the distribution rate observed in t, which was 35.714%. In the long term, namely once the earnings growth rate is stabilized at g = 1.5%, the rate of reinvestment of earnings, noted b, satisfies the equation $g = r_e \times b$, with r_e representing the return on reinvested earnings (assumed to be equal to the cost of equity, namely here 10%). A brief explanation concerning this formula is given in Appendix 2. Given the hypotheses concerning the growth rate and the cost of equity, the long-term rate of reinvestment of earnings is thus $b = g/ r_e = 0.015/ 0.10 = 0.15$ (or 15%). Pastor et al. (2008) assume that, between the date t+1 and the date t+17, the rate of reinvestment decreases linearly (meaning here that it falls by 3.08% each year).

Applying the rate of reinvestment to expected earnings (in column 3) gives the distributable earnings (in column 5). From the year t+17, as earnings can be fully distributed because, by assumption, the firm no longer creates any value, the terminal value of the Capgemini shares is estimated at 128.334 euros (this is the earnings of 12,6437 euros expected in t+17 increased by the reinvestment rate of 15% and return on investment of 10%, and discounted at the cost of equity, assumed to be 10%). Column 6 reports the discounted cash flows (dividends and terminal value) at the rate of 10%. Hence the estimated share price of 66.8309 euros. This price is well below the actual price of Capgemini shares on 31 December 2017 which was 98.89 euros. This difference in value comes from the fact that the discount rate (and return on investment) used in the calculation is too high.

Excel Solver indicates that the correct discount rate is 7.52%. The last three columns detail the calculations with this rate. Due to the lower return on equity, the reinvestment rate must necessarily be higher to maintain growth in earnings (shown in column 2). We note that in the long term the reinvestment rate is also higher since it is equal to $b = g/ r_e = 0{,}015/ 0{,}0752 = 0{,}1994$ (or 19.94%). Consequently, the dividend per share is slightly lower. However, the terminal value is much higher because the expected earnings in t+18 are now discounted at a lower rate (which gives a terminal value of 170.5862 euros against 128.334 euros previously). All the available cash flows are then discounted at the rate of 7.52%, which gives a price per share of 98.8900 euros, matching exactly the actual share price. From this we can conclude that the cost of equity is indeed 7.52%.

2.2.2. The key variable: CEO-Board ties

Our key variable is the extent of the ties between the CEO and members of the board. We measure it by the number of directors with at least one shared degree with the CEO, divided

by the total number of directors, excluding the CEO. This variable, called “CEO-Board ties”, is in line with the work of Fracassi and Tate (2012), who use a similar variable to measure the number of directors linked to the CEO through their professional or university background.

The higher the proportion of directors with a shared degree with the CEO, the more the latter will have discretionary power to take the decisions that he wants and the less he will feel obliged to have to justify himself. Given that executive directors are not the most qualified to judge the CEO impartially, we construct a second variable, called “CEO-ID ties”, which only includes independent directors with at least one shared degree with the CEO. The calculation is the same as with the variable “CEO-Board ties” but restricted to independent directors.

Table 2 illustrates the calculation method by once again taking the example of IT consultancy Capgemini. On 31 December 2017, the board consisted of 16 members. As is often the case in France, the CEO, Paul Hermelin, held his executive position together with that of chairman of the board. As he is a graduate both of the Ecole Polytechnique and ENA, we therefore have to list the directors who graduated from the Ecole Polytechnique or ENA (or both). Two directors studied at the Ecole Polytechnique (Patrick Pouyanné and Pierre Pringuet), while three directors are graduates of ENA (Yann Delabrière, Laurence Dors and Xavier Musca). Accordingly, the “CEO-Board ties” variable is equal to (2+3)/(16–1) = 5/15 = 33.33%, which shows that one in three directors can be considered as being close to the CEO.

By looking at independent directors alone, it is necessary to exclude Yann Delabrière, which results in the variable “CEO-ID ties” being equal to 4/15 = 26.67%. In fact, it can be noted that the board only has eight independent directors, which shows that half of these directors are close to the CEO. Hence, we can question the true nature of directors, which governance codes, like the AFEP-MEDEF code, consider to be independent.

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Table 2

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2.2.3. Control variables

Apart from CEO-Board ties, several factors are likely to explain the cost of equity of a firm. These are the firm’s governance structure, its economic and financial characteristics, and the characteristics of the CEO.

The three governance variables are the following: “Board size” measures the total number of directors. “Board independence” indicates the proportion of independent directors in relation to the AFEP-MEDEF governance code. “Board type” takes the value 1 when the monitoring body consists of a supervisory board distinct from the management board, and 0 if not.

Among the financial characteristics of the firm, we have: “Total assets” is the logarithm of total assets. Used as an alternative measure of firm size, "Capitalization” is the logarithm of the market value of equity. “Tobin’s Q” is proxied by total assets plus market value of equity

minus book value of equity, divided by total assets. "Market/book" is the market value of equity divided by the book value of equity. "Debt" is total debt over total assets. "Beta" measures the firm's systematic risk. "Forecast dispersion" is the standard deviation of earnings forecasts by financial analysts. "Momentum" is the stock market performance over the preceding year. "Family business" indicates that the largest block of shares is in the hands of one family.

The variables relating to the CEO are: "Duality" indicates that the CEO also chairs the board. "Founder" indicates that the CEO is the founder of the firm. "Tenure" gives the number of years the CEO has been in post. In addition, three binary variables indicate the school from which the CEO graduated: "Polytechnique", "HEC" and "ENA". Holding a degree from these schools is a strong determinant of the ties that the CEO can have with his board. This is why not including these variables could lead to a bias if these variables also have an effect on the cost of equity of the firm.

All the variables used in this paper are detailed in Appendix 3. The regressions also include year and industry effects.[6] As a matter of fact, the cost of equity is likely to vary with the state of the economy, while some industries could be linked to risks that the other variables in the model are not able to capture. The basic specification is therefore

$$\begin{aligned}\text{Cost of Equity} = \alpha &+ \beta_1\ \text{CEO–Board ties (or CEO–ID ties)} + \beta_2\ \text{Polytechnique} + \beta_3\ \text{HEC} \\ &+ \beta_4\ \text{ENA} + \beta_5\ \text{Duality} + \beta_6\ \text{Founder} + \beta_7\ \text{Tenure} + \beta_8\ \text{Board size} \\ &+ \beta_9\ \text{Board independence} + \beta_{10}\ \text{Board type} + \beta_{11}\ \text{Total assets} \\ &+ \beta_{12}\ \text{Market/book} + \beta_{13}\ \text{Debt} + \beta_{14}\ \text{Beta} + \beta_{15}\ \text{Forecast dispersion} \\ &+ \beta_{16}\ \text{Momentum} + \beta_{17}\ \text{Family business} + \gamma\ \text{Year} + \varphi\ \text{Industry} + \varepsilon\end{aligned}$$

2.2.4. Descriptive statistics

Table 3 provides descriptive statistics of the sample.[7] The cost of equity comes out at about 9% with a standard deviation of 4.35%. On average boards have 11 members, almost 50% of whom can be described as independent. The CEO-Board ties variable shows that, on average, a director is a graduate of the same school as the CEO and that this number is two directors, or more, in about 25% of cases. The schools most concerned by the CEO's education are the Ecole Polytechnique (16.8%), followed by HEC (13.8%), and ENA (7.6%). In more than half of cases, the CEO also chairs the board, which conveys a certain entrenchment. Furthermore, the number of years since he took up his role is, on average, more than 10 years.

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Table 3

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[6] The sectoral indices are based on the ICB "Industry Classification Benchmark" groups, used by the Euronext Paris stock exchange. They include the oil-gas sector, basic materials, industry, technology, consumer goods, services to consumers, services to local authorities, telecommunications, and healthcare. As we have indicated, the last sector, that of financial services, is excluded from the sample.

[7] A correlation matrix is provided in Appendix 4.

Family businesses represent about 46% of observations. In slightly more than one case out of five, the structure of governance consists of a management board and a supervisory board. Financial characteristics reveal that the firm's market capitalization is more than two times higher than the book value of the firm's equity, while Tobin's Q is around 1.5. On average, debt represents a quarter of total assets, as in the sample of Mard and Marsat (2012). Finally, the beta coefficient is about 0.76, which partly reflects the fact that the stock return of small firms is not so much correlated with the daily return of the CAC All Tradable index. Amongst the contextual variables which help to separate the sample, we can note that the largest shareholder holds on average more than 30% of shares and in 25% of cases the block held exceeds 48%.

3. Results, discussion, and robustness tests

3.1. CEO-director ties and cost of equity

Table 4 presents the results of several regressions linking the cost of equity to the social ties between the CEO and the directors. Model 2 is differentiated from model 1 by the use of a measure of social ties focusing on independent directors. Models 3 and 4 reproduce the first two specifications but use market capitalization instead of total assets to control for the firm's size. In all cases, the coefficient of the social ties variables is both positive and significant, which is consistent with hypothesis 1.

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Table 4

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The result seems to reflect investors' concern that social ties between CEO and directors could undermine the integrity of board members and weaken the disciplinary power of the board. The CEO may, then, benefit from this weakness to increase his discretionary power and take decisions that are contrary to the interest of shareholders (Westphal and Zajac 1995; Nguyen 2012; Kramarz and Thesmar 2013). He may also more easily convince the board to validate his strategy without the latter expressing reservations or engaging in an in-depth discussion concerning the merits and risks of this strategy.

Relaxing the vigilance of the board opens the door to a decrease in the quality of financial information (Bruynseels and Cardinaels, 2013) and to poor accounting practices (Krishnan et al. 2011; Lee et al. 2014; Khanna et al. 2015). It also affects the quality of internal control (Carcello et al. 2011) and is accompanied by a greater opacity of the firm (Upadhyay and Zeng, 2014). In these conditions, it is not surprising that shareholders demand a higher risk premium. This also explains the fall in the share price of the firm on the announcement of the appointment of directors connected to the CEO (Kramarz and Thesmar 2013).

Most control variables display the expected effect. The size of the firm and the market/book ratio have a negative impact on the cost of equity, which can be explained by the fact that

large firms present a lower risk, while a higher share price mechanically translates into a lower cost of equity. Conversely, an increase in systematic risk, measured by the beta of the stock, is associated with a higher cost of equity. Francis et al. (2008) and Barth et al. (2013) obtain a similar result using a sample of US firms. The fact of being a graduate of Ecole Polytechnique, HEC or ENA does not seem to be perceived negatively. In the case of HEC graduates, there is even a favorable impact reflected by the lower cost of equity. The concern of investors seems instead to come from a weakening of the disciplinary control by the board, stemming from the presence within it of directors whose education is identical to that of the CEO. As Gompers et al. (2016) show, these ties are a source of inefficiency which can have a highly significant cost.

3.2. Moderating effect of ownership structure

The sample firms are then separated into two groups according to their ownership structure. When the percentage of shares held by the largest shareholder is higher than 20%, the firms are assumed to be tightly controlled. In fact, such a block seems to be sufficient to allow the main shareholder to impose a change in strategy or to force a replacement of the CEO. La Porta et al. (1999) indicate that, with 20% of voting rights, the main shareholder is generally part of the management team and exerts effective control over the firm.

Table 5 shows that the coefficient of the two variables measuring social ties between the CEO and the directors is clearly lower and becomes almost insignificant when the main shareholder has close control over the firm. In the opposite case, where the firm seems to be less well controlled, the coefficient of the two social ties variables is both higher and more significant. These results are consistent with hypothesis 2.

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Table 5

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It follows that social ties between the CEO and the directors are much less concerning for investors when the main shareholder has a block of shares to allow it to intervene in the case of a failure by the board. The presence of such a shareholder, then, is a substitute for control by the board (Desender et al. 2013; Chhaochharia and Grinstein 2009). It enables it to both force the departure of the CEO and the replacement of a board which is too lenient with the CEO. As a consequence, social ties have only a limited effect on the cost of equity.

On the other hand, when the main shareholder only holds a small percentage of the firm's shares, the complacency of the board can allow the CEO to undertake discretionary expenditure that is not consistent with the interests of shareholders (Jensen 1986). There is therefore no mechanism that can substitute for the board's lack of diligence. The quality of financial information issued by the firm can also be affected (Krishnan et al. 2011), which represents an additional risk for investors. The result is that the latter will be much more

concerned about the social ties between the CEO and the directors, which explains the stronger effect of the two social ties variables on the cost of equity.

3.3. Moderating effect of CEO entrenchment

The analysis carried out in this section consists in separating the firms into two groups by using two indicators of the CEO's entrenchment: (1) the number of years since he took up the post and (2) holding his role with chairing the board. In the first case, we choose a period of seven years, which represents the median of the sample.

Table 6 shows that the coefficient of the two social ties variables is close to zero when the CEO has been in post for less than seven years. It becomes positive and highly significant when the CEO has been in his post for more than seven years. This result may come from the fact that the effect of social ties with the board is only material when the CEO has become sufficiently entrenched after a number of years of carrying out his role. A more plausible explanation is that, over time, the CEO has been able to appoint directors who are connected to him (Hermalin and Weisbach, 1998), especially in terms of education. The combination of a certain entrenchment, coming from the number of years spent in managing the firm, and the support of directors who are connected to him, is what seems to cause the concern of investors, as signified by the higher cost of equity.

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Table 6

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Exercising power increases the CEO's entrenchment and makes his dismissal less easy, even in the case of poor performances (Dikolli et al. 2014). This results in an excess of confidence from the CEO, which can lead him to take more risks (Adams et al. (2005) and even to believe that he can engage in criminal activities without being detected (Altunbas et al. 2018).

Table 7 presents the results for firms whose CEO is or is not chairman of the board. The first group is larger, since the CEO is chairman of the firm in 57.52% of cases. The results are quite similar to those based on the number of years in post. The two social ties variables have a positive and highly significant effect when the CEO is chairman of the board, but a negligible effect when he is not.

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Table 7

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The result may be explained by the fact that holding multiple responsibilities contributes to the CEO's entrenchment and makes it more difficult to remove him (Goyal and Park, 2002). It may also be explained by the decrease in directors' attention given the fact that they have less

control over the agenda of meetings (Tuggle et al. 2010). The result of this situation is that the firm tends to disclose less information and become more opaque (Gul and Leung 2004).

The two indicators used for measuring the CEO's entrenchment provide results consistent with hypothesis 3. The effect of social ties between the CEO and members of the board is particularly significant when the CEO is well entrenched but loses its significance when the CEO is, to all appearances, less entrenched. This result expands in an interesting way on those already obtained. It shows that social ties require a favorable context – represented by the CEO's entrenchment -- to induce a significant risk of opportunistic behavior by the CEO. However, this risk can be contained by the presence of a mechanism of alternative governance to the board – such as that formed by the presence of a large shareholder in the ownership of the firm, as seen in the previous section.

3.4. Moderating effect of analyst coverage

In this section, the sample is split into two groups depending on the strength of monitoring by financial analysts. We recall that the procedure of calculating the cost of equity requires that each firm in the sample is covered by at least one analyst. Accordingly, we can use the number of earnings forecasts as a measure of the strength of monitoring by analysts. Table 8 presents the results in this first case.

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Table 8

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The difference between the groups appears less significant. However, we note that the effect of social ties between the CEO and board members is not quite significant when firms are well monitored by financial analysts and that it is more significant when firms are less well monitored. This result is consistent with hypothesis 4. It shows that financial analysts, through the strength of monitoring, can limit the opportunistic behavior of the CEO (Chen et al. 2015). In this way they contribute to mitigating agency conflicts (Jiraporn et al. 2012) and to dissuading the CEO from engaging in earnings management (Yu 2008). The result is that the social ties that the CEO may have with board members no longer have the same impact. Financial analysts thus play a monitoring role similar to the one played by a large shareholder, as already shown in Section 3.2.

We then use the number of analysts covering the firm. However, since this number varies with the size of the firm (Bhushan, 1989), it is necessary to make an adjustment. Indeed, a small firm monitored by 10 analysts is obviously the subject of more attention than a large firm monitored by as many analysts, especially if the average number of analysts covering a small firm is five, while the average number of analysts covering a large firm is 20. In order to undertake this adjustment, we regress the number of analysts on the size of the firm using a Poisson model. The residual of the regression, in other words the difference between the actual and the expected number of analysts covering the firm, is used as an indicator of the

strength of monitoring. In this way, a positive (negative) residual implies that the firm is the subject of particularly strong (weak) monitoring. The results presented in Table 9 appear to be consistent with hypothesis 4. Low monitoring by analysts provides the CEO with more freedom to make discretionary choices that can damage the interests of shareholders. Hence the significant impact of the two social ties variables, which is not observed in the case of strong monitoring by analysts. This result shows that, for firms of comparable size, the higher the number of analysts covering the firms, the more the firms are closely monitored, which also explains their higher valuation (Chung and Jo 1996) and their lower propensity to engage in earnings management (Yu 2008).

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Table 9

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3.5. Control for endogeneity

It is unlikely that the positive relation observed between CEO-Board social ties and the cost of equity are caused by endogeneity bias. In fact, there is no reason why the CEO should establish a board that is more connected to him because the cost of equity of the firm is higher. Quite the opposite, the fact that investors react in a negative way to the appointment of directors with the same education as the CEO (Kramarz and Thesmar 2013) should dissuade firms whose cost of equity is already high to increase the proportion of directors that can be perceived as being too connected to the CEO. Thus, we can go as far as thinking that the observed relation might actually underestimate the impact of CEO-Board social ties on the cost of equity of the firm.

We undertake two tests with the aim of verifying this fact. To begin with, we regress the cost of equity calculated for year t on the explanatory variables measured in year t-1 (Fich and Shivdasani 2006; Bruynseels and Cardinaels 2013). The results are similar to those presented in Section 4.1. Therefore, we do not present them, in order not to overload the article.

We then use an instrumental variable approach. In line with Bruynseels and Cardinaels (2013), our first instrument is the social ties variable measured in year t-1. The second instrument is the specific risk of the firm, which is measured by the volatility of the residual of the regression of the daily stock return on the daily market return over the past year. This variable is a good instrument for the following reasons. On the one hand, firm specific risk does not affect the cost of equity because expected return only, in theory, depends on the systematic risk of the firm.[8] The exclusion restriction is therefore satisfied in principle. On the other hand, it is likely that, in the presence of a high firm specific risk, the selection of the firm's directors will be more determined by their competences than by other criteria such as

[8] We hypothesize as in the Capital Asset Pricing Model (CAPM) that the market portfolio is the only source of systematic risk. The use of a multi-factor model like Fama and French's (1993) three factor model is of course possible.

that of their connections with the CEO, which should ensure that the instrument is correlated sufficiently with the endogenous variable.

Table 10 shows the result of the two-stage least squares (2SLS) regressions. The first column reveals that the social ties variable is strongly correlated to its lagged value. The second column shows that the cost of equity is explained slightly better with a higher coefficient on CEO-Board ties. The tests at the bottom of the table show the presence of a slight endogeneity bias, which reflects the fact that ordinary least squares regressions tend to underestimate the effect of the social ties variable in accordance with the idea that firms whose cost of equity is high are less likely to appoint directors connected to the CEO.

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Table 10

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The third column shows that the social ties variable is inversely linked to the specific risk of the firm. This relation can be explained by the fact that social ties are associated with poorer information disclosure (Bruynseels and Cardinaels 2013), which itself can also be reflected by a lower firm specific risk (Ferreira and Laux 2007). This relation can also come from the fact that the presence of high firm specific risk is likely to persuade the CEO to favor the appointment of competent directors rather than that of directors who are close to him. In any case, the fourth column of the table gives a result consistent with those coming from ordinary least squares regressions. The coefficient on CEO-Board ties turns out to be slightly higher but not quite significant because of the loss of statistical power due to the simultaneous estimation of the determinants of proximity and its impact on the cost of equity. In this specific case, Larcker and Rusticus (2010) recommend favoring the results of ordinary least squares regressions, which we also think is appropriate, considering the results of the first instrumental variable regression.

3.6. Consistency of the results across time

One concern with the sample period is that it covers the financial crisis of 2008-2009. It is therefore possible that the exceptional market conditions observed during the crisis have led to unusual tensions on risk premiums that are behind the relation between CEO-Board ties and the cost of equity. In order to ensure that this is not the case, we reproduce our analysis for the period 2010-2017 following the crisis. Table 11 shows the results corresponding to those presented in Tables 4, 5, 6, 7 and 9 for the social ties variable relating to the whole board and without showing the control variables, in order not to overload the table.

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Table 11

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We can observe that, for the whole of the post-crisis period, the coefficient of the social ties variable remains significant even if it is slightly lower. Hypothesis 1 thus continues to be validated. Hypotheses 2 and 4 are also validated. The social ties between the CEO and the directors is reflected in a significantly higher cost of capital when the firm is subject to weak external control, whether by the presence of a large shareholder or by monitoring by financial analysts. In the opposite case, the coefficient of CEO-Board ties is not significant, which reflects the capacity of these two governance mechanisms to discipline the CEO. Hypothesis 3 is also confirmed insofar as CEO-Board ties are not significant when the CEO is not very entrenched by being in post for a shorter time and by not holding his position together with that of chairman of the board.

4. Conclusion

Codes of governance, such as the AFEP-MEDEF code in France, consider financial ties between company directors and the firm as being detrimental to the board's mission. And yet the governance of French firms is often characterized by networks of individuals who have close social ties to the CEO, particularly developed through their education at a small number of elite schools. The research presented in this paper examines the effect of these ties on the firm's cost of equity.

Our results confirm the idea that social ties between directors and the CEO are a source of risk for investors insofar as these affect the ability of the board to discipline the CEO (Fracassi and Tate 2012; Nguyen 2012; Kramarz and Thesmar 2013; Khanna et al. 2015). The increase in the cost of equity therefore reflects the risk for shareholders of being exposed to decisions by the CEO that are contrary to their interests.

We also show that this risk exists above all when the CEO is strongly entrenched because of holding his mandate together with chairing the board or with a prolonged exercise of his position. In contrast, the presence of external governance mechanisms that can mitigate the failures of the board helps to limit this risk. It is when a large shareholder is present in the capital of the firm or when the firm is the subject of stronger monitoring by financial analysts.

In the end, our analysis enhances the field of studies concerning CEO social networks, and more particularly those related to his tertiary education. Without prejudging the quality of degrees of prestigious French schools, our results show, as does the study by Kramarz and Thesmar (2013), that it is the weakening of the supervisory body linked to the presence of directors who are too close to the CEO, and so inevitably less rigorous towards him, that imposes a cost on firms. These results highlight the inadequacy of the independence criteria chosen thus far on the subject of external directors, given the existence of social networks that can link them to the CEO.

As Jeanjean and Marmousez (2019) emphasize, this question provides several avenues for research in the field of accounting, auditing, and accountability. In particular, it would be

interesting to examine the influence of CEO networks on the quality of accounting processes or the firm's transparency. It is also possible to ask if the CEO is more inclined to recruit directors from his graduation cohort, and if such a factor plays a determining role in his entrenchment. It would also be interesting to study the effect of the proportion of directors recruited after the CEO took up his position and ask if these directors do not tend to be less rigorous vis-à-vis the CEO by supporting some questionable management decisions.

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Table 1. Cost of equity calculation for Capgemini

Year	Earnings forecasts with a long-term growth rate of 1.5%		Reinvestment rate and discounted dividends. Cost of equity used is $r_e = 0.10$			Reinvestment rate and discounted dividends. Cost of equity used is $r_e = 0.0752$		
	g: growth rate	FE: earnings forecasts	b: reinvestment rate	FCF: distributable earnings	Discounted FCF	b: reinvestment rate	FCF: distributable earnings	Discounted FCF
t+1		6.2293	0.64286	2.2247	2.0225	0.64286	2.2247	2.0691
t+2		6.7800	0.61205	2.6303	2.1738	0.61514	2.6093	2.2570
t+3	0.09016	7.3913	0.58125	3.0951	2.3254	0.58742	3.0495	2.4531
t+4	0.07932	7.9775	0.55045	3.5863	2.4495	0.55971	3.5125	2.6279
t+5	0.06978	8.5342	0.51964	4.0995	2.5454	0.53199	3.9941	2.7791
t+6	0.06139	9.0581	0.48884	4.6301	2.6136	0.50427	4.4904	2.9058
t+7	0.05401	9.5473	0.45804	5.1743	2.6552	0.47656	4.9975	3.0077
t+8	0.04751	10.0009	0.42723	5.7282	2.6723	0.44884	5.5121	3.0854
t+9	0.04180	10.4190	0.39643	6.2886	2.6670	0.42112	6.0313	3.1398
t+10	0.03677	10.8022	0.36563	6.8526	2.6420	0.39340	6.5525	3.1724
t+11	0.03235	11.1516	0.33482	7.4178	2.5999	0.36569	7.0736	3.1851
t+12	0.02846	11.4690	0.30402	7.9822	2.5434	0.33797	7.5928	3.1797
t+13	0.02504	11.7562	0.27321	8.5443	2.4750	0.31025	8.1088	3.1582
t+14	0.02203	12.0152	0.24241	9.1026	2.3970	0.28254	8.6205	3.1225
t+15	0.01938	12.2481	0.21161	9.6563	2.3116	0.25482	9.1270	3.0747
t+16	0.01705	12.4569	0.18080	10.2046	2.2208	0.22710	9.6279	3.0165
t+17	0.01500	12.6437	0.15000	10.7472	2.1263	0.19939	10.1228	2.9496
				128.3340	25.3902		170.5863	49.7065
				PV(FCF)	66.8309		PV(FCF)	98.8900
				r_e	0.10		r_e	0.0752
				Price at 31/12	98.89		Price at 31/12	98.89

Table 2. Capgemini board composition at 31-12-2017

Chairman and Chief Executive		
1.	Paul Hermelin	X, ENA
External directors		
2.	Daniel Bernard	HEC
3.	Anne Bouverot *	ENS, Télécom, Doctorate in Computer Science
4.	Yann Delabrière	ENS, ENA
5.	Laurence Dors *	ENS, ENA
6.	Carole Ferrand *	HEC
7.	Robert Fretel	Toulouse Institute of Chemical Engineering
8.	Siân Herbert-Jones *	B.A. Oxford, Chartered Accountant
9.	Phil Laskawy	MBA Wharton
10.	Kevin Masters	No higher education
11.	Xavier Musca *	IEP, ENA
12.	Patrick Pouyanné *	X, Mines
13.	Pierre Pringuet *	X, Mines
14.	Bruno Roger	IEP
15.	Lucia Sinapi-Thomas	ESSEC
16.	Caroline Watteeuw-Carlisle *	University of Ghent

*: Independent directors

Table 3. Descriptive statistics of the sample

	Mean	Std-dev	p25	Median	p75
1.- *Key variables*					
Cost of equity	0.0898	0.0435	0,0651	0.0797	0.1008
CEO-Board ties	0.0876	0.1388	0,0000	0.0000	0.1540
CEO-ID ties	0.0484	0.1009	0,0000	0.0000	0.0710
2.- *Control variables*					
Polytechnique	0.1684	0.3743	0	0	0
HEC	0.1380	0.3450	0	0	0
ENA	0.0764	0.2657	0	0	0
Duality	0.5752	0.4945	0	1	1
Founder	0.2065	0.4050	0	0	0
Tenure	10.275	9.6892	3	7	15.5
Board size	11.030	3.6328	9	11	14
Board independence	0.4995	0.2170	0.3661	0.50	0.6336
Board type	0.2128	0.4094	0	0	0
Total assets (log)	15.160	1.6886	13.854	15.186	16.472
Capitalization (log)	14.711	1.7599	13.336	14.878	15.988
Tobin's Q	1.5078	0.8355	1.0605	1.2764	1.6418
Market/book	2.1041	1.6591	1.1444	1.7232	2.7201
Debt	0.2463	0.1474	0.1380	0.2348	0.3350
Beta	0.7618	0.3685	0.5048	0.7491	0.9879
Forecast dispersion	0.3912	0.9135	0.1130	0.2086	0.3864
Momentum	0.1069	0.3809	-0.1144	0.0942	0.2944
Family business	0.4627	0.4988	0	0	1
3.- *Context variables*					
Main block of shares	30.608	20.355	10.932	27.533	48.342
Number of forecasts	13.681	8.084	7	13	19
Specific risk	0.0176	0.0490	0.0117	0.0150	0.0194

The cost of equity is calculated following Pastor et al. (2008). CEO-Board ties (CEO-ID ties) is the proportion of directors (independent directors) sharing a common degree with the CEO. Polytechnique, HEC, and ENA show that the CEO is a graduate of the corresponding schools. Duality indicates that the CEO chairs the board. Founder indicates that the CEO is the founder of the firm. Tenure is the CEO's number of years in post. Board size is the number of directors or members of the supervisory board. Board independence is the proportion of independent directors according to the AFEP-MEDEF code. Type of board indicates that the firm functions with a management board and a supervisory board. Total assets is the logarithm of total assets. Capitalization is the logarithm of the market value of equity. Tobin's Q is measured by (total assets + market value of equity – book value of equity)/total assets. Market/book is market value of equity divided by the book value of equity. Debt is total debt over total assets. Beta is calculated using daily stock returns over the previous year. Forecast dispersion is the standard deviation of earnings forecasts by financial analysts. Momentum is the stock return over the previous year. Family business shows that a family is the main shareholder and holds more than 20% of the shares. Main block of shares gives the percentage of shares held by the largest shareholder. Number of forecasts is the number of earnings forecasts by financial analysts. Specific risk is the volatility of the residual of the market model using daily stock returns over the previous year.

Table 4. Effect of CEO-Board ties on the cost of equity

	(1)	(2)	(3)	(4)
CEO-Board ties	0.0301 ***		0.0255 **	
	(2.86)		(2.46)	
CEO-ID ties		0.0421 ***		0.0402 ***
		(2.75)		(2.63)
Polytechnique	0.0044	0.0048	0.0042	0.0040
	(1.14)	(1.24)	(1.16)	(1.09)
HEC	-0.0054 *	-0.0053 **	-0.0027	-0.0029
	(-1.95)	(-1.98)	(-1.02)	(-1.14)
ENA	-0.0042	-0.0031	-0.0058	-0.0052
	(-0.89)	(-0.64)	(-1.23)	(-1.11)
Duality	-0.0047 *	-0,0041	-0.0043	-0.0037
	(-1.67)	(-1.42)	(-1.59)	(-1.37)
Founder	0.0105 ***	0.0106 ***	0.0051	0.0052
	(3.06)	(3.12)	(1.52)	(1.56)
Tenure	-0.0003 **	-0.0003 **	-0.0002 *	-0.0003 **
	(-2.02)	(-2.26)	(-1.87)	(-2.07)
Board size	-0.0013 ***	-0.0012 ***	-0.0001	0.0000
	(-3.00)	(-2.81)	(-0.21)	(0.00)
Board independence	0.0045	0.0034	0.0043	0.0032
	(1.18)	(0.87)	(1.18)	(0.87)
Board type	-0.0056	-0.0059	-0.0058 *	-0.0061 *
	(-1.52)	(-1.60)	(-1.66)	(-1.74)
Total assets	-0.0061 ***	-0.0062 ***		
	(-5.75)	(-5.88)		
Capitalization			-0.0106 ***	-0.0107 ***
			(-9.34)	(-9.53)
Market/book	-0.0058 ***	-0.0057 ***	-0.0027 ***	-0.0026 ***
	(-7.86)	(-7.80)	(-3.77)	(-3.70)
Debt	0.0137	0.0144 *	-0.0008	-0.0003
	(1.59)	(1.68)	(-0.10)	(-0.04)
Beta	0.0198 ***	0.0187 ***	0.0208 ***	0.0198 ***
	(5.87)	(5.51)	(6.47)	(6.10)
Forecast dispersion	0.0017	0.0016	0.0014	0.0013
	(1.36)	(1.26)	(1.06)	(0.96)
Momentum	-0.0005	0.0002	0.0004	0.0010
	(-0.12)	(0.04)	(0.10)	(0.25)
Family business	-0.0003	0.0001	-0.0014	-0.0012
	(-0.10)	(0.02)	(-0.59)	(-0.49)
Constant	0.2102 ***	0.2136 ***	0.2605 ***	0.2633 ***
	(9.78)	(10.08)	(11.89)	(12.20)
F value	10,44 ***	10,66 ***	12.76 ***	13.06 ***
Adjusted R^2	0,2366	0,2373	0.2926	0.2945
N observations	1276	1276	1276	1276

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5: Moderating influence of the presence of a large shareholder

	Main block of shares		Main block of shares	
	< 20%	≥ 20%	< 20%	≥ 20%
CEO-Board ties	0.0719 ***	0.0211 *		
	(3.63)	(1.78)		
CEO-ID ties			0.0742 ***	0.0103
			(2.74)	(0.61)
Polytechnique	-0.0102	0.0093 *	-0.0061	0.0120 **
	(-1.46)	(1.92)	(-0.87)	(2.48)
HEC	-0.0169 ***	-0.0027	-0.0122 **	-0.0015
	(-3.07)	(-0.77)	(-2.41)	(-0.43)
ENA	-0.0094	0.0007	-0.0033	0.0027
	(-1.10)	(0.10)	(-0.38)	(0.42)
Duality	-0.0072	-0.0023	-0.0049	-0.0018
	(-1.62)	(-0.58)	(-1.09)	(-0.42)
Founder	0.0157 **	0.0076 *	0.0152 **	0.0071 *
	(2.43)	(1.93)	(2.31)	(1.80)
Tenure	-0.0007 ***	-0.0003 *	-0.0007 ***	-0.0003 *
	(-2.64)	(-1.78)	(-2.70)	(-1.87)
Board size	0.0013	-0.0021 ***	0.0010	-0.0021 ***
	(1,19)	(-4.15)	(0.95)	(-4.12)
Board independence	-0.0084	0.0050	-0.0082	0.0037
	(-1.41)	(0.85)	(-1.37)	(0.64)
Board type	-0.0040	-0.0062	-0.0044	-0.0063
	(-0.58)	(-1.36)	(-0.63)	(-1.39)
Total assets	-0.0085 ***	-0.0067 ***	-0.0084 ***	-0.0069 ***
	(-3.66)	(-4.90)	(-3.64)	(-4.98)
Market/book	-0.0043 ***	-0.0055 ***	-0.0043 ***	-0.0054 ***
	(-2.80)	(-6.07)	(-2.74)	(-5.99)
Debt	0.0300 *	0.0060	0.0284	0.0070
	(1.73)	(0.60)	(1.58)	(0.71)
Beta	0.0051	0.0303 ***	0.0044	0.0296 ***
	(0.97)	(6.81)	(0.82)	(6.47)
Forecast dispersion	0.0177 **	0.0005	0.0189 **	0.0005
	(2.16)	(0.34)	(2.31)	(0.33)
Momentum	0.0009	-0.0027	0.0030	-0.0024
	(0.13)	(-0.54)	(0.42)	(-0.50)
Family business	0.0039	0.0024	0.0043	0.0025
	(1.08)	(0.69)	(1.19)	(0.73)
Constant	0.1937 ***	0.2669 ***	0.1968 ***	0.2699 ***
	(5.03)	(8.29)	(5.12)	(8.36)
F value	6.48 ***	9.93 ***	6,34 ***	10.01 ***
Adjusted R^2	0.2916	0.2781	0,2895	0.2753
N observations	496	780	496	780

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6: Moderating effect of CEO entrenchment (measured by CEO tenure)

	CEO tenure		CEO tenure	
	> 7 years	≤ 7 years	> 7 years	≤ 7 years
CEO-Board ties	0.0499 ***	0.0061		
	(3.42)	(0.40)		
CEO-ID ties			0.0802 ***	-0,0055
			(3.88)	(-0,24)
Polytechnique	-0.0021	0.0132 **	-0.0030	0,0150 **
	(-0.51)	(2.08)	(-0.69)	(2,39)
HEC	-0.0126 ***	0.0024	-0.0149 ***	0,0030
	(-2.62)	(0.63)	(-3.13)	(0,83)
ENA	-0.0004	-0.0012	-0.0017	0,0003
	(-0.06)	(-0.19)	(-0.26)	(0,04)
Duality	0.0082 *	-0.0110 ***	0.0090 **	-0,0109 ***
	(1.87)	(-3.16)	(2.01)	(-3,11)
Founder	0.0079 **	0.0141	0.0086 **	0,0153
	(2.12)	(1.40)	(2.32)	(1,47)
Tenure	-0.0002	-0.0011	-0.0003	-0,0010
	(-1.19)	(-1.09)	(-1.47)	(-1,06)
Board size	-0.0015 **	-0.0009	-0.0013 **	-0,0010
	(-2.59)	(-1.15)	(-2.36)	(-1,21)
Board independence	0.0016	0.0091	-0.0017	0,0094
	(0.27)	(1.52)	(-0.29)	(1,56)
Board type	-0.0026	-0.0002	-0.0033	-0,0001
	(-0.57)	(-0.04)	(-0.73)	(-0,02)
Total assets	-0.0061 ***	-0.0062 ***	-0.0062 ***	-0,0062 ***
	(-4.23)	(-3.92)	(-4.22)	(-3,92)
Market/book	-0.0040 ***	-0.0058 ***	-0.0037 ***	-0,0057 ***
	(-3.73)	(-5.87)	(-3.47)	(-5,81)
Debt	0.0239 **	0.0083	0.0240 **	0,0082
	(2.12)	(0.63)	(2.17)	(0,63)
Beta	0.0176 ***	0.0198 ***	0.0160 ***	0,0201 ***
	(3.35)	(4.35)	(3.13)	(4,36)
Forecast dispersion	0.0014	0.0032	0.0013	0,0033
	(1.42)	(0.75)	(1.25)	(0,76)
Momentum	-0.0025	0.0005	-0.0014	0,0006
	(-0.40)	(0.08)	(-0.23)	(0,10)
Family business	0.0068 **	-0.0048	0.0066 **	-0,0047
	(2.14)	(-1.03)	(2.13)	(-0,97)
Constant	0.1997 ***	0.2105 ***	0.2068 ***	0,2109 ***
	(6.13)	(6.97)	(6.65)	(7,01)
F value	7.96 ***	5.53 ***	8.38 ***	5.48 ***
Adjusted R^2	0.3067	0.1964	0.3186	0.1963
N observations	623	653	623	653

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7: Moderating effect of CEO entrenchment (measured by CEO duality)

	CEO chairs the board		CEO chairs the board	
	Yes	No	Yes	No
CEO-Board ties	0.0440 ***	0.0037		
	(2.63)	(0.21)		
CEO-ID ties			0.0817 ***	-0.0133
			(3.30)	(-0.56)
Polytechnique	0.0056	0.0085	0.0047	0.0111
	(1.24)	(1.16)	(1,02)	(1.54)
HEC	-0.0041	-0.0022	-0.0042	-0.0010
	(-1.08)	(-0.48)	(-1.16)	(-0.22)
ENA	0.0005	-0.0164 ***	0.0030	-0.0145 **
	(0.07)	(-2.90)	(0.49)	(-2.52)
Founder	0.0062	0.0104	0.0071	0.0106
	(1.40)	(1.56)	(1.62)	(1.56)
Tenure	0,0001	-0.0009 ***	0.0000	-0.0008 ***
	(0.49)	(-3.26)	(0.03)	(-3.33)
Board size	-0.0015 ***	-0.0009	-0.0013 ***	-0.0011
	(-3.21)	(-0.85)	(-2.88)	(-0.99)
Board independence	-0.0023	0.0087	-0.0055	0.0090 *
	(-0.40)	(1.61)	(-0.95)	(1.69)
Board type	-0.0159 **	0.0014	-0.0172 **	0.0017
	(-2.40)	(0.31)	(-2.56)	(0.38)
Total assets	-0.0057 ***	-0.0056 ***	-0.0061 ***	-0.0055 ***
	(-4.47)	(-3.59)	(-4.86)	(-3.56)
Market/book	-0.0053 ***	-0.0055 ***	-0.0049 ***	-0.0053 ***
	(-4.82)	(-5.97)	(-4.47)	(-5.77)
Debt	0.0090	0.0180	0.0125	0.0190
	(0.94)	(1.38)	(1.32)	(1.46)
Beta	0.0252 ***	0.0131 ***	0.0220 ***	0.0134 ***
	(4.95)	(2.91)	(4.35)	(2.98)
Forecast dispersion	0.0009	0.0094	0.0007	0.0101
	(0.80)	(0.62)	(0.63)	(0.65)
Momentum	0.0025	-0.0091	0.0031	-0.0093
	(0.48)	(-1.16)	(0.61)	(-1.17)
Family business	0.0049	-0.0064	0.0056 *	-0.0063
	(1.60)	(-1.15)	(1.85)	(-1.10)
Constant	0.1920 ***	0.1961 ***	0.2017 ***	0.1962 ***
	(6.42)	(5.79)	(7.13)	(5.80)
F value	6,24 ***	7,19 ***	6,99	7,02
Adjusted R^2	0,2572	0,2362	0,2692	0,2367
N observations	734	542	734	542

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 8. Moderating effect of analysts monitoring (measured in number of forecasts)

	Number of forecasts		Number of forecasts	
	≤ 13	≥ 14	≤ 13	≥ 14
CEO-Board ties	0.0311 **	0.0160		
	(2.43)	(1.01)		
CEO-ID ties			0.0436 **	0.0018
			(2.21)	(0.09)
Polytechnique	-0.0057	0.0020	-0.0047	0.0040
	(-0.79)	(0.49)	(-0.66)	(0.94)
HEC	-0.0049	-0.0008	-0.0065	0.0004
	(-0.92)	(-0.29)	(-1.18)	(0.14)
ENA	-0.0215 **	0.0003	-0.0186 *	0.0027
	(-2.13)	(0.07)	(-1.84)	(0.51)
Duality	-0.0035	-0.0011	-0.0032	-0.0005
	(-0.75)	(-0.41)	(-0.67)	(-0.19)
Founder	0.0056	0.0018	0.0056	0.0010
	(1.10)	(0.45)	(1.11)	(0.25)
Tenure	-0.0004 *	0.0001	-0.0004 *	0.0001
	(-1.76)	(0.48)	(-1.84)	(0.47)
Board size	-0,0016 **	-0.0003	-0.0015 **	-0.0004
	(-2.24)	(-0.51)	(-2.05)	(-0.63)
Board independence	0.0062	0.0046	0.0044	0.0043
	(0.85)	(1.08)	(0.61)	(1.06)
Board type	0.0003	-0.0006	-0.0008	-0.0004
	(0.05)	(-0.16)	(-0.13)	(-0.11)
Total assets	-0.0116 ***	0.0005	-0.0118 ***	0.0005
	(-4.75)	(0.51)	(-4.85)	(0.51)
Market/book	-0.0044 ***	-0.0042 ***	-0.0044 ***	-0.0041 ***
	(-2.66)	(-7.21)	(-2.67)	(-7.08)
Debt	0.0140	0.0137	0.0138	0.0142
	(1.12)	(1.30)	(1.11)	(1.42)
Beta	0.0209 ***	0.0144 ***	0.0201 ***	0.0141 ***
	(3.63)	(4.17)	(3.45)	(4.09)
Forecast dispersion	0.0012	0.0189 ***	0.0011	0.0199 ***
	(0.87)	(2.94)	(0.77)	(3.13)
Momentum	-0.0039	0.0085 *	-0.0033	0.0091 *
	(-0.64)	(1.88)	(-0.55)	(1.95)
Family business	-0.0011	-0.0052 **	-0.0008	-0.0052 **
	(-0.30)	(-2.04)	(-0.23)	(-1.98)
Constant	0.3183 ***	0.0469 **	0.3230 ***	0.0480 **
	(8.34)	(2.50)	(8.51)	(2.55)
F value	6.88 ***	11.57 ***	6.92 ***	11.34 ***
Adjusted R^2	0.2439	0.3599	0.2444	0.358
N observations	651	625	651	625

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 9. Moderating effect of analysts monitoring (number of analysts adjusted for firm size)

	Strength of monitoring		Strength of monitoring	
	Weak	Strong	Weak	Strong
CEO-Board ties	0.0427***	0.0269		
	(3.26)	(1.55)		
CEO-ID ties			0.0420**	0.0294
			(2.09)	(1.50)
Polytechnique	0.0070	0.0010	0.0089	0.0002
	(1.24)	(0.19)	(1.56)	(0.03)
HEC	-0.0247***	0.0011	-0.0254***	0.0012
	(-3.73)	(0.30)	(-3.74)	(0.38)
ENA	-0.0070	0.0067	-0.0029	0.0059
	(-0.97)	(0.90)	(-0.41)	(0.77)
Duality	-0.0082*	-0.0009	-0.0080*	-0.0001
	(-1.79)	(-0.33)	(-1.72)	(-0.02)
Founder	0.0077	0.0088**	0.0082	0.0090**
	(1.53)	(2.02)	(1.64)	(2.12)
Tenure	-0.0003	-0.0002	-0.0003	-0.0003
	(-1.37)	(-1.07)	(-1.54)	(-1.35)
Board size	-0.0021***	-0.0006	-0.0022***	-0.0004
	(-3.15)	(-1.16)	(-3.23)	(-0.86)
Board independence	0.0047	-0.0030	0.0033	-0.0053
	(0.44)	(-0.41)	(0.31)	(-0.72)
Board type	-0.0092	0.0019	-0.0098	0.0017
	(-1.36)	(0.53)	(-1.44)	(0.50)
Total assets	-0.0070***	-0.0054***	-0.0071***	-0.0053***
	(-4.00)	(-3.94)	(-4.06)	(-3.82)
Market/book	-0.0054***	-0.0038***	-0.0062***	-0.0043***
	(-5.08)	(-4.32)	(-6.04)	(-4.88)
Debt	0.0123	0.0075	0.0123	0.0095
	(0.85)	(0.71)	(0.85)	(0.90)
Beta	0.0357***	0.0148***	0.0345***	0.0141***
	(6.12)	(3.14)	(5.77)	(3.00)
Forecast dispersion	0.0024**	0.0022	0.0023*	0.0013
	(2.00)	(0.23)	(1.95)	(0.14)
Momentum	-0.0054	0.0039	-0.0042	0.0049
	(-0.82)	(0.83)	(-0.65)	(1.10)
Family business	-0.0022	0.0068***	-0.0023	0.0072***
	(-0.59)	(2.67)	(-0.63)	(2.79)
Constant	0.2404***	0.1643***	0.2454***	0.1680***
	(7.05)	(6.48)	(7.25)	(6.71)
F value	6,02***	7.02***	6.04***	7.95***
Adjusted R^2	0,2664	0.326	0,.675	0.2454
N observations	679	597	679	597

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 10. Instrumental variable regressions

	CEO-Board ties	Cost of equity	CEO-Board ties	Cost of equity
	(1)	(2)	(3)	(4)
CEO-Board ties		0.0480 ***		0.0647
		(3.59)		(0.29)
CEO-Board ties (t-1)	0.8136 ***			
	(18.19)			
Specific risk			-0.0752 ***	
			(-3.11)	
Polytechnique	0.0259 ***	0.0030	0.1792 ***	-0.0018
	(3.69)	(0.71)	(11.10)	(-0.05)
HEC	0.0130 **	-0.0066 **	0.1024 ***	-0.0089
	(2.19)	(-2.27)	(6.27)	(-0.39)
ENA	0.0353 ***	-0.0059	0.1619 ***	-0.0099
	(2.98)	(-1.26)	(12.39)	(-0.27)
Duality	0.0090	-0.0047 *	0.0319 ***	-0.0059
	(1.47)	(-1.76)	(3.54)	(-0.72)
Founder	-0.0041	0.0102 ***	-0.0018	0.0105 ***
	(-0.55)	(2.80)	(-0.13)	(3.12)
Tenure	-0.0002	-0.0002 *	-0.0012 ***	-0.0002
	(-0.90)	(-1.66)	(-2.75)	(-0.78)
Board size	-0.0011 *	-0.0010 **	-0.0063 ***	-0.0011
	(-1.70)	(-2.22)	(-4.86)	(-0.75)
Board independence	-0.0077	0.0045	-0.0079	0.0048
	(-1.23)	(1.12)	(-0.64)	(1.18)
Board type	0.0024	-0.0039	0.0013	-0.0057
	(0.44)	(-1.11)	(0.13)	(-1.51)
Total assets	0.0003	-0.0066 ***	-0.0060 **	-0.0059 ***
	(0.16)	(-5.88)	(-2.16)	(-3.72)
Market/book	0.0002	-0.0058 ***	0.0018	-0.0058 ***
	(0.25)	(-8.36)	(0.79)	(-6.69)
Debt	0.0299 **	0.0116	-0.0190	0.0144
	(2.25)	(1.39)	(-0.70)	(1.41)
Beta	-0.0107 *	0.0202 ***	0.0058	0.0196 ***
	(-1.85)	(5.86)	(0.64)	(5.82)
Forecast dispersion	0.0003	0.0010	0.0051	0.0015
	(0.31)	(0.93)	(1.24)	(0.97)
Momentum	0.0056	0.0007	0.0172	-0.0011
	(0.85)	(0.16)	(1.31)	(-0.18)
Family business	0.0042	0.0005	0.0106	-0.0006
	(1.12)	(0.19)	(1.55)	(-0.17)
Constant	0.0272	0.2062 ***	0.2122 ***	0.1933 ***
	(1.25)	(8.70)	(4.83)	(3.89)
F value	83.44 ***		21.86 ***	
Adjusted R^2	0.8074		0.3298	
Wald chi^2		317.43 ***		290.96 ***
R^2		0.2593		0.2495
Diagnostics (robustness, endogeneity)				
F instrument	331.653 ***		9.7021 ***	
Partial R^2	0.7126		0.001	
Durbin Chi^2		4.2772 **		0.0176
Wu-Hausman F		4.0947 **		0.0220
N observations	1168	1168	1168	1168

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 11. Analysis for the period 2010-2017 following the financial crisis

	CEO-Board ties		Control		Adjusted	
	Coeff.	t-stat	variables	F value	R^2	N obs.
Full sample						
2010-2017 period	0.0276	(2.46)**	Yes	9.23***	0.2101	875
Main block of shares						
< 20 %	0.0799	(3.86)***	Yes	5.44***	0.2627	350
≥ 20 %	0.0139	(1.03)	Yes	9.44***	0.2556	525
Strength of monitoring by financial analysts						
Weak	0.0465	(3.23)***	Yes	5.54***	0.2206	468
Strong	0.0123	(0.67)	Yes	6.27***	0.2206	407
CEO tenure						
> 7 years	0.0423	(2.52)**	Yes	6.64***	0.2646	442
≤ 7 years	0.0153	(1.00)	Yes	5.26***	0.1829	433
CEO duality						
Yes	0.0394	(2.24)**	Yes	6.13***	0.2339	522
No	0.0100	(0.61)	Yes	7.30***	0.2373	353

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Appendix 1. Procedure for calculating the cost of equity

The cost of equity is calculated using the dividend discount model of Pastor et al. (2008).

Let us consider a firm whose index is not shown. The firm's price per share at time *t* can be described by the general formula

$$P_t = \sum_{k=1}^{\infty} \frac{E(FCF_{t+k})}{(1+r_e)^k}$$

in which FCF_{t+k} is the dividend per share for the year *t*+*k*, $E(FCF_{t+k})$ is the expected value of this dividend, and r_e is the firm's cost of equity.

Pastor et al. (2008) propose to make explicit the dividends up to a certain horizon *t*+*T*. The value of the subsequent dividends is represented by a terminal value TV_{t+T}

$$P_t = \sum_{k=1}^{T} \frac{E(FCF_{t+k})}{(1+r_e)^k} + \frac{TV_{t+T}}{(1+r_e)^T}$$

To estimate the flow of dividends, Pastor et al. (2008) start from earnings per share forecasts estimated by financial analysts for the years *t*+1 et *t*+2. The I/B/E/S database provides the median value of these forecasts, noted FE_{t+1} and FE_{t+2}, as well as the median value of the long-term profit growth rate, noted γ, which financial analysts also predict.

Pastor et al. (2008) carry out two adjustments. In order to mitigate the influence of unusual cases, a value of 100% is assigned to growth rates higher than 100%, while a value of 2% is assigned to growth rates lower than 2%. Where the long-term growth rate is not informed, this is replaced by the profit growth rate between *t*+1 and *t*+2.

The long-term growth rate γ cannot be used as it is in order to estimate the firm's earnings until the selected horizon. As a matter of fact, this rate is sometimes too high. Moreover, it does not take account of the fact that a firm cannot grow on a long-term basis at a higher rate than the economy. This explains that Pastor et al. (2008) let this growth rate converge towards the average growth rate of GDP, noted g, which is reached in year *t*+*T*.

The earnings growth rate for the year *t*+*k* is therefore given by the recursive formula:

$$g_{t+k} = g_{t+k-1} \exp\left(\frac{\ln(g/g_{t+3})}{T-3}\right)$$
$$g_{t+3} = \gamma$$

This apparently complex formula simply shows that the logarithmic growth rate over one year is proportional to its growth over the whole period, which includes $T-3$ years, because it can be written $\ln(g_{t+k}) - \ln(g_{t+k-1}) = \frac{1}{T-3}\{\ln(g_{t+T}) - \ln(g_{t+3})\}$ knowing that $g_{t+T} = g$.

The expected earnings FE_{t+k} can therefore be calculated for each year, from *t*+3 to *t*+*T*, starting from the last analysts' forecast FE_{t+2}:

$$FE_{t+k} = FE_{t+k-1}(1 + g_{t+k}).$$

The following step consists in estimating the earnings reinvestment rate. For the year $t+1$, Pastor et al. (2008) take the complement of the distribution rate of dividends of the year t. The reinvestment rate then converges linearly towards the optimal long-term reinvestment rate which is given by the formula

$$b = g/r_e.$$

This formula reflects the fact that, when the firm is no longer able to create value, the profit growth rate is equal to the product of the return on (re)invested equity by the earnings reinvestment rate. More detailed explanations are provided in Appendix 2.

The equation $b_{t+k} - b_{t+k-1} = \frac{1}{T-1}\{b_{t+T} - b_{t+1}\}$ reflects the gradual adjustment in the profit reinvestment rate between $t+1$ and $t+T$. By fixing b_{t+T} at the optimal long-term reinvestment rate b, we obtain the following recursive formula

$$b_{t+k} = b_{t+k-1} + \frac{b - b_{t+1}}{T - 1}$$

The expected dividend for the year $t+k$ is therefore $E(FCF_{t+k}) = FE_{t+k}(1 - b_{t+k})$.

The terminal value TV_{t+T} is obtained by putting forward the hypothesis -- already used to define the optimal long-term earnings reinvestment rate, -- that the firm no longer creates value beyond the selected horizon. Consequently, the terminal value can be calculated as if future earnings were fully distributed. In this case, equity is no longer incremented, which results in expected earnings remaining constant indefinitely.

It is therefore possible to use the constant perpetuity formula to obtain the terminal value $TV_{t+T} = FE_{t+T+1}/r_e$. The fact that the earnings growth rate is stabilized at rate g equal to the average growth of GDP from date $t+T$ allows us to deduce from this that $FE_{t+T+1} = FE_{t+T}(1 + g)$. Consequently,

$$TV_{t+T} = \frac{FE_{t+T}(1 + g)}{r_e}$$

After substituting all the cash flows, we obtain the formula:

$$P_t = \sum_{k=1}^{T} \frac{FE_{t+k}(1 - b_{t+k})}{(1 + r_e)^k} + \frac{FE_{t+T}(1 + g)}{r_e(1 + r_e)^T}$$

As the share price is known at time t, the only parameter remaining to be determined is the cost of equity r_e. Knowing that the share price decreases monotonically when the discount rate increases, a solution can be easily found using numerical methods such as the Newton-Raphson method.

Appendix 2. Optimal long-term earnings reinvestment rate

Consider a firm whose index is not shown. FP_t is the value of equity at time *t* and r_e the cost of equity (or expected return on equity) of the firm. The expected earnings at time t+1 is therefore $FE_{t+1} = r_e \times FP_t$.

If the earnings are fully distributed, the value of equity does not change: $FP_{t+1} = FP_t$ and the expected earnings for the following year also remain unchanged: $FE_{t+2} = FE_{t+1}$.

In contrast, if the firm decides to reinvest a fraction b of its profits, the value of equity increases by $\Delta FP_{t+1} = FP_{t+1} - FP_t = (r_e \times FP_t) \times b$.

Thus, $FP_{t+1} = FP_t + (r_e \times FP_t) \times b$.

By assuming that the return on equity r_e applies to retained earnings, the expected earnings for the year t+2 are therefore:

$$\begin{aligned} FE_{t+2} &= r_e \times FP_{t+1} \\ &= r_e \times \{FP_t + (r_e \times FP_t) \times b\} \\ &= (r_e \times FP_t) + (r_e \times FP_t)(r_e \times b) \\ &= (r_e \times FP_t)(1 + r_e \times b) \\ &= FE_{t+1}(1 + r_e \times b) \end{aligned}$$

This result shows that earnings growth is

$$g_{t+2} = FE_{t+2}/FE_{t+1} - 1 = r_e \times b$$

For a constant reinvestment rate equal to b, the earnings growth rate is also constant and can be noted more simply $g = r_e \times b$. This equation shows that, to obtain a constant earnings growth rate g, all that is required is to reinvest a constant fraction $b = g/r_e$ of the earnings.

Obviously, a firm cannot increase its earnings indefinitely at an arbitrarily high rate. For this, it would need to generate the same return r_e whatever the reinvestment rate. In the long term, this is only possible for a growth rate at most equal to that of the economy. This is why Pastor et al. (2008) propose to fix g at the average growth rate of GDP.

Appendix 3. Definition of variables

Variables	Definition and calculation of variables
Cost of equity	Cost of equity calculated according to Pastor et al. (2008)
CEO-Board ties	Number of directors who are graduates of the same schools as the CEO, divided by the total number of directors, excluding the CEO
CEO-ID ties	Number of independent directors who are graduates of the same schools as the CEO, divided by the total number of directors, excluding the CEO
Polytechnique	Binary variable equal to 1 if the CEO is a graduate of Polytechnique and 0 if not
HEC	Binary variable equal to 1 if the CEO is a graduate of HEC and 0 if not
ENA	Binary variable equal to 1 if the CEO is a graduate of ENA and 0 if not
Duality	Binary variable equal to 1 if the CEO is also chairman of the board and 0 if not
Founder	Binary variable equal to 1 if the CEO is the founder of the firm and 0 if not
Tenure	Number of years the CEO has held his current position
Board size	Number of directors or members of the supervisory board
Board independence	Number of directors considered to be independent according to the AFEP-MEDEF governance code, divided by total number of directors
Board type	Binary variable equal to 1 if the firm functions with a management board and a supervisory board and 0 if not
Total assets	Natural logarithm of total assets
Capitalization	Natural logarithm of market value of equity
Market/book	Market value of equity divided by book value of equity
Debt	Total debt divided by total assets
Beta	Calculated using the market model and daily returns in the previous year
Forecast dispersion	Standard deviation of earnings forecasts by financial analysts
Momentum	Stock return over the previous year
Family business	Binary variable equal to 1 if the main shareholder is a family and holds more than 20% of shares of the firm, and 0 if not
Main block of shares	Percentage of shares held by the largest shareholder of the firm
Number of forecasts	Number of earnings forecasts by financial analysts in the I/B/E/S database
Specific risk	Standard deviation of the non-systematic variation of daily stock returns calculated using the market model

Appendix 4. Correlation between the explanatory variables

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]
Ties	[1]	1.0000																
X	[2]	**0.3640**	1.0000															
HEC	[3]	**0.1932**	**-0.1075**	1.0000														
ENA	[4]	**0.2879**	-0.0118	0.0126	1.0000													
Duality	[5]	**0.1041**	0.0664	**-0.0860**	0.0453	1.0000												
Founder	[6]	**-0.0774**	**-0.0958**	-0.0701	**-0.1467**	**0.2476**	1.0000											
Tenure	[7]	**-0.1156**	**-0.1375**	**-0.0749**	**-0.1385**	**0.2720**	**0.6167**	1.0000										
Board size	[8]	-0.0159	**0.2711**	**-0.0773**	**0.1609**	0.0309	**-0.2613**	**-0.2542**	1.0000									
Board ind.	[9]	-0.0066	0.0692	0.0503	-0.0276	**-0.2229**	**-0.2127**	**-0.1596**	**0.0806**	1.0000								
Board type	[10]	**-0.0757**	-0.0609	0.0129	-0.0491	**-0.5626**	**-0.0865**	-0.0300	**-0.0735**	**0.2678**	1.0000							
Assets	[11]	0.0466	**0.2969**	-0.0386	**0.1896**	-0.0054	**-0.3865**	**-0.3030**	**0.6874**	**0.2461**	-0.0265	1.0000						
M/B	[12]	-0.0314	**-0.0727**	**0.0866**	**-0.1095**	-0.0399	-0.0025	0.0317	-0.0670	-0.0483	-0.0057	-0.0023	1.0000					
Debt	[13]	**0.0754**	**0.1565**	0.0495	**0.0821**	0.0531	**-0.1031**	**-0.1297**	**0.1136**	**0.0845**	**-0.0942**	**0.1510**	**-0.0787**	1.0000				
Beta	[14]	**0.0762**	**0.1426**	-0.0281	**0.1434**	-0.0632	**-0.2059**	**-0.2238**	**0.2183**	**0.3190**	**0.0881**	**0.3052**	**-0.0974**	**0.2095**	1.0000			
Dispersion	[15]	0.0373	0.0153	-0.0451	0.0033	**0.0748**	-0.0667	-0.0409	0.0427	-0.0591	**-0.0731**	**0.1081**	-0.0412	0.0125	**0.1400**	1.0000		
Momentum	[16]	0.0295	-0.0068	0.0227	-0.0317	0.0557	0.0264	0.0483	-0.0230	-0.0104	-0.0528	-0.0465	**0.2206**	**-0.1135**	-0.0507	-0.0360	1.0000	
Family	[17]	**-0.0731**	**-0.2263**	**0.0812**	**-0.2086**	-0.0419	**0.1510**	**0.1877**	**-0.2340**	**-0.1947**	0.0664	**-0.2604**	**0.0794**	**-0.1306**	**-0.1240**	**0.1036**	0.0197	1.0000

Ties (for CEO-Board ties) is the proportion of directors sharing a common degree with the CEO. X (for Polytechnique), HEC, and ENA indicate that the CEO is a graduate of the corresponding schools. Duality indicates that the CEO chairs the board. Founder indicates that the CEO is the founder of the firm. Tenure is the CEO's number of years in post. Board size is the number of directors or members of the supervisory board. Board ind. (for independence) is the proportion of independent directors according to the AFEP-MEDEF code. Board type indicates that the firm functions with a management board and a supervisory board. Assets is the logarithm of total assets. M/B (for Market/Book) is stock market value of equity divided by book value of equity. Debt is total debt over total assets. Beta is calculated using daily returns over the previous year. Dispersion (for Forecast dispersion) is the standard deviation of earnings forecasts by financial analysts. Momentum is the firm's stock return over the previous year. Family indicates that a family is the main shareholder and holds more than 20% of the shares. Significant correlations at the 1% level are shown in bold.