



**LISBOA
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ECONOMICS &
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Paulo Manuel de Moraes Francisco

Orientadores: Prof. Doutor Eduardo Barbosa do Couto e Prof. Doutor Carlos Pestana Barros

Júri:

Presidente: Reitor da Universidade de Lisboa.

Vogais: Doutor Carlos Alberto Pestana Barros, Professor associado com agregação do Instituto Superior de Economia e Gestão da Universidade de Lisboa;

Doutor Eduardo Barbosa do Couto, Professor associado do Instituto Superior de Economia e Gestão da Universidade de Lisboa;

Doutor Miguel José Pereira Athayde Marques, Professor auxiliar da Universidade Católica Portuguesa;

Doutor Júlio Manuel dos Santos Martins, Professor auxiliar convidado da Faculdade de Economia da Universidade do Porto;

Doutor Paulo Fernando Sousa Pereira Alves, Professor adjunto convidado do Instituto Superior de Contabilidade e Administração de Lisboa.

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Resumo

Na presente dissertação são apresentados quatro ensaios sobre governo das sociedades. No primeiro ensaio é analisada a remuneração dos CEO das empresas cotadas portuguesas. Os resultados obtidos revelam que os fatores específicos das empresas explicam grande parte da variabilidade da remuneração total dos CEO, ao passo que o desempenho das empresas explica menos de 5%. Outras características do governo destas sociedades estão também relacionadas com a remuneração dos CEO. No segundo ensaio é analisada a relação entre o desempenho da empresa e o governo das sociedades, com especial enfoque nas características dos CEO, designadamente quanto ao nível e tipo de educação. Além da relação entre o governo das sociedades cotadas portuguesas e o seu desempenho, os resultados sugerem ainda que existe uma relação positiva entre o nível de educação dos CEO e o desempenho das empresas. No terceiro ensaio é analisado efeito da diversidade de género no conselho de administração na redução dos custos de agência. Os resultados empíricos suportam esta relação. Adicionalmente é encontrada evidência de que as empresas mais complexas e com maior preocupação acerca da independência dos seus dirigentes têm maior diversidade de género no conselho de administração. Por fim, no último ensaio é analisado o efeito da composição do conselho de administração na política de financiamento. Os resultados obtidos suportam a ideia de que conselhos de administração mais independentes reduzem a assimetria de informação, levando a uma maior utilização de fontes externas de capital tais como ações e dívida de longo prazo.

Palavras-chave: conselho de administração, presidente executivo, custos de agência, governo das sociedades, finanças empresariais.

Classificação JEL: G30, G32, J33, L22

Abstract

This dissertation presents four empirical essays on corporate governance. The first essay analyses Portuguese CEO's earnings. It is found that firm specific factors accounts for the majority of the variance in total CEO pay, while firm performance accounts for less than 5%. It is also found that the CEO characteristics, board of directors' structures, and shareholders features are related with the CEO pay. In the second essay, we analyse the relationship between company performance and governance characteristics allowing for CEO specific characteristics, such as education, age and tenure. The findings support the conclusion that firm performance relates positively to the CEO's level of educational attainment. Other governance-specific characteristics also explain this relationship, namely, the presence of independent directors on the board and voting cap restrictions. The third essay empirically analyses whether gender diversity enhances boards of directors' independence and efficiency. The empirical results support this hypothesis. Moreover, this essay finds that firms that are concerned with board independence and those in more complex environments are more likely to have gender-balanced boards. Finally, the fourth essay empirically analyses the association between the board of directors' composition and a firm's financing policies. It is theorised that a more independent and efficient board leads to a shift of financing choices from retained earnings to short-term debt, from short-term debt to long-term debt, and from long-term debt to external equity financing. The results obtained in this last study support this hypothesis.

Keywords: board of directors, CEO, agency costs, corporate governance, corporate finance.

JEL classification: G30, G32, J33, L22

Ao meu filho Duarte

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List of acronyms

2SLS – Two stage least squares

AB – Arellano and Bond (1991)

CAPEX – Capital expenditures

CEO - Chief executive officer

CMVM – *Comissão do Mercado de Valores Mobiliários*

EBITDA - Earnings before interest, taxes, depreciation and amortisation

FE – Fixed effects

GDP – Gross domestic product

GICS - Global industry classification standard

GMM – General method of moments

MC – Market capitalization

OLS – Ordinary least squares

RE – Random effects

ROA – Return on assets

R&D - Research and development

CHAPTER I – INTRODUCTION AND DISSERTATION OVERVIEW

1.1 Introduction

Public firms play a crucial role in modern economies (Jensen, 1993). Capital suppliers invest their savings in these companies and, in turn, public companies use these funds in their production processes, as well as in new investment projects in the real economy. Consequently, capital providers (investors) expect to get a return to offset the price of time and risk they incur.

Public firms can either have its capital widely dispersed or controlled by a short number of shareholders, for example by a controlling family shareholder. In either case there is usually a separation between the company management and capital providers. These firms are therefore characterized by the separation of ownership (the principal - shareholders) and control (the agent - management). In this view of the firm, unless effective corporate systems of governance are in place, agency-costs, or conflicts of interest, caused by the different principal-agent interests are incurred and firm value reduced (Jensen and Meckling, 1976; Fama and Jensen, 1983; Hart, 1995). Governance practices endeavour to align the principal's (shareholders') interests with the agent's interests to maximise the shareholders' value. The natural hypothesis is therefore that a firm with more efficient governance practices in place should observe less agency costs and executive managers' interests more aligned with those of the shareholders. The question is which corporate governance devices are more efficient? This dissertation addresses the role of corporate governance devices and its effectiveness on reducing agency costs between managers and shareholders.

In the last two decades several corporate governance regulatory initiatives have been promoted by policy makers, regulators and other organizations in order to endorse governance systems that would align the interests of managers with those of investors. The Cadbury Report (1992), the OECD principles of corporate governance (1999, 2004), the US Sarbanes-Oxley Act of 2002 are just a few examples of these initiatives. Despite the huge attention given to corporate governance issues in the last few decades by the all these social strands (including the academia), corporate governance issues are still a timely subject. Some evidence of this subject pertinence is given by the OECD report (2009) entitled “The Corporate Governance Lessons from the Financial Crisis”:

(...) the financial crisis can be to an important extent attributed to failures and weaknesses in corporate governance arrangements which did not serve their purpose to safeguard against excessive risk taking in a number of financial services companies. Accounting standards and regulatory requirements have also proved insufficient in some areas. Last but not least, remuneration systems have in a number of cases not been closely related to the strategy and risk appetite of the company and its longer term interests. (...) the importance of qualified board oversight and robust risk management is not limited to financial institutions. The remuneration of boards and senior management also remains a highly controversial issue in many OECD countries. The current turmoil suggests a need for the OECD to re-examine the adequacy of its corporate governance principles in these key areas.

As can be seen in the above citation, after the 2007/2008 subprime crisis, the OECD report (2009) on corporate governance highlights the failure of corporate governance devices in place at some financial firms that have initiated this worldwide confidence crisis (e.g. Lehman Brothers).

1.2 Corporate governance definition

Several definitions of corporate governance have been suggested in the literature (e.g., Williamson, 1988; Hart, 1995; Shleifer and Vishny, 1997; just to name a few). Shleifer and Vishny (1997) define corporate governance as the ways in which suppliers

of finance to corporations assure themselves of getting a return on their investment. The Cadbury Report (1992) defines corporate governance as follows:

Corporate governance is the system by which companies are directed and controlled. Boards of directors are responsible for the governance of their companies. The shareholders' role in governance is to appoint the directors and the auditors and to satisfy themselves that an appropriate governance structure is in place. The responsibilities of the board include setting the company's strategic aims, providing the leadership to put them into effect, supervising the management of the business and reporting to shareholders on their stewardship. The board's actions are subject to laws, regulations and the shareholders in general meeting.

Generally, corporate governance can be seen as the means by which the conflicts of interest between managers and shareholders are resolved. Corporate governance devices can also be segregated among internal and external corporate governance devices (Farinha, 2003). Internal governance mechanisms are directly related with the company governance structure, such as the independence of the board of directors. External mechanisms are market based forces that discipline the manager activity and induces an alignment between his personal interest and the shareholders' interests.

Internal mechanisms include an effectively structured board (Hermalin and Weisback, 1998; Fama and Jensen, 1983). The board of directors should include effective and independent members that monitor the executive managers and design top-management incentives (Jensen and Murphy, 1990) to give managers the incentive to create value to shareholders. Nevertheless, managers can entrench themselves, for example, by making manager-specific investments that make it costly for shareholders to replace them. That is, by making themselves valuable to shareholders and costly to replace (Shleifer and Vishny, 1989). In that case, the role of independent directors is compromised and the board of directors is an inefficient corporate governance mechanism. Another internal governance mechanism is the existence of a large shareholder that monitors the role of managers (Hart, 1995). Firms held by a large

number of small investors face a free-rider problem. Since monitoring the agent is expensive, small shareholders leave to others the role of monitoring. If all investors are small and think this way, no monitoring is made. One way to improve corporate governance is therefore throughout one or more large shareholders. But even when a large shareholder exists, there can always be conflicts of interest, since the large shareholder might promote their own interest at the expense of other shareholders (Burkart et al., 1997).

External governance mechanisms include the managerial labor market (Fama, 1980) where managers are quickly replaced when performing poorly; the market for corporate control (Manne, 1965; Fama and Jensen, 1983; Jensen and Ruback, 1983); product market competition (Hart, 1984), and the firm's financial structure (Jensen, 1986). If a firm has its capital widely dispersed, the market for corporate control can act as a monitoring device. In fact, if a manager destroys shareholders value more likely is the threat of a takeover. The bidder can then dismiss the current management team. Relative to the product market competition theory it is predicted that more competition in the market for products can reduce firms operating margins and therefore less available cash for the discretionary use of managers. With respect to the role of the financial structure as a corporate governance device, Jensen (1986) has recognized that large amounts of free-cash flow can increase the manager power. The author develops a theory explaining the benefits of debt in reducing agency costs of free cash flows. In this framework, debt reduces the agency costs by reducing the cash flow available for spending at the will of managers. Furthermore, high levels of debt can increase the threat of going bankrupt, making managers' reputation at risk. Thus, debt works as an incentive to manager's work harder.

Even with all these monitoring devices in place, conflicts of interest between shareholders and managers may still exist. The entrenchment hypothesis explains some of these monitoring imperfections (Stulz, 1988; Shleifer and Vishny, 1989). This line of thought argues that entrenched managers make any potential replacement costly and therefore external corporate governance devices less effective. Several devices can be used by managers to promote entrenchment. High ownership by managers, for example, can make it difficult for a hostile takeover to be successful (Stulz, 1988) and let the CEO with sufficient power to extract wealth from the shareholders. Making investments specific related to the manager own talents is another way they can increase power and bind shareholders to themselves (Shleifer and Vishny, 1989). In fact, any action taken by the CEO that makes future firm profitability dependent on his particular skills, experience or private relationships, makes it difficult for the managerial labor market, the market for control and the market for products, to act has effective external monitoring devices.

1.3 Dissertation overview

This dissertation includes four autonomous essays on corporate governance. The dissertation focus is on CEO and board of directors' characteristics. In the first two papers we analyse governance issues within the Portuguese context, whereas in the last two essays we use an international database. In each paper we try to add new insights to the current corporate governance knowledge. The motivation, contributions and the main findings are explained in this brief overview.

In the first paper, we analyse the relationship between corporate governance practices and CEO earnings in Portuguese companies from 2002-2011, by means of several panel data estimation models, including a dynamic micro panel data model

(Arellano-Bond, 1991). Several sets of factors are analysed: firm performance, firm specific characteristics, CEO specific characteristics, board of directors and ownership structure. This research contributes to the corporate governance literature in several ways. First, it adds new insights as to whether a more independent board of directors' can in fact limit the ability of CEO's to earn excess earnings. Secondly, different corporate governance devices can have complementary or substitutive effects (Farinha, 2003). To address this, this paper includes a larger than usual set of corporate governance variables, including ownership variables, shareholders meetings data and CEO individual characteristics. Finally, the majority of the empirical research on CEO compensation builds on either US or UK data, where financial markets are more efficient and corporate governance practices are potentially more developed when compared with small European countries such as Portugal. A number of issues that are specific to Portugal might make unrealistic the generalization of those countries results. The results reveal that total return to shareholders is positively associated with total CEO pay; however this variable explains only a small fraction of total CEO earnings. Firm specific characteristics are found to explain a larger amount of the CEO earnings variability. Particularly, it is found that firm size and dividend yields are positively associated with higher CEO earnings. Moreover, the CEO earnings are lower in family and regulated firms. With respect to CEO specific characteristics it is found that CEO age and the fraction of the CEO earnings that are variable drive the executives' earnings up. The results also show that CEO education and stock based compensation might reduce CEO total earnings. With respect to the board of directors' characteristics it is found that the existence of a remuneration committee does not restrict the CEO's to extract over paid earnings. On the other hand, the results support the view that a large fraction of independent directors might lower CEO excess earnings. Finally, with

respect to the shareholders characteristics the results found support the view that anti-takeover devices such as shareholders agreements and voting caps might enable CEOs to extract extra rents. On the other hand, the level of participation in the shareholders general meetings and the free float are found to be negatively associated with the CEO earnings.

In the second paper, we analyse the relationship between corporate governance and firm performance in Portuguese listed firms. Despite the large amount of literature on corporate governance, not much attention has been given to the relationship between management abilities, such as CEO education and performance. The present paper makes a step forward, analysing board composition, including firm specific characteristics, and CEO individual characteristics in Portuguese listed companies quantitatively and using a micro panel data from Portuguese listed companies from 2002-2011. The paper adopts the dynamic panel data model of Arellano and Bond (1991). Consistent with the human capital theory (Becker, 1975) the present study results support the hypothesis that the level of CEO education positively affects the firm performance. Nevertheless, management education is negatively associated with firm performance, while CEOs who have a law degree are more likely to be associated with best performing firms. These CEOs in-depth knowledge of the businesses they manage might explain this finding. As such, in the Portuguese context, other abilities other than management education, such as life experience or social ties might be more important to the firm performance than formal management education. Further, this study provides additional insights with respect to the CEO characteristics. Particularly, that the CEO tenure and age are both negatively related with firm performance providing supporting evidence of the entrenchment hypothesis. With respect to the board of directors' characteristics, this study results corroborate the view that a more independent board is

positively associated with higher firm performance, meaning that independent directors might in fact reduce agency costs in the Portuguese context. However, the two-tier governance system is not positively associated with better firm performance. In fact, firms with simple governance structures, where the CEO is also the chairman of the board, reveal higher levels of performance in the present study, raising doubts on the utility of recommending firms to have a two tier board structure in the Portuguese context. Finally, with respect to the shareholders characteristics, this study results support the view that voting cap restrictions might benefit firm performance, suggesting that conflicts of interest among shareholders might be reduced when voting cap restrictions subsists.

In the third essay, we analyse the effect of board structure in terms of gender and outside membership on reducing agency costs and improving firm performance. Although there is a significant amount of literature on the role of independent directors, no previous paper has directly addressed the issue of board independence within a gender diversity framework. The results of the empirical analysis suggest that when a board has less gender diversity, independent directors have a negative effect on firm performance. This effect is observed by a market-based proxy (Tobin's Q) and an accounting-based indicator (return on assets). The results support the proposed hypothesis: a board composed of many outsiders but few females sends a message to the stakeholders that the board is not independent of the executives and is thus potentially entrenched. As such, a board dominated by outsiders may be detrimental to firm performance. Furthermore, the level of capital expenditures is negatively associated with the presence of women on the board of directors. A board with many outsiders limits executives to overinvesting when the board is gender diversified. Finally, firms with concerns about providing evidence of board independence are likely

to have a gender-diversified board of directors. Overall, the results provide supporting evidence that women enhance boards of directors' independence and effectiveness.

In the last essay, we analyse the effect of the board of directors' composition on the firm financing pecking order. We predict that a more independent and effective board of directors increases the quality and quantity of information provided by insiders to the public and therefore reduces the adverse selection costs considered by the pecking order theory. To test this hypothesis, we analyse the effect of the board of directors' features on the different sources of financing: retained earnings, short-term debt; long-term debt and external equity. We then analyse the effect of the board of directors' composition on each of the financing sources. After we control for a wide set of variables, the results of the empirical investigation strongly support the proposed hypothesis. In particular, the presence of a larger fraction of independent directors on the board results in the firm's usage of more external financing sources and in a shift from short-term debt to long-term debt and from long-term debt to external equity. The results also provide some evidence that a more gender-diversified board of directors and a board in which the chairman is a non-executive can prompt the firm to rely more on long-term sources of financing. The results are robust in a number of specifications and robustness tests.

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CHAPTER II - EXECUTIVE PAY AND PERFORMANCE IN PORTUGUESE LISTED COMPANIES

Abstract: This essay analyses the relationship between corporate governance practices and Chief Executive Officer (CEO) wages from a sample of Portuguese listed companies over the period from 2002-2011. The relationship between CEO total compensation and shareholders return, firm characteristics, CEO characteristics, board of directors and shareholders characteristics is analysed. It is found that firm specific factors accounts for the majority of the variance in total CEO pay, while firm performance accounts for less than 5%. It is also found that the CEO characteristics, board of directors' structures, and shareholders features are related with the CEO pay. The policy implications of these results are then derived.

Keywords: Pay, performance, CEO, corporate governance, listed companies, Portugal.

JEL classification: G30, G32, J33, L22

2.1 Introduction

Public listed firms are characterized by the separation of ownership (the principal - shareholders) and control (the agent - management). Unless effective corporate systems of governance are in place, agency-costs caused by the different principal-agent interests are incurred and firm value reduced (Jensen and Meckling, 1976; Fama and Jensen, 1983). A particular manifestation of agency costs is excessive Chief Executive Officers (CEO) compensation. Governance practices endeavour to align the principal's (shareholders') interests with the agent's interests to maximise the shareholders' value. The natural hypothesis is therefore that a firm with more efficient governance practices in place should observe CEO compensation more aligned with firm performance. In other words, firms that follow corporate governance best practices should observe less excess CEO earnings. The question is which corporate governance devices are more efficient?

The present study analyses the relationship between corporate governance practices and CEO earnings in Portuguese companies from 2002-2011, by means of several panel data estimation models, including a dynamic micro panel data model (Arellano-Bond, 1991). Several sets of factors are analysed: firm performance, firm specific characteristics, CEO specific characteristics, board of directors and ownership structure. The results reveal that total return to shareholders is positively associated with total CEO pay; however this variable explains only a small fraction of total CEO earnings. Firm specific characteristics are found to explain a larger amount of the CEO earnings variability. Particularly, it is found that firm size and dividend yields are positively associated with higher CEO earnings. Moreover, the CEO earnings are lower in family and regulated firms. With respect to CEO specific characteristics it is found that CEO age and the fraction of the CEO earnings that are variable drive the executives' earnings

up. The results also show that CEO education and stock based compensation might reduce CEO total earnings. With respect to the board of directors' characteristics it is found that the existence of a remuneration committee does not restrict the CEO's to extract over paid earnings. On the other hand, the results support the view that a large fraction of independent directors might lower CEO excess earnings. Finally, with respect to the shareholders characteristics, the results found support the view that anti-takeover devices such as shareholders agreements and voting caps might enable CEOs to extract extra rents. On the other hand, the level of participation in the shareholders general meetings and the free float are found to be negatively associated with the CEO earnings.

The present research contributes to the corporate governance literature in several ways. First, it adds new insights as to whether a more independent board of directors' can in fact limit the ability of CEO's to earn excess earnings. Although this hypothesis has been tested empirically no consensus has yet been achieved. For instance, Chhaochharia and Grinstein (2009) provide evidence that a more independent board of directors is negatively associated with CEO compensation but Guthrie et al. (2012), using the same data sample and excluding just two outliers (from a total of 865 firms), show that there is no effect between the level of board independence and the level of CEO pay. Secondly, different corporate governance devices can have complementary or substitutive effects (Farinha, 2003). In that sense, analysing the effect of a single set of corporate governance devices on the level of CEO pay may provide biased results and misinterpretations. To address that potential problem, in addition to firm specific variables, this paper includes a larger than usual set of corporate governance variables, including ownership variables, shareholders meetings data and CEO individual characteristics. Finally, the majority of the empirical research on CEO compensation

builds on either US or UK data, where financial markets are more efficient and corporate governance practices are potentially more developed when compared with small European countries such as Portugal. A number of issues that are specific to Portugal might make unrealistic the generalization of those countries results. For instance, the sole code of governance in Portugal was established by the national securities and markets authority (CMVM). This is uncommon when compared with the observed codes of governance worldwide; such codes are generally drawn up by governments, directors' associations, managers' associations, professional bodies and investors, and the codes are usually overseen by autonomous watch-dogs (Aguilera and Cuervo-Cazurra, 2004). Furthermore, not all of the listed companies completely respect Portugal's code. Finally, there are two types of board systems: the single-tier system that is common in Latin countries and the two-tier system that is common in countries based on the common law tradition, such as the UK (Rose, 2006). The concentration of power in a single-tier system, such as in Portugal, might restrict the impetus to adopt governance principles that are considered to be efficient in other countries. Moreover, the European Commission stresses the importance of having a non-executive chairman on the board of directors (Berglof, 1997) which is not observed in the majority of the Portuguese public firms. Taking into account this framework, one can assert that Portugal lacks the necessary governance codes of practice. Further, the high concentration of power make these firms perfect places for CEOs to receive excessive payment relative to his or her performance (Durnev and Kim, 2005; Ikaheimo, et al., 2011). These facts make it interesting to analyse pay and performance in this market.

The paper is organised as follows. In the second section, the contextual setting is presented. In the third and fourth sections, the literature survey and the theoretical framework are presented. The fifth section presents the hypotheses. The sixth section

presents the data and the methodology. The seventh section discusses the results. Finally, the eighth section concludes the paper.

2.2 Contextual setting

Governance practices are based on codes. A governance code is a set of standards that governs the role and the composition of the board of directors, the relationships within the board, the auditing and information disclosure and the selection and dismissal of directors and senior managers (Khurshed, et al. 2011; Ammann, et al. 2011; Ozkan, 2007, 2011; Florackis and Ozkan, 2009; Richard, et al. 2009; Aguilera and Cuervo-Cazurra, 2004). Pay-performance contracts are negotiated with the purpose of aligning the principal-agent relationship, but when based on standard accounting measures, they can be manipulated to boost the executive's earnings. Monitoring the firm management is therefore crucial to aligning interests. The efficiency of the board monitoring role depends on a number of factors identified by previous research (Conyon, 1997; Benito and Conyon, 1999; Conyon and Murphy, 2000; Sawicki, 2009; and Ozkan, 2011), the most significant of which is the independence of the external directors from the CEO and the internal board members. If the CEO influences the director's election process, the independence of the board is compromised and CEO monitoring is rendered ineffective. The result is CEO entrenchment and the opportunity for him to demand earnings in excess of the market equilibrium wage.

The Portuguese corporate governance code evolved from an initial set of non-binding recommendations that were issued by the Portuguese securities and markets authority (CMVM). The first draft of this code was written in October 1999, and it suggested that listed firms should disclose information about 15 governance recommendations, such as shareholders' voting rights and proxy, conflicts of interest,

the board of directors' structure, and director's functional roles. In relation to the board of directors, the code explicitly encouraged the inclusion of independent members in the managerial bodies. During 2001, the code was revised to include the "comply or explain" principle, allowing firms to choose not to follow the code's prescriptions, as long as they disclosed the reasons for their non-compliance. In this revision, some of the recommendations were upgraded to bidding rules, and the governance report format became mandatory. Two recommendations related to the board members' remuneration were added. The first recommendation stressed the need for a portion of the manager's total earnings to be linked to the company's income and the second recommendation was that any stock option plan should be discussed and approved by the shareholders at the annual general meeting. In 2003, the code was revised again, and the recommendations related to board remuneration were restated, insisting that manager earnings "should be aligned with the company interests" and that the annual amount received by the board and key executives should be disclosed on an individual basis. The 2005 code revision added one recommendation, suggesting that boards should have a sufficient number of non-executive board members, and another suggestion restating that shareholders should approve the board remuneration policy. In 2007, the corporate governance code was completely redrafted, with the total number of recommendations increasing from 15 to 43 and many more detailed recommendations having been added. During 2009, a single piece of legislature forced all of the listed firms to disclose the annual amounts received by the board and the key executives on an individual basis. Lastly, in 2010, the corporate governance code was once again redrafted and some disclosure recommendations were changed into mandatory rules.

The present study builds on published data by Portuguese listed firms on their corporate governance annual reports. Particularly, CEO, board of directors and ownership features are analysed.

2.3 Literature survey

There are several strands in the governance literature. One major line of research focuses on the macroeconomic impact of governance by country (La Porta et al., 1997, 1998, 2000; Durnev and Kim, 2005) and concludes that corporate governance systems are linked to the legal traditions of the country. Countries with a civil law tradition, as opposed to a common law tradition (dominant in Anglo-Saxon countries), are the least effective at protecting shareholders rights (La Porta et al., 1998). Another line of research, more relevant to the present study, adopts a microeconomic approach and focuses on analysing pay, performance and board composition. Research on this issue by Pennathur and Shellor (2002) measured the determinants of CEO earnings as a function of the firm's performance, where performance is measured by the stock returns, investments and funds from operations. Further analyses of the relationship between firm performance and CEO earnings are provided by Gregg et al. (2005), Conyon and Murphy (2000), Ozkan (2007, 2011), Shin and Seo (2011), among others. The overall results show that firm performance does not have a significant impact on CEO compensation and where it does it explains only a small fraction of total CEOs earnings.

Core et al. (1999) analysed the relationship between the CEO's earnings and the board's composition, concluding that the board's composition explains a significant amount of cross-sectional variation in the CEO's earnings after controlling for the standard economic determinants of pay. Their result reveals that the CEO has greater

earnings when the governance structures are less efficient. Gosh and Sirmans (2005) concluded that the CEO's earnings depend significantly on the usual economic measures of performance, including firm size and return on assets, as well as on the board's composition. They find that the CEO's earnings are higher in firms with weak monitoring due to either large size or elderly directors. They also find that the existence of a block holder has an adverse impact on the CEO's earnings. More recently, Chhaochharia and Grinstein (2009) provide evidence that US listed firms with better governance present less excess CEO compensation but Guthrie et al. (2012) fail to confirm this result.

A related stream of literature analyses the relationship between corporate governance and firm performance. In that scope, Rosenstein and Wyatt (1990) analysed the role of external directors on the governance of the firm and concluded that a greater representation of external directors enhances the firm's performance. Yermack (1996) demonstrated that bigger boards are detrimental to performance. Although Bhagat and Black (1999) failed to confirm these results, further corroboration did come from Brickley et al. (1997), who found that external directors enhance shareholder gains in tender offers. However, Agarwal and Knoeber (1996) and Mishra and Nielsen (2000) failed to confirm the positive effects of external directors. Carretta et al. (2011) studied the effect of news releases regarding the board of directors functioning and composition on stock returns in Italy.

A recent survey on the effectiveness of the different corporate governance devices can be found in Edmans and Xavier (2009) and William (2010). The current investigation takes a step forward and analyses Portuguese CEOs earnings and board composition variables, including a quantitative analysis of the individual characteristics of Portuguese listed companies. Compared with Fernandes (2008) study on Portuguese

CEO's compensation, this paper adopts a larger data span, uses more variables to complement the previous research in this market and adopts innovative panel data models. Additionally, instead of looking at the executive management earnings as whole, this paper focuses specifically on the CEO earnings. This approach is more interesting when one addressing the board of directors' entrenchment hypothesis.

2.4 Theoretical framework

Williamson (2002) presented a theoretical framework to analyse governance issues at the firm level. Hermalin and Weisback (1998) provided a theoretical framework that related pay and performance to the board composition, and Fama and Jensen (1983) presented a related theoretical framework. These 3 models are the theoretical basis for the current research. In the Hermalin and Weisback (1998) model, board effectiveness is a function of board independence. Four elements are essential in explaining this relationship: first, management turnover is more closely linked to earnings than to stock returns; second, a board tends to become less independent over the course of a CEO's career; third, independent directors are added to the board following poor corporate performance; and fourth, CEO turnover is negatively related to performance and this relationship is stronger when the board is more independent.

In theory, the CEO's salary is fixed by the corporate board depending on supply and demand. The wage may be fixed at the optimal level if the observed board structures are conducive to CEO monitoring. If the proper board structures are in place, the pay-performance contracts are optimal and reflect the economic determinants of performance. However, if the director election process is influenced by the CEO, the independence of the board is compromised and CEO monitoring is rendered ineffective, which results in CEO entrenchment and the opportunity for the CEO to demand

earnings in excess of the equilibrium wage rate. Under this scenario, the board structure variables reflect the effectiveness of the firm's governance structure and impact CEO earnings. The wage will be non-optimal in view of the performance observed.

2.5 Hypotheses

Four sets of factors that explain the CEO's earnings have been suggested in the literature: (1) company performance (e.g., Coughlan et al., 1985; Jensen and Murphy, 1990); (2) firm specific characteristics (e.g., Jensen and Ruback, 1983, Core et al., 1999, and Gosh and Sirmans, 2005); (3) CEO specific characteristics (e.g. Core et al., 1999; Ozkan, 2011); (4) board of directors structure and composition (e.g. Conyon et al. 1995; Conyon et al. 1997); and (5) shareholders and ownership characteristics (e.g. Shin and Seo, 2011). The hypotheses proposed in this research are derived from the abovementioned theoretical models, and from the explanatory indicators found in the empirical literature.

2.5.1 Performance hypothesis

Return to shareholders

Under the agency theory hypothesis, CEO compensation packages are designed to provide incentives for the CEO to increase the shareholders' wealth (Jensen and Murphy, 1990). If payments are designed this way, it should be observed a positive relationship between the CEO's compensation and the firm's performance. To test this relationship, this paper follows Core et al. (1999) and uses the total return to shareholders (TRS) as proxy for firm performance. TRS is defined as the market stock price annual return including any dividends paid out to shareholders.

H1: *CEO earnings are a positive function of total return to shareholders (TRS).*

2.5.2 Firm specific characteristics

Firm size

There is a large body of evidence that connects the firm size to compensation: Jensen and Murphy (1990), Core et al. (1999), Renders, et al. (2010), and Gregorič et al. (2010), just to name a few. The theoretical justification for this connection is that managers of larger and more complex firms must be rewarded for the greater dimension/complexity of their work. For instance, Core et al. (1999) argue that larger firms with greater growth opportunities and more complex operations will demand higher-quality managers and will provide higher equilibrium wages; therefore, it should be observed larger payments to these managers. Smith and Watts (1992) find evidence that firms that have greater investment opportunities employ executives who are more highly skilled and who must be given a higher level of pay. It is therefore expected to see a positive relationship between the CEO's pay and higher levels of the firm's complexity.

Employees

Another firm specific characteristic that might influence the level of CEO pay is the level of the firm dependability on human capital. Under the stakeholders theory (Freeman, 1984), after controlling for firm size, firms whose performance largely depends on skilled and motivated employees shall have more ethical concerns under the penalty of creating internal conflicts and thus harming the performance of the company. Within this line of thought, it is expect to see a negative relationship between the total number of employees and CEO's excess compensation.

Financing and pay-out policy

Another two specific firm features have been suggested in the literature to have an impact on CEO total earnings: the use of debt financing and the level of dividends paid

out to shareholders. Jensen (1986) has provided the theoretical framework for the relationship between agency costs and debt. In his framework, debt is beneficial in that it reduces the agency costs of free cash flows. A conflict of interest between the shareholders and the managers will arise when the firm generates substantial free cash flow; the use of debt requires managers to pay out future cash flows, thereby reducing the cash flow available for discretionary spending by the managers. This mechanism reduces the CEO's ability to extract extra rents, and a negative relationship between the use of debt financing and the CEO's earnings is expected. This hypothesis has been tested in the literature by Ryan and Wiggins (2001), Florackis and Ozkan (2009), and Shin and Seo (2011) and their results are consistent with the proposal that debt minimises agency costs. In a similar view, firms that pay out more dividends have potentially less free cash-flow available and therefore dividends may help to reduce agency problems (Farinha, 2003; Sawicki, 2009). Moreover, with less internal generated funds available those firms must raise external capital more frequently and by that means provide updated information to the market, reducing information asymmetries and therefore agency costs (Easterbrook, 1984).

Family

Literature on family owned companies (e.g. Schulze et al., 2001; Dyer, 2006; Herrero, 2011) argue that agency problems in family businesses are of different scope than of those found in widely held public firms. Anderson and Reeb (2003) provide evidence that family ownership is an effective organizational structure. Particularly, these authors find that family firms perform better than nonfamily firms and when family members serve as CEO, performance is better than with outside CEOs. This piece of evidence suggests that family owned firms face less agency costs and the

ability for CEOs to extract extra rents from the firm is less likely. In that sense we expect to see lower levels of excess CEO earnings in family owned firms.

Regulated

The last firm characteristic analysed in the present study is whether the firm is a regulated firm or not. Banks and utilities have the particularity of being subject to predetermined rules in terms of business conduction which are imposed by regulators. Further, beyond the normal monitoring devices in place for non-regulated firms, regulators provide additional monitoring and disciplining of the management (Demsetz and Lehn, 1985). Given this argument we expect to see lower levels of CEO pay in regulated firms.

In sum, it is conjectured that a set of firm specific characteristics influence the level of CEO's total earnings, specifically: firm size; firm dependability on employees; use of debt financing; dividend pay-out policy; whether the firm is family owned; and whether it is a regulated firm. The hypothesis to be tested is the following:

H2: *CEO earnings are a function of firm specific characteristics.*

2.5.3 CEO specific characteristics

CEO age and tenure

Several CEO specific characteristics have been suggested in the literature to have impact on CEO compensation. Two of those characteristics are CEO age and tenure. The managerial entrenchment hypothesis is usually presented to explain that relationship. The rationale is that CEO age and tenure increases his level of firm specific knowledge (experience) and therefore the greater the difficulty to replace him. In other words, any CEO characteristic that enhances his entrenchment within the firm may have influence on his excess level of compensation. For that reason, pay-performance

contracts are usually seen more generous for older CEOs and with a longer tenure, suggesting that there is managerial entrenchment in the company (Ryan and Wiggins, 2001; Florackis and Ozkan, 2009; 2011). Within that line of thought, Hill and Phan (1991) find that the relationship between the CEO's pay and the stock returns weakens with tenure. In light of these results, it should be expected to find a positive relationship between the CEO's age and tenure, and the CEO's earnings.

CEO education

Another CEO specific characteristic that has recently received some attention from the corporate governance literature is the CEO education. Based on the human capital theory (Becker, 1962), executive officers with higher levels of education should correspond to managers with more abilities and consequently firms with better performance. Within that theoretical framework, Bhagat et al. (2010) find that CEOs with MBA degrees lead to short-term improvements in operating performance but fail to find a relationship between CEO education and long-term firm performance. Also, corporate governance codes around the world, including the Portuguese code often require (or recommend) firms to disclose their managers' curriculum vitae. The idea is that the shareholders have the pertinent information concerning the skills and experience of the firm's management. Nevertheless, in the Portuguese context it is not uncommon to see CEOs with no college degree (or any formal management education) and long tenure, suggesting that either education is not a determinant for Portuguese firm performance or that the shareholders appreciate other abilities beyond education. Within this line of reasoning, education can be used as an inverse proxy for CEO entrenchment. A less educated CEO should in theory provide *ex-ante* less guarantees of leading the firm successfully. But, if the manager remains in the company with a lower level of education than their peers, it may mean he has specific knowledge about the

business that make his replacement be very costly, (e.g. special ties with major clients or with the government). In other words, CEOs with low levels of education may indicate entrenched managers. If that is the case then one should find a negative relationship between CEO education levels and CEO excessive earnings. On the other hand, based on the human capital theory, more educated managers should provide better skills to the firm and therefore require higher levels of compensation. In sum, whether CEO education level is positively or negatively related with CEO compensation is an empirical question which will be tested in the present study.

Compensation structure

Beyond the CEO age, tenure and education the present study also investigates other two features related with the structure of the CEO compensation package: the fraction of the variable earnings in the total compensation package and whether or not that variable compensation is stock based. The Portuguese corporate governance code explicitly highlights the need for a part of the CEO total compensation to be variable and linked to the firm performance. In that view, CEOs with a larger fraction of variable compensation should have their total earnings more aligned with firm performance and thus less likely the ability for executives to extract extra rents from the firm. Moreover, if listed firms have compensation schemes that are not only based on cash payments but are also based on stock compensation, such as stock option grants and restricted stocks, CEOs should also observe less excessive pay. If this type of compensation structure (with variable and stock based earnings) serves as an incentive to align the executives' interests with the shareholders' interests, then after controlling for firm performance, it should be expected a negative relationship between the total cash compensation earned by the CEOs and the fraction of variable compensation. Furthermore, if the variable compensation is fully or partially stock based then those CEOs should also earn less

excessive pay. Nevertheless, as shown by Bergstresser and Philippon (2006), manipulated reported earnings through discretionary accrual accounting are more pronounced at firms where the CEO's total potential compensation is more closely tied to the value of stock and option holdings.

Given the above discussion, it is conjectured that CEO age, tenure and education, and the structure of the total CEO earnings influence the level of CEO's total earnings. The hypothesis to be tested is the following:

H3: *CEO earnings are a function of CEO specific characteristics.*

2.5.4 Board of directors characteristics

The way the board of directors is structured is a major determinant of agency costs (Hermalin and Weisback, 1998). Several features of the board of directors have been suggested in the governance literature to have impact on agency costs. The present study addresses the following board features: whether the chairman of the board is the same person as the CEO; the board size; the board activity (measured as the total number of meetings); the remuneration committee; the fiscal board and auditing committee; the size of other governance commissions; the level of board independence (from executive directors); board gender diversity; and the presence of foreign directors.

CEO/Chairman duality

The literature analysing board of directors' structures has frequently suggested that when the CEO is also the chairman of the board (CEO/Chair duality) he has significant power over the board and therefore more likely to be entrenched and able to extract extra rents (e.g. Core et al., 1999; Shin and Seo, 2011). However, Florackis and Ozkan (2009) highlights that empirical studies on UK listed firms do not support that view.

Board size

With respect to the board size, the same authors reveal that there is no consensus in the literature of whether or not bigger boards are more efficient in monitoring management. On the one hand the decision making process in bigger boards are potentially less efficient and the monitoring role of the board compromised. Yermack (1996) provides empirical evidence supporting this argument. On the other hand it is more difficult for the CEO to negotiate generous compensation packages far beyond his ability to generate wealth for shareholders. Furthermore, having a large number of other directors in the board can mean more potential CEO substitutes which can then lead to less entrenchment in the firm. Given this discussion the board size can either be positively or negatively related with the CEO compensation.

Board activity

Another board of directors feature that can have impact on CEO compensation is the board activity, measured as the total number of board meeting held during the year. The theoretical rational behind this relationship is that boards that meet more frequently might also perform their monitoring functions more frequently. Literature on corporate governance and firm performance has documented however that board that meet more frequently is less efficient (Vafeas, 1999). Consistent with this result, Shin and Seo (2011) find a positive relationship between the total number of board meetings and the total CEO pay, suggesting that board activity is inversely related to its efficiency.

The Portuguese directors' remuneration can either be fixed directly by the shareholders within the general meeting or by a committee of shareholders elected at the general meeting¹. The Portuguese corporate governance code recommends the

¹ Article 399 and 429 of the Portuguese Commercial Company Act.

remuneration committee to submit to the general shareholders meeting appreciation the directors' remuneration policy. Implicitly, the corporate governance code recommends firms to elect a remuneration committee. In this study we also analyse the existence and dimension of the remuneration committee. If this committee is in fact an important corporate governance device one should see a negative relationship between the total number of remuneration committee members and excess CEO earnings.

Fiscal board and auditing committee

Under the current governance structures that are admissible by Portuguese law, companies can choose to have a fiscal body that is either a fiscal board (or a single person) or an auditing committee. The auditing committee is part of the board of directors, while the fiscal body is a separate entity. The latter can be composed of a single fiscal person or could be a fiscal board; a fiscal board normally consists of at least 3 persons that are proposed by the board of directors and elected in the shareholders' meeting. The fiscal board carries, among other duties, the responsibility for analysing the quality of the financial information provided by the executive board (Beasley, 1996) and guaranteeing that management is acting on behalf of the shareholders' interests. It is assumed that a larger fiscal board can more efficiently monitor the management quality and the financial information provided by the board of directors to the shareholders. Additionally, a large fiscal board is less likely to become entrenched with the board of directors and is less likely to have a conflicts of interest arising from the fact that they are recruited by the board.

One of the arguments in favour of a creating a permanent auditing body in the board of directors, instead of having a separate fiscal board, is that the members are more often present at board meetings and assess the executive director's work more closely (Bronson et al., 2006, Piot and Janin, 2007, and Brick and Chidambaran, 2010). The

fiscal board meets less frequently, and their monitoring role is more limited because they do not have access to the same level of information as the auditing committee members. At the same time, by including an auditing committee within the board of directors, the potential entrenchment could become more accentuated. Nevertheless, similar to the fiscal board, a larger auditing committee should have fewer issues around entrenchment, and a negative relationship between the CEO's pay and the total number of auditing committee members should be perceived. Piot and Janin (2007), in their own research in France have considered the effect of having an internal auditor and the relationship between the internal auditor or auditing committee and earnings management. They have also assessed the effects of different dimensions of auditing quality, such as the prestige of the accounting firm, the existence of an auditing committee and its dependence on management and how these dimensions change profits. They found that the presence of accountants from 5 famous auditing companies did not cause a reduction in earnings management. The existence of an auditing committee, however, did cause greater earnings management. They express that these results in corporate governance are related to French companies, which are different from U.S. companies. The fiscal board and auditing committee dimensions are separately analysed in the present study to see which type of fiscal structure better limits the CEO's power in negotiating a pay for performance contract.

Special governance committees

Beyond the remuneration committee and the auditing committee, Portuguese listed firms can implement in their governance structures other special committees. Examples of these special committees are the corporate governance assessment committee, a nominating committee, among others. The existence of these committees is also recommended by the Portuguese governance code. These special committees, normally

composed with independent directors, are allegedly created with the aim of evaluating and enhancing corporate governance practices within the firm. As such, in firms with such committees, one should expect to see less agency problems (Brown and Caylor, 2009), and therefore less CEO excess earnings.

Independent directors

In pay-performance contracts, the CEO's earnings are determined by the board independence (Canyon et al., 1995; Canyon and Murphy, 2000). In light of the Portuguese corporate governance code and following Fama and Jensen (1983), independent directors should monitor the executive directors to ensure that they are working on behalf of the shareholders' best interests. Given the independent directors' role in the determination of pay-performance contracts, a higher number of independent directors make it less likely that the CEO will have an opportunity to successfully negotiate for an overpaid contract. Within this line of reasoning, it should be expected a negative relationship between the CEO's pay and the fraction of independent directors. However, as Jensen (1993) stresses, outside directors are likely to be aligned with management, not only because top management has a non-negligible influence on the selection of the board members but also because, normally, these directors hold the same duties at many other firms. Thus, the board members that are appointed (or whose selection is influenced) by the current CEO are more loyal and less vigilant, and therefore they are expected to be more generous when making decisions about the CEO's earnings.

Although many empirical studies have analysed the effectiveness of board independence no consistent results have been yet achieved. For instance, Chhaochharia and Grinstein (2009) provide evidence that independent boards are more likely to reduce CEO earnings suggesting that board independence is a major determinant of its

efficiency. However, Guthrie et al. (2012), fail to confirm such results. Abdullah (2004) study on the effects of board independence do not provide any relation between board independence and firm performance, suggesting that board independence is not an effective agency costs controlling device.

Gender diversity

Corporate governance codes around the world have recognised that having women on the board is beneficial in promoting ethical behaviour, including governance. For example, the Norwegian government requires that all of the boards of directors of publicly held firms be composed of at least 40% women and the Spanish government has also committed to enforce this guideline by 2015 (Hoel, 2008; De Anca, 2008). Around the world, other countries are considering legislation that recognises the importance of developing female talent at the board level (Singh, 2008). The theoretical research regarding having women on a board of directors (see Terjesen et al., 2009, for a review) argues that a board of directors with greater gender balance improves corporate governance through better use of the capital of the entire talent pool. These authors also suggest that the more diverse boards are more likely to hold the CEOs accountable for poor stock price performance. Given this line of thinking, if there are more females on a board of directors it should be less likely that the CEO will get an overvalued payment contract. As such, it would be expected to observe a negative relationship between the number of females on the board and the CEO's earnings.

Foreign directors

Another board of directors feature that might influence CEO earnings is the level of foreign directors in the board. Transnational listed corporations are the main drivers of globalisation and there is evidence that the compositions of their boards is also

becoming more international (Staples, 2007). Despite this evidence, scant research has been conducted into the role played by foreign managers on national boards. An exception is found in Lee et al. (2012) who show that the presence of foreign directors increases audit quality. This evidence might suggest that these directors enhance the firm transparency environment and as such the board effectiveness. Within this line of reasoning, boards with a larger fraction of foreign directors can limit the ability of the CEO to extract excessive earnings through a more effective monitoring role of the board. However, on the other hand, they may also support a more international remuneration policy to the CEO. Staples (2007) concludes that the trend toward more multinational boards provide a transnational social infrastructure, which may facilitate the emergence of a global business class. If this is the case and Portuguese managers are paid under the average levels of international CEO earnings the presence of managers from abroad can contribute to a higher CEO pay package.

Given the above discussion the fourth hypothesis is defined as follows:

H4: *CEO earnings are a function of board of directors' characteristics.*

2.5.5 Shareholders and ownership characteristics

Shareholders activism

The last set of factors analysed within this study is the shareholders characteristics of the Portuguese listed firms. The most simple and elderly corporate governance device is the shareholders general meetings where they can assess managers' work. It is at the general meetings that shareholders decide on fundamental matters of the firm, such as the election of the board of directors and assessment of the executive management alignment with the shareholders' interests (Easterbrook and Fischel, 1996). In that sense

shareholders activism measured as the level of shareholders meeting participation can reduce agency costs and therefore CEO pay (Conyon and Sadler 2010).

Ownership dispersion

In pay-performance contracts, the CEO's earnings are also determined by the level of ownership dispersion (Cho, 1998). Manne (1965), in one of the first papers about the market for corporate control, claimed that "...only the take-over scheme provides some assurance of competitive efficiency among corporate managers and thereby affords strong protection to the interests of vast numbers of small, non-controlling shareholders". In the same line of thought, Bebchuk, et al. (2002) say that "...a company whose share price sags should become more vulnerable to a hostile takeover, which would likely cause the executives to lose their positions, pay, and perquisites". In fact, the risk of losing their positions makes the market for managers more efficient and makes it less likely that CEOs will extract extra rents from their firms. To test this hypothesis, this paper uses the level of free-float as a proxy for the market for control and also the global holdings of the three greatest shareholders as an inverse proxy of capital dispersion. Listed firms that have a more dispersed ownership are more likely to be in the market for control, and therefore it is less likely that the CEO has enough power to increase his/her wage (Core et al., 1999; Gosh and Sirmans, 2005). We then expect to see a negative relationship between CEO's earnings and the level capital dispersion.

Shareholders agreement

Whether or not some shareholders secure an agreement where, for example, large block holders agree to vote jointly and if they wish to sell their positions they give the other party the preference in that transaction might also influence the firm agency costs.

Following the same rational presented above, this sort of arrangements might influence (negatively) the market for corporate control in the way that a hostile takeover is less likely to be successful when a large percentage of the firm voting rights is concentrated under the agreement (Cronqvist and Nilsson, 2003). We therefore expect to see lower levels of CEO's earnings in firms where such shareholders agreements do not exist.

Voting cap

Voting cap restrictions included in firms' by-laws can make the market for corporate control potentially less efficient and hostile takeovers more difficult for potential bidders (Bebchuk et al., 2002). In fact, voting cap restrictions result in a supermajority vote by shareholders to approve any hostile takeover bid for control (Jensen and Ruback, 1983). The Portuguese corporate governance code has encouraged firms to withdraw this type of restriction, but firms claim that if it is true that voting caps makes hostile takeovers more difficult, it is equally true that minority shareholders believe that voting caps increase their voting power. Balancing both arguments, the effect of voting caps on pay-performance contracts is not straightforward. On the one hand, this feature can be seen as a defence measure against hostile takeovers and therefore positively related to CEO earnings. On the other hand, voting caps facilitate the participation of minority shareholders, thus diminishing the power of the major shareholders that normally select the management team. As such, whether voting caps reduce or increase CEOs earnings is an empirical question.

Given the above discussion the fifth hypothesis is defined as follows:

H5: *CEO earnings are a function of shareholders and ownership characteristics.*

2.6 Data and methodology

2.6.1 Data

This research study conducted on Portuguese listed companies is based on a set of hand-collected corporate governance data that was gathered from the companies' yearly financial reports, corporate governance reports and websites for the years 2002-2011. All listed companies on the Portuguese stock exchange that have publicly available yearly financial and corporate governance reports as of the end of 2011 were selected. The data collection resulted in a sample of unbalanced panel data covering 10 years across 50 companies and 450 year/firm observations.

Table 2.1 summarises the characteristics of the data that used in this paper to test the proposed hypotheses. From the remuneration section of the annual corporate governance reports for each company, the CEOs' compensation data was collected as of the end of the fiscal year during which compensation amounts were earned. The disclosure of this information became mandatory for all listed companies in 2009 and was non-compulsory in the previous years. Therefore, from 2002 to 2008, the original database lacks data for some firms on a direct measure of the CEO's earnings. However, for the entire period of the sample, companies were obliged to disclose aggregated information on the executive board members' compensation. Thus, for each company/year where the database had missing data, the aggregated executives' earnings for that year was matched with the disaggregated CEO's data for the following year and then scaled the data for the total number of executive members. By these means, the missing CEOs' earnings data was estimated. To account for skewness, the natural logarithm of the CEO's total cash earnings is used. The fundamental and the market data were extracted from Bloomberg. In appendix A, table A.1 the list of the Portuguese

Table 2.1. Variable definitions and data sources

Variable	Definition and Source
<i>Dependent variable</i>	
1. CEO earnings	CEO's total earnings (€). This figure includes fixed and variable cash earnings as well as any bonuses provided by the company, such as multi-period bonuses, stock based compensation and pension fund contributions. (<i>Company corporate governance reports</i>).
<i>Performance</i>	
2. TRS	Total Return to Shareholders. This return is calculated by the end of year return, including any dividends paid during the year. (<i>Bloomberg</i>).
<i>Firm characteristics</i>	
3. Assets	The book value of total assets. (<i>Bloomberg</i>).
4. Employees	The total number of employees as reported by the firm in the yearly financial report. (<i>Bloomberg</i>).
5. Debt to assets ratio	The ratio of total debt to total assets (%). (<i>Bloomberg</i>).
6. Dividend yield	The annual dividends per share paid-out by firms divided by the end of the year stock. (<i>Bloomberg</i>).
7. Family dummy	A dummy variable which takes the value of 1 if the controlling shareholder is a family member or an unlisted company, and 0 otherwise. (<i>Company corporate governance reports</i>).
8. Regulated dummy	A dummy variable which takes the value of 1 if the firm is a regulated firm (either a bank or a utility firm), and 0 otherwise.
<i>CEO characteristics</i>	
9. CEO age	The age in years of the CEO as of the end of the fiscal year. (<i>Company corporate governance reports</i>).
10. CEO Tenure	The total number of years that the CEO is in that position in firm as of the end of the year. (<i>Company corporate governance reports</i>).
11. CEO education	An ordinary variable which takes the value of 1 if the CEO does not have any university degree; the value of 2 if holds a bachelor's degree; the value of 3 if holds a bachelor's degree and one or more post-graduation courses; the value of 4 if holds a master's degree; and 5 if it holds doctoral degree. (<i>Company corporate governance reports and web information</i>).
12. Variable earnings (%)	The percentage of all non-fixed CEO earnings compared with the total CEO earnings. (<i>Company corporate governance reports</i>).
13. Stock earnings	A dummy variable which takes the value of 1 if the CEO earns any stock-based compensation, stocks and/or options. (<i>Company corporate governance reports</i>).
<i>Board of directors characteristics</i>	
14. CEO/Chair Duality	A dummy variable that takes the value of 1 if the company's Chief Executive Officer is also Chairman of the Board and 0 otherwise. (<i>Company corporate governance reports</i>).
15. Board size	The total number of directors on the firm's board. If the company has supervisory and management boards, this is the total members of both boards. (<i>Company corporate governance reports</i>).

Table 2.1. (Continued).

Variable	Definition and Source
16. Board meetings	Total annual board meetings. (<i>Company corporate governance reports</i>).
17. Remuneration committee	Total number of members of the remuneration committee board. (<i>Company corporate governance reports</i>).
18. Fiscal board	Total number of members of the fiscal board. (<i>Company corporate governance reports</i>).
19. Auditing committee	Total number of members of the auditing committee. (<i>Company corporate governance reports</i>).
20. Other governance commissions	Total number of members of other corporate governance related commissions. (<i>Company corporate governance reports</i>).
21. % independent	% of independent members on the board as reported by the firm. An independent member is a non-executive director with no economic or familiar relationship with a dominant shareholder. (<i>Company corporate governance reports</i>).
22. % women	% of female members on the board. (<i>Company corporate governance reports</i>).
23. % foreign	% of foreign members on the board. (<i>Company corporate governance reports</i>).
<i>Shareholders and ownership characteristics</i>	
24. Shareholders general meeting	Percentage of the capital represented in the annual general shareholders meetings. (<i>company corporate governance reports</i>).
25. Free float	Percentage of the company's shares that are freely traded and is calculate as the total number of shares not held by shareholders with more than 5% of the capital divided by the total number of shares outstanding. (<i>Company corporate governance reports</i>).
26. Top 3	The sum of the stakes of firm's three largest investors. (<i>Company corporate governance reports</i>).
27. Shareholders agreement	A dummy variable which takes the value of 1 if the firm is aware of any major shareholders agreement and 0 otherwise. (<i>Company corporate governance reports</i>).
28. Voting cap	The inverse of the voting cap percentage (maximum percentage of capital allowed to vote in the shareholders meetings). (<i>company corporate governance reports</i>).

listed firms analysed in the present study is presented, as well as the time period considered and the number of year observations for each firm.

Table 2.2 presents descriptive statistics for the variables used in our analysis. The average annual CEO pay yields 722.54 thousand euros. For the period considered the average total return to shareholders was -0.4%. This negative figure is justified by the

subprime crisis and the European sovereign debt crisis that have lead listed firms stock prices to drop significantly after the year 2007. With respect to corporate governance variables it is worth noting that on average 57.6% of the firms has a Chairman of the board which is also the CEO and on average only 26.8% of the directors are considered independent. Finally, the majority of the firms are closely held by few shareholders, since the average percentage of the top three shareholders is 62.5%.

Table 2.2. Descriptive statistics of the variables used in the analysis.

Variables	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
1. CEO earnings	450	722.54	858.55	77.00	6,225.32
2. TRS	450	-0.004	0.491	-0.913	3.267
3. Assets	450	27,153.44	134,524.10	23.70	1,251,526.00
4. Employees	450	9,418.94	22,689.78	87.00	193,349.00
5. Debt to assets ratio	450	42.321	16.960	0.000	109.145
6. Dividend yield	450	0.027	0.085	0.000	1.468
7. Family dummy	450	0.491	0.500	0.000	1.000
8. Regulated dummy	450	0.142	0.350	0.000	1.000
9. CEO age	450	54.458	10.634	31.000	83.000
10. CEO Tenure	450	7.376	6.650	1.000	29.000
11. CEO education	450	2.613	1.085	1.000	5.000
12. Variable earnings (%)	450	0.266	0.245	0.000	1.000
13. Stock earnings	450	0.187	0.390	0.000	1.000
14. CEO/Chair Duality	450	0.576	0.495	0.000	1.000
15. Board size	450	10.156	6.220	3.000	31.000
16. Board meetings	450	12.824	8.973	3.000	67.000
17. Remuneration committee	450	2.753	1.025	0.000	6.000
18. Fiscal board	450	2.198	1.740	0.000	18.000
19. Auditing committee	450	1.229	1.696	0.000	6.000
20. Other governance commissions	450	1.538	4.289	0.000	31.000
21. % independent	450	0.268	0.231	0.000	1.000
22. % women	450	0.055	0.092	0.000	0.400
23. % foreign	450	0.107	0.152	0.000	0.714
24. Shareholders general meeting	450	0.700	0.156	0.078	0.974
25. Free float	450	0.340	0.199	0.000	1.000
26. Top 3	450	0.625	0.224	0.031	0.997
27. Shareholders agreement	450	0.144	0.352	0.000	1.000
28. Voting cap	450	2.695	4.181	1.000	20.000

Notes: Definitions for all variables are provided in Table 2.1.

2.6.2 Methodology

In order to test the proposed hypotheses we rely on multivariate regression techniques. Since we have longitudinal data (10 years over 50 firms) the regressions estimated will be based on panel data models. The baseline regression model used in this study is a pooled OLS panel data model with the following form:

$$\begin{aligned}
 (CEO \text{ earnings})_{i,t} = & \beta_0 + \beta_1(performance)_{i,t} + \sum_j \beta_j(firm \ characteristic_j)_{i,t} \\
 & + \sum_k \beta_k(CEO \ characteristic_k)_{i,t} + \sum_l \beta_l(board \ characteristic_l)_{i,t} \\
 & + \sum_m \beta_m(shareholders \ characteristic_m)_{i,t} + u_{i,t}
 \end{aligned} \tag{2.1}$$

where *CEO earnings* is the dependent variable measuring total CEO pay at firm *i* during year *t*. *performance* is a covariate measured as the total return to shareholders, *firm characteristic_j* is a set of firm specific variables, *CEO characteristic_k* is a set of CEO related variables, *board characteristic_l* is a set of board of directors features and *shareholders characteristic_m* is a set of shareholders and ownership variables. The β s are the parameters to be estimated and u_{it} is the error term. The relationship between the relevant variables is evaluated based on the t-statistics which are calculated with Huber–White heteroskedasticity consistent standard errors.

Within the pooled OLS estimation technique the observable covariates are assumed to capture all the relevant heterogeneity within the individual firms. In other words, pooled OLS assume that no individual-specific unobserved effect (fixed-effect) is present, and therefore the error term is assumed to be uncorrelated with the covariates and also over time [i.e $Cov(u_{it}; X_{it})=0$, where X_{it} represent the covariates; and also that $Cov(u_{it}; u_{i,t-1})=0$]. Although the present study employees a large set of firm specific variables some firm unobserved heterogeneity may still be present. As such for robustness reasons, after estimating the pooled OLS models, and for those variables that

reveal to be statistically significant we employ a (1) random effects model (RE); (2) a fixed effects model (FE); and a (3) linear dynamic panel data model (AB) as proposed by Arellano and Bond (1991). The random effects model, though also assumes that the unobserved heterogeneity is not correlated with the covariates, it does not require that the error term to be uncorrelated over time [i.e. $\text{Cov}(u_{it}; u_{i,t-1}) \neq 0$]. In the fixed effects model, each variable is subtracted by its individual average (i.e. within each firm), eliminating the unobservable time-invariant fixed effects. Finally, the Arellano and Bond (1991) linear dynamic panel data estimation procedure allows the first lag of the dependent variable (*CEO earnings_{t-1}*) as a covariate and also the unobserved fixed effects (as in the fixed-effects model). For a thorough description of these panel data models see Wooldridge (2002).

2.7 Results discussion

Table 2.3 presents the results of the estimated panel data OLS models. Five specifications are estimated, one for each set of factors presented in the hypotheses section. By these means one can assess the amount of variability explained by each set of factors. The first specification presents the results for the relationship between firm performance and CEO total pay. The coefficient of the current total return to shareholders (TRS) and the previous year TRS are both positive and statistically significant, supporting this paper first hypothesis (H1): the CEO's earnings are positively associated with the firm's performance measured as the TRS. Although it is found supporting evidence that TRS is associated with CEO earnings, the total amount of variability explained by this first specification, as measured by the R-squared yields 3.2%, which means that firm performance explains a little fraction of the total Portuguese CEO earnings.

Table 2.3. OLS regressions of CEO earnings

Independent variables	Return (1)	Firm (2)	CEO (3)	Board (4)	Ownership (5)
TRS	0.220*** (2.624)	0.148*** (3.169)	0.045 (0.994)	0.060 (1.358)	0.075* (1.681)
TRS _{t-1}	0.250*** (2.947)	0.158*** (3.761)	0.076* (1.759)	0.088** (2.126)	0.099** (2.384)
Log(assets)		0.372*** (12.831)	0.279*** (9.687)	0.272*** (8.824)	0.274*** (9.011)
Log(employees)		-0.069* (-1.905)	-0.029 (-0.869)	-0.032 (-0.941)	-0.039 (-1.162)
Debt to assets ratio		-0.003* (-1.881)	-0.002 (-1.252)	-0.000 (-0.183)	0.001 (0.518)
Dividend yield		0.511*** (3.050)	0.235** (2.142)	0.269** (2.581)	0.262** (2.469)
Family dummy		-0.069 (-1.200)	-0.199*** (-3.884)	-0.231*** (-3.601)	-0.162** (-2.439)
Regulated dummy		-0.616*** (-5.917)	-0.575*** (-6.576)	-0.532*** (-5.661)	-0.585*** (-6.040)
CEO age			0.004 (1.513)	0.005* (1.700)	0.005* (1.855)
CEO Tenure			0.003 (0.538)	0.004 (0.790)	0.007 (1.327)
CEO education			-0.067** (-2.418)	-0.066** (-2.383)	-0.080*** (-2.952)
Variable earnings (%)			1.200*** (8.391)	1.064*** (7.693)	1.013*** (7.475)
Stock earnings			-0.125* (-1.896)	-0.100 (-1.590)	-0.116* (-1.858)
CEO/Chair Duality				-0.122* (-1.814)	-0.154** (-2.366)
Log(board size)				-0.143 (-1.641)	-0.166* (-1.839)
Board meetings				-0.006 (-1.439)	-0.004 (-1.079)
Remuneration committee				0.063** (2.053)	0.076** (2.545)
Fiscal board				-0.018 (-1.017)	-0.009 (-0.538)
Auditing committee				0.019 (0.876)	0.034 (1.532)
Other governance commissions				0.026*** (4.236)	0.028*** (4.185)
% independent				-0.356*** (-2.833)	-0.302** (-2.457)
% women				0.118 (0.382)	-0.010 (-0.033)
% foreign				0.279 (1.476)	0.338* (1.698)
Shareholders general meeting					-0.733*** (-2.724)
Free float					-0.641** (-2.014)
Top 3					-0.234 (-0.860)

Table 2.3. (Continued)

Independent variables	Return (1)	Firm (2)	CEO (3)	Board (4)	Ownership (5)
Shareholders agreement					0.188*** (2.989)
Voting cap					0.012* (1.751)
Constant	6.184*** (143.137)	4.314*** (26.553)	4.308*** (19.085)	4.605*** (18.435)	5.364*** (12.652)
Observations	400	400	400	400	400
R-squared	0.032	0.623	0.706	0.739	0.752
Adj. R ²	0.027	0.616	0.696	0.723	0.733
F statistic (p-value)	6.841 (0.001)	96.666 (0.000)	88.049 (0.000)	60.053 (0.000)	61.843 (0.000)

Notes: The dependent variable is log(CEO earnings). Definitions for all variables are provided in Table 2.1. Heteroskedastic robust *t* statistics in parentheses below the parameters. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

In specification (2) we added the firm specific factors to the model as proposed in hypothesis 2. As can be seen, the R-squared increases to 62.3% which reveals that these factors explain a large fraction of the total CEO earnings. Particularly it is found that firm dimension, as measured by the book value of assets, and dividend yield are positively associated with higher levels of CEO pay. Consistent with previous empirical studies (e.g. Fernandes, 2008) the present results corroborate that firm size drives chief executives' earnings up. The results do not provide evidence that dividends can help reduce CEO's earnings. Actually, the results reveal that, after controlling for the TRS, firms with higher levels of dividend yields pay more to their CEO's and that relationship is economically and statistically significant ($t=3.05$). This result is consistent with the view of La Porta et al. (2000) where firms that need to come to the external market for funds, must establish *ex ant* a good reputation. One way to establish such a reputation is by paying out more dividends. Shareholders are willing to pay more to managers who have better reputation, i.e. pay-out more dividends. This result is also consistent with the theory that firms link executives' compensation to dividend payments to reduce conflicts between shareholders and management (White, 1996). As

predicted in the firm specific hypothesis, the variables: *number of employees*; *debt to assets ratio*; *family dummy*; and *regulated dummy*; are negatively associated with the CEO total pay. Particularly relevant is the association between the variable *regulated dummy* and CEO earnings where the coefficient is the highest among the variables used in this specification and the *t* statistic yields -5.917. This result suggests that *ceteris paribus* Portuguese regulated listed firms pay less to their CEOs.

In specification (3) we include in the model the CEO specific characteristics. After doing so the R-square increases to 0.706 (which represents an absolute increase of 8.3%). Although not statistically different from zero, the coefficients of the variables CEO age and tenure are both positive. This positive association is consistent the entrenchment hypothesis where older and more experienced CEO are more difficult to replace and therefore more able to negotiate an above average pay package. An interesting result is the negative the coefficient of the education variable. Contrary to what we expected, the results reveal that the higher the CEO education level the less is his total pay. An interpretation of this result may be that CEOs who have more education degrees are also the ones who are more sensitive to the labour market for CEOs. In other words, the less educated CEOs might possess more business specific knowledge and therefore will be more entrenched and overpaid. Overall, the human capital variables are in line with the entrenchment hypothesis and with previous empirical studies, in the way that human capital variables generally have weak effects on CEO wages (Wade et al. 2006).

An interesting result within the CEO specific characteristics is the positive association between the fraction of variable earnings paid to the chief executives (*variable earnings %*) and the total CEO earnings. Further, this relationship is found to be economically and statistically relevant ($t=8.391$). Therefore, having a large fraction

of non-fixed earnings does not necessarily mean that the total CEO earnings will be more aligned with the firm performance. In fact, the results reveal that CEOs who receive more non-fixed earnings are also receiving more excess earnings (i.e. above what would be expected after controlling for the total return for shareholders). There is also some evidence that stock-based compensation limits the opportunity for the CEOs to extract cash payments. Overall, these results reveal that having a large fraction of non-fixed CEO compensation does not necessarily means more alignment with firm performance. Actually, the results support the design of a remuneration package structured to have more equity based compensation rather than cash based bonuses.

In specification (4) the model adds the board of directors' specific characteristics. The R-square in this specification yields 0.739 (which represents an absolute increase of 3.3%). This increase in the R-square is much lower than the increase observed when the CEO specific factors are added into the model. This difference indicates that the board characteristics are less economically important to explain CEO total compensation when compared with firm performance, firm characteristics and CEO characteristics. With respect to the variables it is found that when the CEO is also the chairman of the board the total CEO earnings are lower. This negative relationship is statistically significant at a 10% level ($t = 1.814$) and contrary to what was expected and to the recent empirical findings (Shin and Seo, 2011). This result might be related to the sample used in this study. As already mentioned, the Portuguese listed firms are characterized by being small firms with simple governance structures (in 57.6% of the firms the CEO is also the chairman of the board). This result might therefore mean that the relationship is rather connected with the fact that these firms have simple governance structures and, as such, pay less to their CEOs. Nevertheless, no favourable evidence is provided as that having a non-executive chairman mitigates the CEO ability to extract extra earnings.

Although not statistically significant, the results of the *board size* variable reveal a negative relationship between the size of the board and the total CEO earnings, consistent with the view that a larger board is less efficient. Similar results are found with respect to the board activity as measured by the total number of annual board meetings.

With respect to the board committees (remuneration committee, fiscal board, auditing committee and other governance commissions) the results are quite surprising. The existence and dimension of the remuneration committee is positively related with the CEO earnings and this relationship is statistically significant ($t = 2.053$). This result reveals that firms with no remuneration committee pay less to their CEOs, suggesting that this type of governance device (in Portugal) does not lead to a reduction in the CEOs ability to extract extra rents from the firm. This result is also consistent with the chairman/CEO duality variable which provides evidence that simple governance structures have less agency costs when measured by the ability of CEOs to earn excess wages. The result for the *other governance committees* variable provides similar results and the relationship is also positive and statistically significant, providing further evidence of the uncertainty of the efficiency of these corporate governance devices. With respect to the auditing committee and the fiscal board no statistically significant relationship with CEO earnings is found.

Regarding the effect of the fraction of independent members on the board (*% independent*) a negative and statistically significant (at the 1% level) relationship between this variable and the dependent variable is found, which provides support for the hypothesis that independent directors are more likely to provide proper monitoring. No statistically significant relationship is found between the board gender diversity and also the level of foreign directors in the board.

Turning now to the shareholders characteristics, in specification 5 of table 2.3, the R-square is 0.752 which reveals that these characteristics explain a further 1.3% of the CEO total earnings. The first characteristic analysed is the shareholders activism measured by the percentage of voting rights present in the ordinary general shareholders meetings (*shareholders general meeting*). The results strongly support the hypothesis that this high-level decision-making body is an important determinant of CEO earnings. The coefficient of the shareholders general meeting variable is negative (-0.733) and statistically different from zero ($t = -2.724$) which leads to the interpretation that these meetings are an important agency costs control mechanism and may promote a reduction of CEO excess earnings. The *free float* variable results reveal a negative sign for the parameter. A statistically significant t statistic (-2.014) for this variable is recognized. It was hypothesised that the CEO's earnings are a negative function of the free float. Thus, the results provide supporting evidence that the market for corporate control is an effective governance device in the sense that it potentially reduces CEOs excess earnings. With respect to the *top 3* variable, which aims to capture ownership concentration, it is not found a statistically relevant relationship with CEO earnings. Finally, with respect to the variables *shareholders agreement* and *voting cap* the results reveal a positive relationship between these variables and CEO earnings. These results are consistent with the market for corporate control hypothesis which predicts that any anti-takeover device increases the difficulty of an acquisition and therefore increases the CEO entrenchment. The results are particularly significant with respect to the *shareholders agreement* variable where the t statistic is 2.989, signifying that when large shareholders enter into an agreement the market for control might be less efficient and CEOs more able to extract extra rents. The coefficient of the voting cap variable is also positive and statistically significant (at a 10% level), signifying that companies

with more voting rights restrictions have a higher level of payments to their CEOs. Hence, these results suggest that withdrawing these anti-takeover devices may limit CEOs earnings.

In sum, with respect to the proposed hypotheses, the statistically significant results from the full model (specification 5 of table 2.3) reveal that CEO earnings are a positive function of firm performance as measured by the current and previous year's *total return to shareholders*, as proposed in H1. In relation to firm specific factors (H2), the results reveal that CEO earnings are a positive function of the firm dimension and the firm dividend yield and are lower in family and regulated firms. CEO specific characteristics that drive CEO earnings up (H3) are CEO age and the fraction of the CEO earnings that are variable. The results also show that more educated CEOs have lower earnings. Further, CEO pay packages that include stock based compensation might reduce CEO total earnings. The board of directors' characteristics (H4) that are positively and statistically related with the CEO earnings are the size of the remuneration committee and other governance commissions and the level of foreign directors within the board. The variables that restrict CEO earnings are the *CEO/Chair Duality* dummy variable, the board size and the percentage of independent directors within the board. Finally, the shareholders characteristics (H5) that have a positive influence on the level of CEO total earnings are the shareholders agreements and the voting cap. The level of participation in the shareholders general meeting and the free float are negatively associated with the CEO earnings.

Based on the statistically significant results achieved in table 2.3, we further analyse the robustness of these associations in table 2.4. In the first specification (column 1) we provide results from the full set of variables that were statistically significant in specification 5 of table 2.3. All variables remain statistically significant, except for the

Table 2.4. Robustness checks.

Independent variables	(1) OLS	(2) OLS	(3) RE	(4) FE	(5) AB
Log(CEO earnings) _{t-1}	-	-	-	-	-0.050* (-1.731)
TRS	0.062 (1.391)	-	-	-	-
TRS _{t-1}	0.089** (2.121)	0.085** (2.137)	0.045* (1.721)	0.041* (1.723)	0.042*** (7.432)
Log(assets)	0.259*** (13.214)	0.238*** (15.264)	0.185*** (6.537)	0.012 (0.132)	0.032 (1.368)
Dividend yield	0.258** (2.350)	0.246** (2.274)	0.020 (0.269)	0.024 (0.196)	0.389*** (5.851)
Family dummy	-0.192*** (-3.628)	-0.159*** (-3.007)	-0.202* (-1.813)	-	-
Regulated dummy	-0.579*** (-8.280)	-0.593*** (-8.238)	-0.379*** (-2.586)	-	-
CEO age	0.008*** (2.951)	0.008*** (3.024)	0.007* (1.906)	0.010** (2.482)	0.004*** (3.328)
CEO education	-0.085*** (-3.334)	-0.086*** (-3.418)	-0.056* (-1.797)	-0.029 (-0.852)	-0.020 (-1.636)
Variable earnings (%)	1.079*** (8.344)	1.064*** (8.761)	1.206*** (7.146)	1.212*** (7.185)	1.335*** (34.563)
Stock earnings	-0.056 (-0.974)	-	-	-	-
CEO/Chair Duality	-0.124** (-1.973)	-0.094* (-1.660)	-0.191*** (-3.012)	-0.273*** (-3.972)	-0.162*** (-4.580)
Log(board size)	-0.127 (-1.516)	-	-	-	-
Remuneration committee	0.076*** (2.651)	0.068** (2.344)	0.057* (1.690)	0.042 (1.150)	0.057*** (4.870)
Other governance commissions	0.021*** (3.512)	0.022*** (3.693)	0.013** (2.468)	0.012* (1.787)	0.001 (0.607)
% independent	-0.308** (-2.543)	-0.299** (-2.485)	-0.354** (-2.099)	-0.411** (-2.210)	-0.008 (-0.283)
% foreign	0.380** (2.145)	0.321* (1.767)	0.433 (0.927)	0.460 (0.532)	0.473*** (3.324)
Shareholders general meeting	-0.748*** (-2.701)	-0.762*** (-2.810)	-0.417 (-1.239)	-0.403 (-1.108)	-0.164** (-2.306)
Free float	-0.472** (-2.062)	-0.495** (-2.211)	0.185 (0.751)	0.225 (0.832)	-0.030 (-0.232)
Shareholders agreement	0.160** (2.559)	0.149** (2.395)	0.264*** (3.139)	0.320*** (2.856)	0.231*** (10.566)
Voting cap	0.014** (2.095)	0.013** (2.002)	-0.007 (-0.718)	-0.017 (-1.339)	-0.008*** (-4.208)
Constant	4.775*** (16.904)	4.648*** (16.944)	4.633*** (11.687)	5.599*** (7.077)	5.755*** (34.993)
Observations (firms)	400 (50)	400 (50)	400 (50)	400 (50)	350 (50)
Adj. R ²	0.728	0.727	0.716	0.524	-
F statistic (p-value)	70.797 (0.000)	82.021 (0.000)	-	-	-
Wald χ^2 (p-value)			633.190 (0.000)	14.162 (0.000)	47522.449 (0.000)

Table 2.4. (Continued).

Independent variables	(1) OLS	(2) OLS	(3) RE	(4) FE	(5) AB
AR(1) test					-1.8983
(p-value)					(0.0577)
AR(2) test					-0.15877
(p-value)					(0.8739)
Sargan χ^2					38.09287
(p-value)					(0.3305)

Notes: The dependent variable is log(CEO earnings). Definitions for all variables are provided in Table 2.1. Column (1) and (2) provide parameters estimates using OLS models, column (3) provides a random effects (RE) model, column (5) a fixed effects model and column (6) the Arellano-Bond (1991) linear dynamic panel-data model. Sargan test of overidentifying restrictions (H0: overidentifying restrictions are valid). AR(1) and AR(2) Arellano-Bond test for first- and second-order autocorrelation in first-differenced errors. (t or z -statistics) in parentheses are below the parameters. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

current year total return to shareholders (TRS) and the dummy variable *stock earnings*.

Based on this evidence we run a new OLS regression dropping these two variables (specification 2). These results remain statistically significant for all the variables. In specification 3 we run a random effects (RE) regression, which controls for autocorrelation within firms. The results remain qualitatively identic, even though some variables lose their statistical significance. In the fourth specification a fixed effects model is employed to control for possible endogeneity in the model. Since this model requires variability in the independent variables, all the time invariant dummy variables such as the regulated and family dummy variables are dropped from the model. The results obtained remain qualitatively similar. Nevertheless, the statistical significance of the coefficients decreases in several variables. This should be expected, since the fixed effects model subtracts the variables average which in turn significantly reduces the cross section variability of the covariates. Finally, the Arellano and Bond (AB) linear dynamic panel data estimation procedure is assessed. Within this model the first lag of the dependent variable is considered as an independent variable. The coefficients reveal similar figures to those found on the previous specifications. Moreover, the AB

model reveals that CEO earnings present a negative and statistically significant autocorrelation (at 10% level of significance). The Sargan χ^2 test cannot be rejected at any conventional level of significance, meaning that we cannot reject that the AB instruments are valid.

2.8 Conclusion

This paper empirically analyses the relationship between corporate governance practices and Chief Executive Officers' (CEO) wages among listed companies in Portugal using panel data from 2002-2011. The relationship between CEO total compensation and shareholders return, firm characteristics, CEO characteristics, board of directors and shareholders characteristics is analysed. Several OLS specifications are adopted, one for each set of factors. For robustness purposes a random effects model, a fixed effects model and the Arellano and Bond (1991) model are also adopted.

With respect to the determinants of the Portuguese CEO earnings the results reported in the present study are generally consistent with other countries' findings. Particularly, that firm specific factors accounts for the majority of the variance in total CEO pay, while firm performance accounts for less than 5% (Tosi et al., 2000). Moreover, it is found that CEO earnings are higher in larger firms and in firms that have higher levels of dividend yields. Further, the CEO earnings are lower in family and regulated firms. It is also found that CEO age and the fraction of the CEO earnings that are variable drive the executives' earnings up. The results also show that more educated CEOs have lower earnings. There is also some evidence that CEO pay packages that include stock based compensation might reduce CEO total earnings. With respect to the board of directors' characteristics it is found that the size of the remuneration committee and other governance commissions and the level of foreign directors within the board are positively associated with the CEOs earnings. On the other hand when the CEO is

the same person as the chairman of the board, when the board is large and the percentage of independent directors within the board is also large the CEO receives lower total earnings. With respect to the shareholders characteristics the results found support a positive influence of the shareholders agreements and the voting caps on the level of CEO pay. Finally, the level of participation in the shareholders general meeting and the free float are found to be negatively associated with the CEO earnings.

The overall conclusion is that the CEO's earnings are driven by firm performance, CEO and board characteristics and also shareholders characteristics, providing new insights to the determinants of executives' earnings and validating some of the previous research in this field (e.g. Ozkan 2011). Therefore the overall conclusion is that there are persistent effects on governance in distinct markets as well as aspects specific to each market.

It is recognised that a Portuguese CEO earns on average less than a CEO in Europe as a whole (Heidrick and Struggles, 2009). This income difference is expected when taking into account the lower GDP per capita in Portugal. However, governance principles are needed for Portuguese companies to restrict the ability of uncompetitive CEOs (AdCapita and Cranfield University, 2003) to extract rents from their companies. The policy implications of the present research are therefore as follows. First, the adoption of the governance code by all listed and non-listed companies should be promoted in an effort to advance the progress of Portugal in terms of governance best practices. Second, the effective roles of the remuneration committee and other governance commissions should be screened; as it is not clear that they properly monitor and limit the CEO's earnings. Third, minimum requirements for percentages of independent members on boards should be instituted, as result of the positive effect found on restricting the CEO's earnings. Fourth, the inclusion of stock-based

compensation as a part of the CEO's earnings should be promoted because stock-based compensation limits excessive earnings for CEOs. Fifth, variable cash based bonuses should be rethought as this sort of payment is driving upwards CEOs earnings. Sixth, CEO education should be disclosed as it seems that a lack of education might reveal some entrenchment and the ability for executives to earn excess earnings. Finally, anti-takeover devices such as shareholders agreements or voting caps should be discouraged and the shareholder participation on general meetings promoted.

This essay presents several limitations. First, because the Portuguese stock market is quite underdeveloped the total sample used (50 firms) limits the ability to generalize these results to other realities. Secondly, the relative recent adoption of the sole code of governance code in Portugal also limits the assessment of the corporate governance devices effectiveness. Finally, the necessity of having to estimate the value of total CEO earnings for some firms and years also results in a limitation of the present study, in sense that it translates into potential measurement errors in the analysis. For these reasons, more research is needed to confirm these results. Thus, it would be interesting for us to further investigate the relationship between the CEOs earnings and corporate governance in Portugal using different techniques and time spans.

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Appendix A

Table A.1. List of Portuguese listed firms and sample observations.

Ticker	Firm name	N	Period
ALTR	Altri, SGPS, S.A.	7	2005-2011
BCP	Banco Comercial Português, S.A.	10	2002-2011
BES	Banco Espírito Santo, S.A.	10	2002-2011
BNF	Banif - SGPS, S.A.	10	2002-2011
POP	Banco Popular Español, SA	5	2007-2011
BPI	Banco BPI, S.A.	10	2002-2011
BRI	Brisa - Auto Estradas de Portugal, SA	10	2002-2011
CFN	Cofina - SGPS, SA	10	2002-2011
COMAE	Compta - Equipamento e Serviços de Informática, SA	10	2002-2011
COR	Corticeira Amorim - SGPS, SA	10	2002-2011
CPR	Cimpor - Cimentos de Portugal, SGPS, SA	10	2002-2011
EDP	EDP - Energias de Portugal, SA	10	2002-2011
EDPR	EDP Renováveis, SA	4	2008-2011
EGL	Mota-Engil, SGPS, SA	10	2002-2011
ESO	Estoril Sol - SGPS, SA	10	2002-2011
FCP	Futebol Clube do Porto - Futebol, SAD	10	2002-2011
FSP	Fisipe - Fibras Sintéticas de Portugal, SA	10	2002-2011
GALP	Galp Energia, SGPS, SA	6	2006-2011
GLINT	Glintt - Global Intelligent Technologies, SGPS, S.A.	10	2002-2011
GPA	Imobiliária Construtora Grão Pará, SA	10	2002-2011
IBS	Ibersol - SGPS, SA	10	2002-2011
INA	Inapa - Investimentos, Participações e Gestão, SA	10	2002-2011
IPR	Impresa - SGPS, SA	10	2002-2011
JMT	Jeronimo Martins - SGPS, SA	10	2002-2011
LIG	Lisgráfica - Impressão e Artes Gráficas, SA	10	2002-2011
MAR	Martifer - SGPS, SA	5	2007-2011
MCP	Grupo Media Capital SGPS, SA	8	2004-2011
NBA	Novabase - SGPS, SA	10	2002-2011
ORE	Sociedade Comercial Orey Antunes, SA	10	2002-2011
PTC	Portugal Telecom, SGPS, SA	10	2002-2011
PTI	Portucel - Empresa Produtora de Pasta e Papel, SA	10	2002-2011
RAM	F. Ramada - Investimentos, SGPS, S.A.	4	2008-2011
RED	Reditus - SGPS, SA	10	2002-2011
RENE	REN - Redes Energéticas Nacionais, SGPS, SA	5	2007-2011
SVA	SAG Gest - Soluções Automóvel Globais, SGPS, SA	10	2002-2011
SAN	Banco Santander, SA	10	2002-2011
SCOAE	Grupo Soares da Costa, SGPS, SA	10	2002-2011
SCP	Sporting - Sociedade Desportiva de Futebol, SAD	10	2002-2011
SCT	Toyota Caetano Portugal, SA	10	2002-2011
SYV	Sacyr Vallehermoso, SA	8	2004-2011
SEM	Semapa - Sociedade Investimento e Gestão, SGPS, SA	10	2002-2011
SLBEN	Sport Lisboa e Benfica - Futebol SAD	3	2009-2011

Table A.1. (Continued).

Ticker	Firm name	N	Period
SNC	SONAECOM - SGPS, SA	10	2002-2011
SON	Sonae - SGPS, SA	10	2002-2011
SONC	Sonae Capital, SGPS, SA	5	2007-2011
SONI	Sonae Indústria - SGPS, SA	10	2002-2011
SUCO	SUMOL+COMPAL, S.A.	10	2002-2011
TDU	Teixeira Duarte - Engenharia e Construções, SA	10	2002-2011
VAF	VAA - Vista Alegre Atlantis - SGPS, SA	10	2002-2011
ZON	ZON MULTIMÉDIA - Serviços de Telecomunicações e Multimédia - SGPS, S.A (former PT Multimedia)	10	2002-2011

Table A.2. Pearson correlation matrix of the variables used in the analysis.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1.Log(CEO earnings)	1											
2.TRS	0.0986*	1										
3.Log(assets)	0.742***	0.0161	1									
4.Log(employees)	0.629***	0.0675	0.820***	1								
5.Debt to assets ratio	-0.00595	-0.0774	0.0438	-0.0559	1							
6.Dividend yield	0.135**	0.000962	0.104*	0.0958*	0.000658	1						
7.Family dummy	-0.134**	0.0544	-0.127**	0.0463	-0.0621	0.0472	1					
8.Regulated dummy	0.281***	-0.0546	0.570***	0.245***	-0.0304	0.0334	-0.145**	1				
9.CEO age	0.176***	0.00745	0.185***	0.111*	0.0498	-0.0816	0.125**	0.0999*	1			
10.CEO Tenure	0.154**	-0.0132	0.115*	0.0304	0.0794	0.0108	0.193***	0.0392	0.591***	1		
11.CEO education	-0.139**	0.0429	-0.0810	0.0677	-0.125**	-0.0761	-0.00634	-0.213***	-0.376***	-0.303***	1	
12.Variable earnings (%)	0.653***	0.174***	0.518***	0.461***	-0.0837	0.146**	0.0723	0.220***	-0.00356	0.108*	-0.0569	1
13.Stock earnings	0.319***	-0.0128	0.375***	0.281***	-0.0887	0.0331	-0.220***	0.131**	-0.0502	0.0322	0.0867	0.345***
14.CEO/Chair Duality	-0.293***	0.00473	-0.294***	-0.287***	0.0957*	-0.0461	0.0522	-0.178***	0.252***	0.264***	-0.103*	-0.273***
15.Log(board size)	0.625***	-0.000318	0.794***	0.654***	-0.0313	0.103*	-0.294***	0.513***	0.0210	0.0327	-0.0196	0.474***
16.Board meetings	-0.0220	-0.0666	0.0544	0.0167	0.0637	-0.00385	-0.119*	0.142**	-0.110*	-0.0321	-0.0104	-0.0537
17.Remuneration committee	0.347***	0.0141	0.307***	0.313***	-0.0323	0.0779	-0.193***	0.0173	-0.120*	0.0169	0.0602	0.181***
18.Fiscal board	-0.125**	-0.0839	-0.0419	-0.0856	0.0334	-0.0125	0.00330	0.115*	0.0227	-0.0495	0.000488	-0.124**
19.Auditing committee	0.546***	0.00777	0.621***	0.535***	-0.0806	0.0558	-0.196***	0.287***	0.0462	-0.0311	0.0434	0.399***
20.Other governance commissions	0.359***	-0.0480	0.335***	0.270***	-0.0629	0.0339	-0.177***	0.356***	-0.0373	-0.0828	-0.0854	0.256***
21.% independent	0.0556	-0.0383	0.178***	0.186***	0.0309	0.0447	-0.248***	0.0828	-0.129**	-0.234***	-0.00778	0.0717
22.% women	-0.0837	0.0288	-0.0954*	-0.0495	0.0998*	-0.00384	0.294***	-0.136**	0.209***	0.168***	-0.162***	-0.107*
23.% foreign	0.213***	0.0129	0.162***	0.208***	-0.222***	0.0897	0.122**	0.0660	0.0824	0.0178	0.0815	0.186***
24.Shareholders general meeting	-0.172***	-0.0521	-0.156***	-0.163***	0.0252	-0.000665	0.0704	-0.0437	0.0482	0.0684	-0.142**	-0.194***
25.Free float	0.370***	0.0522	0.475***	0.420***	0.0874	0.0339	-0.259***	0.291***	0.0337	-0.0211	0.0867	0.291***

Table A.2. (Continued).

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
26.Top 3	-0.355***	-0.0306	-0.432***	-0.370***	-0.136**	-0.0211	0.349***	-0.241***	-0.0115	0.0537	-0.108*	-0.247***
27.Shareholders agreement	0.0870	-0.00168	0.0839	0.0572	-0.171***	-0.0232	-0.214***	0.104*	0.0674	-0.0366	0.117*	-0.0373
28.Voting cap	0.210***	-0.0266	0.274***	0.170***	0.0494	0.0506	-0.399***	0.429***	-0.135**	-0.198***	-0.0949*	0.118*
Variable	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
13.Stock earnings	1											
14.CEO/Chair Duality	-0.177***	1										
15.Log(board size)	0.393***	-0.471***	1									
16.Board meetings	-0.156***	0.00325	0.00541	1								
17.Remuneration committee	0.199***	-0.150**	0.338***	0.0696	1							
18.Fiscal board	-0.0840	-0.0808	-0.0262	0.382***	-0.0850	1						
19.Auditing committee	0.420***	-0.293***	0.591***	-0.228***	0.350***	-0.379***	1					
20.Other governance commissions	0.0224	-0.298***	0.374***	0.308***	0.0460	0.187***	0.152**	1				
21.% independent	0.237***	-0.130**	0.153**	-0.163***	0.0252	-0.0624	0.247***	0.00193	1			
22.% women	-0.141**	0.146**	-0.125**	-0.0264	-0.231***	0.00422	-0.115*	-0.104*	-0.177***	1		
23. % foreign	0.190***	-0.368***	0.247***	-0.172***	0.153**	-0.0322	0.318***	0.122**	0.0630	-0.170***	1	
24.Shareholders general meeting	-0.212***	-0.112*	-0.0577	0.0565	-0.00770	-0.0211	-0.0990*	-0.0110	-0.0850	0.0372	0.208***	1
25.Free float	0.287***	-0.0145	0.396***	0.115*	0.146**	0.0413	0.327***	0.254***	0.173***	-0.131**	-0.162***	-0.719***
26.Top 3	-0.332***	-0.0255	-0.398***	-0.0653	-0.171***	0.00304	-0.316***	-0.237***	-0.147**	0.113*	0.195***	0.674***
27.Shareholders agreement	0.0465	0.0715	0.140**	0.0370	0.0126	-0.127**	0.0228	-0.00731	-0.0746	0.0443	0.0378	0.111*
28.Voting cap	0.0752	-0.200***	0.390***	0.0827	0.0422	-0.0229	0.213***	0.272***	0.222***	-0.161***	-0.0781	-0.125**

Table A.2. (Continued).

Variable	(25)	(26)	(27)	(28)
25.Free float	1			
26.Top 3	-0.909***	1		
27.Shareholders agreement	0.00451	-0.0831	1	
28.Voting cap	0.325***	-0.341***	0.153**	1

Notes: This table reports Pearson correlations between the variables used in the analysis. Significance levels are computed as two tailed p-values: * p<0.05, ** p<0.01, *** p<0.001.

CHAPTER III - PERFORMANCE AND GOVERNANCE IN LISTED COMPANIES: DOES FORMAL EDUCATION OF THE CEO IS ASSOCIATED WITH FIRM PERFORMANCE?

Abstract: This study analyses the relationship between company performance, measured by the Tobin's Q, and governance characteristics allowing for chief executive officers' (CEO) specific characteristics, such as education, age and tenure, among a sample of Portuguese listed companies from 2002-2011. The study uses a dynamic micro panel data model. The findings support the conclusion that firm performance relates positively to the CEO's level of educational attainment. Management education is negatively associated with firm performance, whereas CEOs with a law degree are associated with higher firm performance. Other governance-specific characteristics also explain this relationship, namely, the presence of independent directors on the board and voting cap restrictions. Policy implications conclude.

Keywords: Performance, CEO, corporate governance, listed companies, CEO education, Portugal.

JEL classification: A20, G30, G32, L22

3.1 Introduction

The governance of companies is a theme that attracts research that seeks to address deficiencies in corporate governance due to the principal-agency relationship (Fama and Jensen, 1983; Jensen and Meckling, 1976), aiming to align the principal (shareholders) with the agent's (CEO) interests in order to maximize shareholder value. According to the agency theory, firms should choose their CEOs on the basis of their ability to create value for shareholders. An efficient market should ensure that firms and their shareholders hire their CEOs with the best available pay-for-performance contracts (Fama and Jensen, 1983).

Portuguese listed firms possess specific characteristics that make that selection potentially non-optimal. First, many companies are family-owned and therefore, their CEOs tend to be routinely selected from among members of the family. Second, many of the current listed companies went public in the last two decades (Martins and Ramos, 2005), with the Portuguese State maintaining its holding of a substantial part of the capital or at least a golden share that enables the government to have a substantial influence in the CEO selection process. Third and finally, even if the listed companies do not have a direct State participation, their ability to conduct successful business is somewhat dependent on the CEO's relationship with the political power, since the State plays a significant role in the Portuguese economy. In fact, it is common to find former government ministers occupying management positions in listed firms.

This contextual situation is confronted with doubts on the competitiveness of Portuguese managers (see, for example, the report on an enquiry conducted by AdCapita and Cranfield University, 2003), possibly due to under-education among the highest echelons of management. For example, MBA's –master business administration course is a standard training for managers in contemporary economics. Graduate

business schools endeavour to prepare their students for management positions, yet, despite this standard training for managers, there are many CEOs in Portuguese listed companies without a MBA or a formal university degree. Therefore, it is of interest to analyse performance at this level, taking into account CEO education.

Despite the large amount of literature on corporate governance (see table B1 in appendix for a summary of the contemporary empirical literature on governance issues), with exception of the Kim and Lim (2010) work, not much attention has been given by the current literature to the relationship between management abilities, such as CEO education and performance. The present paper makes a step forward, analysing board composition, including firm specific characteristics, and CEO individual characteristics in Portuguese listed companies quantitatively and using a micro panel data from Portuguese listed companies from 2002-2011. The paper adopts the dynamic panel data model of Arellano and Bond (1991). The model concludes that education is of paramount importance among the covariates that explain company performance. Further, boards composed with more independent directors are also positively associated with firm performance.

This study is organized as follows. Section two present the contextual setting of the Portuguese listed companies. Section three presents a literature survey and the hypotheses. Section four presents the data and explains the methodology. Section five reveals the empirical results. Section six discusses the results and concludes.

3.2 Contextual setting

Listed firms in Portugal elect their management team usually throughout the general shareholders meeting or in the incorporation meeting. The Portuguese Commercial Company Act provides the legal framework by which firms can enter into a contract

with the management team. Although this legal framework provide some limits to these contracts, for example the contracts duration, which shall not exceed four calendar years, no legal obligation exists in terms of the managers formal education and background. Nevertheless, shareholders assess the management performance and supervision bodies of the company in the annual shareholders meeting (article 376 of the Act). Within the scope of this annual meeting shareholders have the power to dismiss managers or to table a vote of no confidence in a manager. If management do not perform well, an efficient market for managers enables the shareholders to replace them for a team that delivers them more value (Fama and Jensen, 1983). However, the Portuguese context can make the market for managers less efficient (e.g. highly concentrated ownership; family listed firms; and substantial influence by the Portuguese State).

Alongside with the Portuguese Commercial Company Act, that rules the formal interaction between firm's management and shareholders, listed firms are obliged to provide information in respect to the Portuguese corporate governance code. The sole code of governance in Portugal was established by the National Securities and Markets Authority (CMVM). This differs markedly to what is the common means of elaborating codes of governance throughout the world; they are normally more than one and drawn up by directors' associations, managers' associations, professional bodies and investors and are usually overseen by autonomous watch-dogs (Aguilera and Cuervo-Cazurra, 2004).

This code arises from an initial set of non-binding recommendations. The first draft of this code was written in 1999 and reviewed the first time in 2001. Before this redraft listed firms weren't obliged to explain why they didn't follow the recommendations if that was the case. After the first redraft the recommendations code made it mandatory

for companies to apply the “comply or explain” principle. Nevertheless, firms were free to choose not to follow the code’s prescriptions, so long as they disclosed and explained such non-compliance. This code recommends firms to disclose information on several corporate governance issues, such as board structure, directors’ independence, mandate terms, remuneration, conflicts of interest, due diligence, loyalty and confidentiality rules internal risk management systems in place, shareholders voting rights and proxy recommendations, among others. The code particularly recommends listed firms to create supervision independent bodies within their management structures that carry out an on-going assessment on the management of the company. Additionally, the company shall explain its policy of portfolio rotation on the Board of Directors, including the person responsible for the financial portfolio, and report its policy in the Annual Corporate Governance Report. According to the CMVM’s first evaluation report on the Portuguese listed firms’ compliance with the code (in 2001), only 70% of the firms listed on regulated markets and 13% of the firms listed on non-regulated markets had disclosed (partial) information on the adoption of the first governance code in their annual financial reports for the fiscal year ending in December month 2000. Analysing this data, Alves and Mendes (2004) found a positive relationship between code compliance with specific recommendations and performance among Portuguese listed firms.

Although the sole code on corporate governance is maintained by the Portuguese securities market supervisor, it was created in 2004 the Portuguese Institute of Corporate Governance. This institute is a non-profit association that was created with aim of promoting the good corporate governance practices (including a new corporate governance code). Until now this institute has promoted several debates about the topic

and produced a White Book on Corporate Governance in Portugal (2006) but hasn't produced an alternative corporate governance code.

Within this recommendatory landscape, this study analyses the effectiveness of the corporate governance devices in place at the Portuguese listed firms with the focus on CEOs characteristics, such education, age and tenure. To this end, Tobin's Q is used as a proxy for firm performance.

3.3 Theoretical framework and hypotheses

3.3.1 Theoretical framework

The majority of the papers on corporate governance are built on the agency theory of Jensen and Meckling (1976). In this framework, conflicts of interest arising from the separation of ownership and control are recognized (Fama and Jensen, 1983). Corporate governance deals with the mechanisms in providing a solution for these conflicts. These mechanisms can be internal or external and are designed to align the interests of managers with those of the shareholders.

Internal mechanisms include an effectively structured board (Hermalin and Weisback, 1998; Fama and Jensen, 1983), in which effective independent members monitor the executive managers; top-management incentives (Jensen and Murphy, 1990) throughout pay-for-performance contracts that are designed to give managers the incentive to create value to shareholders; and ownership structure (Hart, 1995; Khan et al., 2005; Khurshed et al., 2011). In relation to the last mechanism, Hart (1995) states that firms held by a large number of small investors face a free-rider problem. Since monitoring the agent is expensive, small shareholders leave to others the role of monitoring. If all investors are small and think this way, no monitoring is made. One way to improve corporate governance is therefore through one or more large

shareholders. But even when a large shareholder exists, there can always be conflicts of interest, since the large shareholder might promote their own interest at the expense of other shareholders (Burkart et al. 1997). Thus, there are benefits and cost associated with the presence of large shareholders.

External governance includes the managerial labor market (Fama, 1980) where managers are quickly replaced when performing poorly; the market for corporate control (Manne, 1965; Fama and Jensen, 1983; Jensen and Ruback, 1983); product market competition (Hart, 1995; Amman et al., 2011), and the firm's financial structure (Jensen, 1986). If a firm has its capital widely dispersed, the market for corporate control can act as a monitoring device. In fact, if a manager destroys shareholders value more likely is the threat of a takeover. The bidder can then dismiss the current management team. Relative to the product market competition theory it is predicted that more competition in the market for products can reduce firms operating margins and therefore less available cash for the discretionary use of managers. With respect to the role of the financial structure as a corporate governance device, Jensen (1986) has recognized that large amounts of free-cash flow can increase the manager power. The author develops a theory explaining the benefits of debt in reducing agency costs of free cash flows. In this framework, debt reduces the agency costs by reducing the cash flow available for spending at the will of managers. Furthermore, high levels of debt can increase the threat of going bankrupt, making managers' reputation at risk. Thus, debt works as an incentive to manager's work harder.

Even with all these monitoring devices in place, conflicts of interest between shareholders and managers may still exist. The entrenchment hypothesis explains some of these monitoring imperfections (Stulz, 1988; Shleifer and Vishny, 1989). This line of thought argues that entrenched managers make any potential replacement costly and

therefore external corporate governance devices less effective. Several devices can be used by managers to promote entrenchment. High ownership by managers, for example, can make it difficult for a hostile takeover to be successful (Stulz, 1988) and let the CEO with sufficient power to extract wealth from the shareholders. Making investments specific related to the manager own talents is another way they can increase power and bind shareholders to themselves (Shleifer and Vishny, 1989). In fact, any action taken by the CEO that makes future firm profitability dependent on his particular skills, experience or private relationships, makes it difficult for the managerial labour market, the market for control and the market for products, to act has effective external monitoring devices.

If it is true that managerial entrenchment that emerges from the specific knowledge of the business can be seen as an agency-cost, the human capital literature (Becker, 1975) has recognized that individuals with high levels of human capital, i.e. abilities, are more likely to add to firm performance. Abilities can be both innate and learned. The latter is enhanced by professional experience. The entrenchment theory and the human capital theory can then be conflicting in the sense that CEOs who are more time on the job can obtain more abilities but at the same time can gain more power and more likely the board will be entrenched.

The present paper is concerned with the effect of corporate governance devices on firm performance. Although analysing internal and external mechanisms that are normally used by firms to address the agency-principal conflicts, several CEO specific characteristics such as CEO age, tenure and education (in particular the participation in a MBA program) are also analysed. Therefore, this study builds on the human capital theory and the principal-agent theory, and assesses the effect of corporate governance devices and specific human capital of the CEO on firm performance.

3.3.2 Hypotheses

Governance mechanisms may relate to company performance in complex ways. Indeed, the literature on governance frequently document corporate governance mechanisms to be substitutable and/or complimentary². The main characteristics of the contemporary empirical literature are provided in table B.1 in appendix. Following current empirical studies, we use a wide range of corporate governance devices that potentially can explain firm performance. Four sets of explanations are used in this paper to describe companies' performance: (1) CEO characteristics such as education, age and tenure; (2) the board of directors' structure; and (3) ownership-specific characteristics. The theoretical models on governance (Fama and Jensen, 1983; Hermalin and Weisback, 1998; Jensen and Meckling, 1976) and human capital (Becker, 1975) inform the hypotheses.

CEO characteristics

Not much attention has been given to CEO abilities when analysing corporate governance issues at the firm level (Harris and Helfat, 1998). An exception is found in Kim and Lim (2010) who analysed the education and age of outside directors in Korean listed firms and found that directors' experience has important effects on firm value. As seen above, the entrenchment hypothesis can predict opposing directions on performance when compared with the human capital theory. Highly qualified managers can be hired, gain field experience and become entrenched without necessarily rip-off shareholders wealth. In fact a trade-off between benefits and cost of entrenchment has to be made. To address these issues, the present study analysis several CEO characteristics

² Several covariates have been suggested in the literature to explain governance issues. See for example: Veliyath et al. (1994); Conyon (1997); Lippert and Porter (1997); Benito and Conyon (1999); Halliwell et al. (1999); Conyon and Murphy (2000); Bhagat and Bolton (2008); Florackis and Ozkan, (2009); Sawicki (2009); Brown et al. (2011); Ozkan (2007, 2011).

that can support both the entrenchment hypothesis and the human capital theory, namely, CEO education, age and tenure.

With respect to CEO education, Portuguese listed firms are characterized by a heterogeneous landscape. It is observed that many firms have CEOs without a university degree, and quite a lot have no formal degree in management, but rather in specific areas, such as engineering or law. Although the human capital theory predicts a positive relationship between the CEO level of education and firm performance, the CEOs who have no education in management can provide additional value to the company. Their individual expertise in specific areas of the business can be more valuable than management skills. Furthermore, it is not uncommon to see former politician to be hired in Portuguese listed firms. Hillman (2005) has documented that firms with former politicians in their boards perform better, specially regulated firms. On the other hand, Boyatzis and Case (1989) have documented that attending a management degree adds value on a number of abilities related to effective managerial performance. In this framework, we propose the following hypotheses.

H1.1: *Firm performance is a positive function of the CEO level of education.*

H1.2: *Firm performance depends on the type of CEO education.*

It is hypothesized that the CEO age and tenure increases the level of firm (and sector) specific knowledge accumulated by the manager. This can lead to a lack of competition in the market for CEOs and promote entrenchment. Tenure and age has been used as a proxy for CEO entrenchment, Hill and Phan (1991), Florackis and Ozkan (2009), and Ozkan (2011), are just a few examples. These authors argue that the CEO degree of influence over the board of director's increase with tenure and age. Nevertheless, CEO tenure and age increases the CEO experience and, thus, their ability.

Therefore, firm performance can be a positive function of the CEO experience if the human capital theory predicts a better explanation than that of the entrenchment hypothesis.

H1.3: *Firm performance is a function of CEO tenure.*

H1.4: *Firm performance is a function of CEO age.*

Governance characteristics

The corporate governance literature and also the corporate governance codes around the world advocate that the board of directors should be comprised of outside directors. Further, these outside directors should be independent from the executive managers (insiders). The rationale is that the board of directors will only perform its monitoring roles and properly measure the performance of the executives (internal agents) if it is composed with outside and independent directors, that is, not related with internal agents (Fama and Jensen, 1983). The empirical findings concerning the effectiveness of the outside directors to reduce agency costs is not consensual, because some authors find a positive effect of independent directors on firm performance (Rosenstein and Wyatt, 1990) and other find the opposite relationship (Agrawal and Knoeker, 1996).

In the same line of thought, when the CEO and the chairman of the board of directors is the same person (CEO/Chairman duality) the monitoring of the executives and particularly the CEO is rendered ineffective, because of the high concentration of power in a single person. As such, the literature on board of directors (e.g. Florackis and Ozkan, 2009) and also virtually all the corporate governance codes considers a board of directors where the chairman of the board and CEO are the same person to be less independent. Given this theoretical scope the following hypotheses are proposed:

H2.1: *Firm performance is a positive function of the percentage of independent directors.*

H2.2: *Firm performance is higher when the chairman of the board is a non-executive director.*

Boards comprising many directors might be less efficient (Yermack, 1996). Coordination, communication and decision-making can be more burdensome in large boards, thus rendering the monitoring role of the board less effective. However, a larger board of directors is required in order to accommodate more external board members, who will monitor the executive management (Hermalin and Weisbach, 1988, 1991, 1998). On the same line of reasoning, Vafeas (1999) suggests that the number of board meetings can be related to firm value in both directions. On the one hand, a larger number of directors can provide the board with more human capital for monitoring purposes and also provide more support and advice to the executives on strategic issues. On the other hand, larger boards are more costly: managerial time, travel expenses and directors' meeting fees must be accounted for.

H2.3: *Firm performance is a function of the board size.*

Under Portuguese law, listed companies must have a supervisory body within its governance structure. Firms, however, can choose to have either a 'fiscal board' or an 'audit committee'. The audit committee is part of the board of directors, while the fiscal body is a separate entity. Audit committees and fiscal boards are the bodies responsible for the effective monitoring of the board and are composed of external, non-executive directors. Large audit committees and fiscal boards should provide better, more effective monitoring, reduce information asymmetries and agency costs should be

lower. However, additional costs incur such as the arrangement of meetings, auditors' fees and travel expenses. Furthermore, as Jensen (1993) stresses, external directors can ally to the executive management. Indeed, senior executives can influence supervisory board member selection when senior executives have sufficient voting power. Thus, board members with appointments to the supervisory bodies under such conditions are liable to be more loyal and less vigilant. In such a context, we cannot predict the sign of the effect of the dimension of these supervisory bodies. As such the relationship between the existence and dimension of these supervisory bodies on firm performance is an empirical question.

H2.4: *Firm performance is a function of the number of members on the fiscal board.*

H2.5: *Firm performance is a function of the number of members on the audit committee.*

Ownership structure

A dynamic market for control can mitigate the agency cost, since managers face the risk of losing their positions (Bebchuk, et al. 2002). Listed firms with a more dispersed ownership are more likely to be in the market for control; therefore, the executive management should be more efficient (Core et al., 1999; Gosh and Sirmans, 2005). Nevertheless, ownership concentration can have both effects on firm performance. At some levels of voting power concentration the free-rider problem can be solved by those shareholders with a significant qualified holding, throughout proper monitoring of executive management. However, at some point (high) of voting power the entrenchment hypotheses is more likely to be observed. Chrisman et al. (2007) has documented a positive relation between ownership concentration and firm performance in family held firms. Florackis et al. (2009), Shleifer and Vishny (1989), and McConnell

and Servaes (1990) have provided evidence of non-linear relation between managerial ownership and firm performance. Given this discussion the following hypotheses are suggested.

H3.1: *Firm performance is a function of ownership concentration.*

Under the same line of argument, voting cap restrictions and shareholders agreements render the market for corporate control less efficient and hostile takeovers more difficult for potential bidders (Bebchuk, et al., 2002). Voting cap restrictions result in a supermajority vote by shareholders to approve any hostile takeover bid for control (Jensen and Ruback, 1983). In the same line of reasoning, shareholders agreements might make it more difficult for potential bidders to have success in a takeover for a controlling stake. Thus, agency costs should be smaller when the market for control is more efficient. However, if, on the one hand, voting caps can be viewed as an anti-takeover device, on the other hand, they facilitate the participation of minority shareholders, thus diminishing the conflicts of interest between large and small shareholders (Shleifer and Vishny, 1989). Therefore, voting caps are likely to be an external corporate governance mechanism, in the sense of the market control mechanism. However, it can also be seen as a device to mitigate the entrenchment costs. Given these arguments the following hypotheses will be tested.

H3.2: *Firm performance is a function of the voting cap restrictions.*

H3.3: *Firm performance is a function of the shareholders agreements.*

Whether the issued capital disperses throughout the market or concentrated among few shareholders, the means by which shareholders (major or minority) exercise their

voting rights is through the shareholders' meetings. Indeed, a high level of attendance and participation by shareholders in the meetings conveys a sense of a more diligent, rigorous monitoring of the executive team. Therefore, agency costs should be smaller in firms with higher levels of attendance and participation by the shareholders in the meetings.

H3.4: *Firm performance increases with greater shareholder participation in annual general meetings.*

3.4 Data and methodology

3.4.1 Data

The dependent variable is firm performance. The Tobin's Q is used as a proxy for firm performance. This indicator has been extensively used in the empirical literature (Amman et al., 2011; Anderson and Reeb, 2003; Florackis et al., 2009; Ikäheimo et al., 2011; Lefort and Urzúa, 2008; Maury, 2006; Kim and Lim, 2010). Tobin's Q is defined as the sum of total assets less the book value of equity plus the market value of equity, divided by total assets and provides an indication of the firm's expected performance. A Tobin's Q greater than one means that the shareholders believe the company is worth more than its book value, while a value smaller than one means that the market is expecting the company to destroy shareholders value in the future. This measure is available directly from the financial data vendor Bloomberg for all of the Portuguese listed firms.

With respect to the main independent variables, the level of CEO education (H1.1) is measured as an ordinary variable which takes the value of 1 if the CEO does not have any university degree; the value of 2 if holds a bachelor's degree; the value of 3 if holds a bachelor's degree and one or more post-graduation courses; or if holds a master's

degree; and 4 if it holds doctoral degree. To analyse the effect of specific types of education on firm performance (H1.2) we employ a set of dummy variables concerning the CEO university degree. Particularly, the analysis includes a dummy variable that takes the value of one if the CEO has a MBA or any other college degree in management; another dummy variable that takes the value of one if the CEO has an engineering university degree and finally a dummy variable that takes the value of one if the CEO has an engineering university. The CEO specific variables were obtained from the CEO's curriculum vitae.

The independent corporate governance variables were collected from companies' annual financial and corporate governance reports and websites for the years 2002-2011. The sample comprises all listed companies on the Portuguese stock exchange that have publicly available annual financial and corporate governance reports from 2002 to 2011. The sample resulted in an unbalanced micro panel data of 10 years across 50 companies for a total of 450 firm/year observations. Table 3.1 summarizes the characteristics of the data used for testing our proposed hypotheses. To account for skewedness, we take the natural logarithm of several variables. Fundamental and market data was extracted from Thompson Reuters and Bloomberg data vendors. In appendix A, table A.1, of the previous chapter the list of the Portuguese listed firms analysed in this study is presented, as well as the time period considered and the number of year observations for each firm.

In order to avoid any potential confounding effects, the present study includes a set of other control variables that might be related to firm performance. Namely, the leverage ratio (*debt to assets ratio*); firm pay-out policy measured by the *dividend yield*; and firm dimension measured by the book value of the firm *assets*. When a firm generates substantial free cash flows, managers may be tempted to build empires by

Table 3.1. Variable definitions and data sources

Variable	Definition and Source
<i>Dependent variable</i>	
1. Log(Tobin's Q)	Tobin's Q is defined as the sum of total assets less the book value of equity plus the market value of equity, divided by total assets. The natural logarithm is used to eliminate the skewness. (<i>Bloomberg</i>).
<i>CEO characteristics</i>	
2. CEO education	An ordinary variable which takes the value of 1 if the CEO does not have any university degree; the value of 2 if holds a bachelor's degree; the value of 3 if holds a bachelor's degree and one or more post-graduation courses; or if holds a master's degree; and 4 if it holds doctoral degree. (<i>Company corporate governance reports and web information</i>).
3. Management education	Dummy variable that takes the value of 1 if the CEO has a MBA or any other college degree in management and 0 otherwise. (<i>CEO curriculum vitae</i>).
4. Law degree	Dummy variable that takes the value of 1 if the CEO has an engineering university degree and 0 otherwise. (<i>CEO curriculum vitae</i>).
5. Engineering degree	Dummy variable that takes the value of 1 if the CEO has an engineering university degree and 0 otherwise. (<i>CEO curriculum vitae</i>).
6. CEO age	The age in years of the CEO as of the end of the fiscal year. (<i>Company corporate governance reports</i>).
7. CEO tenure	The total number of years that the CEO is in that position in firm as of the end of the year. (<i>Company corporate governance reports</i>).
<i>Board of directors characteristics</i>	
8. CEO/Chair Duality	A dummy variable that takes the value of 1 if the company's Chief Executive Officer is also Chairman of the Board and 0 otherwise. (<i>Company corporate governance reports</i>).
9. % independent	% of independent members on the board as reported by the firm. An independent member is a non-executive director with no economic or familiar relationship with a dominant shareholder. (<i>Company corporate governance reports</i>).
10. Log(Board size)	The total number of directors on the firm's board. If the company has supervisory and management boards, this is the total members of both boards. The natural logarithm is used to eliminate the skewness. (<i>Company corporate governance reports</i>).
11. Fiscal board	Total number of members of the fiscal board. (<i>Company corporate governance reports</i>).
12. Auditing committee	Total number of members of the auditing committee. (<i>Company corporate governance reports</i>).
<i>Shareholders and ownership characteristics</i>	
13. Shareholders agreement	A dummy variable which takes the value of 1 if the firm is aware of any major shareholders agreement and 0 otherwise. (<i>Company corporate governance reports</i>).

Table 3.1. (Continued)

Variable	Definition and Source
14. Voting cap	The inverse of the voting cap percentage (maximum percentage of capital allowed to vote in the shareholders meetings). (<i>company corporate governance reports</i>).
15. Top 3	The sum of the stakes of firm's three largest investors. (<i>Company corporate governance reports</i>).
16. Shareholders general meeting	Percentage of the capital represented in the annual general shareholders meetings. (<i>company corporate governance reports</i>).
<i>Firm characteristics</i>	
17. Debt to assets ratio	The ratio of total debt to total assets (%). (<i>Bloomberg</i>).
18. Log(Assets)	The book value of total assets. The natural logarithm is used to eliminate the skewness. (<i>Bloomberg</i>).
19. Dividend yield	The annual dividends per share paid-out by firms divided by the end of the year stock. (<i>Bloomberg</i>).

investing in non-valuable projects, or even by extracting excessive bonuses. In this context, Jensen (1986) recognizes agency costs. The use of debt bonds managers to pay out future cash flows and reduces the cash available for spending at the discretion of managers. Therefore, debt is viewable as a corporate governance device. In the same way, firms that pay-out a large fraction of their income in the form of dividends may lead them more often to the financial market for new funding, reducing information asymmetries and therefore agency costs (Easterbrook, 1984). Finally, larger firms might be more complex and managers more able to be entrenched within the firm, information asymmetries more pronounced and agency costs higher (Core et al., 1999).

Table 3.2 presents descriptive statistics for the variables used in our analysis. As already mentioned, Portuguese listed firms have a large percentage of CEOs without any formal management education (only 54% of them have a formal management education). Another figure worth highlighting is the fact that 14% of the sample observations are represented by CEOs without any college degree. On the other extreme less than 4% of the observations reveal a CEO with a PhD degree. In order to evaluate

the degree of correlation among the explanatory variables, which can cause multicollinearity, the correlation matrix is estimated (see table B.2 in appendix).

Table 3.2. Descriptive statistics of the variables used in the analysis

Variables	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
1. Log(Tobin's Q)	450	0.144	0.272	-0.672	1.297
2. CEO education	450	2.356	0.763	1	4
3. Management Education	450	0.544	0.499	0	1
4. Law Degree	450	0.142	0.350	0	1
5. Engineering Degree	450	0.307	0.462	0	1
6. CEO age	450	54.458	10.634	31	83
7. CEO tenure	450	7.376	6.650	1	29
8. CEO/Chair duality	450	0.576	0.495	0	1
9. % independent	450	0.268	0.231	0	1
10. Log(board size)	450	2.155	0.566	1.099	3.434
11. Fiscal board	450	2.198	1.740	0	18
12. Auditing committee	450	1.229	1.696	0	6
13. Shareholders agreement	450	0.144	0.352	0	1
14. Voting cap	450	2.695	4.181	1	20
15. Top 3	450	0.625	0.224	0.031	0.997
16. Shareholders general meeting	450	0.700	0.156	0.078	0.973
17. Debt to assets ratio	450	42.325	16.960	0	109.145
18. Log(assets)	450	7.108	2.292	3.165	14.040
19. Dividend yield	450	0.027	0.084	0	1.468

Notes: Definitions for all variables are provided in Table 3.1.

3.4.2 Methodology

The baseline model used in this study is a dynamic panel data model with the following form:

$$y_{it} = \rho_1 y_{i,t-1} + \mathbf{x}_{it} \boldsymbol{\beta} + v_{it} \quad (3.1)$$

$$v_{it} = c_i + u_{it}, \quad i = 1, \dots, N; t = 1, \dots, T \quad (3.2)$$

Where, y_{it} is the dependent variable measuring firm performance, $y_{i,t-1}$ is the lagged dependent variable, \mathbf{x}_{it} is a vector of observable CEO and corporate governance

covariates for firm $i=1,\dots,N$ and years $t=1,\dots,N$. ρ_l and the vector $\boldsymbol{\beta}$ are the parameters to be estimated. The error term v_{it} in equation (3.1) includes the unobservable time-invariant firm characteristics c_i (fixed effects) and u_{it} , which is the idiosyncratic error (equation 3.2). This model formulation fits properly in the present study, because the dependent variable can actually be dynamic. This is a plausible assumption, since the best-performing firms (i.e. with higher values of Tobin's Q), are likely to remain so over the following year.

Several econometric issues arise when estimating this model. First, the covariates can be endogenous because causality may run in both directions and therefore, these regressors may be correlated with the error term. Second, fixed effects c_i can be correlated with the covariates. Thirdly, the presence of the lagged dependent variable gives rise to autocorrelation. The Arellano and Bond (1991) linear dynamic panel data estimation procedure allows the first lag of the dependent variable (equation 3.1) as a covariate and unobserved fixed effects (as in equation 3.2). However, by introducing autocorrelation into the model, the unobserved effects c_i become correlated with the lagged dependent variables, thus making standard estimators inconsistent. To address this, the Arellano and Bond (AB) procedure starts with the transformation of all regressors by differencing equation (3.1),

$$\Delta y_{it} = \rho_l \Delta y_{i,t-1} + \Delta \mathbf{x}_{it} \boldsymbol{\beta} + \Delta u_{it} \quad (3.3)$$

By this means, the time-invariant parameter c_i in equation (3.2) is removed. Arellano and Bond (1991), building on Holtz-Eakin, et al. (1988) and using the general method of moments (GMM) framework developed by Hansen (1982), identify the lags of the dependent variable that are valid instruments and how to combine these lagged variables into a larger instrument matrix. They found that the dependent variable lags

two or higher are valid instruments. Furthermore, if explanatory variables are not strictly exogenous, lagged levels of these variables can also be added as additional instruments. This estimator makes the standard assumption that there be no autocorrelation in the idiosyncratic errors (Baltagi, 2001; Wooldridge, 2002).

3.5 Results discussion

The hypotheses presented are tested by means of a micro dynamic panel data model, using the Arellano and Bond (1991) estimation methods with an endogenous lag. Table 3.3 presents the results of the parameters estimates. Four model specifications are provided. In the first specification, the CEO specific variables are analysed and in the second specification we include the control variables. In the third and fourth specifications the board of directors and shareholders variables are included in the model. The results show that the autoregressive parameter ρ_I is positive and statistically significant in all specifications, meaning that Tobin's Q has dynamic features, and therefore, supports the use of a dynamic panel data model when analyzing firm performance over a time series. The Sargan test of over-identifying restrictions is used to assess the validity of the instruments. The results of the Sargan test do not reject the null hypothesis that the over-identifying restrictions are valid, suggesting their acceptance (Roodman, 2006). Furthermore, as expected (Wu, 2011), the results present strong evidence supports the null hypothesis of zero autocorrelation in the first-differenced errors at order one, but not in the second order serial correlation. This result is common in applied research (e.g. Baltagi et al. 2009) validating the use of the lagged dependent variable as an instrument in the GMM methods. Thus, the results can be said to be statistically robust. Tobin's Q increases with positive covariates coefficients and decreases with negative coefficients.

Table 3.3. Dynamic panel data model results

Independent variables	(1) CEO Education	(2) Firm specific Controls	(3) Board of Directors	(4) Ownership Characteristics
Log(Tobin's Q) _{t-1}	0.725*** (71.367)	0.450*** (25.571)	0.401*** (15.950)	0.355*** (17.190)
CEO education	0.056*** (6.013)	0.042*** (8.019)	0.046*** (7.980)	0.042*** (4.036)
Management Education	-0.059*** (-5.113)	-0.077*** (-7.846)	-0.088*** (-7.546)	-0.057*** (-3.090)
Law Degree	0.052** (2.567)	0.032*** (3.995)	0.040** (2.231)	0.001 (0.044)
Engineering Degree	-0.016 (-1.239)	-0.022** (-1.997)	-0.021 (-1.325)	-0.023* (-1.706)
CEO age	-0.003*** (-3.947)	-0.002*** (-3.999)	-0.002** (-2.396)	-0.001 (-1.209)
CEO tenure	-0.003*** (-3.001)	-0.000 (-0.416)	-0.001 (-1.179)	-0.001 (-0.609)
CEO/Chair duality			0.045*** (3.265)	0.042* (1.761)
% independent			0.069*** (2.782)	0.036 (1.082)
Log(board size)			-0.114*** (-6.086)	-0.078*** (-2.803)
Fiscal board			-0.008 (-1.283)	-0.008 (-1.379)
Auditing committee			-0.007 (-1.430)	-0.012 (-1.590)
Shareholders agreement				-0.165*** (-2.725)
Voting cap				0.012*** (3.028)
Top 3				-0.009 (-0.156)
Shareholders general meeting				-0.037 (-0.649)
Debt to assets ratio		-0.001** (-2.344)	-0.000 (-0.771)	0.000 (0.131)
Log(assets)		-0.370*** (-38.429)	-0.315*** (-30.976)	-0.321*** (-15.784)
Dividend yield		-0.119*** (-10.018)	-0.135*** (-8.681)	-0.105*** (-3.066)
Constant	0.107** (2.179)	2.845*** (36.958)	2.697*** (23.539)	2.658*** (16.044)
Observations (firms)	350 (50)	350 (50)	350 (50)	350 (50)
Wald χ^2	6650.30	24765.23	472685.69	67192.99
(p-value)	0.000	0.000	0.000	0.000
AR(1) test	-3.1323	-3.3445	-3.4582	-3.3156
(p-value)	(0.0017)	(0.0008)	(0.0005)	(0.0009)
AR(2) test	-1.2153	-1.1356	-0.97719	-1.0309
(p-value)	(0.2243)	(0.2561)	(0.3285)	(0.3026)
Sargan χ^2	41.169	39.457	36.332	34.224
(p-value)	(0.2187)	(0.2774)	(0.4064)	(0.5054)

Notes: The dependent variable is log(Tobin's Q). Definitions for all variables are provided in Table 3.1. Sargan test of overidentifying restrictions (H0: overidentifying restrictions are valid). AR(1) and AR(2) Arellano-Bond test for first- and second-order autocorrelation in first-differenced errors. z –statistics are presented in parentheses below the parameters. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

The results validate some hypotheses, based on the statistically significant parameters. With respect to CEO specific features, results from specification 1 show that the education variable is positively related with firm performance and the association is statistically significant ($z = 6.013$) thus validating the human capital hypothesis (H1.1). Concerning of CEO specific education the results show that firm performance is higher when the CEO has a law degree. Further, firm performance is lower when the CEO has some formal degree in management and not statistically different from zero when the CEO has a degree in engineering. These results suggest that management education is not important for firm performance. This could mean that CEO's without a university management diploma can have stronger abilities other than formal management education. These results might also be related with the Portuguese context where many firms are family held and government related. As such, the CEO in-depth knowledge and control over the competitive advantages that make these firms profitable can explain this finding (Carney, 2005; Hillman, 2005). Meaning that other than management education CEO specific characteristics, such as life experience or social ties might be more important for firm performance in the Portuguese context. The CEO tenure and age coefficients are both negative and statistically significant (in specification 1) providing supporting evidence of the entrenchment hypothesis (H1.3 and H1.4).

In specification two of table 3.3 we provide the CEO characteristics results with control variables included. The results remain qualitatively similar and, with exception of CEO tenure, the remaining variables remain statistical significant. The variable *debt to assets ratio* reveals a negative relationship which might be related with the period of the sample used in this study which includes the subprime crisis and also the European debt crisis that cause leveraged firms to be highly pressured in the financial markets.

The firm dimension is negatively related with firm performance as predicted by the entrenchment hypothesis (Core et al. 2009). The dividend yield variable is negatively related with firm performance. Therefore this result is not consistent with the view that dividends may act as an agency cost mitigation mechanism. Probably, this negative relation is associated with the fact that firms who pay out more dividends have less new investment opportunities and as a result have a lower Tobin's Q value which is also frequently used as a proxy for new growth opportunities (e.g. Florackis and Ozkan, 2009).

Turning now to the board of directors characteristics the results of specification three show that the percentage of independent directors in the board is positively related with firm performance and this association is statistically significant ($z = 2.782$), meaning that it affects positively the firm performance, thus validating H2.1. Notwithstanding, when the CEO is also the chairman of the board the firm performance is higher, contradicting the entrenchment hypothesis (H2.2). This result may be related with the Portuguese governance context, where various firms are family owned, with highly concentrated ownership and simple governance structures. In fact, the majority of the Portuguese listed firms (57.6%) have a chairman of the board of directors which is simultaneously the firm CEO. This finding is consistent with some of the empirical findings concerning the two-tier versus one-tier board structures. For example, Vafeas and Theodorou (1998) find no link between the two-tier model and firm performance. Further, this result also corroborates the notion that uniform board structures should not be mandated but should instead be adapted to the specific context. The *board size* coefficient is negative and statistically significant, meaning that it negatively affects the performance of the company. Therefore, H2.3 receives support in the sense that large boards are detrimental to firm performance. Finally the variables fiscal board and

auditing committee have both a not statistically different from zero coefficient, suggesting that these supervisory bodies do not impact firm performance. Nevertheless the coefficients are both negative, suggesting some support of the entrenchment hypothesis in H2.4 and H2.5.

Finally, in specification four of table 3.3 the shareholders related variables are included in the model. The results reveal statistical insignificant coefficients for all the variables except for the voting cap variable. As such we find no statistical relationship between shareholders agreements, ownership concentration and shareholder participation in general meetings to be related with firm performance. Therefore no support is found with respect to hypotheses H3.1, H3.3 and H3.4. However, the voting cap variable has a positive and statistically significant parameter, signifying that it has a positive effect on firm performance, thus validating H3.2 and supporting the notion that voting caps facilitate the participation of minority shareholders, thus reducing costs arising from the conflicts of interest between shareholders (Shleifer and Vishny, 1989).

3.6 Conclusion

This study empirically analyses corporate governance mechanisms and company performance among listed companies in Portugal with a panel data from 2002-2011, taking into account the CEOs' education. The analysis presents several econometric function's specifications, adopting the Arellano and Bond (1991) dynamic model. The model specifications give similar results, revealing that the models fit the data adequately.

While previous empirical literature on corporate governance focuses on specific sets of governance devices, this study controls for the effects of a wide range of governance mechanisms suggested in the literature. Furthermore, the study focuses on specific

characteristics of the CEO, such as education age and tenure, while controlling for other internal and external governance devices. The specific innovation of this study is its focus on CEO education. The analysis finds that the lagged effect influences firm performance, signifying that there is persistence in firm performance in the Portuguese Stock Exchange. The rationale for it is that governance practices are part of the business culture.

Consistent with the human capital theory (Becker, 1975) the present study results support the hypothesis that the level of CEO education positively affects the firm performance. Nevertheless, management education is negatively associated with firm performance, while CEOs who have a law degree are more likely to be associated with best performing firms. These CEOs in-depth knowledge of the businesses they manage might explain this finding. As such, in the Portuguese context, other abilities other than management education, such as life experience or social ties might be more important to the firm performance than formal management education. Therefore, this essay results are in line with Gitsham (2011), who rejects the notion that management education is one of the most important elements of the CEO's profile. Moreover, this paper validates the findings of Bhagat et al. (2010), who conclude that there is no consistent relationship between CEO management education and firm performance. Still, this study provides additional insights with respect to the CEO characteristics. Particularly, that the CEO tenure and age are both negatively related with firm performance providing supporting evidence of the entrenchment hypothesis.

With respect to the board of directors' characteristics, this study results corroborate the view that a more independent board is positively associated with higher firm performance, meaning that independent directors might in fact reduce agency costs in the Portuguese context. However, the two-tier governance system is not positively

associated with better firm performance. In fact, firms with simple governance structures, where the CEO is also the chairman of the board, reveal higher levels of performance in the present study, raising doubts on the utility of recommending firms to have a two tier board structure in the Portuguese context. Finally, with respect to the shareholders characteristics, this study results support the view that voting cap restrictions might benefit firm performance, suggesting that conflicts of interest among shareholders might be reduced when voting cap restrictions subsists.

The innovation of this essay is in its blending of governance and education characteristics which are representative of less developed countries with more limited educational resources. The conclusion is that education is an important covariate explaining performance, concluding that governance issues arise from education characteristics in less developed countries. This also signifies that education is central to company performance and therefore should be taken into account in governance research.

The results of the present research validate some previous research on a number of issues, such as the negative relationship between the board size, firm size and firm value, and also, the entrenchment hypotheses on several aspects of the governance structure of Portuguese firms. Compared with alternative research on European corporate governance, this paper controls for the unobservable dynamic aspects of firm performance with a heterogeneous impact across sample members, while most of the published papers on corporate governance ignore these effects. These results are specific to the Portuguese market, but some of its characteristics may extend to other Latin countries, as well as other less developed countries, where deficiencies in education, strong family ties and the importance of social capital characterize the listed companies and corporate activity.

The main policy recommendations that emerge from the present research are the following. First, to promote higher quality levels of education for CEOs, because it seems that education is an important covariate explaining firm performance. Second, to recommend the inclusion of independent directors on the board as it seems to be an important agency cost reducing mechanism. Finally, rethink the idea that a two-tier board structure reduces agency costs and that voting caps are detrimental to firm performance.

The general conclusion is that educational and possibly cultural issues, as well as internal corporate governance mechanisms explain company performance. However, more research is needed to confirm the present results, in particular to compare the present results with other Portuguese non-listed firms.

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Appendix B

Table B.1. Characteristics of the contemporary literature

Authors	Model	Country and period	Endogenous variable	Exogenous variables
Ozkan (2007)	OLS regression	UK 2003-2004	CEO compensation	Sales, return, Tobin's Q, Board size, non-executive directors, institutional ownership, CEO ownership, and directors' ownership.
Fernandes (2008)	OLS regression	Portugal 2002-2004	Managerial compensation	Sales, annual stock return, risk, book-to-market ratio, total number of board members and fraction of non-executive members.
Lefort and Urzúa (2008)	OLS regression and 3SLS regression	Chile 2000-2003	Board composition; Firm performance	Firm performance; Board composition. Both regressions use the additional independent variables: board size, financial needs, ownership, cash and voting rights indicators, investment funds presence and a set of control variables, including firm size, leverage, standard deviation of weekly returns, and industry and time dummies.
Farinha and López-de-Foronda (2009)	Generalized Method of Moments (GMM) panel and Logit model	USA, Europe 1996-2000	Dividend yield and dividend payout.	Ownership by insider shareholders, institutional ownership, ratio between the book value of debt and total assets, market to book ratio, indexes for shareholders and creditors rights (La Porta et al., 1997), size defined as the log of the book value of the assets, common/civil law dummy.
Florackis and Ozkan, (2009)	Dynamic model	UK 1999-2005	Managerial entrenchment	Asset turnover ratio, an inverse proxy for agency costs. Control variables: dividends, short-term debt, market-to-book ratio, leverage and firm size.
Florackis and Ozkan, (2009b)	OLS, FE and Dynamic model	UK 1999-2004	Financial leverage	Corporate governance composite index, constructed by the authors. Control variables: asset tangibility, growth opportunities, firm size and profitability.
Florackis et al. (2009)	Semi-parametric estimation and parametric cross sectional analysis	UK 2000-2004	Corporate performance (Tobin's Q)	Managerial ownership: percentage of shares held by executive directors. Control variables: board size number of non-executive directors to the total number of directors, a dummy equal to 1 for CEO/Chair dual role, ownership concentration, size, leverage and investment.
Kim and Lim (2010)	Random-effects panel data	Korea 1999-2006	Firm value (Tobin's Q)	Outside director education, age and sector experience.

Table B.1. (Continued)

Authors	Model	Country and period	Endogenous variable	Exogenous variables
Shin and Seo (2010)	Two-stage least squares	USA 1998-2002	CEO compensation	Return on assets, shareholder return, firm risk, size, leverage, CEO ownership, board independence, board size, number of board meetings, CEO duality, CEO tenure, ownership concentration and turnover. Ownership variables: banks, insurance companies, private pensions, public pensions, and mutual funds.
Ozkan (2011)	OLS regression	UK 1999-2005	CEO compensation	Sales, shareholders' return, Tobin's Q, board size, non-executive directors, ownership type and concentration, executive ownership, CEO age and tenure.
Khurshed et al. (2011)	Tobit and 3SLS regression	UK 1996, 1999, 2003	Ownership and board composition.	Firm size, book-market ratio, past return on asset, dividend yield, leverage, listing history, share return volatility, share turnover and company beta.
Amman et al. (2011)	FE regressions.	EU 2003-2007	Firm value (Tobin's Q)	CGI (governance index based on governance attributes fulfilled by a company) and Herfindahl-Hirschman-Index of firms market value. Control variables: total assets and firm age.
Becchetti (2011)	Event Study OLS regression Non-parametric tests	USA 1990-2004	Abnormal shareholders' return	Deletions from the Domini 400 Social Index (based on social attributes of firms: community; corporate governance; diversity; employee relations; environment; human rights; product quality; and controversial business issues).
Aggarwal and Dow (2012)	OLS and 2SLS regressions	USA 2009	Firm value (Tobin's Q)	Greenhouse gas (GHG) emissions, The Environmental Impact Score (EIS). Control variables: book value of assets, market debt/equity ratio and ratio of free cash flow to sales.
Hansson et al. (2011)	OLS and 3SLS regression	Finland 2009	Return-on-assets (ROA) Return on investment (ROI)	Firm size, solidity, Family CEO/Chair, board size, family board members, family employees, ownership, firm age and CEO age.
Ikäheimo et al. (2011)	OLS regression	Scandinavia 1999-2004	Firm value (Tobin's Q)	A corporate governance index and its components (made up with anti-takeover provisions).
Carretta et al. (2011)	Event Study	Italy 2003-2007	Cumulative abnormal return.	Dummy variables: news related to (1) changes in the board of directors; (2) functioning of the board of directors; (3) firm's ownership. Control variables: Dupont's five-part ROE decomposition.
Wu (2011)	First-order autoregressive model	Taiwan 1999-2003	Firm value (market-to-book ratio).	Minority state ownership (government) and other control variables.

Table B.1. (Continued)

Authors	Model	Country and period	Endogenous variable	Exogenous variables
Baixauli-Soler and Sanchez-Marin (2011)	Arellano and Bond (1991) dynamic panel data model	Spain 2003-2007	Total management pay levels.	Firm performance; labor market for managers; proxies for complexity: market growth, demand instability, corporate diversity, capital intensity and R&D activity; ownership structure; board characteristics and other control variables.
Baixauli-Soler et al. (2011)	OLS regression	Spain 2004-2007	Total management pay level	Number of directors, number of committees, size of committees compensation, number of meetings, ownership structure-manager controlled, ownership structure-institutional controlled, ownership structure- private investor. Performance, complexity and firm size.
Aldamen and Duncan (2011)	OLS regression	Australia 2007	Cost of debt	Corporate governance composite index, constructed by the authors. Control variables: firm's default risk, information risk, exposure to bank monitoring, age, collateral, size and industry.
Taylor et al. (2011)	OLS regression	Australia 2007	Reserve disclosure index	Corporate governance structure, overseas listing of the firm, occurrence of reserves outside of Australia, reserves pledged in debt covenants, firm leverage and the existence of a Big 4 auditor. Control variables: firm size, sub-industry, shareholder concentration and development /production phase of the firm.

Table B.2. Pearson correlation matrix of the variables used in the analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Log(Tobin's Q)	1											
2. CEO education	0.115*	1										
3. Management Education	0.0438	0.568***	1									
4. Law Degree	-0.0928*	0.0689	-0.177***	1								
5. Engineering Degree	0.0745	0.367***	0.0664	-0.271***	1							
6. CEO age	-0.215***	-0.355***	-0.396***	0.278***	-0.0749	1						
7. CEO tenure	-0.168***	-0.308***	-0.234***	0.234***	-0.207***	0.591***	1					
8. CEO/Chair duality	-0.0438	-0.124**	-0.190***	0.0279	0.0348	0.252***	0.264***	1				
9. % independent	0.130**	0.0541	0.0988*	0.0379	-0.175***	-0.129**	-0.234***	-0.130**	1			
10. Log(board size)	0.0369	0.00673	-0.0381	0.0552	0.0240	0.0210	0.0327	-0.471***	0.153**	1		
11. Fiscal board	-0.168***	-0.00947	0.0168	0.144**	-0.0868	0.0227	-0.0495	-0.0808	-0.0624	-0.0262	1	
12. Auditing committee	0.00981	0.0592	-0.0318	0.0727	0.0211	0.0462	-0.0311	-0.293***	0.247***	0.591***	-0.379***	1
13. Shareholders agreement	0.1000*	0.115*	-0.132**	-0.0225	0.124**	0.0674	-0.0366	0.0715	-0.0746	0.140**	-0.127**	0.0228
14. Voting cap	0.236***	-0.0759	-0.141**	-0.00836	0.0312	-0.135**	-0.198***	-0.200***	0.222***	0.390***	-0.0229	0.213***
15. Top 3	-0.0767	-0.129**	0.0915	-0.0789	-0.116*	-0.0115	0.0537	-0.0255	-0.147**	-0.398***	0.00304	-0.316***
16. Shareholders general meeting	-0.0224	-0.104*	0.0215	-0.0315	-0.133**	0.0482	0.0684	-0.112*	-0.0850	-0.0577	-0.0211	-0.0990*
17. Debt to assets ratio	-0.0755	-0.0803	0.117*	0.0146	-0.0139	0.0498	0.0794	0.0957*	0.0309	-0.0313	0.0334	-0.0806
18. Log(assets)	-0.0846	-0.0690	-0.0404	0.183***	-0.0495	0.185***	0.115*	-0.294***	0.178***	0.794***	-0.0419	0.621***
19. Dividend yield	-0.0566	-0.0641	0.00669	0.0405	-0.0330	-0.0816	0.0108	-0.0461	0.0447	0.103*	-0.0125	0.0558

Table B.2. (Continued)

Variable	(13)	(14)	(15)	(16)	(17)	(18)	(19)
13. Shareholders agreement	1						
14. Voting cap	0.153**	1					
15. Top 3	-0.0831	-0.341***	1				
16. Shareholders general meeting	0.111*	-0.125**	0.674***	1			
17. Debt to assets ratio	-0.171***	0.0494	-0.136**	0.0252	1		
18. Log(assets)	0.0839	0.274***	-0.432***	-0.156***	0.0438	1	
19. Dividend yield	-0.0232	0.0506	-0.0211	-0.000665	0.000658	0.104*	1

Notes: This table reports Pearson correlations between the variables used in the analysis. Significance levels are computed as two tailed p-values: * p<0.05, ** p<0.01, *** p<0.001.

CHAPTER IV - DOES BOARD GENDER DIVERSITY ENHANCE OUTSIDE DIRECTORS' INDEPENDENCE? AN INTERNATIONAL PERSPECTIVE

Abstract: Building on Jensen's (2002) 'enlightening stakeholder theory,' this study empirically analyses whether gender diversity enhances boards of directors' independence and efficiency. After controlling for a wide set of corporate governance mechanisms, this study finds that external independent directors do not contribute to firm performance or mitigate agency costs unless the board is gender diversified. These results hold with respect to different estimation specifications and robustness tests. This study also finds that firms that are concerned with board independence, and those in more complex environments are more likely to have gender-balanced boards. Finally, the paper argues that governance policies worldwide must emphasize the importance of boards' gender structure in addition to their independence structure.

Keywords: agency costs; board of directors; corporate governance; firm performance; gender diversity; independence.

JEL classification: G30, G32, G34, M14

4.1 Introduction

Agency costs arising from the separation of ownership (shareholders) and control (management) in public corporations (Jensen and Meckling, 1976) is a persistent topic in the financial economics literature. Corporate governance research addresses the mechanisms designed to mitigate these costs. One prominent and incomplete line of research has focused on the role of external and ‘independent’ directors as monitors of executive management to mediate the conflicts of interests arising from this role separation (Fama and Jensen, 1983; Hermalin and Weisbach, 1998). Although the ‘independence’ of the board of directors and its effectiveness in reducing agency costs have been extensively studied in the literature³, its effect is far from conclusive because the *a priori* positive effects of external directors on the board is often rejected. The entrenchment hypothesis concerning board members and the costs of acquiring information relevant to the monitoring roles of outsiders are often forwarded as explanations for the failure to have external directors on the board acting as proper monitors of executive management.

Despite researchers’ considerable attention to the independence of outside directors, little consideration has been given to the independence (and thus effectiveness) of the board in a gender diversity framework. If a firm’s board of directors is composed of a large proportion of outside directors and all of these directors are male, can anyone (and stakeholders in particular) be certain that these directors are independent from the firm’s management? If males and females in a firm have similar educational backgrounds and workforce participation in a particular economy, why are so few females present on the board of that firm? If the overall labor market is not unbalanced, why should the market for directors be unbalanced? One may argue that this issue is cultural and social in

³ E.g., Rosenstein and Wyatt, 1990; Agrawal and Knoeber, 1996; Yermack, 1996; Brickley et al., 1997; Bhagat and Black, 1999; Mishra and Nielsen, 2000; Lefort and Urzúa, 2008; Duchin et al., 2010; Ibrahim and Samad, 2011.

nature, such that the society in a particular country views top management functions as more appropriate for men and other jobs, such as housework, as more appropriate for women (e.g., women in Islamic societies). Despite the various reasons that a board of directors may be gender imbalanced in favour of males, the message that this imbalance conveys to the public is that its selection was biased, at least in terms of gender. A board selected under biased conditions provides fewer guarantees of its independence and may have negative effects on firm performance.

The present study explores this argument and analyses the effect of board structure in terms of gender and outside membership on reducing agency costs and improving firm performance. Although there is a significant amount of literature on the role of independent directors, no previous paper has directly addressed the issue of board independence within a gender diversity framework. The present study aims to fill this gap. The research question (RQ) addressed here has received little attention in the existing corporate governance literature:

RQ: Is the effect of independent directors on reducing agency costs enhanced by the board's gender balance?

This study contributes to the corporate governance literature in several ways. Its main contribution is its investigation of the role of female directors in improving board effectiveness. This study also helps to explain the conditions under which an independent board of directors effectively reduces agency costs. By analysing board structure within a gender framework, this paper reconciles inconsistent and inconclusive findings from previous empirical studies about board independence and its effect on firm performance. Furthermore, this study contributes to the debate over whether independent directors should be legally required on boards of directors. The empirical analyses are innovative in their examination of international firm-level data (47

countries), in contrast to the majority of papers on corporate governance, which tend to analyse a single country.

The results of the empirical analysis suggest that when a board has less gender diversity, independent directors have a negative effect on firm performance. This effect is observed by a market-based proxy (Tobin's Q) and an accounting-based indicator (return on assets). The results support the proposed hypothesis: a board composed of many outsiders but few females sends a message to the stakeholders that the board is not independent of the executives and is thus potentially entrenched. As such, a board dominated by outsiders may be detrimental to firm performance. Furthermore, the level of capital expenditures is negatively associated with the presence of women on the board of directors. A board with many outsiders limits executives to overinvesting when the board is gender diversified. Finally, firms with concerns about providing evidence of board independence are likely to have a gender-diversified board of directors. Overall, the results provide strong evidence that women enhance boards of directors' independence and effectiveness.

The remainder of the paper is organized as follows. In the following section, the board composition literature is surveyed, and the hypotheses are developed. In section 3, the data and methodology are presented. The results are presented and discussed in section 4. Section 5 concludes with policy implications of the findings.

4.2 Literature review and development of hypotheses

4.2.1 Literature on board independence

In public companies, shareholders select and delegate the firms' daily management to a board of directors. In this context, the separation between ownership (principal) and decision making (agent) raises conflicts of interests. Agents, who have no or few

ownership claims, are naturally motivated to appropriate larger amounts of corporate resources in the form of perquisites. More importantly, their incentive to create value for shareholders is lower than that of an entrepreneur, who fully owns a firm's equity (Jensen and Meckling, 1976). The agent's self-serving behaviour can be limited by a board of directors composed of outside directors, who are unrelated to internal agents. Outside directors, including an independent chairman and other nonexecutive independent directors, are responsible for monitoring the executive officers. In particular, the board is responsible for approving major policy initiatives, hiring, firing, and establishing the compensation of the executive managers. The board should also ensure that managers pursue shareholders' best interests (Fama, 1980; Fama and Jensen, 1983).

Hermalin and Weisbach (1998) provide a theoretical model for analysing board composition and effectiveness as a function of board independence. The chief executive officer (CEO) has incentives to influence the selection of a board that enables him/her to maximize his own benefits. In contrast, directors have incentives to maintain their own independence, preventing them from being complacent about the CEO, particularly when the CEO is in the directors' labour market. In this context, the board's independence level emerges from a dynamic negotiation between the CEO and board of directors. These authors also emphasize that exogenously requiring the addition of more outsiders to the board would result in an outsider-dominated board but not necessarily one that was more independent from the CEO. In fact, unless the new outside directors could influence the bargaining process, the board's independence would remain the same.

Corporate governance codes worldwide have recognized the need for boards composed of outside 'independent' directors. Nevertheless, several reasons have been

offered for the potential failure of outside directors to properly monitor executives (Jensen, 1993). The most important reason is that top executive managers may have a non-negligible influence on the selection of outside members; thus, their independence may be compromised. Furthermore, entrenched managers make potential replacement costly and corporate governance devices less effective, including the positive effects of adding outside directors (Stulz, 1988; Shleifer and Vishny, 1989). In fact, a negative effect may exist because shareholders pay only for outside members' salaries (Agrawal and Knoeber, 1996). Moreover, large boards with many outside directors are less likely to function well because of difficult coordination, compromised information flow and an inefficient monitoring process. Most of the information available to outside members is gathered and provided by internal members, creating a natural information asymmetry.

Although a board of directors' primary function is to monitor executive management, the board also provides important advice on strategy formulation and decision making (Holmstrom, 2005; Adams and Ferreira, 2007). Excess monitoring by outsiders may be detrimental to their advisory role because the CEO may be less likely to provide relevant information about the firm to avoid criticism (Adams and Ferreira, 2007; Faleye et al., 2011). Consistent with this view, Duchin et al. (2010) and Ferreira et al. (2011) argue that the effectiveness of outsiders in both monitoring and advising functions depends on the costs of acquiring relevant information about the firm.

A large body of empirical literature has analysed outside directors' independence and the effect of this independence on firm performance. The results of these studies are far from conclusive. For instance, Brickley et al. (1997), Luan and Tang (2007), Florackis et al. (2009), Kim and Lim (2010), Nguyen and Nielsen (2010), and Pombo and Gutiérrez (2011) find a positive relationship between the proportion of outsiders on

the board and firm. In contrast, Hermalin and Weisbach (1991), Barnhart and Rosenstein (1998), Bhagat and Black (1999, 2002), Vafeas and Theodorou (1998), Klein (1998), and Arosa et al. (2010) demonstrate that independent directors do not increase firm value. Moreover, Agrawal and Knoeber (1996), Bebchuk and Cohen (2005), Ibrahim and Samad (2011) and Shan and McIver (2011) found that independent boards are, in fact, value decreasing and provide evidence that the CEO may exercise power over the board. Faleye et al. (2011) find consistent results, positing that intense monitoring by independent directors may negatively affect the firm's value, thus suggesting that the costs of weak advising outweigh the board's monitoring. Although these empirical findings are not consistent with the view that independent directors provide a valuable service to shareholders, the dominant view, based on corporate governance codes throughout the world and international guidelines, is that independent directors are beneficial to shareholders (Nguyen and Nielson, 2010).

4.2.2 Literature on board gender diversity

Turning to the gender structure of the board of directors, Machold et al. (2008) build on firm stakeholder theories (Freeman, 1984; Jones, 1995) to provide a theoretical framework for analysing corporate governance from a feminist perspective. These authors argue that corporate governance should be analysed according to feminist ethical theories (in particular, the ethics of care) because these theories emphasize relationships rather than individual rights. The model proposed by these authors views a firm as a web of relationships between stakeholders rather than a nexus of contracts, such as the one governing the relationship between shareholders and management. The moral principle underpinning these reciprocal relationships is the obligation to care, or individuals' sense of responsibility toward others within the governance relationship.

As Jensen (2002) posits, social welfare is maximized when all of the firms in an economy maximize total firm value. However, the objective of maximizing the firm's long-term value to shareholders does not mean that managers do not have to 'care' about all of the stakeholders, namely, the employees, customers, their suppliers, or any person who interacts with the firm. If these stakeholders understand that by maximizing the value of the shareholders, managers are also improving the social welfare, they may be willing to share the firm's goal (i.e., to maximize the long-term value of the shares). To do so, managers must manage trade-offs between different interests while maintaining good relationships with all of the parties involved in the process of maximizing long-term share values (not only the shareholders). In other words, they must signal to all of the stakeholders that they are managing the firm towards the long-term value creation of the shares, which, in turn, benefits everyone who interacts with the firm.

If firms wish to provide their shareholders with the maximum long-term value of their shares, managers should focus on more than just short-term value creation. Creating long-term value for the shareholders means that managers must take the employees' needs and customers' satisfaction into consideration while maintaining good relations with suppliers. If they fail to do so, managers may create short-term value for the shareholders but destroy their long-term value. For example, if managers significantly lower employees' wages, they may deliver additional profits to the shareholders that year. However, in subsequent years, their best employees will likely leave the firm to work for its competitors, resulting in long-term damage. Jensen (2002) terms this view of the firm an 'enlightened stakeholder theory'. Within this theory, the agency theory (Jensen and Meckling, 1976) is fully consistent with the stakeholders' theory (Freeman, 1984; Jones, 1995). As such, firms' measures to enhance the

relationships between stakeholders should also be addressed within the framework of the shareholders. Thus, the theory of care (Machold et al., 2008) is important within a principal-agent framework as well as from a stakeholder view of the firm.

Terjesen et al. (2009) review and summarize the theoretical literature on women on corporate boards. The human capital theory is frequently used to support a gender-diverse board of directors and suggests that the abilities brought to boards by talented women improve firm performance. Furthermore, the low status of women in comparison with men forces women to provide more evidence of their abilities to achieve top-level roles. The perceived human capital that women provide is thus undervalued by this 'status theory'. In reality, women in top-level roles perform better than do men.

From a 'resource dependence' theoretical approach (Pfeffer and Salancik, 1978), firms are linked and dependent upon complex and diverse external units that provide them with valuable resources. Directors' diverse human and social capital, as well as their gender diversity, facilitates access to these resources. Similarly, but at an 'institutional' level, female board members are important for the firm's success because they signal that a corporation values its women's success at least as much as that of its men. From an 'agency' theory perspective, which is relevant to this study, the literature suggests that gender diversity can enhance the monitoring effectiveness of outside directors (Adams and Ferreira, 2009). Finally, at the industry and environment level, Terjesen et al. (2009) find no particular theory-based research at the industry level. However, the political environment, such as the tradition of women's political representation, can influence corporate boards' gender composition (Terjesen and Singh, 2008).

Terjesen et al. (2009) also employ the ‘social identity, social network and social cohesion’ theories to explain why there are so few females on boards of directors. From this perspective and according to an argument for better intragroup communication, individuals seek to surround themselves with people who share similar profiles. Thus, male directors have incentives to choose other male directors. Moreover, the board is seen as a privileged, closed group, and directors recommend colleagues similar to themselves to join other boards.

Based on these theories, prior empirical literature addressing women on boards has frequently documented a positive relationship between board gender diversity and firm performance. Erhardt et al. (2003), Carter et al. (2003), Campbell and Mínguez-Vera (2008, 2010), Francoeur et al. (2008), Carter et al. (2010), Kang et al. (2010), Gul et al. (2011) and Mahadeo et al. (2012), among others, find a positive relationship between gender-diversified boards and firm performance.

Empirical work analysing board independence and gender diversity is scarce. Adams and Ferreira (2009) document that female directors attend more board meetings, which is the primary method of gathering important monitoring information, suggesting that gender-diverse boards allocate more effort to monitoring executive directors. Sun et al. (2011) analyse whether the gender diversity of independent audit committees affects their ability to constrain earnings management, but they fail to identify an association.

4.2.3 Development of hypotheses

Based on the theoretical and empirical work on board composition, we develop several testable hypotheses related to board structure. This study’s primary hypothesis argues that a board of directors’ composition sends a signal to the public. In general, a board composed of more outside directors should be viewed more positively by the

public than one with fewer outsiders. However, when the level of outsiders is fixed, the percentage of women on the board is not irrelevant in the assessment of the outsiders' perceived independence. Regardless of the number of outsiders, a shareholder (or any stakeholder) can reasonably suspect that a board composed mainly of men is more closely aligned with the executive management than a gender-diverse board. A large board of directors with few women may be interpreted as being selected by the executive management network or as a sign that internal agents (executive officers) wield significant power over the selection of outside agents. In reality, a board with a gender imbalance may be independent of the executive management to the same degree as a gender-diverse board, but the lack of women increases doubts from appointed directors, shareholders and any stakeholders who interact with the firm regarding the board's independence.

Stakeholders' perception that the board composition is influenced by executives has implications at various levels of the firm. First, at the shareholder level, this perception leads to a lack of confidence in the efficacy of outside directors as monitors of executives. Moreover, it signals that the CEO has some power over the selection of the board and thus is entrenched and costly to replace. It may also signal that the CEO is performing poorly and using his bargaining power to maintain a friendly board to avoid being criticized or fired (Hermalin and Weisbach, 1998). At the board level, outside directors view their colleagues as aligned with executives and less motivated to 'swim against the tide' (and thus provide valuable advising and monitoring services) (Faleye et al., 2011). Furthermore, to protect his career, a director may be unwilling to cause trouble for the CEO because of the perceived power of the CEO in the market for directors (see the network hypothesis in Terjesen et al., 2009). Perhaps most importantly, employees, suppliers, customers and virtually all of the stakeholders will

see the board as ‘friendly’, influenced by internal agents aiming to circumvent legal requirements in terms of outside independent directors’ minimum quotas. This signal is inconsistent with Jensen’s (2002) ‘enlightened stakeholder theory’, which suggests that management should provide correct signals to the stakeholders to maximize their long-term value. An inability to provide these signals will cause the stakeholders to view management as self-serving agents and be less willing to share the firm’s goals. For example, employees will see a gender-imbalanced board as one that is selected based on the network hypothesis, indicating that the firm does not value the success of its women. If the firm does not value women’s success, it is likely that it also does not value merit at all (Terjesen et al., 2009). In sum, the board’s gender composition is an issue of business ethics. Establishing a(n) (im)balanced gender board sends an (un)ethical signal to the stakeholders, which negatively (positively) affects the board’s effectiveness and the firm’s performance.

Jensen’s (2002) ‘enlightened stakeholder’ theory, which is consistent with both the agency costs theory (Jensen and Meckling, 1976) and stakeholders’ theory (Freeman, 1984), predicts that both female directors and independent directors will enhance firm performance.

H1.1: *Firm performance is a positive function of the proportions of independent directors and female directors on the board.*

Based on the above discussion, for a given level of outside independent directors, a board composed of few or no women directors may be less effective than a gender-diversified board. Moreover, the negative signaling effect of a gender-imbalanced board may overcome the positive effect of outside directors. Thus, we propose the following testable hypothesis:

H1.2: *Ceteris paribus, the (positive) effect of independent directors on a board of directors on firm performance is higher when the board of directors is more gender diversified.*

Although firm performance is the measure most frequently used to analyse the effect of independent outside directors in reducing agency costs, another indicator may provide additional evidence. Under the agency theory framework, managers have incentives to cause their firms to grow beyond their optimal sizes because growth increases managers' power and entrenchment by increasing the resources under their control (Jensen and Meckling, 1976). Thus, self-interested managers prefer to expand their firms and will spend excess cash flow on acquisitions and capital expenditures (Harford et al., 2008), thereby increasing agency costs. Consequently, if independent outside directors reduce agency costs, a negative relationship should be observed between the fraction of independent outside directors and a firm's capital expenditures. Furthermore, under the hypothesis that a more gender-diverse board is more effective in reducing agency costs, there should be a negative relationship between gender diversification and the level of capital expenditure. Based on this discussion, we propose the following hypotheses:

H2.1: *Capital expenditures are a negative function of the proportions of independent directors and female directors on the board.*

H2.2: *Ceteris paribus, the (negative) effect of independent directors on a board of directors on capital expenditures is greater when the board of directors is more gender diversified.*

4.3 Methodology and data

4.3.1 Methodology

The first hypothesis (H.1.1) posits that both gender and independence are positively associated with performance. To test this hypothesis, firm performance is used as the dependent variable in a multivariable regression framework. The baseline model takes the following form:

$$performance_i = \beta_0 + \beta_1 female_i + \beta_2 independent_i + \sum_j \beta_j control_i + u_i, \quad (4.1)$$

where i is the firm index, *performance* is a measure of firm performance, *female* is the percentage of females on the board, and *independent* is the percentage of outside directors on the board (those considered independent members by the firm). *Control* is a set of firm-specific variables that can affect a firm's performance, and u_i is the zero-mean error term. When a company has a supervisory board and management board, the board structure is defined in terms of the supervisory board. Because the *female* and *independent* variables are measured in terms of percentage of the board, their effects on firm performance can be directly compared. However, because these two variables may be highly correlated (female directors can also be independent) and to avoid co-linearity problems, equation (4.1) is estimated twice, eliminating the *female* variable and then the *independent* variable.

To test whether the effectiveness of independent directors is enhanced by the board's gender structure (H1.2), the variables *independent* and *female* interact in the following manner:

$$performance_i = \gamma_0 + \gamma_1 independent_i \times female_i + \gamma_2 independent_i + \sum_j \gamma_j control_i + \varepsilon_i \quad (4.2)$$

By estimating equation (4.2), one can determine whether the marginal effect of a board's independence structure is mediated by the gender structure of the board, as predicted by H1.2. It should be noted that in this study, the percentage of female directors on a board of directors is used as a proxy of the board's gender diversity. A board may be male unbalanced; for example, the proportion of female members may be 75%, in which case the board is more gender unbalanced than one with 40% female directors. However, the sample used in this study reveals that more than 99% of firms have a board of directors that is less than 1/3 female. Consequently, for this analysis, the proportion of female directors is a good proxy for gender diversity. Furthermore, because both the independent and female variables are measured as percentages of the board, the effects of these variables on the dependent variable can be directly compared.

In this study, firm performance is used as the dependent variable, and corporate governance variables (for example, the board structure) are covariates. Estimating equations (4.1) and (4.2) based on the OLS method can provide biased estimates because of potential endogeneity. As demonstrated by Hermalin and Weisbach (1998, 2003) and Adams et al. (2010), board composition is unlikely to be exogenously related to firm performance. That is, random shocks that affect firm performance likely also affect the firm's board structure. To address this problem, this study adopts an instrumental variable framework. Thus, corporate governance variables, such as those analysed above, are treated as endogenous regressors. These endogenous regressors can be instrumented with the other (exogenous) regressors and other variables that are not in equation (4.1). The general method of moments (Hansen, 1982) is used to estimate parameters β_j and γ_j in equations (4.1) and (4.2). This estimation technique solves the endogeneity problems normally encountered in the governance literature, such as reverse causality, measurement errors in the regressors and omitted-variable bias.

Furthermore, the general method of moments (GMM) approach directly computes standard errors that are robust to heteroskedasticity of unknown form (Wooldridge, 2001, 2002).

The same approach is used to test H.2.1 and H.2.2, in which the dependent variable is capital expenditures (*capex*):

$$capex_i = \beta_0 + \beta_1 female_i + \beta_2 independent_i + \sum_j \beta_j control_i + u_i \quad (4.3)$$

$$capex_i = \gamma_0 + \gamma_1 independent_i \times female + \gamma_2 independent_i + \sum_j \gamma_j control_i + \varepsilon_i. \quad (4.4)$$

4.3.2 Data description

This study relies on public cross-sectional data provided by the data vendor Bloomberg, which provides accounting, stock market and corporate governance data on listed companies throughout the world. All of the companies that had available data on board structure (the total number of board members, independent members and female members) as of the end of the 2010 fiscal year were selected. The initial sample resulted in 3,876 firms from 47 countries.

Table 4.1 provides descriptive information for various countries. The level of independent directors is more relevant for the sample firms than the number of females, possibly because corporate governance codes worldwide give much more importance to the independence structure of a board than its gender structure. Overall, the figures show that the average number of females on boards of directors is only 0.90, whereas the average number of independent directors is 5.40 per firm. In fact, in every country observed, the number of independent directors is higher than the number of females.

Table 4.1. Sample characteristics

Country	Number of Firms	Board Size	Women on Board	Independents on Board
Australia	294	6.84	0.65	4.46
Austria	12	12.67	1.00	8.67
Belgium	18	11.83	1.17	4.89
Brazil	15	9.53	0.60	3.87
Canada	233	9.83	1.06	7.63
China	292	8.86	0.80	3.65
Colombia	1	9.00	1.00	6.00
Cyprus	1	15.00	1.00	6.00
Denmark	21	8.81	0.90	4.38
Estonia	3	6.33	0.00	2.67
Finland	39	7.56	1.67	6.00
France	83	12.86	1.64	6.55
Germany	27	13.44	1.07	8.37
Greece	6	12.67	0.83	4.00
Hong Kong	56	11.75	1.04	4.54
Hungary	1	9.00	0.00	6.00
India	438	8.22	0.36	4.35
Indonesia	2	6.00	0.00	2.50
Ireland	23	11.30	1.17	7.43
Israel	3	10.67	1.33	5.67
Italy	35	14.00	0.77	7.46
Japan	543	9.97	0.09	1.38
Lithuania	1	7.00	2.00	2.00
Luxembourg	6	9.83	1.33	5.33
Malaysia	15	9.33	0.87	4.00
Mexico	2	11.50	0.00	7.50
Netherlands	34	7.68	0.85	6.12
New Zealand	10	7.70	0.70	5.10
Norway	17	9.24	3.35	5.59
Pakistan	7	10.00	0.14	4.71
Papua New Guinea	1	9.00	0.00	7.00
Philippines	5	11.00	0.20	2.40
Portugal	8	16.63	0.63	6.63
Russia	13	10.85	0.69	4.23
Singapore	41	9.63	0.76	5.76
South Africa	45	12.73	2.31	6.89
South Korea	19	7.11	0.11	3.21
Spain	31	14.06	1.58	5.81
Sri Lanka	8	8.13	0.50	3.63
Sweden	54	9.65	2.33	6.02
Switzerland	58	8.95	0.79	7.67
Taiwan	8	9.13	1.13	1.88
Thailand	8	12.25	1.00	5.50
Turkey	7	9.43	1.00	1.71
United Arab Emir	5	7.00	0.20	3.20
United Kingdom	326	9.10	0.86	5.11
United States	1,001	10.06	1.40	8.05
<i>Total Sample</i>	<i>3,876</i>	<i>9.54</i>	<i>0.90</i>	<i>5.40</i>

Note: This table reports per country means of the size of their firms' boards of directors, the number of women on their firms' boards and the number of independent directors on their firms' boards.

To test the primary hypotheses (H1.1 and H1.2), firm performance is used as the dependent variable in equations (4.1) and (4.2). Two measures are used as proxies for firm performance: Tobin's Q and return on assets (ROA). Tobin's Q is computed as the ratio of a firm's market value to the replacement cost of the firm's assets, and ROA is the ratio of net income to the book value of the firms' assets. Tobin's Q is a market valuation indicator, whereas ROA is an accounting-based indicator. We use both to assess the effect of board structure on firm performance as perceived by the shareholders and determine its effects on the firm's operating performance. Recall that when developing the hypotheses, we argued that a gender-diversified board has an impact at the shareholder and operating levels. In relation to the covariates, board structure is defined in terms of the percentages of females and independent directors.

Beyond the independence and gender structure of a board, several other board characteristics have been identified in the literature as having a negative impact on firm performance, such as board size, the number of board meetings and CEO/chair duality (e.g., Florackis et al., 2009). Large boards with numerous outside directors and many meetings are less likely to function well because of difficult coordination, limited information flow and an inefficient monitoring process. When the CEO is also the chairman of the board, there is a high concentration of power and adverse conditions for outsiders to effectively monitor the executive members (Yermack, 1996; Carter et al., 2003; Coles et al., 2008; Duchin et al., 2010). Thus, these board characteristics are included in the analysis as board control variables.

The firm-specific control variables are the debt-to-assets ratio, a dividend dummy, the percentage of free-float, the percentage of institutional ownership, insider ownership, and the book value of the firm's assets. Debt usage and dividends may mitigate agency problems and provide alternative corporate governance devices

(Easterbrook, 1984; Jensen, 1986). Moreover, when a firm's ownership is dispersed, a free rider problem may exist because while virtually all of the shareholders expect others to monitor management, no one does (Admati et al., 1994). There is also evidence that institutional investors can be efficient monitors of management (Shin and Seo, 2011). Internal agents' ownership can be seen as a way to align the interests of insiders with those of shareholders (Hart, 1995; Florackis et al., 2009). Finally, there is some evidence that larger firms are associated with more entrenched managers and that managers are more difficult to assess (Coles et al., 2008; Ammann et al., 2011).

Country-specific control variables include the gross domestic product per capita and the ratio of market capitalization to the gross domestic product. These country control variables aim to extract any potential effect of the wealth and level of development of a country on firm performance. There is evidence that developed countries with more advanced financial markets may have better corporate governance devices (Gugler et al., 2003). Country-level data were extracted from the World Bank's website. These control variables are included in the analysis to eliminate any potential confounding effects between these variables and the board structure variables on firm performance. Sector dummy variables are also included in our model to extract any potential sector bias in our results.

To test H2.1, the dependent variable is capital expenditures, measured (in millions of USD across countries) by the logarithm of the purchases of (tangible) fixed assets by the firm and excluding purchases of investments during fiscal year 2010. Several other control variables that may have specific effects on this variable are also included. Because corporate governance mechanisms are expected to restrict *capex*, all of the aforementioned control variables are included in equations (4.3) and (4.4). Furthermore, to control for the level of investments in place, the logarithm of the book value of the

assets is included in the models. Finally, the logarithm of the number of employees is also included as a control variable because capital-intensive firms can have less human capital and *vice versa*. Several of the variables used were logarithmized to account for skewness in the data. Table 4.2 presents the description of the variables used in this study and in Table 4.3 descriptive statistics these variables are also presented.

4.4 Empirical results

4.4.1 Gender and independence structure of a board

The main results of this investigation are found in Tables 4.4 and 4.5, where H1.1 and H1.2 are tested. In Table 4.4, the dependent variable considered is Tobin's Q, and ROA is used as an additional control variable. In Table 4.5, the only dependent variable is ROA. By evaluating these two models, the effect of gender diversity on firm performance can be separately analysed at the shareholder level (using a market-based indicator) and intrinsic level (using an accounting-based indicator).

Five specifications are tested in Tables 4.4 and 4.5. Specification (1) provides estimates of equation 4.1 (see methodology section above) that simultaneously consider the gender and independence structure of a board. Specifications (2) and (3) investigate individually the effect of the percentages of women and independent directors on performance, respectively. Specification (4) analyses the interaction between both variables, as in equation 4.2. Finally, specification (5) analyses the effect of a dummy variable that takes the value of 1 if the board has at least one female member while maintaining the variable percentage of independent directors on performance. On average, only 52% of the firms considered have at least one female member on their board of directors (see Table 4.3). Thus, we run specification (5) for robustness purposes.

Table 4.2. Variable definitions

<i>Variable</i>	<i>Description</i>
Panel A: Board Structure	
1. Women on board	Number of women on the firm's board of directors, as reported by the company.
2. Dummy (women on board)	Dummy variable that takes the value of 1 if the firm's board of directors has at least one female member and 0 otherwise.
3. % women on board	Ratio between the number of women and number of directors on the firm's board (board size).
4. Independents on board	Number of independent directors on the firm's board, as reported by the company. Independence is defined according to the company's own criteria.
5. % independents on board	Ratio between the number of independent directors and number of directors on the firm's board (board size).
6. Board size	The total number of directors on the firm's board. If the company has supervisory and management boards, this is the total members of the supervisory board.
7. Board meetings	Total number of corporate board meetings held in 2010.
8. CEO/chair duality	Dummy variable that takes the value of 1 if the company's Chief Executive Officer is also Chairman of the Board and 0 otherwise.
Panel B: Firm Specific	
9. Log(Tobin's Q)	Logarithm of the ratio of the firm's market value to the replacement cost of its assets.
10. Log(1+Return on Assets)	Logarithm of the firm's gross return on assets (ROA). Gross ROA is defined as one plus the ratio of the net income to the book value of the firm's assets.
11. Debt-to-asset ratio	Ratio between the total book value of debt financing (short-, medium- and long-term debt) and the total book value of the firm's assets.
12. Dividend dummy	Dummy variable that takes the value of 1 if the company paid any dividends during 2010 and 0 otherwise.
13. % free float	Percentage of the firm's shares that are freely traded, calculated as the total number of shares not held by any controlling shareholder divided by the total number of shares outstanding.
14. % institutional ownership	Percentage of outstanding shares held by institutions.
15. % insider ownership	Percentage of outstanding shares currently held by insiders.
16. Log(Capital expenditures)	Logarithm of the value of the firm's purchases of (tangible) fixed assets, excluding purchases of investments during 2010.
17. Log(No. of employees)	Logarithm of the firm's total number of employees, as reported by the firm, in 2010.
18. Log(Revenue)	Logarithm of the total value of firm's operating revenues, sales or turnover, as reported by the firm, during 2010.
19. Log(Assets)	Logarithm of the book value of the firm's assets, as reported by the firm, at the end of 2010.

Table 4.2. (continued)

Panel C: Country Specific	
20. Log(GDP <i>per capita</i>)	Logarithm of the per capita gross domestic product (USD) of the country where the firm is based.
21. Log(market cap.-to-GDP ratio)	Logarithm of the total market capitalization divided by the gross domestic product.
22. % working women index	Percentage of female participation in a country's labor force rate as of 2009.

Table 4.3. Descriptive statistics of the variables used in the analysis

<i>Variable</i>	<i>No. of Obs.</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>25th Perc.</i>	<i>75th Perc.</i>
Panel A: Board Structure					
1. Women on board	3,876	0.90	1.08	0.00	1.50
2. Dummy (women on board)	3,876	0.53	0.50	0.00	1.00
3. % women on board	3,876	8.95	10.45	0.00	15.38
4. Independents on board	3,876	5.40	3.16	3.00	8.00
5. % independents on board	3,876	57.25	28.59	16.67	80.00
6. Board size	3,876	9.54	3.20	7.00	11.00
7. Board meetings	3,876	9.62	5.20	6.00	12.00
8. CEO/chair duality	3,876	0.32	0.47	0.00	1.00
Panel B: Firm Specific					
9. Log(Tobin's Q)	3,876	0.34	0.49	6.72E-03	0.59
10. Log(1+Return on Assets)	3,874	0.05	0.11	0.01	0.08
11. Debt-to-asset ratio	3,876	24.91	20.30	9.03	36.39
12. Dividend dummy	3,876	0.73	0.44	0.00	1.00
13. % free float	3,876	72.88	26.48	51.17	97.49
14. % institutional ownership	3,876	53.80	35.76	23.56	83.63
15. % insider ownership	3,876	4.75	11.77	0.09	2.80
16. Log(Capital expenditures)	3,763	5.50	2.74	3.81	7.23
17. Log(No. of employees)	3,580	8.38	2.02	7.20	9.74
18. Log(Revenue)	3,876	8.52	2.69	6.93	10.19
19. Log(Assets)	3,876	21.79	2.26	20.54	23.15
Panel C: Country Specific					
20. Log(GDP <i>per capita</i>)	3,876	10.06	1.21	7.30	10.76
21. Log(market cap.-to-GDP ratio)	3,876	4.64	0.51	4.39	4.91
22. % working women index	3,876	53.65	9.63	32.80	58.40

Notes: This table reports descriptive statistics of the variables used in the study. All of the data were obtained from Bloomberg, except for the country-specific variables, which were gathered from the World Bank's website. All of the values are presented in 2010 USD unless otherwise specified. Refer to table 4.2 for variable definitions.

Following the argument of Hermalin and Weisbach (2003), all board-related variables, including the percentages of women and independent members on the board and board size, are assumed to be endogenously related to firm performance and are thus instrumented. The selected instruments should be related to the variables instrumented and should not be correlated with the disturbance term. The lag percentages of women and independents on the board (as of the fiscal year ending in 2009), the lag of the board size variable, the logarithm of the number of employees, and the country's working women index (an index of the percentage of women in the workforce; source: World Bank) were selected as the initial set of instruments. To determine whether the variables of interest should be treated as endogenous variables, the GMM C statistic is applied (Baum et al., 2007). The null hypothesis is that the variables are exogenous. Thus, a statistically significant test statistic indicates that the variables should be treated as endogenous. The results for this test are rejected at any typical level of significance, corroborating the suggestion that the board-related variables are endogenously related to firm performance. Furthermore, to assess the instruments' validity, Hansen's (1982) J statistic χ^2 test is computed for each of the estimated models. A statistically significant test statistic indicates that the instruments may not be valid. The results obtained for this test are not rejected at any typical level of significance (see the bottom rows of Tables 3.4 and 3.5).

The parameter estimates of specification (1) in Table 4.4 show that when simultaneously considering the fractions of female members and outside directors, the percentage of female directors is positively associated with Tobin's Q, whereas the percentage of independent directors is negatively related to Tobin's Q. Furthermore, the results reveal that *ceteris paribus*, a 1% increase in the percentage of women on a board would increase Tobin's Q by approximately 4%, whereas a 1% increase in the

proportion of outsiders would reduce Tobin's Q by 0.6%. If we assume that the model is correctly specified (i.e., the relationship between board structure and firm value is linear), these results provide evidence that the gender structure of a board is more important to firm performance (as perceived by the shareholders) than its independence structure. However, these results do not mean *per se* that the independence structure of a board is irrelevant or detrimental to firm performance because firms that have many directors may also have many women on the board (in fact, this is often the case, as will later be demonstrated). Nonetheless, specification (1) suggests that when there are few or no women on a board, the effect of a higher percentage of independent directors on firm performance is negative, which is consistent with this study's argument that a gender-diversified board enhances board independence, as perceived by the shareholders.

Further insights concerning the relationship between board structure and Tobin's Q are provided in specifications (2) and (3), where each of these covariates is separately regressed against Tobin's Q. The coefficients are now both positive and statistically significant at any reasonable level of confidence, providing support for H.1.1, which states that both gender and the independence structure of a board are important and positively valued by shareholders. The change in the sign implies that the percentage of females on a board is positively related to the percentage of outside independent directors. However, the marginal effect of the percentage of women on Tobin's Q is much higher than that of the percentage of independent directors, supporting the previous results that suggested that gender is more important to firm performance than a board's independence structure. In specification (2), a 1% increase in the fraction of females on a board would result in an approximately 3.5% increase in Tobin's Q, whereas in specification (3), a 1% increase in the proportion of outside directors would

decrease Tobin's Q by approximately 0.5%. One possible reason for the differences in these effects is that in most of the countries, listed firms are required to maintain a non-optimal minimum percentage of outside directors (Coles et al., 2008). Further corroboration comes from specification (4), which analyses the interaction between both variables. The results show that a board of directors' independence structure has a positive and statistically significant effect on firm performance when the board is more gender diversified, thus validating H1.2. In specifications (4) and (5), the coefficients of the percentage of independent members variable are negative and statistically significant, suggesting that when a board has few or no women, the presence of independent directors is detrimental to firm performance, as perceived by shareholders. These results are consistent with this paper's main hypothesis, which suggests that a gender-imbalanced board signals to shareholders that management is less independent and more entrenched, resulting in lower firm market values.

With respect to the control variables, the coefficient of the ROA variable is positive and statistically significant. This result is expected because accounting profitability explains a significant fraction of the shareholders' valuation of the firm (measured here as Tobin's Q). The remaining estimates of the board control variable coefficients are consistent with previous results in the literature on governance. Specifically, large boards with many meetings and for which the CEO is also the chairman are detrimental to the effectiveness of the board. In relation to firm-specific control variables, there is some evidence that firms that pay dividends are positively associated with higher firm values, consistent with the view that dividends can be an agency cost mechanism (Easterbrook, 1984). However, no significant evidence is found for the relationship between the use of debt and firm value, as predicted by Jensen (1986). There is also some evidence that higher levels of ownership performance are associated with lower

Table 4.4. Generalized method of moments (GMM) regression of Tobin's Q

Explanatory variables	Dependent variable: Log(Tobin's Q)				
	(1)	(2)	(3)	(4)	(5)
% women on board ^a	0.04429*** (5.902)	0.03583*** (6.628)	-	-	-
% independents on board ^a	-0.00608*** (4.501)	-	0.00500*** (4.137)	-0.01396*** (4.824)	-0.00731*** (4.608)
% women × % independent ^a	-	-	-	0.00086*** (5.182)	-
Dummy (women on board) ^a	-	-	-	-	1.05901*** (5.687)
Board size ^a	-0.12492*** (4.331)	-0.10276*** (4.071)	-0.23161*** (6.639)	-0.17636*** (5.224)	-0.13487*** (4.656)
Board meetings	-0.01724*** (4.989)	-0.00912*** (3.219)	-0.01846*** (4.818)	-0.02556*** (5.708)	-0.01166*** (3.414)
CEO/Chair duality	-0.08769*** (3.792)	-0.06576*** (3.047)	-0.07256*** (2.813)	-0.15998*** (5.240)	-0.06299*** (2.614)
Log(1+Return on Assets)	0.96614*** (3.893)	0.97482*** (4.109)	0.56326** (2.118)	0.95744*** (3.658)	1.03969*** (4.297)
Debt-to-asset ratio	0.00020 (0.273)	-0.00000 (0.003)	-0.00059 (0.725)	0.00025 (0.302)	0.00007 (0.094)
Dividend dummy	0.03554 (1.153)	0.08002*** (2.873)	0.15853*** (4.781)	0.01810 (0.464)	0.00480 (0.149)
% free float	-0.00015 (0.232)	-0.00160*** (2.842)	-0.00231*** (3.093)	-0.00099 (1.319)	0.00005 (0.080)
% institutional ownership	0.00191*** (4.811)	0.00142*** (3.842)	0.00143*** (3.236)	0.00227*** (4.732)	0.00122*** (2.913)
% insider ownership	0.00060 (0.421)	0.00023 (0.172)	-0.00119 (0.845)	0.00073 (0.458)	0.00097 (0.687)
Log(Assets)	0.06344** (2.174)	0.04366* (1.664)	0.19506*** (5.874)	0.10320*** (3.151)	0.04876 (1.617)
Log(GDP per capita)	-0.04326** (2.412)	-0.03679** (2.304)	-0.07105*** (3.426)	-0.08801*** (4.060)	-0.03677** (2.090)
Log(market cap.-to-GDP ratio)	-0.02949 (1.173)	-0.04079* (1.762)	-0.06612** (2.092)	-0.02265 (0.733)	-0.03926 (1.560)
Constant	0.50123* (1.742)	0.44678* (1.730)	-1.05140*** (4.412)	1.02994** (2.522)	0.76146** (2.380)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	3579	3579	3579	3579	3579
Wald χ^2 (p-value)	507.123 (0.000)	592.242 (0.000)	391.218 (0.000)	311.205 (0.000)	500.770 (0.000)
GMM C statistic χ^2 ^b (p-value)	101.766 (0.000)	120.457 (0.000)	139.939 (0.000)	105.188 (0.000)	84.3635 (0.000)
Hansen's J χ^2 ^c (p-value)	0.753198 (0.3855)	0.587272 (0.4435)	3.16509 (0.2055)	0.64108 (0.4233)	0.988723 (0.3201)

Notes: Heteroskedastic robust z statistics in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Refer to table 4.2 for variable definitions. ^a Instrumented with the following variables: lag % women on board, lag % independents on board, lag board size, log(number of employees), debt-to-equity ratio, working women index and log(revenue). ^b H0: instrumented variables are exogenous. ^c H0: instruments are valid.

levels of firm value, as predicted by the free-rider hypothesis (Admati et al., 1994). Consistent with Ferreira and Matos (2008), a positive relationship is found between institutional investors' ownership and Tobin's Q, supporting the view that institutional investors are effective monitors of executive management. No evidence is found on the effect of insiders' ownership on firm performance.

This study also finds that larger firms, as measured by the book value of assets, are associated with higher values of firm performance in terms of the firm's Tobin's Q. Thus, we cannot provide evidence that larger firms have more entrenched boards that are detrimental to firm performance. This result can be explained by this study's time frame, which analysed cross-sectional data from 2010. This year coincides with the beginning of the European debt crises, in which small firms (with few real assets) were more likely to be sold than larger firms (with large asset values). With respect to country-level control variables, the results do not support the view that countries with higher levels of GDP per capita and more developed financial markets are positively associated with higher firm values, as perceived by the shareholders, after accounting for other firm-specific corporate governance devices. This finding may be attributed to the fact that many of the countries with lower GDPs are developing countries, where investors expect higher growth opportunities and thus higher Tobin's Q values.

The effects of board composition by gender and independence on firm performance when measured by ROA (see Table 4.5) provide results similar to those found for Tobin's Q (in Table 4.4). In general, the proportions of independent directors and female members (when analysed separately) are both positively associated with a firm's ROA. Moreover, similar to the results found for Tobin's Q, the coefficient of the percentage of female directors is much higher than that of the percentage of independent directors (see specifications 2 and 3 in Table 4.5). The results show that *ceteris paribus*,

a 1% increase in the proportion of female members on a board would result in an approximately 0.2% increase in the firm's return on assets, whereas the same increase in the proportion of external directors would result in an approximately 0.02% increase in the firm's return on assets. Nevertheless, when a board is less gender diversified or does not contain women, the effect of outside directors is negatively associated with the firm's ROA (specifications 4 and 5). As such, the results strongly suggest that the gender structure of a board is valuable within the firm at the operational level as well as at the shareholder level.

These effects are consistent with the argument proposed when developing the hypotheses: when a firm's board is gender diversified, the firm sends a positive signal to shareholders and other stakeholders. For example, if employees perceive that the board has been established in an ethical manner (as opposed to a 'quack independent board') and values merit by providing the same opportunities to men and women, employees are motivated to share the firm's goals and support long-term value creation, as advocated by the 'enlightening stakeholders theory' (Jensen, 2002). In contrast, a gender-imbalanced board of directors is more likely to be seen as a 'friendly board' and thus detrimental to stakeholders' motivation to share the firm's long-term objectives.

In relation to the control variables, similar to the Tobin's Q analysis, the ROA is negatively affected by board size and the number of board meetings. With respect to the CEO's duality, despite the fact that a positive coefficient is reported in all of the specifications, no strong statistical relationship is found, suggesting that a chairman who is not also the CEO has a greater effect on shareholders' confidence than operating performance. Highly indebted firms are negatively associated with ROA. This outcome is not unexpected because our sample was extracted for the end of 2010, when the European debt crises significantly affected the cost of corporations' debt financing.

Table 4.5. Generalized method of moments (GMM) regression of return on assets

Explanatory variables	Dependent variable: $\text{Log}(1+\text{return on assets})$				
	(1)	(2)	(3)	(4)	(5)
% women on board ^a	0.00325*** (2.841)	0.00245*** (3.287)	-	-	-
% independents on board ^a	-0.00036* (1.715)	-	0.00018** (2.094)	-0.00065 (1.630)	-0.00038* (1.696)
% women \times % independent ^a	-	-	-	0.00005** (2.112)	-
Dummy (women on board) ^a	-	-	-	-	0.06728*** (2.683)
Board size ^a	-0.00227*** (3.041)	-0.00163*** (2.645)	-0.00174*** (2.752)	-0.00211*** (2.765)	-0.00386*** (3.358)
Board meetings	-0.00187*** (3.971)	-0.00151*** (3.209)	-0.00201*** (4.571)	-0.00219*** (4.345)	-0.00161*** (3.342)
CEO/Chair duality	0.00567 (1.490)	0.00687* (1.826)	0.00598 (1.619)	0.00187 (0.422)	0.00739* (1.947)
Debt-to-assets ratio	-0.00081*** (4.462)	-0.00079*** (4.488)	-0.00079*** (4.854)	-0.00077*** (4.305)	-0.00080*** (4.339)
Dividend dummy	0.03900*** (8.595)	0.04020*** (9.139)	0.04551*** (10.038)	0.03636*** (7.439)	0.03747*** (7.612)
% free float	-0.00003 (0.276)	-0.00012 (1.254)	-0.00015 (1.542)	-0.00008 (0.802)	-0.00003 (0.245)
% institutional ownership	0.00033*** (4.555)	0.00029*** (4.138)	0.00032*** (4.863)	0.00035*** (4.763)	0.00028*** (3.821)
% insider ownership	0.00024 (0.721)	0.00022 (0.649)	0.00027 (0.914)	0.00026 (0.780)	0.00024 (0.713)
Log(Assets)	0.00227 (1.074)	0.00174 (0.818)	0.00402** (2.151)	0.00212 (0.958)	0.00244 (1.145)
Log(GDP per capita)	-0.01382*** (4.879)	-0.01365*** (4.848)	-0.01292*** (4.246)	-0.01612*** (5.786)	-0.01386*** (4.869)
Log(market cap.-to-GDP ratio)	0.00193 (0.508)	0.00196 (0.521)	0.00346 (0.974)	0.00364 (0.982)	0.00140 (0.360)
Constant	0.10161*** (2.835)	0.09537*** (2.728)	0.04888* (1.767)	0.14388*** (2.900)	0.10944*** (2.941)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	3579	3579	3579	3579	3579
Wald χ^2 (p-value)	518.529 (0.000)	589.616 (0.000)	620.823 (0.000)	515.101 (0.000)	473.746 (0.000)
GMM C statistic χ^2 ^b (p-value)	10.8311 (0.004)	9.5104 (0.002)	3.95631 (0.047)	7.78257 (0.020)	5.46156 (0.065)
Hansen's J χ^2 ^c (p-value)	1.24755 (0.7416)	0.999371 (0.6067)	0.568688 (0.7525)	5.19991 (0.1577)	1.92152 (0.5889)

Notes: Heteroskedastic robust z statistics in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Refer to table 4.2 for variable definitions. ^a Instrumented with the following variables: lag % women on board, lag % independents on board, lag board size, log(number of employees), debt-to-equity ratio, working women index and log(revenue). ^b H0: instrumented variables are exogenous. ^c H0: instruments are valid.

Similar to the Tobin's Q analysis, the dividend dummy variable is positively associated with a higher ROA. However, no statistical relationship can be identified in terms of the effect of ownership dispersion on the operating performance. Institutional ownership is strongly positively associated with higher levels of firm operating performance, providing further evidence that these investors are proper monitors of internal agents. However, no robust evidence is found in relation to the role of insiders' ownership on a firm's operating performance. This study also finds that firms with more assets are generally more profitable (higher ROA), but this effect is not statistically significant. With respect to country-specific effects, firms based in countries with a higher gross domestic product per capita are negatively associated with firms' operating performance, possibly due to the low wage practices in these countries. Finally, although a positive effect is found between the level of market development and ROA, no statistically robust evidence is provided by this sample.

Turning now to the effect of board composition in mediating firms' capital expenditures (see Table 4.6), the presence of women can potentially enhance a board's ability to limit the executive management's overinvestment because a negative and statistically significant relationship is found between the percentage of female directors on a board and the level of capital expenditures. The results reported in Table 4.6 provide the expected coefficient estimates for equations 4.2 and 4.3 of the methodology section. In particular, the percentages of independent directors and female directors on a board are both negatively associated with capital expenditures (H2.1). Furthermore, when a board is less gender diversified or composed exclusively of men, the marginal effect of independent members is not significantly different from zero (H2.2). Overall, these results support the idea that the presence of female members enhances a board's effectiveness and curbs managers' incentives to build an empire. Conversely, if a board

of directors is not gender diversified, outside directors *per se* are not effective monitors of managers' expansion plans. These results further corroborate our previous argument that a gender-imbalanced board of directors signals a 'friendly board', leading to less efficient monitoring abilities.

In relation to the control variables, the results reveal that larger boards with many meetings and for which the CEO is also the chairman are less likely to restrict firms' capital expenditures. Capital expenditures are positively associated with a firm's debt level. This result is not unexpected because firms with real asset investment needs may also have more financing needs and are likely to use more debt to finance those assets (pecking order theory). A surprising result is that dividend-paying firms are positively associated with higher levels of capital expenditures. Firms that pay out dividends retain fewer earnings; thus, we would expect a negative association between these two variables. However, it should be noted that we use a dummy variable that takes the value of 1 if the firm pays any dividends and 0 otherwise. Thus, we do not consider the level of dividends paid out. This result can be explained by the signaling effect of dividends (Williams, 1988), by which firms pay dividends to provide financial markets with a signal of the return on assets they invest. Capital expenditures are also found to be positively associated with the percentage of free float. However, this relationship is not statistically significant in any of the model specifications. These results are not unexpected because firms with block holders that have controlling voting power (and less free float) only issue new equity to finance new investments up to the amount possible before losing controlling power. Thus, firms with higher levels of free float (and with fewer controlling shareholders) face fewer equity financing restrictions and may invest more. As expected, capital expenditures are positively associated with the level of assets in place and the firm's revenue. Insider and institutional ownership are

Table 4.6. Generalized method of moments (GMM) regression of CAPEX

<i>Explanatory variables</i>	<i>Dependent variable: Log(Capital Expenditures)</i>				
	(1)	(2)	(3)	(4)	(5)
% women on board ^a	-0.01814*** (5.117)	-0.02111*** (6.553)	-	-	-
% independents on board ^a	-0.00285* (1.762)	-	-0.03042*** (5.100)	-0.00061 (0.309)	-0.00276 (1.555)
% women × % independent ^a	-	-	-	-0.00029*** (5.034)	-
Dummy (women on board) ^a	-	-	-	-	-0.50637*** (5.317)
Board size ^a	0.24414*** (3.983)	0.29808*** (5.103)	0.27668*** (3.152)	0.25844*** (4.099)	0.22542*** (3.590)
Board meetings	0.01725** (2.564)	0.02211*** (3.368)	-0.00289 (0.365)	0.01922*** (2.781)	0.01303* (1.954)
CEO/Chair duality	0.07022 (1.450)	0.06627 (1.306)	0.07771 (1.414)	0.08930* (1.815)	0.05899 (1.240)
Debt-to-assets ratio	0.01209*** (6.609)	0.01190*** (6.325)	0.01314*** (6.395)	0.01209*** (6.562)	0.01247*** (6.859)
Dividend dummy	0.15895** (2.486)	0.14338** (2.180)	0.02924 (0.375)	0.15719** (2.416)	0.17310*** (2.756)
% free float	0.00097 (0.780)	0.00035 (0.277)	0.00769*** (3.535)	0.00126 (1.003)	0.00085 (0.693)
% institutional ownership	-0.00251*** (2.819)	-0.00247*** (2.668)	-0.00139 (1.329)	-0.00254*** (2.833)	-0.00232*** (2.633)
% insider ownership	-0.00263 (1.047)	-0.00207 (0.801)	-0.00197 (0.690)	-0.00249 (0.986)	-0.00330 (1.313)
Log(assets)	0.13657*** (2.626)	0.08539* (1.830)	0.20401*** (3.375)	0.11963** (2.235)	0.16559*** (3.187)
Log(revenue)	0.73612*** (32.698)	0.75075*** (35.097)	0.58910*** (12.662)	0.74610*** (33.166)	0.72720*** (32.295)
Log(GDP per capita)	-0.09177*** (2.935)	-0.07326** (2.329)	-0.14383*** (4.026)	-0.07462** (2.298)	-0.10356*** (3.389)
Log(market cap to GDP ratio)	0.29774*** (5.246)	0.30715*** (5.144)	0.39398*** (5.365)	0.29285*** (5.085)	0.30332*** (5.439)
Log(employees)	-0.15262*** (5.693)	-0.16793*** (6.253)	-0.10766*** (3.318)	-0.15875*** (5.832)	-0.13929*** (5.106)
Constant	-6.57432*** (12.764)	-6.33548*** (12.221)	-6.38881*** (11.032)	-6.69170*** (12.897)	-6.82970*** (13.253)
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Observations	3490	3490	3490	3490	3490
Wald χ^2 (p-value)	9455.502 (0.000)	8612.324 (0.000)	6702.244 (0.000)	9168.090 (0.000)	9970.123 (0.000)
GMM C statistic χ^2 (p-value)	16.1016 (0.0011)	29.4177 (0.0000)	22.4667 (0.0000)	16.6259 (0.0008)	19.3695 (0.0002)
Hansen's J χ^2 (p-value)	2.05106 (0.1521)	4.48739 (0.1061)	1.32307 (0.2500)	2.0752 (0.1497)	0.366292 (0.5450)

Notes: Heteroskedastic robust z statistics in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Refer to table 4.2 for variable definitions. ^a Instrumented with the following variables: lag % women on board, lag % independents on board, lag board size, debt-to-equity ratio and working women index. ^b HO: instrumented variables are exogenous. ^c HO: instruments are valid.

found to be negatively associated with capital expenditures, revealing that these are good mechanisms for restricting overinvestment by executive management (particularly institutional investors). As expected, firms with more employees and those in countries with lower GDP per capita (which tend to rely more on their labour force than technology) are associated with lower capital expenditures. Finally, firms based in countries with more developed financial markets are more likely to expend capital, probably because access to capital markets is facilitated in these countries.

4.4.2 Robustness checks

In the previous analyses, we assumed that the models were properly specified. In particular, we assumed a linear relationship between board structure and firm performance. However, one could argue that the effect of gender diversity on firm performance may differ at different levels of board independence. To determine whether the results hold in a non-linear scope, the regressions presented in Tables 4.4 through 4.6 were re-estimated for two groups of board structures: (1) an outsider-dominated board, defined as a board composed of at least 50% independent directors and (2) an insider-dominated board, defined as one with more than 50% insider directors. The results are generally maintained. However, the effect of the percentage of women on firm performance and capital expenditures is stronger when the board is insider dominated.

From a similar approach, the regressions were re-estimated for different levels of women's participation on the board of directors. Because the study's sample has a significantly lower level of female directors on boards (only 52% of the firms have at least one female member on their boards), the sensitivity analysis was conducted by forming two groups: one group of firms with zero or one female director and another

group of firms with more than one female member. The results presented in tables 4.4 through 4.6 hold, but the magnitudes of the effects of the percentages of women and independent directors are stronger when the board has fewer women.

Although we have included in the models industry dummies and country level variables, it can still be argued that firm performance and capital expenditures within a country and an industry are exposed to common factors beyond those variables. If this is the case, the estimated standard errors (which are robust to heteroscedasticity of unknown form) can be more accurate if they are instead clustered within countries and industries, although the coefficient estimates would remain the same and continue to be efficient (Wooldridge, 2002). To address this potential improvement, we re-estimated all models with z statistics computed based on standard errors clustered by country and industry. Generally, the results are the same; in particular, the board composition z statistics (the fraction of female members and the fraction of independent members) are still highly significant. Nevertheless, other control variables reveal significantly lower values of z statistics, particularly the country level variables. This result is not unexpected because the sample of the present study derived from many countries with very few firms.

Finally, the results were subject to sensitivity tests related to the types of firms and countries used: (1) the models were re-estimated by excluding financial firms because banks may be subject to different forces that mediate firm performance and capital expenditures; and (2) all of the observations from countries with only one firm were excluded. The results remain similar after performing these sensitivity tests. The OLS estimates reveal robust and qualitatively similar results.

4.4.3 Determinants of board gender composition

Given our findings that the effectiveness of outside directors depends on a board's gender composition, it is natural to investigate whether firms consider gender when composing their boards. If female board members increase board independence and have positive effects on firms' performance, we should observe more gender-balanced boards among firms that have more independent directors and a greater concern about providing correct signals as to the boards' independence, such as a chairman who is not also the CEO.

Furthermore, based on the theories of care and resource dependence, it is hypothesized that women facilitate relationships between several board factions. This argument is consistent with the empirical evidence that female representation is more likely to be found in large boards of directors and larger firms (Bernardi et al., 2004, 2006). Moreover, based on stakeholders theory and the unique value goal of a firm, having a greater number of women on a board will facilitate communication with stakeholders and help stakeholders understand and share the firm's objectives. The latter view is consistent with the argument of Francoeur et al. (2008), who posit that female directors are more likely to be found among firms with more complex stakeholders relationships.

Thus, we argue that female members of a board of directors are more likely to be found in firms with more independent directors, where the chairman and CEO are different people and there are more complex relationships within the firm. To test these associations, the following model is proposed:

$$\begin{aligned}
 \text{women}_i = & \beta_0 + \beta_1 \text{independent} + \beta_2 \text{CEOduality} \\
 & + \sum_j \beta_j \text{complexity}_i + \sum_l \beta_l \text{control}_i + \delta_i,
 \end{aligned}
 \tag{4.5}$$

where *women* is measured by a dummy variable that takes the value of one if the board of directors includes at least one female member and zero if it does not. For robustness purposes, women's representation on a board is also measured as the total number of women on the board and the percentage of female members on the board. *Independent* represents the total number of independent members on the board. *Complexity* is a set of indicators that aims to quantify a firm's relationship complexity and is measured by the logarithm of the firm's assets, board size, number of employees, and Tobin's Q (proxy of growth opportunities). Other control variables that potentially affect the gender composition of a board are also included. For each of the 3 measures of female representation used, a different model is applied: (1) a logit model, (2) a Tobit model (left censored) and (3) a Tobit model (left and right censored). Although running three models provides some robustness to the results, endogeneity is not controlled here, as in the previous section. In the previous sections, we were able to identify potentially valid instruments for the variables of interest (board composition variables). In this section, all of the variables are of interest and potentially endogenously related with the dependent variable. Unfortunately, due to the lack of available data, we cannot address this potential estimation bias. Nevertheless, because the determinants of female presence in boards of directors are not the focus of this paper, further research addressing endogeneity is needed to validate the results presented in this section. Table 4.7 provides the results of the 3 model estimates.

Similar results are found for the three dependent variables considered. In particular, the level of female representation on a board of directors is positively associated with the total number of independent directors and negatively related to the dummy variable that takes the value of one if the CEO is also the chairman of the board. These results are consistent with our argument that firms with concerns about their boards'

Table 4.7. Determinants of female participation on boards of directors

<i>Explanatory variables</i>	<i>Model (Dependent variable)</i>		
	<i>Logit (Dummy (women on board))</i>	<i>Tobit, Left censored (No. of women on board)</i>	<i>Tobit, Left and right censored (% women on board)</i>
% independents on board	0.03076*** (8.974)	0.01774*** (4.298)	0.18275*** (5.354)
CEO/Chair duality	-0.18525** (1.982)	-0.11724** (1.973)	-1.26536** (2.086)
Log(assets)	0.12905** (2.574)	0.11875*** (3.485)	1.01347*** (3.031)
Board size	0.23959*** (11.957)	0.17456*** (14.463)	0.85509*** (7.663)
Log(employees)	0.17392*** (4.798)	0.15578*** (5.648)	1.55681*** (5.617)
Log(Tobin's Q)	0.17652* (1.849)	0.16165*** (2.582)	1.55772** (2.299)
Debt-to-assets ratio	0.00321 (1.356)	0.00250 (1.585)	0.02882* (1.832)
Log(capital expenditures)	-0.19233*** (6.404)	-0.15287*** (5.650)	-1.49876*** (6.146)
Dividend dummy	0.34528*** (3.199)	0.15551** (2.312)	1.77696** (2.495)
% institutional ownership	0.00100 (0.679)	0.00031 (0.323)	0.00112 (0.112)
% insider ownership	-0.00281 (0.717)	-0.00205 (0.723)	-0.01486 (0.478)
Log(GDP per capita)	-0.17205*** (3.352)	-0.15240*** (4.320)	-1.40896*** (3.837)
Log(market cap.-to-GDP ratio)	0.27847*** (3.037)	0.24290*** (4.069)	1.95542*** (3.404)
% Working-women index	0.03305*** (5.195)	0.02881*** (6.474)	0.29367*** (6.407)
Constant	-8.73768*** (9.670)	-6.82055*** (10.488)	-55.71631*** (8.753)
Industry Dummies	Yes	Yes	Yes
Observations	3490	3490	3490
Wald χ^2 (p-value)	675.69 (0.000)	-	-
F-Stat (p-value)	-	56.33 (0.000)	44.26 (0.000)
Pseudo R ²	0.2860	0.1632	0.0686

Notes: Heteroskedastic robust z statistics in parentheses. *, ** and *** refer to significance at the 10%, 5% and 1% levels, respectively. Refer to Table 4.2 for variable definitions.

independence are more likely to have women on their boards. Furthermore, female directors are more likely to be found on larger boards. All of the variables representing a firm's complexity environment are positively associated with greater female

representation on the board. This finding is consistent with our argument that a more gender-diverse board is necessary for firms with complex relationships and more complex communication systems with stakeholders.

With respect to the control variables, this study finds that a firm's use of debt financing is positively associated with greater female representation on its board of directors. However, this relationship is not significantly different from zero. This study also finds that capital-intensive firms with higher levels of capital expenditures are negatively associated with female representation on their boards. This result is not unexpected because capital-intensive firms have less complex relationships with stakeholders compared to firms that rely on human capital. Another interesting finding is that firms that pay dividends are more likely to have female board members, possibly because firms that pay dividends interact more with the financial market and are thus more motivated to provide correct signals as to their board's effectiveness. With respect to the ownership structure of firms, no specific evidence is found as to whether institutional and insider ownership promotes gender-diversified boards of directors. With respect to the country-level control variables, as expected, firms in countries with more females in the labour market are more likely to have firms with women on their boards. Surprisingly, female representation on boards is not a characteristic of richer countries, as a negative association exists between a country's gross domestic product per capita and women board members. Finally, firms in countries with more developed financial markets (measured as the fraction of market capitalization to GDP) have more women on their boards of directors. Again, this finding is consistent with the argument that firms with more corporate governance concerns are more likely to pay attention to their boards' gender structure.

4.5 Conclusion

This paper analyses the role of women directors in enhancing the independence and effectiveness of boards of directors. In particular, this study analyses the effect of gender and the independence structure of a board of directors on firm performance. Because entrenched executives tend to overinvest, the effect of board structure on capital expenditures is also analysed. We hypothesize that a gender-imbalanced board of directors provides a negative signal to all of the stakeholders. Thus, stakeholders may perceive an outsider-dominated board as a ‘quack’ corporate governance practice. Moreover, this unethical signal has negative effects on various levels of the firm: shareholders may lower stock prices, independent members of the board may be less efficient and employees may not engage efficiently in the firm’s long-term objectives.

The results reported in the empirical analysis provide strong evidence in support of the hypothesis that women directors send a positive signal to the public regarding a firm’s ethical behaviour and specifically concerning its board’s independence. Female board members are associated with fewer agency costs and more valuable firms. Furthermore, the effect of a board composed of many independent directors is only positive if the board is gender diversified. This evidence is important because recent studies have questioned whether the board independence hypothesis effectively restricts agency costs. This study provides new insights into the determinants of greater female presence on boards. As expected, firms with concerns about board independence and effectiveness and those operating in complex environments are more likely to have female members on their boards of directors. The findings presented here are consistent with both the shareholders’ and stakeholders’ theories.

Furthermore, these results support the idea that board independence should be analysed at an ethical level rather than from a legal standpoint (Schwartz et al., 2005)

because if boards want to be seen as effective management and monitoring bodies, they must provide the correct ethical signals to the public rather than following legal obligations that force them to have outside directors. The investigation reported here provides evidence that a gender-diversified board can provide such a signal. These results are in line with those of recent empirical findings on the role of independent directors and board diversity (e.g., Campbell and Mínguez-Vera, 2008; Francoeur et al., 2008). It should be stressed, however, that the results reported here do not suggest that board independence is irrelevant. The empirical results merely indicate that board independence becomes secondary when gender diversity is not addressed. Thus, in terms of political implications, this paper supports the notion that gender diversity is an important corporate governance issue. In fact, if firms wish to provide correct signals regarding board effectiveness, they should consider gender diversity. Exogenously requiring the addition of outside directors to a board does not imply that the board will be more independent.

Some countries have realized the importance of gender-balanced boards of directors. Norway, Spain and Sweden have instituted gender quotas in their corporate governance code recommendations (De Anca, 2008; Hoel, 2008; Singh, 2008). Nonetheless, more attention has been given to boards' independence structures. Virtually all corporate governance codes address the need for firms to have boards composed of outside 'independent' directors, whereas only a few codes address boards' gender structure. Given this study's finding that a more gender-diversified board is likely to enhance its independence and effectiveness, corporate governance codes worldwide should give at least the same importance to this matter as they give to the structure of board independence. In fact, acknowledging the role of women by corporate governance best

practices can potentially increase the effectiveness of independent directors, as it decreases the negative signal of an unbalanced gender board.

The analysis undertaken in this study has several limitations. First, the hypotheses are tested using cross-sectional data, which capture the effects at a particular moment in time (2010). Panel data would more accurately reveal the proposed relationships because they would reduce any potential biases arising from the use of the 2010 data only. The interaction between a board's gender structure and its independence structure do not segregate female directors into independent and non-independent. Further research using segregated data on female directors would enhance the results. Another limitation of this study is that it does not consider different types of governance models, such as the one-tier system, in which executive managers are part of a firm's board of directors, or the two-tier system, which includes supervisory and management boards. This study's findings would benefit from further research that considers these two types of governance structures. Finally, this study does not take firm age into account. One may assume that younger firms have a higher incentives to cooperate with the various stakeholders and have gender-diversified boards. If so, some confounding effects may limit the robustness of the results presented.

This study opens new avenues for future research. We hypothesized that independent directors are only a valuable agency cost mechanism when the correct signals regarding their independence are provided. We tested gender diversity as a way for firms to signal their boards' independence, but other devices can also provide these signals. For example, board diversity in terms of background, ethnicity, age, education and experience may all be means by which firms can signal their ethical behaviour and provide evidence concerning board independence.

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Appendix C

Table C.1 Pearson correlation matrix of the variables used in the analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Log(Tobin's Q)	1									
2. Log(1+Return on Assets)	0.317***	1								
3. Log(capital expenditures)	-0.176***	0.0278	1							
4. % women on board	0.111***	0.0399*	-0.120***	1						
5. % independents on board	0.210***	0.0361*	-0.359***	0.384***	1					
6. Board size	-0.0909***	-0.00683	0.375***	0.135***	-0.0615***	1				
7. Board meetings	-0.214***	-0.136***	0.241***	-0.104***	-0.314***	-0.000272	1			
8. CEO/Chair duality	-0.0974***	0.00728	0.137***	-0.0307	-0.0763***	0.0107	0.0643***	1		
9. Debt to assets ratio	-0.0987***	-0.200***	0.161***	0.0266	0.0262	0.106***	0.0178	-0.0539**	1	
10. Dividend Dummy	-0.0437**	0.151***	0.323***	0.0182	-0.152***	0.221***	0.0699***	0.0177	-0.0317	1
11. % free-float	0.0515**	-0.00235	-0.0520**	0.176***	0.365***	0.0594***	0.0250	0.0961***	-0.0225	0.0264
12. % institutional ownership	0.196***	0.0944***	-0.143***	0.191***	0.354***	0.0687***	-0.120***	-0.00382	-0.0263	-0.0359*
13. % insider ownership	0.0663***	0.0300	-0.227***	-0.0417*	-0.00761	-0.174***	-0.151***	0.00103	-0.0455**	-0.0966***
14. Log(employees)	0.0163	0.102***	0.480***	0.214***	0.0600***	0.463***	0.00767	0.0695***	0.0486**	0.241***
15. Log(Assets)	-0.123***	0.0127	0.503***	0.211***	0.128***	0.563***	0.133***	0.0458**	0.0902***	0.245***
16. Log(Revenue)	-0.234***	0.0449**	0.847***	-0.0846***	-0.409***	0.386***	0.279***	0.183***	0.0553**	0.355***
17. Log(GDP per capita)	-0.000162	-0.0592***	-0.0364*	0.138***	0.175***	0.0688***	0.183***	0.112***	-0.0830***	0.0437**
18. Log(market cap.-to-GDP)	0.125***	0.0635***	-0.152***	0.133***	0.245***	-0.0651***	-0.207***	-0.0722***	-0.0785***	-0.000456
19. % working women index	0.258***	0.0547**	-0.287***	0.265***	0.338***	-0.0708***	-0.0642***	0.0161	-0.0930***	-0.119***

Table C.1 (Continued)

Variable	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
11. % free-float	1								
12. % institutional ownership	0.488***	1							
13. % insider ownership	-0.254***	-0.173***	1						
14. Log(employees)	0.169***	0.226***	-0.189***	1					
15. Log(Assets)	0.277***	0.258***	-0.259***	0.671***	1				
16. Log(Revenue)	-0.0401*	-0.121***	-0.224***	0.593***	0.517***	1			
17. Log(GDP per capita)	0.524***	0.388***	-0.162***	0.164***	0.379***	-0.00982	1		
18. Log(market cap.-to-GDP)	0.148***	0.217***	0.0601***	-0.0324	0.0144	-0.198***	0.138***	1	
19. % working women index	0.345***	0.284***	-0.00593	0.0772***	0.181***	-0.316***	0.413***	0.219***	1

Notes: This table reports Pearson correlations between the variables used in the analysis. Significance levels are computed as two tailed p-values: * p<0.05, ** p<0.01, *** p<0.001.

CHAPTER V - BOARD OF DIRECTORS' COMPOSITION AND FINANCING CHOICES

Abstract: Building on the pecking order theory of Myers and Majluf (1984) and Myers (1984), this study empirically analyses the association between the board of directors' composition and a firm's financing policies. In particular, the percentage of independent directors on the board, the fraction of female directors, and the size of the board are analysed, as well as whether the Chief Executive Officer (CEO) is also the chairman of the board. It is theorised that a more independent and efficient board leads to a shift of financing choices from retained earnings to short-term debt, from short-term debt to long-term debt, and from long-term debt to external equity financing. The results obtained in this study strongly support this hypothesis and offer additional policy implications.

Keywords: board of directors; independent directors; corporate governance; capital structure.

JEL classification: G30, G32, G34, M10

5.1 Introduction

Since Modigliani and Miller's (1958) seminal paper, many studies have attempted to explain the capital structure used by corporations to finance their investments. One prominent line of research is the pecking order theory of Myers (1984) and Myers and Majluf (1984). This theory argues that because of adverse selection costs, firms have an order of preference in the use of their financing sources. The theory predicts that firms prefer to use retained earnings rather than debt, short-term debt rather than long-term debt and debt rather than equity. This pecking order arises from the information asymmetries between managers and outside investors.

In this study, we analyse the effect of the board of directors' composition on the firm pecking order. We predict that a more independent and effective board of directors increases the quality and quantity of information provided by insiders to the public and therefore reduces the adverse selection costs considered by the pecking order theory. To test this hypothesis, we analyse the effect of the board of directors' features on the different sources of financing. That is, our research question asks whether the board of directors' composition has an influence on the pecking order of financing sources.

Given that less information asymmetry leads to the lower usage of retained earnings, the impact of a more independent board on the use of equity can be difficult to assess because retained earnings are part of the firm's equity. To address this problem, this study analyses the effect of board composition on external equity and internally generated equity (i.e., retained earnings). Further, because the pecking order theory predicts that firms will prefer to use short-term debt rather than long-term debt if debt capital is needed, we segregate the firm sources of financing into retained earnings, short-term debt and long-term debt. We then analyse the effect of the board of directors' composition on each of the financing sources.

After we control for a wide set of variables, the results of the empirical investigation strongly support the proposed hypothesis. In particular, the presence of a larger fraction of independent directors on the board results in the firm's usage of more external financing sources and in a shift from short-term debt to long-term debt and from long-term debt to external equity. The results also provide some evidence that a more gender-diversified board of directors and a board in which the chairman is a non-executive can prompt the firm to rely more on long-term sources of financing. The results are robust in a number of specifications and robustness tests.

This study extends the previous empirical research on the effect of corporate governance on capital structure in the following three main ways. First, whereas the majority of the previous studies that relate corporate governance and capital structure focus on aggregated corporate governance data, this study focuses on particular attributes of the board of directors' structure, namely the total number of independent directors, the fraction of female directors, and the board size, as well as whether the Chief Executive Officer (CEO) is also the chairman of the board of directors. This focused analysis is important because many of the aggregated indices may include governance devices that are beneficial both to shareholders and bondholders, as in the case of antitakeover devices (Bradley and Chen, 2011). Second, because the pecking order theory has different empirical implications in regard to different types of financing sources, this study analyses the effect of board structure on the fraction of retained earnings, external equity, short-term debt and long-term debt. Finally, this study provides new insights on the determinants of capital structure and adds to the discussion on capital structure theories.

The remainder of the paper is organised as follows. In the next section, the previous literature on capital structure and on the effect of board composition on capital structure

is reviewed and the main hypothesis is developed. In section 3, the data and the methodology are presented. The results are presented and discussed in section 4, and section 5 concludes with the policy implications of the findings.

5.2 Literature review and hypothesis development

In this section, we briefly review the main theories and previous empirical studies relating to capital structure and corporate governance. These theoretical and empirical studies will then be used to frame the hypothesis.

5.2.1 Literature review

Capital structure theory can be divided into the following two main lines of thought: (1) the trade-off theory and the (2) pecking order theory. Although these theories are not contrasting, they can predict different management behaviours in relation to financing choices, particularly the effect of the board of directors' composition on those choices. Because these theories are frequently discussed in the corporate finance literature, we will be brief on the exposition. For a thorough and relatively recent theoretical and empirical discussion of both the trade-off and the pecking order theories, refer to Myers (2003) and Frank and Goyal (2008).

Trade-off theory

The trade-off theory suggests that firms will target an optimal level of balance between equity and debt that maximises the difference between the benefits and costs of issuing debt. The benefit of debt is the tax advantage of interest payments to debt holders (Modigliani and Miller, 1963; Miller, 1977). Because interest is tax deductible, firms have incentives to use more debt. The costs of debt are generally described as

financial distressed costs. These costs include the costs of bankruptcy (Kraus and Litzenberger, 1973) and the agency costs of financial distress (Jensen and Meckling, 1976).

The costs of bankruptcy include the direct costs (e.g., legal and administrative expenses) and the indirect costs of bankruptcy. These indirect costs are characterised by a reduction in value of the firm assets over the bankruptcy process (e.g., the loss of business with clients who demand guaranties of business continuity from their suppliers). Beyond these bankruptcy costs, the costs that arise from the conflicts of interest between equity holders and debt holders must also be taken into account in this trade-off theory. As Jensen and Meckling (1976) show, managers can change the riskiness of their investments after issuing debt. Motivated by the fact that equity can be viewed as a call option in which its value appreciates as the risk of the underlying asset increases (Merton, 1973), managers acting on the interest of equity holders can be tempted to shift the risk of their operations at the cost of the creditors. This behaviour is often labelled as “the asset substitution problem”. Rational debt holders are aware of that possibility and therefore write debt contracts (including monitoring devices) to prevent managers from shifting the firms’ assets risk and/or demand higher premiums for buying debt. In either case, as shown by Jensen and Meckling (1976), the entire cost is incurred by the shareholders and the more debt the firm uses, the higher the likelihood of incurring financial distress costs. The trade-off theory then argues that firms will aim at some target level leverage so that the firm value is maximised (i.e., where the marginal costs of debt use match the marginal benefits).

Pecking order theory

The pecking order theory of Myers and Majluf (1984) and Myers (1984) argues that because of adverse selection costs, firms have an order of preference in the use of their financing sources. The theory builds on asymmetric information problems between managers and outside investors. Because managers know more about the company prospects than outside investors, managers may pass up valuable new investment opportunities if external financing is needed. The rationale for this behaviour is that investors (who have less information than managers) infer the true value of the firm from the managers' willingness to issue equity. Investors interpret a new equity issue rationally, viewing it as bad news, and only agree to buy new equity at a discount price. Because the issuance of new equity at lower prices might transfer value from current shareholders to new shareholders, managers do not issue new equity and pass up an investment opportunity that would increase the firm value.

In this scenario (in which internal agents know more about the firm than do outsiders), internal financing sources allow managers to proceed with valuable new investment opportunities. Further, if debt is available and free of risk, it can also be used. If debt is available but risky, Myers (1984) argues that intuitively, it is preferable to use equity because debt is less sensible with regard to adverse selection costs. In other words, the adverse selection premium demanded by investors is lower for less risky securities. Therefore, because of these information asymmetries, the pecking order theory predicts that if capital is needed for new investment opportunities, firms prefer to use retained earnings rather than debt, short-term debt rather than long-term debt and debt rather than equity.

One key difference between the pecking order theory and the trade-off theory is that in the most extreme interpretation of the pecking order theory, managers do not have a

well-defined target leverage ratio, whereas in the trade-off theory, it is predicted that management will issue debt or equity towards a target leverage ratio (Myers, 1984). A frequent critique of the pecking order theory is that in its most extreme interpretation, companies should never issue equity, provided that it is always possible to issue debt. Pecking order advocates argue, however, that because firms have some limited debt capacity, the debt capacity serves to limit the amount of debt within the pecking order and in fact allows for the use of equity (Lemmon and Zender, 2010). Although neither the trade-off theory nor the pecking order theory can explain all the stylised facts encountered in reality (Frank and Goyal, 2008, 2009), previous empirical studies have documented that managers behave as the pecking order theory predicts, even if they have a flexible target leverage ratio in mind (e.g., Pinegar and Wilbricht (1989); Shyam-Sunder and Myers, 1999; Fama and French, 2002; Brounen et al., 2006; Lemmon and Zender, 2010).

Other factors that can influence capital structure

Although the trade-off theory and the pecking order theory are the main theories explaining how firms choose their financing structures, other forces also can influence that structure. Jensen (1986) posits that the use of debt can mitigate agency costs that arise from the conflicts of interest between managers and shareholders. The managers of firms that generate substantial cash flows are seen as more likely to be entrenched, tempted to overinvest and to accept perquisites. The use of debt requires managers to pay out future cash flows, reducing the cash flow available for spending at their discretion and increasing organisational efficiency. As such, in line with the trade-off theory, debt has the additional benefit of reducing agency costs between managers and equity holders. Using a different line of thought, Baker and Wurgler (2002) argue that

firms decide whether to issue equity or to repurchase it depending on equity market values, creating what it is commonly labelled as the market timing hypothesis. Alti (2006) tested this market timing hypothesis and found that the negative effect of timing equity issues on financial leverage quickly reverses. This reversion occurs because when firms issue overvalued equity, it is likely that debt is also overvalued and firms issue more debt.

Corporate governance and financing structure

Empirical researchers have only recently devoted increased attention to the effect of corporate governance devices on capital structure decisions. One line of research has focused on the relation between aggregated corporate governance metrics and the use of total equity versus total debt. John and Litov (2010) and Jiraporn et al. (2012) are two examples of this approach. These two studies find that firms whose managers are more entrenched (with poor governance mechanisms) are significantly more leveraged. These authors argue that debt and governance play the same role and may substitute for each other. In contrast to these results, Harford and Zhao (2008) use an index of board directors' characteristics in their finding that 'stronger' (more independent) boards will force the firm to hold more debt and more short-term debt rather than long-term debt.

Using a similar approach, Setia-Atmaja et al. (2009) analyse family-controlled firms and find that these firms have higher debt levels and lower levels of board independence compared to non-family firms, suggesting that debt is a substitute for independent directors. Consistent with these results, Ghosh et al. (2011) find that firms with entrenched CEOs use less leverage and shorter-maturity debt. These researchers argue that managers acting in their own self-interest will choose lower leverage to reduce

liquidity risk and will use short-maturity debt to preserve their ability to enhance their compensation and reputations by empire building.

A related stream of literature analyses the way in which corporate governance mechanisms affect the cost of debt. Klock et al. (2005), Bradley and Chen (2011), Lorca et al. (2011) and Fields et al. (2012) are some examples of this line of research. Klock et al. (2005) find that antitakeover governance provisions (that provide the strongest management rights) lower the cost of debt financing. In other words, there is a positive association between governance quality and the cost of capital. Consistent with this result, Bradley and Chen (2011) argue that managerial self-serving behaviour (entrenchment) may not be detrimental to bondholders because these managers adopt low-risk, self-serving operating strategies that coincidentally redound to the benefit of corporate bondholders. Conversely, Lorca et al. (2011) and Fields et al. (2012) find that firms that have higher quality boards (with a stronger advisory presence) contribute to a reduction in the agency cost of debt financing. These researchers argue that the board of directors' monitoring role leads to a decrease in the opportunistic behaviour of managers and information asymmetry, with a consequent reduction in creditors' perception of the likelihood of default in loan repayments, resulting in a lower cost of debt. These two contrasting results may stem from the fact that antitakeover provisions affect the cost of debt in an opposing way to the board of directors' independence and effectiveness effect. Antitakeover provisions are detrimental to equity but beneficial to bond holders because of the coinsurance effect associated with acquisitions (Bradley and Chen, 2011)), whereas the board of directors' independence is beneficial to both equity and bondholders because it reduces information asymmetry (Fields et al. (2012)).

5.2.2 Hypothesis

In line with the pecking order theory, it is clear that information asymmetry problems between the firm and capital providers are important determinants of financing choices. Because different fund providers have different access to relevant information about the firm and different abilities to monitor firm behaviour, firms care about who provides the funds (MacKie-Mason, 1990). Because information asymmetry between managers and investors increases the difficulty of issuing securities, particularly public equity and debt securities, it creates a natural preference for managers to use internal rather than external financing.

The pecking order theory predicts that the lower the information asymmetry between management and public investors, the less costly it is to issue securities. Firms with a high level of information asymmetry should use more internally generated funds; if needed, these firms should issue less risky securities, such as short-term debt, and avoid issuing securities at a higher discount, such as long-term debt and/or equity. Among external financing sources, managers prefer less risky securities because high-risk securities (such as new equity and long-term debt) are more sensitive to information asymmetries than low-risk ones such as short-term debt (Myers and Majluf, 1984).

A more independent and diversified board of directors is expected to decrease information asymmetries between managers and investors and therefore should make it easier to issue external securities and risky securities. This scenario occurs because outside financing requires managers to explain to outside investors the need for the funds and therefore expose themselves to investor monitoring if they want to get best price for the securities. Entrenched and self-serving managers dislike this process and would prefer retained earnings rather than external financing (Frank and Goyal, 2008). A board of directors composed in such a way that it reduces information asymmetries

between managers and potential investors should make it easier to issue external finance and more risky securities. In other words, one should see a shift between internal and external financing choices, and from less risky securities (e.g., short-term debt) to more risky securities (e.g., long-term debt and new equity) when the board of directors can act as a mechanism of reducing information asymmetries between insiders and external investors. Therefore, we propose the following hypothesis.

H1: *The board of directors' composition influences the firm financing mix, including retained earnings, external equity, short-term debt and long-term debt.*

5.3 Data and methodology

This study builds on a sample of firms extracted from the Bloomberg database. This data vendor provides market, accounting and corporate governance data from a wide set of listed firms across the world. The initial data sample consists of all nonfinancial firms with both financial and corporate governance data available between 2006 and 2010. We select this time period because this data vendor only provides corporate governance data for a wide set of firms from 2006 onwards. Selecting a longer-term window would significantly reduce the total number of firms in the initial sample. Financial firms are excluded because they are subject to specific capital requirement regulations that can potentially influence their financing choices (Alves and Ferreira, 2011). The initial sample results in 2,427 firms (12,135 observations) from 33 countries. Column (1) and (2) of table 5.1 provide a description of sample data from the various countries. Similar to other capital structure studies (e.g., Alves and Ferreira, 2011) our sample is composed of roughly 50% of firms from the US and Japan.

Table 5.1. Sample characteristics

Country	Firms (1)	N (2)	Market EE (3)	Market RE (4)	Market STD (5)	Market LTD (6)
Australia	180	900	0.718	-0.013	0.103	0.194
Austria	7	35	0.377	0.181	0.127	0.315
Belgium	7	35	0.498	0.177	0.097	0.219
Brazil	14	70	0.545	0.085	0.121	0.247
Britain	197	985	0.471	0.156	0.152	0.223
Canada	92	460	0.652	0.049	0.054	0.245
China	56	280	0.634	0.099	0.192	0.074
Denmark	13	65	0.490	0.219	0.136	0.154
Finland	25	125	0.385	0.228	0.183	0.203
France	43	215	0.459	0.089	0.179	0.263
Germany	9	45	0.512	0.065	0.172	0.234
Greece	4	20	0.435	0.147	0.150	0.269
Hong Kong	22	110	0.513	0.191	0.107	0.186
India	289	1,445	0.253	0.240	0.221	0.264
Ireland	14	70	0.598	0.042	0.113	0.251
Israel	3	15	0.630	0.105	0.147	0.119
Italy	18	90	0.325	0.193	0.170	0.311
Japan	722	3,610	0.239	0.323	0.230	0.207
Luxembourg	5	25	0.469	0.171	0.146	0.204
Malaysia	7	35	0.524	0.182	0.093	0.201
Netherlands	21	105	0.466	0.133	0.183	0.215
New Zealand	8	40	0.430	0.294	0.070	0.205
Norway	6	30	0.306	0.166	0.172	0.356
Portugal	3	15	0.461	0.147	0.103	0.289
Russia	7	35	0.386	0.387	0.092	0.132
Singapore	17	85	0.475	0.185	0.181	0.158
South Africa	27	135	0.522	0.187	0.126	0.165
Spain	15	75	0.417	0.128	0.122	0.325
Sweden	23	115	0.460	0.202	0.156	0.182
Switzerland	27	135	0.533	0.177	0.108	0.181
Thailand	2	10	0.472	0.248	0.087	0.193
Turkey	5	25	0.347	0.234	0.278	0.141
United States	539	2,695	0.596	0.065	0.094	0.246
Full Sample	2,427	12,135	0.432	0.179	0.163	0.223

Note: This table reports per country firms, observation and means of the market financing sources. Market EE is defined as market external equity (MEE) divided by market capital. MEE is computed as the market value of equity minus the book value of retained earnings. Market capital is defined as book capital less the book value of equity plus the market value of equity. Book capital is defined as the book value of assets less accounts payable. Market RE is defined as book value of retained earnings (RE) divided by market capital. Market STD is defined as book value of current liabilities due within one year (STD) minus accounts payable divided by market capital. Market LTD is defined as total book value of non-current liabilities (LTD) divided by market capital.

5.3.1 Dependent Variables

This paper's hypothesis posits that the composition of a firm's board of directors affects the mix of financing sources. In particular, a board composed in a way that reduces information asymmetries between management and investors makes it more likely for the firm to use external sources of funds, and among these sources, to use the more risky ones. To test this hypothesis, we segregate firms' financing sources into four different levels according to the predicted hierarchy of the pecking order. First, following Myers (1984), we segregate equity into internal and external, one at the top of the pecking order and one at the bottom. Further, using a description similar to that of Baker and Wurgler (2002), we define internal equity as the book value of retained earnings (RE) and book external equity (BEE) as the total book value of equity minus retained earnings. Finally, we segregate the firm debt into short-term debt (STD) and long-term debt (LTD), where STD is the book value of current liabilities due within one year minus accounts payable and LTD is defined as the total book value of non-current liabilities (liabilities not due to be paid within the next year). Each of these four types of financing sources is then scaled by the total book value of capital employed (*book capital*), which is defined as the book value of assets minus accounts payable as in Rajan and Zingales (1995). By this means, the total book capital is segregated into the following four types of financing sources that add up to one: (1) *Book EE*, defined as BEE divided by *book capital*; (2) *Book RE*, defined as RE divided by *book capital*; (3) *Book STD*, defined as STD divided by *book capital*; (4) *Book LTD* defined as LTD divided by *book capital*.

In addition, each of the four types of financing mentioned above is also computed as a quasi-market value. For consistency with the book measures, the market value of external equity (MEE) is defined as the market value of equity minus the book value of

retained earnings. The other three measures (RE, STD and LTD) are computed in the same way. Each one is then divided by the quasi-market value of capital (*market capital*), which is computed as the book value of total capital minus the book value of equity plus the market value of equity. As with the book values of financing sources, these quasi-market values also add up to one as follows: (1) *Market EE*, defined as MEE divided by *market capital*; (2) *Market RE*, defined as RE divided by *market capital*; (3) *Market STD*, defined as STD divided by *market capital*; and (4) *Market LTD*, defined as LTD divided *market capital*. In sum, we end up with eight measures of financing sources, four measures computed as book values and another four measures valued as quasi-market values (in which the book value of equity is replaced by the market value of equity). Finally, we have winsorised each of these measures using the bottom and the top 1% of the variables' distribution tails to avoid potential erroneous data. Columns (3) to (6) of table 5.1 present these four quasi-market-value financing sources for the various countries in the sample. Overall, the fraction of market external equity yields up to 43.2%, which represents the highest fraction of all financing sources. The second most used source of finance is long-term debt, followed by short-term debt and then by retained earnings. This ranking varies widely across countries. For instance, in Japan, retained earnings are the most representative financing source at an average 32.3% of total capital. On the other hand, in Australia, external equity represents 71.8% of the total capital whereas retained earnings are negative, probably revealing that Australian firms in this sample pay out most of their positive profits and that when capital is needed (e.g., when having negative profits), they issue external equity.

5.3.2 Independent variables

In this study, we are interested in learning whether the structure of the board of directors affects management decisions in terms of financing choices. We predict that a board of directors that reduces information asymmetries between management and outside investors would lead to a financing mix with more external financing and more risky securities. One feature that has received major attention from researchers is the board of directors' independence, or in other words, the percentage of directors considered to be outside directors or not related to internal managers (executives) and its effect on reducing agency costs between agents (executive managers) and shareholders (Fama, 1980; Fama and Jensen, 1983; Hermalin and Weisbach, 1998, 2003).

Within this scope, several studies have found that firms with stronger corporate governance devices have more effective information disclosures and fewer information asymmetry problems (e.g., Vafeas, 2000; Klein, 2002; Beekes et al., 2004; Ajinkya et al., 2005; Karamanou and Vafeas, 2005; Cheng and Courtenay, 2006; Petra, 2007; Kanagaretnam et al., 2007; Dimitropoulos and Asteriou, 2010). For example, Ajinkya (2005) finds that firms with more outside directors issue forecast earnings more frequently and that the forecasts are more specific, accurate and less optimistically biased. Similarly, Kanagaretnam et al. (2007) report that firms with more independent boards of directors have lower information asymmetry with regard to quarterly earnings announcements. Because boards are responsible for monitoring the quality of the information contained in financial reports and provided to the shareholders, the directors who do a more effective job of monitoring management enhance the quality and the frequency of public information released by the executive management. We therefore

expect a positive relationship between the fraction of outsiders and the use of more risky securities in its financing structure.

Several studies also address the effect of gender diversity on the efficiency of corporate boards. Carter et al. (2003, 2010) suggest that board diversity can improve monitoring efficiency. Similarly, Kang et al. (2010) indicate a positive reaction from investors to the appointments of female directors. Adams and Ferreira (2009) document that female directors attend more board meetings, which is the primary way in which important monitoring information is gathered, suggesting that gender-diverse boards allocate more effort to monitoring executive directors. Based on this argument, we expect a more gender-diversified board of directors to be more efficient and thus to contribute to lower information asymmetries.

The effect of board size on information asymmetry can be ambiguous. Yermack (1996) claims that larger boards are less efficient in monitoring management, arguing that coordination, communication and decision making can be more burdensome in large boards, thus making the monitoring role of the board less effective. Consistent with this view, Vafeas (2000) and Ahmed et al. (2006) document that the earnings of firms with smaller boards are perceived by investors as being more informative. However, more recently, Coles et al. (2008) provide evidence that complex firms, which have larger advising requirements than simple firms, have larger boards and that in these firms, board effectiveness is positively associated with size. Results from Peasnell et al. (2005) reveal that firms with larger boards are less likely to be associated with earnings management measured by abnormal accruals. These authors suggest that larger boards contribute towards the integrity of financial statements. Further, Cheng and Courtenay (2006) provide evidence that the size of the board of directors is positively associated with the level of a firm's voluntary disclosure. Moreover, a larger board can

also reflect dispersed ownership of the firm (as opposed to family-controlled firms), which in turn can positively affect the quantity and quality of information provided to the public (Chau and Gray, 2002). Therefore, an empirical question remains as to whether board size increases or decreases the information asymmetries between managers and the public. Hence, we are not able to predict a sign for the association between board size and firm financing choices.

Within the same scope, Klein (2002) suggests that boards that are structured to function more independently from the CEO are more effective in monitoring the corporate financial accounting process. In this sense, a board of directors in which the chairman of the board is also the CEO should be less independent because of this high concentration of power and adverse conditions for outsiders to effectively monitor the executive members (Coles et al., 2008; Duchin et al., 2010). Consistent with this view, Gul and Leung (2004) show that CEO duality is associated with lower voluntary disclosures by firms. As such, we expect that firms with a chairman of the board who is simultaneously the CEO are likely to face larger information asymmetries and to use less risky sources of financing.

Given the preceding discussion, the independent variables considered in this study are as follows: (i) the percentage of outside independent directors, measured as the ratio between the number of independent directors as reported by the company and the number of directors on the firm's board (% independent); (ii) the percentage of female directors measured as the ratio between the number of women and number of directors on the firm's board (% women); (iii) the board size, which is the logarithm of the total number of directors on the firm's board ($\text{Log}(\text{board size})$). If the company has supervisory and management boards, this is the total members of the supervisory board;

(iv) a dummy variable that takes the value of one if the CEO is also the chairman of the board (CEO/chair duality).

5.3.3 Control variables

We include several control variables that are shown in previous studies to have significant impact on financing choices (e.g., Titman and Wessel, 1988; Harris and Raviv, 1991; Rajan and Zingales, 1995). First, we control for growth opportunities because of the asset substitution problem described by Jensen and Meckling (1976) and the underinvestment problem identified by Myers (1977). Firms with higher opportunities for growth are better able to shift the risk of their assets to benefit shareholders at the cost of bondholders. In a similar way, firms with valuable new investment opportunities may pass them up if they lead to a reduction in the risk of assets that would benefit bondholders. The asset substitution and underinvestment problems can influence the firm financing choices, particularly for firms with higher growth opportunities and for highly leveraged firms (Brounen et al., 2006; Alves and Ferreira, 2011).

We use two proxies for growth opportunities. The first proxy is the average growth rate of the firm sales (sales growth) as shown in Mande et al. (2010). The second proxy is the value of investment in research and development (R&D) scaled by the firm total assets (R&D to assets) as shown in Johnson (2003) and Brown et al. (2009). We use these proxies for growth opportunities as opposed to the market-to-book ratio for the following three reasons. First, the market-to-book indicator measures not only growth opportunities, but also the degree of information asymmetry between management and investors. In fact, a firm with a high market-to-book value may indicate that it has valuable growth opportunities and fewer agency problems. This finding is important for

this study because a lower level of information asymmetry may stem from a more independent board of directors. Including market-to-book value as a control variable could result in collinearity between this variable and the board structure variables. Second, the relation between the market-to-book ratio and financing sources may reflect the fact that managers time their equity issues (Baker and Wurgler, 2002). This finding is also important in this study because managers may time their equity issues when their shares are overvalued, and this overvaluation may also reflect the effect of having a more independent board. Finally, as explained in Baker and Wurgler (2002) and Johnson (2003), the relation between the market-to-book ratio and market measures of leverage can be mechanical, rather than reflecting the effect of growth opportunities on financing choices. For example, when regressing market leverage (measured as the book value of debt over the market value of capital) on the market-to-book ratio, the market value of the firm is on the numerator of the dependent variable and also on the denominator of the independent variable.

Tax shields are also important determinants of firms' capital structure (Modigliani and Miller, 1963). Numerous studies on the determinants of capital structure have recognised their importance in explaining financing choices (e.g., Huang and Song, 2006; Brounen et al., 2006). The effective tax rate (tax rate) measured as the total of corporate income taxes paid divided by the pre-tax profit is then used as a control variable. Effective tax rate is censored to be between zero and one.

Firm size has also been identified in capital structure literature as one of the main determinants of financing mix (e.g., Frank and Goyal, 2009). Larger firms are more likely to be diversified and thus less likely to default on their debt provisions. Accordingly, larger firms may issue more debt than smaller firms. Therefore, we expect size to be positively related to leverage. Further, although larger firms tend to issue

more information, they can be more complex and relevant information more difficult to interpret by investors. We therefore include the logarithm of sales ($\log(\text{sales})$) as a proxy for firm size as an additional control variable.

DeAngelo and Masulis (1980) emphasise that non-debt-related corporate tax shields such as tax deductions for depreciation and investment tax credits may affect leverage. Such non-debt tax shields are substitutes for the tax benefits of debt. To address this determinant, we follow Huang and Song (2006) and use depreciation and amortisation over assets as a control variable to measure this kind of non-debt tax shield (depreciation to assets).

In a study by Williamson (1988), assets' redeployability is a determinant of capital structure choices. In his scope, the asset specificity of firms determines the most effective types of financing sources to be employed. For firms in which asset specificity is great (and less redeployable), equity financing should be used, because equity enables management oversight by the board of directors and, if financed with debt, debtholders would bear higher risks (less protection in case of liquidation) and demand higher rates of return. For firms with highly redeployable assets, however, debt financing should be the preferred source of finance because it limits management discretion to more bounded behaviour. Further, Williamson (1988) argues that although tangibility and redeployability are not identical, they are highly correlated. Campello and Giambona (2010) and Alves and Ferreira (2011) empirically observe a strong positive relationship between tangibility and firm leverage, corroborating Williamson's (1988) predictions. As such, our study also employs a control variable for asset tangibility, measured as the ratio of fixed assets over total assets (tangibility).

Operating profitability, measured as the ratio of earnings before interest, taxes, depreciation and amortisation (EBITDA) to book value of total assets (return on assets

(ROA)), is also included as a control variable. If firms prefer internally generated funds to finance their investment needs, firms with higher levels of profitability can have potentially higher levels of retained earnings, despite information asymmetry problems. Moreover, firms with a more independent board of directors can also be more profitable. Thus, profitability is included as a control variable to extract any of these potential confounding effects. Additionally, we include operating earnings volatility as another control variable because firms with higher operating income volatility have higher operating risk and are more likely to default (Frank and Goyal, 2009). This measure is computed for each firm as the standard deviation of its operating profit over the sample period ($\sigma(\text{ROA})$).

Country-specific control variables are also included in the analysis. Following Kayo and Kimura (2011), we use the market capitalisation to GDP ratio as a proxy to stock markets' level of development ($\log(\text{market cap to GDP})$). Following Alves and Ferreira (2011), we also include a proxy for creditor rights, measured as an index that ranges from 0 to 10, with higher scores indicating that these countries' bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending (legal rights indicator). Both indicators were obtained from the World Bank database. Several of the variables used were logarithmised to account for skewness in the data. Table 5.2 presents the variable definitions and table 5.3 presents descriptive statistics on the variables used in this study.

Table 5.2. Variable definitions

<i>Variable</i>	<i>Description</i>
Panel A: Financing sources	
Book EE	Defined as book external equity (BEE) divided by book capital. BEE is computed as the book value of equity minus the book value of retained earnings. Book capital is defined as the book value of assets less accounts payable.
Book RE	Defined as book value of retained earnings (RE) divided by book capital. Book capital is defined as the book value of assets less accounts payable.
Book STD	Defined as book value of current liabilities due within one year (STD) minus accounts payable divided by book capital. Book capital is defined as the book value of assets less accounts payable.
Book LTD	Defined as total book value of non-current liabilities (LTD) divided by book capital. Book capital is defined as the book value of assets less accounts payable.
Market EE	Defined as market external equity (MEE) divided by market capital. MEE is computed as the market value of equity minus the book value of retained earnings. Market capital is defined as book capital less the book value of equity plus the market value of equity. Book capital is defined as the book value of assets less accounts payable.
Market RE	Defined as book value of retained earnings (RE) divided by market capital. Market capital is defined as book capital less the book value of equity plus the market value of equity. Book capital is defined as the book value of assets less accounts payable.
Market STD	Defined as book value of current liabilities due within one year (STD) minus accounts payable divided by market capital. Market capital is defined as book capital less the book value of equity plus the market value of equity. Book capital is defined as the book value of assets less accounts payable.
Market LTD	Defined as total book value of non-current liabilities (LTD) divided by market capital. Market capital is defined as book capital less the book value of equity plus the market value of equity. Book capital is defined as the book value of assets less accounts payable.
Panel B: Board composition variables	
% independent	Ratio between the number of independent directors and number of directors on the firm's board (board size), as reported by the company. Independence is defined according to the company's own criteria.
% women	Ratio between the number of women and number of directors on the firm's board (board size), as reported by the company.
Board size	The total number of directors on the firm's board. If the company has supervisory and management boards, this is the total members of the supervisory board.
CEO/chair duality	Dummy variable that takes the value of 1 if the company's Chief Executive Officer is also Chairman of the Board and 0 otherwise.
Panel C: Firm Specific control variables	
Sales growth	Average growth rate of firm's operating revenues during the sample period (between 2006 and 2010).
R&D to assets	Value of firm's investment in research and development (R&D) scaled by book value of assets.
Tax rate	Total of corporate income taxes paid divided by the pre-tax profit is then used as a control variable. Censored to be between zero and one.

Table 5.2. (continued)

Log(Sales)	Logarithm of the total value of firm's operating revenues, sales or turnover, as reported by the firm as of the end of fiscal year.
Depreciation to assets	Value of firm's reported depreciation and amortization divided by book value of assets.
Tangibility	Book value of fixed assets as reported by the firm (such as machinery, buildings and land) divided by book value of assets.
Return on assets (ROA)	Ratio of earnings before interest, taxes, depreciation and amortization (EBITDA) to book value of total assets.
Sigma (ROA)	Standard deviation of ROA (%) over the sample period (from 2006 to 2010).
Panel D: Country Specific	
Log(Market cap to GDP ratio)	Logarithm of the per capita gross domestic product (USD) of the country where the firm is based.
Legal rights indicator	Index that ranges from 0 to 10, with higher scores indicating that these countries bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending.

5.3.4 Methodology

To test the effect of a board of directors' composition on different financing sources, we employ a panel data model of the following baseline form:

$$\begin{aligned} (\textit{financing source})_{i,t} = & \beta_0 + \beta_1(\% \textit{independent})_{i,t} + \beta_2(\% \textit{women})_{i,t} \\ & + \beta_3(\textit{board size})_{i,t} + \beta_4(\textit{CEO duality})_{i,t} + \sum_j \beta_j(\textit{control variable}_j)_{i,t} + u_{i,t} \end{aligned} \quad (5.1)$$

where the index i denotes a firm, t denotes a year, *financing source* is one of the eight measures of financing sources used by firms, *% of independent* is the fraction of independent directors on the board of directors, *% female* is the fraction of female directors on the board of directors, *board size* is the logarithm of the total number of directors on the board, *CEO/duality* is a dummy variable that takes the value of one if the chairman of the board is also de CEO and *control variable* is the set of control variables defined above. This baseline specification includes year- and industry-fixed effects. The industry effects are captured using the Global Industry Classification Standard (GICS) sectors developed by Standard & Poor's.

Table 5.3. Descriptive statistics of the variables used in the analysis

<i>Variable</i>	<i>No. of Obs.</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>25th Perc.</i>	<i>75th Perc.</i>
Panel A: Financing sources					
Book EE	12,135	0.291	0.389	0.122	0.349
Book RE	12,135	0.214	0.405	0.096	0.401
Book STD	12,135	0.208	0.135	0.110	0.275
Book LTD	12,135	0.284	0.196	0.129	0.405
Market EE	12,135	0.432	0.373	0.212	0.645
Market RE	12,135	0.179	0.313	0.063	0.291
Market STD	12,135	0.163	0.130	0.068	0.224
Market LTD	12,135	0.223	0.170	0.086	0.324
Panel B: Board composition					
% independent	12,135	0.439	0.281	0.200	0.692
% women	12,135	0.065	0.088	0.000	0.111
Board size	12,135	9.745	3.247	8.000	12.000
CEO/chair duality	12,135	0.392	0.488	0.000	1.000
Panel C: Firm Specific					
Sales growth	12,135	0.122	0.188	0.034	0.146
R&D to assets	12,135	0.016	0.039	0.000	0.018
Tax rate	12,135	0.341	0.245	0.214	0.398
Log(Sales)	12,135	7.418	2.132	6.335	8.820
Depreciation to assets	12,135	0.039	0.026	0.023	0.049
Tangibility	12,135	0.334	0.220	0.155	0.475
Return on assets (ROA)	12,135	0.091	0.104	0.041	0.129
Sigma (ROA)	12,135	3.874	4.654	1.326	4.690
Panel D: Country Specific					
Log(Market cap to GDP ratio)	12,135	4.594	0.451	4.312	4.922
Legal rights indicator	12,135	7.802	1.484	7.000	9.000

Notes: This table reports descriptive statistics of the variables used in the study. All of the data were obtained from Bloomberg, except for the country-specific variables, which were gathered from the World Bank's website. All of the values are presented in USD unless otherwise specified.

We include industry fixed effects as opposed to firm fixed effects for two reasons. First, including firm fixed effects requires variation within firms across time in the variables of interest, which here are the fraction of independent and female directors, the board size and a dummy for the CEO/chairman duality. Although these variables are not strictly constant over time for all firms, they are in fact time invariant for the majority of firms. Over the sample period (2006 to 2010), many firms may have

constant fractions of independent and female directors and are even more likely to have a constant dummy for the dummy variable CEO/chairman duality. By estimating the parameters of equation (5.1) with firm fixed effects, the effects associated with the variables that are time invariant for those specific firms are not taken into account. As stressed by Wooldridge (2002, pg. 286), when key independent variables do not vary much over time, firm fixed effects (and first differencing methods) can lead to imprecise estimates. John and Litov (2010) and Ghosh et al. (2011) also stress their inability to use firm fixed effects in this scope. Second, the capital structure literature has often documented that the firm industry is a major determinant of financing practices. For example, Frank and Goyal (2009) find evidence that firms in industries in which the median leverage is high tend to have higher leverage and that this is a core factor explaining leverage practices across firms.

One potential problem of using industry rather than firm fixed effects or first differencing models is that this approach assumes exogeneity from independent variables (i.e., the error term in equation (5.1) is uncorrelated with the independent variables). We believe, however, that the board of directors' composition variables and the financing sources variables are unlikely to be endogenously determined. Jiraporn et al. (2012), following the arguments of Berger et al. (1997), Garvey and Hanka (1999), John and Litov (2009), among others, claim that there is no theoretical model in the literature suggesting that capital structure shocks cause changes in governance devices. Further, these authors argue that although capital structure decisions are defined by (executive) managers, it is rather difficult for these managers to modify the firm's corporate governance devices. Therefore, our baseline model is estimated assuming exogeneity. Nevertheless, we relax this assumption in the robustness section of the results.

To account for possible heteroskedasticity and autocorrelation in error terms, all coefficients t statistics are estimated with heteroskedasticity-consistent errors clustered by firm (Petersen, 2009). As a robustness check, we also estimated t statistics based on errors clustered by industry and country. The results remain qualitatively similar.

5.4 Empirical results

5.4.1 Board composition and financing choices

The main results of our investigation are presented in table 5.4. In this table, we show the results for eight regressions, one for each of the independent variables considered in the baseline model. In column (1) and (2), the independent variables are book EE and market EE, respectively. The variable % of independent reveals a positive and highly statistically significant coefficient, indicating that a board composed of a higher fraction of independent directors is associated with a higher fraction of external equity in its capital composition. This relation is economically relevant because the results estimate that an increase of 10% in the number of independent directors is associated with an increase of 3.22% (2.14%) in the fraction of market (book) external equity financing. In columns (3) and (4), we present the regression results when the dependent variable is the market RE and the book RE. Contrary to the results of external equity, retained earnings are now negatively associated with a higher fraction of independent directors in the board of directors and the coefficient is also highly statistically significant. This relation is also economically relevant because an increase of 10% in the number of independent directors is associated with a decrease of 2.94% (3.15%) in the fraction of retained earnings scaled by total market (book) capital. Together, the results from specifications (1) to (4) provide evidence in support of our prediction that a more independent board of directors facilitates the use of external

equity as compared with internal equity. In specification (5) and (6), the dependent variables are now the book and market STD and in specification (7) and (8), the book and market values of LTD. According to the pecking order theory, these sources of financing are between internal and external equity, being the STD preferable to LTD. Our prediction is that a more independent board should lead to a shift from STD to LTD. The results for the percentage of independent directors' variable are consistent with our prediction. A more independent board is negatively associated with the use of short-term debt and positively associated with the use of long-term debt. These relations are still highly statistical significant. Further, an increase of 10% in the number of independent directors would reduce short-term debt scaled by market capital by 0.65% and increase long-term debt over market capital by 1.67%. Overall, the results provide supporting evidence that a more independent board leads to a rise beyond the order of financing choices proposed by Myers and Majluf (1984). In particular, a more independent board of directors is positively associated with the use of external equity and long-term debt (at the bottom of the pecking order) and negatively associated with the use of retained earnings and short-term debt (at the top of the pecking order).

With respect to the effect of the board of directors' gender composition, the results do not provide statistically strong results because the coefficients are only statistically significant for two of the specifications. One potential problem is that the percentage of female directors is highly correlated to the percentage of independent directors, leading to collinearity problems in the estimation results. We will further address this issue in the analysis. Nevertheless, consistent with our prediction, the results show that a more gender-diversified board of directors is positively associated with a higher use of market external equity (specification 1) and negatively associated with the use of short-term debt (specification 2). Although these results have lower t statistic values, they provide

some support that a more gender-diversified board can prompt firms to use more external equity and less retained earnings. With respect to STD and LTD, the results are not consistent when using book or market values because we obtain opposite and non-statistical significant signs.

The effect of board size on the different types of financing sources is only statistically significant for specifications (5) to (8) in which the dependent variables are the market and book values of STD and LTD. The results support the idea that larger boards are more likely to use long-term debt and less likely to use short-term debt. These results may imply that a large board of directors reduces information asymmetries through more disclosure (Cheng and Courtenay, 2006) which in turn enables firms to use more long-term debt. Nevertheless, we find no evidence that larger boards prompt firms to use more external equity and less retained earnings.

When the CEO is also the chairman of the board, one should expect a less efficient board of directors and higher levels of information asymmetries. We therefore predict that for this kind of board, firms should use more internal equity and less external equity. The results of table 5.4 provide evidence in support of this prediction; that is, when the CEO is also the chairman, the firm has lower levels of external equity and has a higher fraction of retained earnings. The coefficients of this dummy variable have the expected signs and are statistically significant for the market value of external equity and for both the market and book retained earnings. The association between this variable and the fraction of STD is negative. Following the results of the % of independent directors' variable (where the relation found is negative), we expected to see a positive relation between this variable and the use of STD; however, the results are negative. The results for the market and the book values of LTD show the predicted sign and are highly statistical significant. Firms with a CEO who is also the chairman of

Table 5.4. Industry- and year-fixed effects regression of financial sources

<i>Explanatory variables</i>	<i>Market EE</i> (1)	<i>Book EE</i> (2)	<i>Market RE</i> (3)	<i>Book RE</i> (4)	<i>Market STD</i> (5)	<i>Book STD</i> (6)	<i>Market LTD</i> (7)	<i>Book LTD</i> (8)
% independent	0.322*** (13.121)	0.214*** (8.304)	-0.294*** (13.217)	-0.315*** (11.240)	-0.102*** (11.774)	-0.065*** (6.564)	0.074*** (6.656)	0.167*** (12.363)
% women	0.160** (2.146)	-0.022 (0.268)	-0.101 (1.503)	-0.082 (0.958)	-0.040* (1.854)	0.047 (1.600)	-0.030 (0.868)	0.039 (0.921)
Log(Board size)	0.023 (1.313)	-0.006 (0.345)	-0.009 (0.526)	-0.005 (0.224)	-0.039*** (5.174)	-0.029*** (3.391)	0.018** (2.034)	0.035*** (3.201)
CEO/Chair duality	-0.032*** (3.221)	-0.008 (0.803)	0.044*** (4.672)	0.043*** (3.847)	-0.000 (0.129)	-0.020*** (4.574)	-0.012*** (2.586)	-0.016*** (2.882)
Sales growth	0.210*** (4.967)	0.141*** (3.195)	-0.146*** (4.132)	-0.125*** (2.868)	-0.051*** (4.614)	-0.020 (1.633)	-0.013 (0.707)	0.002 (0.079)
R&D to assets	1.235*** (3.605)	2.782*** (3.130)	-0.532* (1.718)	-2.389** (2.505)	-0.223*** (5.077)	-0.048 (0.701)	-0.483*** (6.228)	-0.338*** (3.371)
Tax rate	0.061** (2.481)	0.118*** (4.704)	-0.093*** (4.117)	-0.133*** (5.141)	0.031*** (4.625)	0.015** (2.161)	0.009 (1.053)	0.010 (1.062)
Log(Sales)	-0.021*** (4.262)	-0.039*** (8.085)	0.003 (0.856)	0.017*** (3.662)	0.007*** (4.709)	0.007*** (4.706)	0.013*** (7.645)	0.016*** (8.969)
Depreciation to assets	1.179*** (3.708)	0.381 (0.923)	-0.788*** (2.679)	-0.525 (1.238)	-0.231*** (3.503)	-0.046 (0.577)	-0.121 (1.039)	0.211 (1.263)
Tangibility	-0.217*** (6.509)	-0.115*** (3.065)	0.037 (1.292)	-0.007 (0.167)	-0.065*** (6.164)	-0.127*** (10.309)	0.258*** (14.642)	0.266*** (13.644)
Return on assets (ROA)	0.240** (2.312)	-1.176*** (9.199)	0.460*** (5.240)	1.418*** (9.912)	-0.232*** (9.703)	0.042* (1.650)	-0.469*** (13.827)	-0.266*** (6.787)
Sigma (ROA)	0.013*** (7.276)	0.014*** (5.966)	-0.006*** (3.562)	-0.009*** (3.339)	-0.003*** (6.172)	-0.002*** (3.375)	-0.004*** (6.828)	-0.003*** (4.256)

Table 5.4. (continued)

<i>Explanatory variables</i>	<i>Market EE</i> (1)	<i>Book EE</i> (2)	<i>Market RE</i> (3)	<i>Book RE</i> (4)	<i>Market STD</i> (5)	<i>Book STD</i> (6)	<i>Market LTD</i> (7)	<i>Book LTD</i> (8)
Log(Market cap to GDP)	0.109*** (7.779)	0.051*** (3.148)	-0.036*** (3.145)	-0.003 (0.140)	-0.019*** (4.587)	0.000 (0.031)	-0.053*** (7.890)	-0.049*** (6.035)
Legal rights indicator	-0.002 (0.521)	0.002 (0.461)	-0.004 (1.163)	-0.010** (2.024)	-0.007*** (4.704)	-0.012*** (5.208)	0.014*** (6.904)	0.021*** (8.120)
Constant	-0.114 (1.632)	0.264*** (4.062)	0.499*** (8.240)	0.281*** (3.626)	0.434*** (16.926)	0.395*** (12.996)	0.164*** (4.620)	0.042 (0.992)
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,135	12,135	12,135	12,135	12,135	12,135	12,135	12,135
R ²	0.304	0.358	0.164	0.288	0.302	0.150	0.374	0.335
F Statistic (p-value)	138.282 (0.000)	16.798 (0.000)	26.170 (0.000)	21.272 (0.000)	73.291 (0.000)	30.654 (0.000)	119.707 (0.000)	77.052 (0.000)

Notes: Standard errors are adjusted for clusters in firms and heteroskedastic robust variance estimators. *t* statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively. Refer to table 5.2 for variables definition.

the board use much less LTD. Combining the results, we find that the dummy variable CEO/chairman duality is positively associated with retained earnings and negatively associated with the remaining sources of financing, which is also consistent with the prediction that a more independent board uses more risky financing sources.

Regarding the analysis of control variables, our proxies for growth opportunities (sales growth and R&D) are positively related to external equity financing and negatively related to the other sources of financing. These results are consistent with the previous literature. Firms with higher growth opportunities are more likely to face asset substitution and underinvestment problems. Therefore, these firms use more external equity compared to debt. The negative relationship between growth opportunities and retained earnings may be linked to the fact that these firms are still in the growing phase and thus have few positive earnings to retain. Additionally, to finance their new investment opportunities with external equity, these firms might need to pay out a large fraction of dividends, as predicted by the signalling effect of dividends (Williams, 1988), to provide financial markets with a signal of the return on assets they invest and to reduce the agency costs of equity (Easterbrook, 1984). With respect to the tax rate, the results show a positive relationship between this variable and the fraction of short-term debt and a negative relationship with retained earnings, which is consistent with the tax shield hypothesis. Surprisingly, it seems that firms that pay higher tax rates use more external equity. One possible justification for this result is that firms that have higher tax rates are also more valuable firms, which in turn are more likely to issue more equity. Nevertheless, more research is needed to further explain this relationship. We find no evidence as to whether the tax rate has an influence on long-term debt usage. With respect to firm dimension (measured as the log of sales), table 5.4 results are also consistent with the previous empirical literature, because the results provide

new evidence that larger firms are more likely to use debt as a preferred source of finance. The effect of depreciation on the different sources of finance is also consistent with the previous empirical literature (e.g., DeAngelo and Masulis, 1980) in the sense that firms with higher levels of asset depreciation use fewer debt financing sources and more external equity. Further, as expected, the results show that firms with more depreciations also have less retained earnings because depreciations are usually considered non-cash expenses and a part of the internal generated funds (Brown et al., 2009). As expected, tangibility is positively and highly statistically associated with the use of long-term debt and negatively associated with external equity and short-term debt (Bevan and Danbolt, 2002). Profitability, measured by return on assets, is naturally positively associated with the fraction of retained earnings. Further, in line with the pecking order theory and previous capital structure empirical studies (e.g., Frank and Goyal, 2009), the results show that profitable firms are less likely to use long-term debt. With respect to operating risk, which is measured as the standard deviation of ROA, the results show that firms with higher operating risk are less likely to issue debt (both short-term and long-term) and retained earnings. As expected, firms with higher earnings volatility make more use of external equity. Finally, with respect to country level variables, firms in countries with more developed stock markets rely more on external equity and less on long-term debt. Moreover, as expected, firms based in countries in which laws are more likely to protect the rights of borrowers and lenders have higher fractions of long-term debt (Alves and Ferreira, 2011).

5.4.2 Board composition and financing hierarchy

In the previous subsection, we provided evidence that board composition has an influence on firm financing choices. In particular, a board with more outside directors

uses more external equity and long-term debt and less retained earnings and short-term debt, which is consistent with our hypothesis. We are, however, unable to provide evidence as to whether a more independent board of directors is more likely to use debt or external equity, long-term debt or external equity, and more retained earnings or short-term debt. In this subsection, we provide further insights as to the trade-off between each of the four types of financing sources.

In table 5.5, we consider an independent variable that relates the total debt (STD plus LTD) to the total quasi-market value of external financing (total debt plus the market value of external equity). Following previous capital structure empirical literature (e.g., Alves and Ferreira, 2011; Cronqvist et al., 2012), we focus on the quasi-market values of financing sources to account for the possibility that managers think in terms of market values instead of book values (this is consistent with the hypothesis that managers time their equity issues as predicted by the market timing stylised facts). Nevertheless, the results using book values show qualitatively similar results. We then logarithmise this variable because the data show some skewness and this approach provides better model adjustment. This variable is then regressed against the same independent variables considered in table 5.4. Further, to address potential multicollinearity problems among board composition variables, we provide 5 specifications of the base line model as follows: column (1) includes all board-related variables; column (2) focuses on the effect of board independence; column (3) focuses on gender composition; column (4) examines the board size; and column (5) includes only the dummy variable for CEO/chair duality.

The results of column (1) and (2) in table 5.5 indicate a negative relationship between the fraction of debt over total external financing and percentage of independent directors in the board, providing support that a more independent board leads to an

Table 5.5. Regression results of the fraction between total debt and total external financing

<i>Explanatory variables</i>	Board composition (1)	Board independence (2)	Board gender (3)	Board size (4)	Board chairman (5)
% independent	-0.468*** (7.727)	-0.512*** (9.484)			
% women	-0.285* (1.750)		-0.896*** (6.228)		
Log(Board size)	-0.120*** (2.610)			-0.111** (2.395)	
CEO/Chair duality	0.031 (1.271)				0.061** (2.441)
Sales Growth	-0.454*** (3.964)	-0.439*** (3.853)	-0.490*** (4.263)	-0.488*** (4.235)	-0.463*** (3.968)
R&D to assets	-2.984*** (6.066)	-2.972*** (6.066)	-3.036*** (6.140)	-2.966*** (5.983)	-2.998*** (6.034)
Tax rate	-0.102* (1.894)	-0.091* (1.720)	-0.037 (0.686)	-0.015 (0.271)	-0.023 (0.436)
Log(Sales)	0.105*** (7.377)	0.094*** (7.160)	0.091*** (6.971)	0.092*** (6.514)	0.082*** (6.413)
Depreciation to assets	-0.849* (1.695)	-0.762 (1.521)	-0.684 (1.328)	-0.684 (1.315)	-0.570 (1.095)
Tangibility	0.665*** (7.067)	0.652*** (6.973)	0.642*** (6.771)	0.667*** (6.908)	0.645*** (6.769)
Return on assets (ROA)	-1.991*** (7.040)	-1.990*** (7.021)	-2.066*** (7.286)	-2.132*** (7.478)	-2.110*** (7.383)
Sigma (ROA)	-0.040*** (7.756)	-0.040*** (7.718)	-0.041*** (7.880)	-0.042*** (8.022)	-0.041*** (7.854)
Log(Market cap to GDP ratio)	-0.334*** (10.058)	-0.341*** (10.161)	-0.353*** (9.864)	-0.362*** (9.826)	-0.363*** (9.951)
Legal rights indicator	0.033*** (2.864)	0.035*** (3.014)	0.007 (0.671)	-0.004 (0.384)	-0.001 (0.075)
Constant	0.129 (0.751)	-0.038 (0.234)	0.122 (0.735)	0.429** (2.397)	0.210 (1.251)
Industry Effects	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes
Observations	12,018	12,018	12,018	12,018	12,018
R ²	0.360	0.358	0.347	0.342	0.342
F Statistic	124.425	139.567	136.076	135.114	136.098
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Notes: The dependent variable is the log of total debt divided total external financing sources. Total debt is defined as book value of STD plus book value of LTD. Total external financing sources is defined as total debt plus market value of external equity. Refer to table 5.2 for description of independent variables. Standard errors are adjusted for clusters in firms and heteroskedastic robust variance estimators. *t* statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

increase in the use of external equity (the more risky securities). Moreover, a board with a higher fraction of female directors is associated with less debt financing as compared with external equity financing and is therefore consistent with the view that gender diversity in the board room improves its efficiency (Carter et al. 2003). With respect to board size, it appears that larger boards are associated with less debt and more external equity, supporting the view that larger boards reduce information asymmetries. Finally, the results from specification (5) provide some support (although with a small t statistic) that when the CEO is also the chairman of the board, the firm is more likely to use debt rather than external equity financing. These results are consistent with those of Jiraporn and Gleason (2007) in which they find an inverse relationship between leverage and shareholder rights, suggesting that firms adopt higher debt ratios in which shareholder rights are more restricted, and consistent with agency theory, which predicts that leverage helps alleviate agency problems (Jensen 1984). With respect to control variables, the results from table 5.5 are generally in line with the results of columns (5) to (8) in table 5.4.

Following the same methodological strategy as in table 5.5, in table 5.6 we provide the results from regressing a dependent variable that relates short-term debt with retained earnings against board composition variables. In particular, the dependent variable is defined as the logarithm of the fraction between retained earnings divided by short-term debt plus retained earnings. We choose this fraction as opposed to short-term debt in the numerator because this fraction reveals a better adjustment of the data (based on the R^2 measure).

The results remain consistent with the hypothesis that a firm whose board is more independent and more gender diversified uses more risky sources of financing. Columns (1) to (3) in table 5.6 demonstrate that the percentages of independent and female

directors are positively and statistically significantly related with a higher fraction of short-term debt as compared with retained earnings. Results from specification (4) show that firms with a large board of directors use more retained earnings than short-term debt, which is inconsistent with the results from table 5.5 supporting the view that a larger board contributes to the use of more risky financing sources. One plausible justification for this result is that a larger board can in fact reduce information asymmetries (by issuing more information) and therefore make it easier to issue external equity over total debt. However, at the same time, a larger board can also be less effective in monitoring executive management. In this scope, internal agents might be tempted to rely more on internally generated funds rather than on short-term debt. Another possible justification for this effect is that board size may affect both board effectiveness and information asymmetries in a non-linear way. To check this possibility, we re-estimated specification (4) from table 5.6 to include a new variable defined as the square of $\log(\text{board size})$. The results then show that the $\log(\text{board size})$ is positively related with the use of short-term debt and the square of $\log(\text{board size})$ is negatively related with short-term debt. Both coefficients are statistically significant at the 10% level. This result may indicate that board size can be related to capital structure in complex ways and that further research is needed to explore those complexities. In column (5) of table 5.6, the coefficient of the CEO/chair duality dummy variable is negative and statistically significant, which is consistent with the view that a more independent board (in which the chairman is a different person from the CEO) leads to an increase in short-term debt in relation to retained earnings.

With respect to the control variables, the results show that our proxies for growth opportunities have different signs. The variable *sales growth* is positively associated with the use of short-term debt although we should expect to see a negative relationship.

Table 5.6. Regression results of the fraction between short term debt and retained earnings plus short term debt

<i>Explanatory variables</i>	Board composition (1)	Board independence (2)	Board gender (3)	Board size (4)	Board chairman (5)
% independent	0.274*** (4.210)	0.343*** (5.719)			
% women	0.337* (1.835)		0.688*** (4.052)		
Log(Board size)	-0.110** (2.261)			-0.115** (2.322)	
CEO/Chair duality	-0.065** (2.344)				-0.081*** (2.880)
Sales Growth	0.342*** (3.315)	0.352*** (3.435)	0.398*** (3.829)	0.370*** (3.604)	0.363*** (3.507)
R&D to assets	-0.687 (1.472)	-0.777* (1.664)	-0.797* (1.677)	-0.898* (1.849)	-0.850* (1.764)
Tax rate	0.254*** (5.237)	0.244*** (5.036)	0.201*** (4.121)	0.171*** (3.504)	0.196*** (4.005)
Log(Sales)	0.032*** (3.434)	0.024*** (2.770)	0.026*** (3.007)	0.043*** (4.517)	0.034*** (3.974)
Depreciation to assets	1.258** (2.159)	1.353** (2.325)	1.297** (2.214)	1.179** (2.003)	1.216** (2.082)
Tangibility	-0.430*** (4.831)	-0.454*** (5.136)	-0.447*** (5.087)	-0.434*** (4.930)	-0.448*** (5.101)
Return on assets (ROA)	-1.392*** (6.739)	-1.360*** (6.508)	-1.274*** (6.220)	-1.212*** (6.093)	-1.232*** (6.155)
Sigma (ROA)	-0.016*** (3.022)	-0.016*** (2.850)	-0.015*** (2.722)	-0.015*** (2.809)	-0.015*** (2.816)
Log(Market cap to GDP ratio)	-0.063 (1.530)	-0.063 (1.511)	-0.057 (1.352)	-0.046 (1.088)	-0.052 (1.224)
Legal rights indicator	0.001 (0.046)	0.003 (0.220)	0.019* (1.737)	0.024** (2.166)	0.025** (2.270)
Constant	-0.465** (2.224)	-0.689*** (3.673)	-0.786*** (4.179)	-0.689*** (3.268)	-0.831*** (4.385)
Industry Effects	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes
Observations	11,364	11,364	11,364	11,364	11,364
R ²	0.089	0.086	0.081	0.078	0.078
F Statistic (p-value)	12.382 (0.000)	13.116 (0.000)	12.190 (0.000)	11.906 (0.000)	12.360 (0.000)

Notes: The dependent variable is defined as the logarithm of the fraction between retained earnings divided by short term debt plus retained earnings. Refer to table 5.2 for description of independent variables. Standard errors are adjusted for clusters in firms and heteroskedastic robust variance estimators. *t* statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

A plausible reason for this result is that firms with high growth in their revenues rely heavily on short-term debt to finance their increasing working capital needs. The variable R&D is negatively associated with short-term debt, which is consistent with the hypothesis that growth opportunities lead to the lower use of debt. The results from the tax rate variable reveal that firms with higher effective tax rates use much more short-term debt than retained earnings, which is consistent with the tax benefit of debt; this relationship is highly statistically significant in all five specifications. Consistent with the previous results, the level of firm revenues is positively associated with the use short-term debt when compared with retained earnings. The level of depreciations is positively associated with the fraction of short-term debt over short-term debt plus retained earnings. This result can simply indicate that firms with higher levels of depreciations retained fewer earnings, because depreciation is a non-cash expense that serves as internally generated funds for investment purposes. Results from table 5.6 reveal that firms with more tangible assets use less short-term debt when compared with retained earnings. This finding is consistent with Bevan and Danbolt's (2002) results. These authors argue that firms match their asset maturity with the maturities of financing sources. As such, *ceteris paribus* firms with more tangible assets have fewer current assets and less short-term debt. Finally, the variables that measure profitability, operating risk, stock market development and lenders rights have coefficients with similar signs of those in table 5.5.

In table 5.7, the dependent variable under consideration relates the use of long-term debt with short-term debt. This variable is defined as the logarithm of the ratio between the long-term debt divided by total debt. The results from columns (1) and (2) reveal that the percentage of independent directors on the board is positively and statistically significantly related with the use of long-term versus short-term debt. Therefore, these

Table 5.7. Regression results of the fraction between long term debt and total debt

<i>Explanatory variables</i>	Board composition (1)	Board independence (2)	Board gender (3)	Board size (4)	Board chairman (5)
% independent	0.480*** (8.472)	0.432*** (8.811)			
% women	-0.283* (1.691)		0.330** (2.240)		
Log(Board size)	0.091** (2.113)			0.075* (1.716)	
CEO/Chair duality	0.016 (0.717)				-0.011 (0.501)
Sales Growth	-0.045 (0.480)	-0.050 (0.550)	-0.013 (0.142)	-0.010 (0.108)	-0.021 (0.225)
R&D to assets	-1.045*** (2.790)	-1.011*** (2.700)	-0.984*** (2.610)	-1.013*** (2.687)	-1.001*** (2.654)
Tax rate	0.051 (1.411)	0.052 (1.426)	-0.007 (0.184)	-0.014 (0.384)	-0.014 (0.380)
Log(Sales)	0.078*** (8.917)	0.085*** (10.874)	0.091*** (11.530)	0.088*** (9.908)	0.094*** (12.279)
Depreciation to assets	1.530*** (2.970)	1.468*** (2.842)	1.365*** (2.589)	1.388*** (2.633)	1.328** (2.526)
Tangibility	0.993*** (13.859)	1.011*** (14.188)	1.016*** (14.144)	1.002*** (13.823)	1.015*** (14.134)
Return on assets (ROA)	-1.109*** (5.658)	-1.126*** (5.729)	-1.035*** (5.225)	-1.007*** (5.123)	-1.017*** (5.185)
Sigma (ROA)	-0.015*** (3.564)	-0.015*** (3.733)	-0.014*** (3.369)	-0.013*** (3.217)	-0.013*** (3.330)
Log(Market cap to GDP ratio)	-0.189*** (4.148)	-0.189*** (4.101)	-0.172*** (3.715)	-0.170*** (3.655)	-0.168*** (3.634)
Legal rights indicator	0.104*** (6.147)	0.102*** (6.045)	0.130*** (8.111)	0.135*** (8.662)	0.133*** (8.515)
Constant	-1.983*** (9.565)	-1.812*** (9.323)	-2.009*** (10.505)	-2.178*** (10.679)	-2.048*** (10.852)
Industry Effects	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes
Observations	12,135	12,135	12,135	12,135	12,135
R ²	0.241	0.239	0.225	0.224	0.224
F Statistic	43.064	47.917	39.826	39.080	38.577
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Notes: The dependent variable is defined as the logarithm of the fraction between long term divided by short term debt plus long term debt. Refer to table 5.2 for description of independent variables. Standard errors are adjusted for clusters in firms and heteroskedastic robust variance estimators. *t* statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

results are consistent with the proposed hypothesis; that is, firms with a more independent board are more likely to use more risky securities. The effect of gender diversity is not clear, however, because specification (1) shows a negative relation and specification (3) demonstrates a positive relation. One reason for this sign change is that the percentage of independent directors is highly correlated with the fraction of female directors (Pearson correlation yields up to 0.51). Therefore, the negative sign can only be interpreted when the board has few independent directors. In fact, female directors cannot enhance board independence if the board has no independent directors. Further, because the t statistic of the percentage of women variable is relatively low in specification (1) ($t=1.691$) and relatively higher in specification (3) ($t=2.240$), the results provide some limited evidence that a more gender-diversified board of directors is positively associated with more long-term debt in comparison with short-term debt. With respect to board size, the relation is also limited because t statistics are quite low for both specification (1) and (4). However, a positive relation is found between board size and the use of long-term debt, supporting the view that larger boards reduce information asymmetry problems. As previously stated, further research is needed to provide improved perceptions regarding the relation between board size and financing sources. Finally, the results of the dummy variable CEO/duality are also not clear, because the sign of the relation changes from specification (1) to (5). Nevertheless, the association is not statistically different from zero. As such, we are unable to provide supporting evidence as to whether a more independent chairman leads to a shift from short-term debt to long-term debt. With respect to the control variables, the results from table 5.7 are generally in line with those of columns (7) and (8) in table 5.4. One exception worth noting is the coefficient of the variable depreciation, which in table 5.7 is found to be positively related with the fraction of long-term debt over total debt. This

Table 5.8. Regression results of the fraction between long term debt and external equity plus long term debt

<i>Explanatory variables</i>	Board composition (1)	Board independence (2)	Board gender (3)	Board size (4)	Board chairman (5)
% independent	-0.231** (2.352)	-0.341*** (3.958)			
% women	-0.669** (2.439)		-0.985*** (4.111)		
Log(Board size)	-0.068 (0.918)			-0.071 (0.961)	
CEO/Chair duality	0.070* (1.748)				0.088** (2.176)
Sales Growth	-0.641*** (3.559)	-0.628*** (3.520)	-0.669*** (3.746)	-0.660*** (3.679)	-0.634*** (3.508)
R&D to assets	-4.303*** (5.522)	-4.249*** (5.462)	-4.314*** (5.548)	-4.244*** (5.437)	-4.279*** (5.464)
Tax rate	-0.016 (0.210)	0.001 (0.010)	0.025 (0.321)	0.051 (0.652)	0.036 (0.464)
Log(Sales)	0.187*** (9.050)	0.179*** (9.488)	0.181*** (9.622)	0.178*** (8.692)	0.170*** (9.295)
Depreciation to assets	0.180 (0.210)	0.227 (0.264)	0.239 (0.280)	0.280 (0.323)	0.378 (0.436)
Tangibility	1.493*** (10.359)	1.495*** (10.443)	1.485*** (10.375)	1.505*** (10.334)	1.487*** (10.340)
Return on assets (ROA)	-3.445*** (7.854)	-3.462*** (7.855)	-3.487*** (7.983)	-3.554*** (8.111)	-3.532*** (8.038)
Sigma (ROA)	-0.060*** (7.287)	-0.061*** (7.322)	-0.061*** (7.432)	-0.062*** (7.499)	-0.061*** (7.340)
Log(Market cap to GDP ratio)	-0.561*** (8.353)	-0.570*** (8.380)	-0.573*** (8.394)	-0.584*** (8.451)	-0.582*** (8.481)
Legal rights indicator	0.119*** (4.887)	0.120*** (4.884)	0.106*** (4.537)	0.094*** (4.071)	0.097*** (4.211)
Constant	-1.032*** (3.274)	-1.074*** (3.609)	-1.023*** (3.524)	-0.771** (2.480)	-0.939*** (3.239)
Industry Effects	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes
Observations	11,827	11,827	11,827	11,827	11,827
R ²	0.347	0.345	0.345	0.342	0.343
F Statistic (p-value)	92.336 (0.000)	103.208 (0.000)	102.285 (0.000)	101.921 (0.000)	101.860 (0.000)

Notes: The dependent variable is the log of long-term debt divided by total external equity plus long-term debt. Refer to table 5.2 for description of independent variables. Standard errors are adjusted for clusters in firms and heteroskedastic robust variance estimators. t statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

result may be linked to the fact that firms with higher levels of depreciation also have long-lived assets, which in turn leads to the use of more long-term debt to match the assets' maturity with the financing sources' maturity (Bevan and Danbolt, 2002).

In table 5.8, the dependent variable considered is the fraction between long-term debt and external equity plus long-term debt. Again, the results provide strong support that a board of directors that is more independent and more gender-diversified uses more external equity than long-term debt. Also, although not statistically significant, the size of the board is found to be negatively related with the use of debt versus external equity. Moreover, when the board of directors has an independent chairman, the firm has a higher fraction of external equity in comparison with long-term debt. These results provide new insights because in table 5.4, we find that board composition features prompt the firm to use both more external equity and long-term debt. With respect to the control variables, the results shown in table 5.8 are generally in line with those of table 5.5.

Overall, the results of tables 5.5 to 5.8 support the idea that a board composition that increases its independence and efficiency makes it easier for firms to issue more risky securities. In particular, a board composed of more independent members relies more on external financing than retained earnings, more on short-term debt than retained earnings, more on long-term debt than short-term debt, and more on equity than long-term debt.

5.5 Robustness checks

The results provided thus far assume that the independent variables of interest, i.e., a board of directors' composition, are exogenous and therefore unrelated with the error term. One potential source of endogeneity may come from reverse causality between

financing sources and a board of directors' variables. If this is the case, the coefficient estimates provided in tables 5.5 to 5.8 can be biased. To address this potential reverse causality problem, we re-estimated tables 5.5 to 5.8 using the same variables but with the lagged values of the independent variables. In table 5.9, the regression results provided in panel A replicate the regressions of column (1) from tables 5.5 to 5.8 considering one lag between the dependent variables and independent variables. In panel B, we replicate the same regressions using the maximum number of lags available in the data (i.e., 4 years). The results are generally preserved. In particular, the coefficients of the variable percentage of independent directors remain highly statistically significant and maintain the expected signs. The percentage of female directors also reveals the expected signs, except in specifications (3) and (7) in which the independent variable considered is long-term debt over total debt. As in the results from table 5.7, in this case we encounter collinearity problems among the percentages of female directors and other explanatory variables. In fact, when we re-estimate specification (3) and (7) by dropping other board variables, the coefficients turn positive. The results for the size of the board remain mixed. As discussed above, this variable may relate to complex financing sources, and therefore, we are unable to provide consistent evidence as to whether a larger board leads firms to scale up in the pecking order. With respect to the role of the chairman of the board, the results provide some evidence that a non-executive chairman may increase the board independence and prompt the firm to rely more on risky financing sources. Overall, the results support the view that the direction of causality goes from the board of directors' variables to financing sources and not the other way around.

Table 5.9. Panel data regressions results of financing sources with lagged dependent variables

	<i>Panel A: (endogenous variable) $t+1$</i>				<i>Panel B: (endogenous variable) $t+4$</i>			
	<i>TD/(EE+TD)</i> (1)	<i>STD/(RE+STD)</i> (2)	<i>LTD/TD</i> (3)	<i>LTD/(EE+LTD)</i> (4)	<i>TD/(EE+TD)</i> (5)	<i>STD/(RE+STD)</i> (6)	<i>LTD/TD</i> (7)	<i>LTD/(EE+LTD)</i> (8)
% independent	-0.532*** (8.365)	0.290*** (4.267)	0.509*** (8.537)	-0.282*** (2.728)	-0.713*** (8.664)	0.224*** (2.791)	0.452*** (6.346)	-0.490*** (3.929)
% women	-0.313* (1.819)	0.322* (1.684)	-0.278 (1.635)	-0.716** (2.503)	-0.139 (0.686)	0.441** (1.983)	-0.415** (2.026)	-0.689** (1.994)
Log(Board size)	-0.126*** (2.652)	-0.108** (2.111)	0.065 (1.389)	-0.104 (1.308)	-0.054 (0.922)	-0.091 (1.553)	0.025 (0.470)	-0.082 (0.891)
CEO/Chair duality	0.040 (1.563)	-0.081*** (2.839)	0.019 (0.789)	0.081* (1.897)	0.089*** (2.894)	-0.060* (1.759)	0.030 (1.071)	0.128*** (2.663)
Sales Growth	-0.467*** (3.868)	0.310*** (2.870)	-0.004 (0.042)	-0.632*** (3.296)	-0.277* (1.884)	0.198 (1.433)	-0.076 (0.513)	-0.419* (1.653)
R&D to assets	-2.558*** (5.025)	-0.497 (1.064)	-0.533 (1.297)	-3.266*** (4.098)	-1.734** (2.427)	-0.024 (0.059)	0.397 (1.073)	-1.484* (1.698)
Tax rate	-0.082 (1.473)	0.239*** (4.754)	0.069* (1.680)	0.027 (0.326)	-0.192* (1.712)	0.036 (0.307)	-0.149* (1.678)	-0.286* (1.704)
Log(Sales)	0.106*** (7.450)	0.035*** (3.515)	0.078*** (8.756)	0.190*** (9.219)	0.120*** (7.658)	0.047*** (3.805)	0.083*** (7.527)	0.213*** (9.411)
Depreciation to assets	-1.259** (2.540)	1.243* (1.813)	1.123** (2.351)	-0.775 (0.970)	-2.055*** (2.987)	-0.945 (0.867)	1.122 (1.433)	-1.886 (1.341)
Tangibility	0.675*** (6.893)	-0.473*** (5.138)	0.980*** (13.947)	1.496*** (10.292)	0.678*** (6.007)	-0.249** (2.174)	0.766*** (9.184)	1.330*** (7.780)
Return on assets (ROA)	-1.424*** (5.053)	-1.517*** (6.830)	-0.909*** (4.544)	-2.599*** (6.007)	-0.745** (2.312)	-1.536*** (5.363)	-0.693*** (2.950)	-1.642*** (3.322)
Sigma (ROA)	-0.038*** (7.414)	-0.014** (2.393)	-0.013*** (2.641)	-0.056*** (6.437)	-0.034*** (6.227)	-0.002 (0.198)	-0.010 (1.493)	-0.049*** (4.796)

Table 5.9. (continued)

	<i>Panel A: (endogenous variable) $t+1$</i>				<i>Panel B: (endogenous variable) $t+4$</i>			
	<i>TD/(EE+TD)</i> (1)	<i>STD/(RE+STD)</i> (2)	<i>LTD/TD</i> (3)	<i>LTD/(EE+LTD)</i> (4)	<i>TD/(EE+TD)</i> (5)	<i>STD/(RE+STD)</i> (6)	<i>LTD/TD</i> (7)	<i>LTD/(EE+LTD)</i> (8)
Log(Market cap to GDP ratio)	-0.240*** (7.324)	-0.060 (1.409)	-0.184*** (3.813)	-0.434*** (6.261)	-0.570*** (7.465)	-0.134* (1.680)	-0.123 (1.594)	-0.804*** (6.628)
Legal rights indicator	0.018 (1.518)	-0.004 (0.314)	0.097*** (5.940)	0.094*** (3.796)	0.044** (2.567)	0.009 (0.566)	0.066*** (4.137)	0.101*** (3.675)
Constant	-0.165 (0.942)	-0.452** (2.072)	-1.925*** (8.668)	-1.355*** (4.057)	1.103*** (3.619)	-0.266 (0.784)	-1.737*** (5.043)	0.478 (0.915)
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,603	9,090	9,708	9,423	2,396	2,275	2,427	2,352
R ²	0.318	0.096	0.233	0.306	0.297	0.091	0.203	0.282
F Statistic (p-value)	104.515 (0.000)	12.616 (0.000)	41.551 (0.000)	77.924 (0.000)	44.259 (0.000)	8.757 (0.000)	34.688 (0.000)	32.021 (0.000)

Notes: TD/(EE+TD) is defined as total debt divided by external equity plus total debt. Total debt is the sum of short term debt and long term debt. External equity is defined as market value of equity less retained earnings. STD/(RE+STD) is defined as short term debt divided by retained earnings plus short term debt. LTD/TD is the ratio of long term debt divided by total debt. LTD/(EE+LTD) is defined as long term debt divided by external equity plus long term debt. Refer to table 5.2 for description of independent variables. Standard errors are adjusted for clusters in firms and heteroskedastic robust variance estimators. t statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

To further control for possible endogeneity problems, we re-estimated our models using an instrumental variable framework. In particular, we rely on 2SLS regressions. This estimation technique directly addresses endogeneity problems of any kind (reverse causality, measurement errors in the regressors and omitted-variable bias). In this scope, the variables that we suspect to be endogenous are instrumented with the other independent variables as well as other variables not in the model (instruments). These instruments should be related to the variables instrumented (considered to endogenous) and should not be correlated with the error term. In table 5.10, we provide the second-stage results of a 2SLS regression in which the dependent variables are the same as those of table 5.9 and the variable percentage of independent directors on the board is treated as endogenous and therefore instrumented. The selected instruments are the lag values of this variable. The results are identical to those in tables 5.5 to 5.9, and the coefficients of the variable percentage of independent directors not only have the expected signs but are also highly statistically significant. To determine whether the variables of interest should be treated as endogenous variables, we use Wooldridge's (1995) robust score test (see bottom lines of table 5.10). If the test statistic is significant, then the variables being tested should be treated as endogenous. As can be seen, this test is not rejected at any usual level of significance. As such, we do not reject the hypothesis that the variable percentage of independent directors is exogenous. In other words, we confirm the validity of the previous results that treated this variable as exogenous. Further, at the bottom of table 5.10, we also provide results for the assessment of the instruments validity. Sargan's (1958) χ^2 test of overidentifying restrictions is employed to this end. A statistically significant test statistic always indicates that the instruments may not be valid. The results obtained for this test are not rejected at any typical level of significance. Further, the partial R^2 that measures the

Table 5.10. 2SLS regression results of the financing sources

<i>Explanatory variables</i>	<i>TD/(EE+TD)</i> (1)	<i>STD/(RE+STD)</i> (2)	<i>LTD/TD</i> (3)	<i>LTD/(EE+LTD)</i> (4)
% independent ^a	-0.520*** (13.227)	0.410*** (7.209)	0.505*** (10.971)	-0.290*** (4.665)
Sales Growth	-0.342*** (4.738)	0.397*** (4.559)	-0.037 (0.453)	-0.464*** (3.894)
R&D to assets	-3.075*** (9.573)	-0.711 (1.498)	-1.211*** (3.638)	-4.368*** (8.574)
Tax rate	-0.079* (1.944)	0.205*** (3.381)	0.069* (1.676)	0.008 (0.128)
Log(Sales)	0.087*** (10.160)	0.024*** (3.078)	0.089*** (12.644)	0.172*** (13.971)
Depreciation to assets	-0.451 (1.147)	2.216*** (4.004)	2.282*** (5.113)	1.149* (1.876)
Tangibility	0.596*** (8.889)	-0.462*** (6.258)	0.957*** (15.622)	1.376*** (13.887)
Return on assets (ROA)	-1.960*** (8.930)	-1.984*** (9.352)	-1.401*** (6.535)	-3.602*** (10.254)
Sigma (ROA)	-0.037*** (10.749)	-0.018*** (3.804)	-0.014*** (3.637)	-0.058*** (10.124)
Log(Market cap to GDP ratio)	-0.305*** (14.203)	-0.043 (1.137)	-0.139*** (4.005)	-0.487*** (11.777)
Legal rights indicator	0.034*** (4.281)	-0.002 (0.229)	0.080*** (6.456)	0.103*** (6.567)
Constant	0.145 (1.362)	-0.794*** (5.231)	-1.956*** (12.881)	-1.026*** (5.497)
Industry Effects	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes
Observations	7,189	4,535	4,854	7,032
χ^2	3230.558	409.059	1552.785	2333.000
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)
Wooldridge's χ^2	1.08575	2.4408	0.001933	0.00157
(p-value)	(0.2974)	(0.1182)	(0.9649)	(0.9684)
Sargan χ^2	0.044796	0.00042	0.955277	0.100666
(p-value)	(0.8324)	(0.9837)	(0.3284)	(0.7510)
Partial R ²	0.9243	0.8881	0.8855	0.9236

Notes: TD/(EE+TD) is defined as total debt divided by external equity plus total debt. Total debt is the sum of short term debt and long term debt. External equity is defined as market value of equity less retained earnings. STD/(RE+STD) is defined as short term debt divided by retained earnings plus short term debt. LTD/TD is the ratio of long term debt divided by total debt. LTD/(EE+LTD) is defined as long term debt divided by external equity plus long term debt. Refer to table 5.2 for description of independent variables. Standard errors are adjusted for clusters in firms and heteroskedastic robust variance estimators. χ^2 statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively. ^ainstrumented with the lagged values.

level of correlation between the instrumented variable and the instruments is also presented; in all specifications, their values are very high. In sum, the results suggest that the instruments are valid. In this analysis, we have focused on the independent directors' variable to avoid collinearity problems. Nevertheless, we have conducted the same analysis considering the percentage of female directors instead of the percentage of independent directors; the results reveal the same signs of those presented here, including high values of the z statistics. The results for the size of the board and CEO/chair duality are similar to those in table 5.9.

In table 5.11, we analyse the results using a cross-section framework for each year in the sample period. By these means, one can check whether the results are consistent over the period considered. The results are relatively similar to those presented in table 5.10. In particular, for every year, the coefficient of the variable percentage of independent directors is the same as in table 5.10 and is statistically significant for all years except in panel A and D for the year 2008. This lack of statistical significance may be related to the subprime crisis when stock prices significantly dropped. Because we are measuring debt as book values, this price decline is not seen in the value of debt, whereas it probably would be seen if debt market values were available.

Table 5.11. Cross section regressions results of financing sources

Year	% ind.	Growth	R&D	TAX	Sales	DEP	TANG	ROA	Sigma (ROA)	MC to GDP	LR	Const.	R ²
Panel A: Regression results of the fraction between total debt and total debt plus equity [TD/(EE+TD)]													
2006	-0.397*** (3.754)	-0.879*** (3.556)	-4.638** (2.257)	-0.128 (0.779)	0.188*** (8.947)	-1.440 (1.265)	1.624*** (9.527)	-2.967*** (5.408)	-0.071*** (5.731)	-0.812*** (5.469)	0.149*** (4.391)	-0.141 (0.258)	0.353
2007	-0.374*** (3.772)	-0.806*** (3.418)	-4.707*** (4.185)	0.064 (0.416)	0.182*** (8.872)	-0.607 (0.372)	1.632*** (9.454)	-3.674*** (7.120)	-0.060*** (5.640)	-0.801*** (6.964)	0.154*** (5.529)	-0.108 (0.232)	0.366
2008	-0.137 (1.308)	-0.462** (2.151)	-3.571*** (3.604)	0.022 (0.223)	0.152*** (7.602)	0.152*** (7.602)	1.315*** (8.367)	-2.834*** (4.934)	-0.050*** (4.672)	-0.420*** (5.179)	0.103*** (3.616)	-1.306*** (3.831)	0.265
2009	-0.308*** (2.930)	-0.500*** (2.779)	-4.626*** (5.223)	0.034 (0.317)	0.160*** (7.342)	-0.125 (0.120)	1.448*** (8.056)	-3.942*** (5.931)	-0.066*** (7.060)	-0.487*** (6.929)	0.104*** (3.772)	-0.996*** (3.164)	0.324
2010	-0.406*** (4.006)	-0.412* (1.908)	-5.284*** (6.063)	-0.022 (0.167)	0.203*** (8.941)	1.937 (1.586)	1.323*** (7.372)	-4.458*** (7.536)	-0.057*** (6.472)	-0.448*** (7.083)	0.085*** (3.423)	-1.285*** (3.935)	0.349
Panel B: Regression results of the fraction between short term debt and retained earnings plus short term debt [STD/(RE+STD)]													
2006	0.311*** (4.527)	0.321** (2.236)	-0.738* (1.751)	0.219** (2.052)	0.009 (0.868)	0.511 (0.875)	-0.367*** (3.390)	-1.336*** (4.769)	-0.008 (1.052)	-0.128* (1.797)	0.018 (1.212)	-0.428 (1.439)	0.079
2007	0.179*** (2.627)	0.496*** (3.347)	-0.185 (0.306)	0.353*** (3.789)	0.023** (2.099)	0.533 (0.614)	-0.500*** (4.641)	-0.845*** (3.270)	-0.020*** (3.125)	0.089 (1.468)	-0.004 (0.350)	-1.403*** (4.867)	0.078
2008	0.444*** (5.837)	0.166 (0.912)	-1.405** (2.374)	0.297*** (4.043)	0.041*** (3.743)	1.387* (1.798)	-0.492*** (4.333)	-1.167*** (3.391)	-0.018** (2.183)	-0.153*** (2.640)	0.005 (0.371)	-0.554*** (2.595)	0.101
2009	0.454*** (5.970)	0.371*** (3.196)	-0.595 (0.878)	0.160** (2.054)	0.015 (1.339)	2.276*** (3.044)	-0.532*** (5.098)	-1.845*** (6.754)	-0.024*** (3.257)	-0.075 (1.317)	-0.007 (0.494)	-0.524** (2.357)	0.102
2010	0.310*** (4.104)	0.417*** (3.268)	-0.829 (1.244)	0.262*** (2.697)	0.034*** (3.178)	2.164*** (2.631)	-0.396*** (3.778)	-2.141*** (6.530)	-0.013** (2.019)	-0.075 (1.317)	0.005 (0.346)	-1.082*** (5.298)	0.102
Panel C: Regression results of the fraction between long term debt and total debt [LTD/TD]													
2006	0.242*** (3.772)	-0.194 (1.406)	-1.611 (1.422)	-0.011 (0.136)	0.086*** (8.009)	0.558 (0.558)	1.024*** (9.352)	-0.822*** (3.645)	-0.019*** (3.681)	-0.208** (2.137)	0.114*** (4.430)	-1.669*** (4.726)	0.217
2007	0.519*** (8.978)	-0.000 (0.001)	-0.974 (1.512)	0.040 (0.511)	0.074*** (7.327)	0.514 (0.385)	1.093*** (10.953)	-1.093*** (4.357)	-0.013** (2.256)	-0.379*** (4.905)	0.127*** (6.458)	-1.030*** (3.464)	0.261

Table 5.11. (continued)

Year	% ind.	Growth	R&D	TAX	Sales	DEP	TANG	ROA	Sigma (ROA)	MC to GDP	LR	Const.	R ²
2008	0.441*** (7.091)	0.056 (0.502)	-0.760 (1.394)	0.060 (1.099)	0.082*** (8.402)	1.645*** (3.060)	1.006*** (12.000)	-1.071*** (3.254)	-0.018*** (3.394)	-0.172*** (3.099)	0.106*** (5.248)	-2.046*** (9.946)	0.235
2009	0.506*** (8.419)	0.039 (0.389)	-1.257*** (2.745)	0.119** (2.228)	0.085*** (9.464)	1.896*** (3.473)	0.991*** (11.161)	-1.415*** (5.023)	-0.013*** (2.612)	-0.136*** (2.799)	0.088*** (4.667)	-2.033*** (10.323)	0.251
2010	0.507*** (8.103)	-0.117 (0.903)	-1.174** (2.546)	0.001 (0.021)	0.092*** (8.534)	2.844*** (3.831)	0.916*** (10.874)	-1.393*** (4.353)	-0.015*** (2.584)	-0.143*** (2.929)	0.072*** (4.552)	-1.860*** (7.996)	0.262
Panel D: Regression results of the fraction between long term debt and external equity plus long term debt [LTD/(EE+LTD)]													
2006	-0.397*** (3.754)	-0.879*** (3.556)	-4.638** (2.257)	-0.128 (0.779)	0.188*** (8.947)	-1.440 (1.265)	1.624*** (9.527)	-2.967*** (5.408)	-0.071*** (5.731)	-0.812*** (5.469)	0.149*** (4.391)	-0.141 (0.258)	0.353
2007	-0.374*** (3.772)	-0.806*** (3.418)	-4.707*** (4.185)	0.064 (0.416)	0.182*** (8.872)	-0.607 (0.372)	1.632*** (9.454)	-3.674*** (7.120)	-0.060*** (5.640)	-0.801*** (6.964)	0.154*** (5.529)	-0.108 (0.232)	0.366
2008	-0.137 (1.308)	-0.462** (2.151)	-3.571*** (3.604)	0.022 (0.223)	0.152*** (7.602)	1.965** (2.146)	1.315*** (8.367)	-2.834*** (4.934)	-0.050*** (4.672)	-0.420*** (5.179)	0.103*** (3.616)	-1.306*** (3.831)	0.265
2009	-0.308*** (2.930)	-0.500*** (2.779)	-4.626*** (5.223)	0.034 (0.317)	0.160*** (7.342)	-0.125 (0.120)	1.448*** (8.056)	-3.942*** (5.931)	-0.066*** (7.060)	-0.487*** (6.929)	0.104*** (3.772)	-0.996*** (3.164)	0.324
2010	-0.406*** (4.006)	-0.412* (1.908)	-5.284*** (6.063)	-0.022 (0.167)	0.203*** (8.941)	1.937 (1.586)	1.323*** (7.372)	-4.458*** (7.536)	-0.057*** (6.472)	-0.448*** (7.083)	0.085*** (3.423)	-1.285*** (3.935)	0.349

Notes: TD/(EE+TD) is defined as total debt divided by external equity plus total debt. Total debt is the sum of short term debt and long term debt. External equity is defined as market value of equity less retained earnings. STD/(RE+STD) is defined as short term debt divided by retained earnings plus short term debt. LTD/TD is the ratio of long term debt divided by total debt. LTD/(EE+LTD) is defined as long term debt divided by external equity plus long term debt. Refer to table 5.2 for description of independent variables. Heteroskedastic robust *t* statistics in parentheses. *, ** and *** refer to significance at 10%, 5% and 1% levels respectively.

We subjected our results to a battery of additional sensitiveness tests. Following Alves and Ferreira (2011), we re-estimated the results of tables 5.5 to 5.8 excluding utilities, because these firms are regulated in a number of countries and therefore can be subject to specific forces that drive individual financing choices. Further, we also have excluded firms from the United States and from Japan, respectively. We also have substituted the proxies of growth opportunities with the lag value of the market-to-book ratio (to minimise the mechanical relationship between this variable and the market-based financing sources measures), defined as the market value of equity plus the book value of total debt divided by the book value of assets. The results are qualitatively similar to those reported above. To conserve space, these sensitiveness tests are not reported in this paper but rather are available from the authors upon request.

5.6 Conclusion

This article empirically investigates the way in which the board of directors' composition affects the mix of financing sources used by firms. The investigation is conducted using a panel of data from 2,427 firms in 33 countries over the period of 2006 to 2010. After controlling for a wide set of capital structure determinants, the results indicate that firms with a board of directors composed of more independent directors are more likely to use higher fractions of riskier financing sources. In particular, the results provide strong evidence that firms with a larger fraction of independent directors on the board: (1) use more external financing sources than retained earnings; (2) use more short-term debt than retained earnings; (3) use more long-term debt than short-term debt; and (4) use more external equity than long-term debt. These results are consistent with our hypothesis that a more independent board should prompt firms to reduce information asymmetries between managers and outside

investors and should reduce the cost of issuing more risky sources of financing as predicted by the pecking order theory of Myers (1984) and Myers and Majluf (1984). The results also provide some evidence that a board of directors that is more gender-diversified and in which the chairman is a non-executive (i.e., the CEO is a different person than the chairman) can improve the board's independence and efficiency and therefore prompt the firm to rely more on long-term sources of financing. The effect of board size on financing choices is mixed because larger boards can be more or less effective depending on the complexity of the firm.

With respect to policy implications, this study provides new insights into the ways in which firms can issue more external sources of finance. The result showing that a firm with a more independent board of directors issue more long-term debt and external equity suggests that the firm can more easily match (i.e., in a less costly manner) the maturity of its assets with the maturity of its financing sources (Hall et al., 2000). This study also provides important implications for securities regulators, because the findings suggest that firms with more independent directors are more likely to issue long-term debt and external equity. If that is the case, then regulators could promote the inclusion of independent directors in the board of directors of listed firms to develop their financial markets. Finally, the results also add to the discussion regarding capital structure theories. If the trade-off theory is to hold on its own and the pecking order theory is not, then one should not see such a strong effect between the board of directors' structure and the use of different financing sources. In fact, the results of this study suggest that managers choose financing sources by taking into account the level of information asymmetry. Further, the results suggest that board independence is not only important for aligning the managers' interest with those of the owners but is also important to other financing suppliers such as bondholders.

The results are consistent with a number of empirical findings previously documented in the literature. For example, our results are consistent with the findings of Cronqvist et al. (2012) in which firms with strong governance devices are less likely to reveal corporate leverage practices that arise from the CEO's personal preferences. The results are also consistent with the previous literature arguing that governance mechanisms can substitute the effect of debt in reducing the free cash flow agency problems (e.g., Berger et al. 1997 and Jiraporn et al. 2012); that is, we find that firms with a more independent board of directors rely more heavily on external equity when compared with total debt and long-term debt. Finally, the results are also consistent with previous empirical work that finds a negative relation between corporate governance devices and the cost of debt (e.g., Fields et al. 2012).

This study has several limitations that should be stressed. First, the financing sources are measured using book values and quasi-market values. Given that long-term debt market values can be much lower than book values during the sample period considered in this study, the results are not as robust as they would be if market values were considered. Further, the study does not segregate public from private debt. Information asymmetries costs are potentially lower for private debt because creditors can more closely monitor executive management. Additionally, the sample data analysed have a small time span (5 years) and a large cross section. Therefore, the results presented are more likely to characterise different financing policies across firms than across time. Finally, the present study does not control for firm ownership heterogeneity. Firms with diverse ownership structures may have different information asymmetry levels. As such, this study's findings would benefit from further research that considers these limitations. Future research could exploit these limitations and

provide new evidence as to whether other corporate governance devices such as ownership structure could change firm financing choices.

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Appendix D

Table D.1 Pearson correlation matrix of the variables used in the analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. Book EE	1										
2. Book RE	-0.860***	1									
3. Book STD	-0.142***	-0.109***	1								
4. Book LTD	-0.0790***	-0.316***	-0.157***	1							
5. Market EE	0.633***	-0.540***	-0.0794***	-0.0565***	1						
6. Market RE	-0.628***	0.783***	-0.134***	-0.297***	-0.800***	1					
7. Market STD	-0.131***	-0.0625***	0.768***	-0.136***	-0.438***	0.0558***	1				
8. Market LTD	-0.114***	-0.218***	-0.153***	0.823***	-0.360***	-0.137***	0.0958***	1			
9. % independent	0.0915***	-0.166***	-0.190***	0.296***	0.316***	-0.281***	-0.362***	0.103***	1		
10. % women	-0.0203*	-0.0553***	-0.0635***	0.200***	0.177***	-0.150***	-0.217***	0.0564***	0.510***	1	
11. Board size	-0.151***	0.0703***	-0.0256**	0.180***	-0.0720***	0.0333***	-0.0531***	0.145***	-0.0229*	0.111***	1
12. CEO/chair duality	-0.0491***	0.0796***	-0.0222*	-0.0513***	-0.121***	0.117***	0.0829***	-0.0109	-0.159***	-0.0537***	0.0569***
13. Sales growth	0.116***	-0.0583***	-0.0665***	-0.0740***	0.156***	-0.0931***	-0.118***	-0.0856***	0.0350***	-0.0856***	-0.164***
14. R&D to assets	0.359***	-0.265***	-0.00706	-0.156***	0.201***	-0.112***	-0.0582***	-0.184***	-0.00499	-0.0122	-0.0131
15. Tax rate	0.128***	-0.111***	0.0553***	-0.0516***	-0.0317***	-0.0315***	0.161***	0.0138	-0.205***	-0.128***	-0.0320***
16. Log(Sales)	-0.243***	0.126***	0.0478***	0.226***	-0.0372***	0.0160	-0.0490***	0.128***	0.150***	0.264***	0.494***
17. Depreciation to assets	0.0225*	-0.0518***	-0.0926***	0.142***	0.0621***	-0.0733***	-0.103***	0.0942***	0.0356***	0.0201*	0.0511***
18. Tangibility	-0.0960***	0.00437	-0.234***	0.350***	-0.155***	0.0200*	-0.106***	0.391***	0.0261**	-0.0391***	0.0771***
19. ROA	-0.349***	0.372***	0.0117	-0.0710***	0.130***	0.1000***	-0.260***	-0.265***	0.186***	0.146***	0.00967
20. Sigma (ROA)	0.296***	-0.182***	-0.0944***	-0.144***	0.253***	-0.138***	-0.149***	-0.188***	0.0800***	-0.0396***	-0.184***
21. Log(MC to GDP)	0.0654***	-0.0387***	-0.0886***	0.0195*	0.281***	-0.141***	-0.266***	-0.143***	0.254***	0.149***	-0.0225*
22. Legal rights indicator	0.0895***	-0.108***	-0.150***	0.166***	0.221***	-0.166***	-0.250***	0.0276**	0.437***	0.259***	-0.0664***

Table D.1 (Continued)

Variable	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
12. CEO/chair duality	1										
13. Sales growth	-0.120***	1									
14. R&D to assets	0.0458***	-0.0696***	1								
15. Tax rate	0.113***	-0.0682***	0.0623***	1							
16. Log(Sales)	0.111***	-0.259***	0.0347***	-0.0578***	1						
17. Depreciation to assets	-0.00926	-0.0498***	0.0704***	0.00801	0.142***	1					
18. Tangibility	-0.0100	0.0693***	-0.239***	-0.0437***	-0.0565***	0.315***	1				
19. ROA	-0.0609***	0.0545***	-0.153***	-0.194***	0.146***	0.0342***	-0.0310***	1			
20. Sigma (ROA)	-0.116***	0.204***	0.166***	0.0260**	-0.264***	0.0587***	-0.00328	0.00186	1		
21. Log(MC to GDP)	-0.0822***	0.0563***	-0.0346***	-0.111***	0.00607	-0.0471***	-0.0169	0.130***	0.0748***	1	
22. Legal rights indicator	-0.0827***	-0.0784***	0.0438***	-0.0545***	0.0870***	0.0340***	-0.114***	0.102***	0.0762***	0.456***	1

Notes: This table reports Pearson correlations between the variables used in the analysis. Significance levels are computed as two tailed p-values: * p<0.05, ** p<0.01, *** p<0.001.

CHAPTER VI – CONCLUSION

In this dissertation we have completed four essays on corporate governance. In the first two essays (chapter 2 and 3) we have analysed governance issues within the Portuguese context over the period from 2002-2011. The endogenous variables used were CEO total earnings and firms Tobin's Q respectively. These variables are the most common variables used in the current literature to analyse the impact of corporate governance devices on agency costs. In the last two essays (chapter 4 and 5) we used an international database. In the third essay we analyse the effectiveness of the board of directors in a gender framework and, in the fourth essay, we have analysed the effect of the board of directors' structure on the firms financing policy.

With respect to the first essay the overall conclusion is that the CEO's earnings are driven by firm performance, CEO and board characteristics and also shareholders characteristics, providing new insights to the determinants of executives' earnings and validating some of the previous research in this field. Therefore the overall conclusion is that there are persistent effects on governance in distinct markets as well as aspects specific to each market. The policy implications of the present research are therefore as follows. First, the adoption of the governance code by all listed and non-listed companies should be promoted in an effort to advance the progress of Portugal in terms of governance best practices. Second, the effective roles of the remuneration committee and other governance commissions should be screened; as it is not clear that they properly monitor and limit the CEO's earnings. Third, minimum requirements for percentages of independent members on boards should be instituted, as result of the positive effect found on restricting the CEO's earnings. Fourth, the inclusion of stock-based compensation as a part of the CEO's earnings should be promoted because stock-

based compensation limits excessive earnings for CEOs. Fifth, variable cash based bonuses should be rethought as this sort of payment is driving upwards CEOs earnings. Sixth, CEO education should be disclosed as it seems that a lack of education might reveal some entrenchment and the ability for executives to earn excess earnings. Finally, anti-takeover devices such as shareholders agreements or voting caps should be discouraged and the shareholder participation on general meetings promoted.

The second essay (chapter 3) results support the hypothesis that the level of CEO education positively affects the firm performance which is consistent with the human capital theory. Nevertheless, management education is negatively associated with firm performance, while CEOs who have a law degree are more likely to be associated with best performing firms. These CEOs in-depth knowledge of the businesses they manage might explain this finding. As such, in the Portuguese context, other abilities other than management education, such as life experience or social ties might be more important to the firm performance than formal management education. Further, this essay founds that the CEO tenure and age are both negatively related with firm performance providing supporting evidence of the entrenchment hypothesis. With respect to the board of directors' characteristics, this study results corroborate the view that a more independent board is positively associated with higher firm performance, meaning that independent directors might in fact reduce agency costs in the Portuguese context. However, the two-tier governance system is not positively associated with better firm performance. With respect to the shareholders characteristics, this study results support the view that voting cap restrictions might benefit firm performance, suggesting that conflicts of interest among shareholders might be reduced when voting cap restrictions subsists. The main policy recommendations that emerge from the present research are the following. First, to promote higher quality levels of education for CEOs, because it seems that

education is an important covariate explaining firm performance. Second, to recommend the inclusion of independent directors on the board as it seems to be an important agency cost reducing mechanism. Finally, rethink the idea that a two-tier board structure reduces agency costs and that voting caps are detrimental to firm performance.

The first and second essays (chapter 2 and 3) present several limitations that should be highlighted. First, because the Portuguese stock market is quite underdeveloped the total sample used (50 firms) limits the ability to generalize these results to other realities. Secondly, the relative recent adoption of the sole code of governance code in Portugal also limits the assessment of the corporate governance devices effectiveness. Finally, the necessity of having to estimate the value of total CEO earnings for some firms and years also results in a limitation of the present study, in sense that it translates into potential measurement errors in the analysis. For these reasons, more research is needed to confirm these results. Thus, it would be interesting for us to further investigate the relationship between the CEOs earnings and corporate governance in Portugal using different techniques and time spans.

In the third essay (chapter 4) we analyse the role of female directors in enhancing the board effectiveness. The results provide strong evidence in support of the hypothesis that women directors send a positive signal to the public regarding a firm's ethical behaviour and specifically concerning its board's independence. Female board members are associated with fewer agency costs and more valuable firms. In fact, the effect of a board composed of many independent directors is only positive if the board is gender diversified. Moreover, as expected, firms with concerns about board independence and effectiveness and those operating in complex environments are more likely to have female members on their boards of directors. With respect to policy implications, the

results support the idea that board independence should be analysed at an ethical level rather than from a legal standpoint, because if boards want to be seen as effective management and monitoring bodies, they must provide the correct ethical signals to the public rather than following legal obligations that force them to have outside directors. The investigation reported here provides evidence that a gender-diversified board can provide such a signal. Thus, this analysis supports the notion that gender diversity is an important corporate governance issue. In fact, if firms wish to provide correct signals regarding board effectiveness, they should consider gender diversity. As such, corporate governance codes worldwide should give at least the same importance to this matter as they give to the structure of board independence. In fact, acknowledging the role of women by corporate governance best practices can potentially increase the effectiveness of independent directors, as it decreases the negative signal of an unbalanced gender board. The analysis undertaken in chapter 4 has several limitations. First, the hypotheses are tested using cross-sectional data. Panel data would more accurately reveal the proposed relationships. The interaction between a board's gender structure and its independence structure do not segregate female directors into independent and non-independent. Further research using segregated data on female directors would enhance the results. Another limitation of this study is that it does not consider different types of governance models, such as the one-tier system, in which executive managers are part of a firm's board of directors, or the two-tier system, which includes supervisory and management boards. This study's findings would benefit from further research that considers these two types of governance structures.

Finally, in the last essay (chapter 5), we investigate the way in which the board of directors' composition affects the mix of financing sources used by firms. The results indicate that firms with a board of directors composed of more independent directors are

more likely to use higher fractions of riskier financing sources. These results are consistent with our hypothesis that a more independent board should prompt firms to reduce information asymmetries between managers and outside investors and should reduce the cost of issuing more risky sources of financing as predicted by the pecking order theory. The results also provide some evidence that a board of directors that is more gender-diversified and in which the chairman is a non-executive (i.e., the CEO is a different person than the chairman) can improve the board's independence and efficiency and therefore prompt the firm to rely more on long-term sources of financing. With respect to policy implications, this study provides new insights into the ways in which firms can issue more external sources of finance. The result showing that a firm with a more independent board of directors issue more long-term debt and external equity suggests that the firm can more easily match (i.e., in a less costly manner) the maturity of its assets with the maturity of its financing sources. This study also provides important implications for securities regulators, because the findings suggest that firms with more independent directors are more likely to issue long-term debt and external equity. If that is the case, then regulators could promote the inclusion of independent directors in the board of directors of listed firms to develop their financial markets. Finally, the results also add to the discussion regarding capital structure theories. If the trade-off theory is to hold on its own and the pecking order theory is not, then one should not see such a strong effect between the board of directors' structure and the use of different financing sources. In fact, the results of this study suggest that managers choose financing sources by taking into account the level of information asymmetry. Further, the results suggest that board independence is not only important for aligning the managers' interest with those of the owners but is also important to other financing suppliers such as bondholders. This last essay has several limitations that should be

stressed. First, the financing sources are measured using book values and quasi-market values. Given that long-term debt market values can be much lower than book values during the sample period considered in this study, the results are not as robust as they would be if market values were considered. Further, the study does not segregate public from private debt. Information asymmetries costs are potentially lower for private debt because creditors can more closely monitor executive management. Additionally, the sample data analysed have a small time span (5 years) and a large cross section. Therefore, the results presented are more likely to characterise different financing policies across firms than across time. Finally, the present study does not control for firm ownership heterogeneity. Firms with diverse ownership structures may have different information asymmetry levels. As such, this study's findings would benefit from further research that considers these limitations. Future research could exploit these limitations.