Corporate governance and intellectual capital reporting in a period of financial crisis: evidence from Portugal

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ABSTRACT **This paper uses an analytical frame comprised of agency theory and a resource based perspective to explore the influence of boards of directors on listed companies' voluntary disclosure of information concerning intellectual capital [IC]. The IC disclosures in 75 published company reports of 15 listed Portuguese companies in a five year period of financial crisis, 2007 to 2011, are investigated using content analysis and regression techniques. IC disclosures are found to increase with company size, dual corporate governance models, industry, listing on sustainability indexes, and increases in board size up to a maximum point (beyond which disclosures decrease). IC disclosures are reduced by CEO duality and by a higher proportion of independent directors on boards. The year of reporting is not significant, suggesting that the period of financial crisis did not influence the level of IC disclosures. The evidence adduced is consistent with a view that highly visible companies acknowledge the importance of IC disclosures in maintaining their reputation and competitive advantage, even during a period of financial crisis. This paper highlights the need for caution in believing that adding extra directors to an existing board will lead to improved disclosure outcomes. Additionally, given the token number of females appointed to boards currently, the Portuguese capital market regulator should consider enforcing measures to ensure compliance with EU objectives.**

INTRODUCTION

Intellectual capital [IC] has had an increasingly important influence on long term corporate value in the knowledge economy. Consistent with Meritum (2002) and Oliveira et al. (2010), we conceive IC as:

> ... the value-creating combination of a company's human capital (skills, experience, competence and innovation ability of personnel), structural capital (organizational processes and systems, software and databases and business processes), and relational capital (all resources linked to the external relationships of the firm with stakeholders, such as customers, creditors, investors, suppliers, etc.).

Similarly, the European Commission (2006, p. 31) defines IC as the combination of the human, organizational and relational resources and activities of an organization – by which it includes the knowledge, skills, experiences and abilities of employees; R&D activities, organizational routines, procedures, systems, databases and intellectual property rights of the company; and all resources linked to the external relationships of the enterprise, such as with customers, suppliers, and R&D partners.

If stakeholders are informed fully of a firm's management of IC, their ability to assess the firm's capacity to sustain and increase long-term value will be enhanced. However, access to information regarding IC is asymmetric. Most stakeholders are disadvantaged in terms of access to information and are forced to rely strongly on voluntary disclosures of information about IC to inform their decision making.

In this paper we report findings which update, reinforce and extend prior studies of the effect of corporate governance factors on levels of disclosure of IC items (Cerbioni and Parbonetti, 2007; Li *et al.*, 2008; Hidalgo *et al.*, 2011). Gul and Leung (2004, p. 355) suggest that the 'failure to include corporate governance characteristics could account for the inconsistent results [in prior studies] since corporate disclosure policies emanate from the board.' As with Hidalgo *et al.* (2011), we seek to improve understanding of the corporate governance variables that are likely to reduce information asymmetry. We focus on voluntary disclosures of information about IC items.

Currently, knowledge of the factors influencing voluntary disclosure of IC information by companies is incomplete. This study makes a distinctive contribution by focusing on governance issues in the context of the Portuguese financial crisis, 2007-2011; by framing its analysis in terms of agency theory and a resources-based perspective [RBP]; and by exploring voluntary IC disclosures in a wider catchment of published

reports than usual (that is, in company annual reports, sustainability reports, and/or a combination of both).[1] Although Manolopoulou and Tzelepis (2014) concluded that IC reporting significantly decreased during the period of crisis in Greece, our evidence reveals that Portuguese companies maintained their level of IC reporting, apparently to maintain their reputation and competitive advantage. We also analyse levels of female board membership and explore whether the gender diversity of boards influences IC disclosures.[2]

Our results improve understanding of how financial crisis affects disclosure practices related to IC information, especially the influence of the composition of boards of directors on disclosures. They also help to assess the impact of recent corporate governance regulations in Portugal on IC disclosures. Portugal is an ideal setting to explore these matters for two reasons: first, because it was one of the European Union [EU] members most affected by the Global Financial Crisis [GFC]; and second, because the decision to require greater female participation on boards of Portuguese companies represents a deep cultural change.[3]

Our findings suggest that even in a period of financial crisis, companies understand the importance of maintaining levels of IC disclosure in building a positive image of innovation and concern for IC matters. As with Hidalgo *et al.* (2011), we find a quadratic relationship between board size and IC disclosure. Thus, an increase in the number of directors is related positively to the level of IC disclosure until a maximum is reached, beyond which any increase in directors does not increase the level of IC disclosure. Similarly, we also find CEO duality is statistically significant at the 10% level in explaining voluntary disclosure of IC items. Importantly, we provide new evidence of a statistically significant negative correlation between levels of IC disclosure and the proportion of independent board members; and of the absence of a statistically significant relationship between the gender diversity of a board and levels of IC disclosure.

The average size of boards of directors of listed companies in Portugal has grown in response to the Portuguese Securities Exchange Commission's requirement that at least one quarter of boards of listed companies be comprised by independent directors (*Instituto Português de Corporate Governance* [IPCG], 2006). In effect, this requirement implies that non-independent directors be replaced by independent

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[1] The International Integrated Reporting Council [IIRC] (2011) argues that integrating annual reports and sustainability reports into a combined report will build understanding of how performance in one area drives value in another.

[2] Recently, a European Union [EU] report required publicly listed companies in Europe to commit voluntarily to increase the presence of women on their corporate boards to 30% by 2015 and 40% by 2020, by actively recruiting qualified women to replace outgoing male members (EC, 2012).

[3] Salazar's dictatorship in Portugal (1932 to 1968) shaped Portugal as a very 'masculine' country. In Salazar's era, Portuguese society was very conservative. Women had little or no access to senior positions in government or business and their employment was restricted mainly to manual work and domestic duties (Nogueira *et al.,* 1995).

directors. In view of this, it is surprising to find that higher proportions of independent directors had a negative influence on IC disclosures. We draw attention to the small number of females on boards of listed companies in Portugal, and to whether the EU's targeted representation levels for 2020 will be attained. We reveal that more IC information is disclosed by companies in high intangibles intensive industries, by companies with high visibility and reputation (as measured by size and listing in sustainability indexes), and by companies with a dual corporate governance model.

In the following section we explain the corporate regulatory context of Portugal, review relevant literature, and develop research hypotheses. Thereafter, we explain our research design, sample selection, and dependent and independent variables. We then present results, before entering conclusions and recommendations.

PORTUGUESE CORPORATE REGULATORY CONTEXT AND DEVELOPMENT OF HYPOTHESES

Portuguese regulatory context

The Portuguese Stock Exchange is small by international standards. There are many listed family companies (Oliveira *et al.,* 2010). Traditionally, the ownership of Portuguese companies is concentrated highly (Lopes and Rodrigues, 2007). Many companies are financed strongly by family owners and banks (Caria and Rodrigues, 2014). There is strong concern within the Portuguese business community about the extensive financial disclosure requirements imposed by the Securities Market Commission (*Comissão do Mercado de Valores Mobiliários*–CMVM) (Oliveira *et al.,* 2010).

From January 2005 onwards, compliance with International Financial Reporting Standards [IFRS] became compulsory for Portuguese listed companies in preparing consolidated accounts. From 1 January 2010, the Portuguese government imposed an IFRS-based system (*Sistema de Normalização contabilística -* Accounting Standardization system) on all unlisted companies. The income tax code was adapted to be more amenable to the new accounting rules. Listed companies were permitted to apply IFRS from 2010 onwards in separate financial statements (Guerreiro *et al.,* 2012).

The first Portuguese corporate governance code, issued by the CMVM in 1999 (CMVM, 1999), was motivated by publication of the 'OECD Principles of Corporate Governance' (OECD, 1999). The

Portuguese Code required listed companies to disclose information related to various aspects of corporate governance. In 2007, a major amendment to the corporate governance code required boards of directors to include sufficient non-executive members to ensure effective supervision, monitoring and evaluation of executive members' activities (CMVM, 2007). At least one quarter of directors were required to be non-executive directors. The CMVM also recommended that boards of directors rotate responsibility for the finance area among directors at least every two complete terms of office. There was no recommendation related to the gender composition of boards.

In 2006, the IPCG recommended that the positions of CEO and Chair be held by different persons (Silva *et al.*, 2006). If the Chair and CEO was the same person, the IPCG recommended that companies explain in their annual report how the work of non-executive directors was coordinated. The IPCG's study of corporate governance practices in Portugal concluded that:

- the average size of boards of directors had increased since 1996 due to the inclusion of independent non-executive directors, and the trend to establish an Executive Committee for the day-to-day running of a company.

- the main purpose of companies must be to create wealth and to distribute it equally among shareholders.

- the annual general meeting of shareholders should approve a company's policies relating to sustainable development and social responsibility.

- audit committee independence should be strengthened, particularly in view of the lack of assurance that audit committees were independent of executive directors.

Portugal was affected severely by the Global Financial Crisis (GFC). The Portuguese economy suffered a pronounced on-going recession, featuring persistently high unemployment. The recession increased the level of debt rapidly, despite efforts to reduce public spending through government-imposed austerity measures. Additionally, Portugal has many gender-based inequalities. These are evident in aspects of management power and leadership, both in companies and in government bodies (Nogueira *et al.,* 1995).

Development of hypotheses

According to agency theory, a board of directors should monitor managers to ensure they behave in the interests of shareholders (Bertoni *et al.,* 2014). In fulfilling this role, a board of directors serves as a value-protection mechanism. According to the RBP view of corporate endeavour, a board of directors should help a company attain valuable resources to facilitate its competitive advantage. This role includes giving strategic advice, contributing to the company's reputation, and expanding the company's business contacts. Adoption of an RBP view emphasizes several matters: the value-creation capacity of a board of directors; that intangible resources and capabilities are the most important sources of company success; and that intangible resources are created, enhanced or depleted through relationships with stakeholders (Branco and Rodrigues, 2006).

Asymmetry exists between what is known inside a company and what is known outside a company. Corporate reputations are sometimes more important than the true state of affairs in shaping the way external actors engage with companies (Branco and Rodrigues, 2006). IC disclosures are an information signal with the capacity to influence the way stakeholders assess corporate reputation under conditions of incomplete information. In this regard, IC disclosures can be particularly important in assisting a company to develop competitive advantage by creating a positive image (for example, of a modern and competitive company), thereby encouraging people "to do business with the firm and buy its products" (Hooghiemstra, 2000, p. 64). Companies which invest in IC activities to create positive reputation often fail to realise the value of that reputation unless they make associated disclosures about their activities (Toms, 2002; Hasseldine *et al.,* 2005). Disclosures about IC activities help to build a positive image with external stakeholders and employees. These perceptions are also interrelated since employees' assessments of how external stakeholders will react to their employer will influence their job satisfaction and employment intentions (Branco and Rodrigues, 2006).

We seek to understand how the composition of a board of directors explains why listed companies disclose IC information in published reports. We do so in respect of Portugal during a period of financial crisis. We are especially interested in exploring argument that it is important to understand whether the effect of internal governance mechanisms on voluntary corporate disclosures is complementary or substitutive (Cerboni and Parbonetti, 2007). If it is complementary, agency theory predicts increased

disclosure since the adoption of more governance mechanisms will strengthen a company's monitoring environment. If the relationship is substitutive, managers could decide to disclose less information to avoid competitive disadvantage by disclosing strategic information (Dye, 2001). Cerboni and Parbonetti (2007) argued that although results have been mixed and controversial, because of strong demand for product development information by technology analysts and science-based companies, firms seek to satisfy this demand by disclosing value-relevant information.

Thus, we contend that corporate governance mechanisms have a positive impact on corporate disclosures. We begin by exploring the explanatory potential of corporate governance characteristics, canvassed in a diverse body of scholarly literature, to explain motivators for voluntary disclosure of information by listed companies. These characteristics include board size, board activity, CEO duality, independent directors, gender representation, and corporate governance model. The reasons for choosing these factors are discussed below. Related hypotheses are developed.

Board size

Board size has a significant influence on the efficiency, effectiveness and supervision of management (Hidalgo *et al.*, 2011). Allegrini and Greco (2013) found a positive association between board size and levels of voluntary disclosure. Some prior studies have suggested that large boards are less effective at mitigating agency conflicts than smaller ones (Babío and Muíño, 2005; Cerbioni and Parbonetti, 2007), although opinion is often expressed cautiously:

> … larger boards may be beneficial because they increase the pool of expertise and resources available to the organisation but, as the number of members on the board increases, this benefit may be offset by the incremental costs of poorer communication and increased decision making time that are often associated with large groups (Hidalgo *et al.,* 2011, p. 486).

Several studies have reported a quadratic relationship between board size and economic performance (e.g., Andres and Vallelado, 2008; Veprauskaitė and Adams, 2013; López and Morrós, 2014), between board size and corporate social disclosure (Cormier *et al.,* 2011), and between board size and disclosures of IC information (Hidalgo *et al.,* 2011). These studies have found, in effect, an inverted "U" relationship, with

optimal board size existing at the midpoint (Cormier *et al.,* 2011; Hidalgo *et al.,* 2011). Increases in board size have been found to improve the marginal rate of disclosure up to the top of the inverted "U", but then the marginal rate of disclosure diminishes as the size of the board becomes larger, and possibly unwieldy. This leads to the following hypotheses:

> **H1a***: Board size is related positively to voluntary disclosures of IC information.*

> **H1b***: Board size is related positively to voluntary disclosures of IC information, up to an optimal board size. Board size beyond an optimal point is related negatively to voluntary disclosures of IC information.*

Independent directors

The Green Paper on the EU Corporate Governance Framework (EC, 2011a) argues that boards will benefit from non-executive members who possess diverse views, skills and professional experience. The Green Paper recommends that independent non-executive board members be selected on the basis of "merit, professional qualifications, experience, personal qualities […] independence and diversity" (p. 5). These characteristics accord with the value-creation mechanisms of a board of directors that are emphasised by a RBP.

Board of director effectiveness in protecting shareholders is associated positively with the proportion of independent directors on the board (Rosenstein and Wyatt 1990; Dechow *et al.,* 1996; Peasnell *et al.,* 2005). Nevertheless, Eng and Mak (2003) and Gul and Leung (2004) have found a substitution effect: that an increase in independent directors reduces the need to disclose more information, and that increased monitoring by independent directors results in a lower level of voluntary disclosure. Although Hidalgo *et al.* (2011) did not find any significant relationship between the number of independent directors and disclosures of information about IC, Cerbioni and Parbonetti (2007) found a significant positive relationship. Given the possibility of a substitution effect, our hypothesis H2 is non-directional.

> **H2***: The proportion of independent members on a board of directors is related to voluntary disclosures of information about IC.*

Board activity

Boards of directors which meet more frequently than others are argued to be more diligent and to monitor management more effectively (Lipton and Lorsch, 1992; Xie *et al.,* 2003; Kanagaretnam *et al.,* 2007). Allegrini and Greco (2013) reported a positive relationship between number of board meetings and voluntary disclosures of information. Thus, an active board of directors is likely to provide more effective management control of IC, and disclose more information about IC, to publicise work undertaken.

> **H3.** *The number of meetings of a board of directors is related positively to voluntary disclosure of information about IC.*

CEO duality

A common requirement of corporate governance regulation internationally is to separate the role of chair of the board from that of CEO. Agency theory suggests that combining the two roles enables the CEO to engage in opportunistic behaviour because of his/her dominance of the board (Barako *et al.,* 2006). Since one of a board's most important roles is to oversee top management's performance, allowing the CEO to serve concurrently as chair compromises desired checks and balances, and reduces the probability that the board will execute its oversight and governance role properly (Lorsh and MacIver, 1989). Forker (1992) and Gul and Leung (2004) have reported a negative relationship between voluntary information disclosure and "CEO duality" (that is, in circumstances where one person assumes the roles of CEO and of chair of the board of directors). Cerbioni and Parbonetti (2007) reported that concentration of power through CEO duality is associated negatively with IC disclosures, whereas Hidalgo *et al.,* (2011) found no such relationship.

> **H4:** *CEO duality is related negatively to voluntary disclosures of information about IC.*

Gender composition

Gender diversity in the membership of a board of directors yields a broader range of competencies and expertise. Gender composition is considered important in enhancing the collective intelligence of a board of

directors in the EU Corporate Governance Framework (EC, 2011a).[4] Arguments for the appointment of female non-executive directors are that this will increase diversity of opinion, enhance decision making and leadership styles, and provide a competitive advantage by improving company image with stakeholder groups (Burgess and Tharenou 2002; Carter *et al.,* 2003).

Barako and Brown (2008) found that the representation of women on boards of Kenyan banks is associated positively with the extent of corporate social reporting information disclosed in annual reports. Nalikka (2009), in a study of 108 annual reports for 2005 to 2007 of companies listed on the Helsinki Stock Exchange, concluded that "gender diversity is one of the attributes influencing the extent of voluntary disclosure in annual reports." Specifically, she found a statistically significant association between companies with female Chief Financial Officers and the level of voluntary disclosure in annual reports. As well, a wide variety of empirical research reports that gender diversity improves company performance (for example, Lückerath-Rovers, 2013). We draw on such prior findings to argue that gender diversity should have a positive impact on disclosure.

> *H5: The proportion of women directors on the board is related positively to the voluntary disclosure of information about IC.*

Corporate governance model

The governance structure of Portuguese companies has changed in recent years. In 1999, companies followed either:

- the Latin model of corporate governance (Board of Directors and an Audit Board (which could be one person) or

- the Continental model (Supervisory Board and a Management Board. The latter was responsible for arranging a statutory audit).

In 2006, the revised Companies Code (*Código das Sociedades Comerciais*, CSC) allowed Portuguese companies to adopt more advanced models of corporate governance: they could choose between a Latin

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[4] A Securities and Exchange Commission Staff Working Paper (EC, 2011b), titled "The Gender Balance in Business Leadership", reported the average proportion of females on (supervisory) boards of listed companies in the EU was only 12%.

model, a Continental model, and an Anglo-Saxon model. The Anglo-Saxon model comprised a board of directors, an audit committee, and a statutory auditor – all elected at a company's annual general meeting. The audit committee is to be composed exclusively of non-executive directors, but with at least one member having sound knowledge of accounting and auditing. The CSC regarded the Anglo-Saxon model to be a more advanced model of corporate governance, and one likely to increase a company's legitimacy and reputation with many stakeholders (Costa *et al.,* 2013). Companies adopting this model were thought likely to disclose more IC information than companies which adopted either of the other models.

> ***H6.*** *Companies adopting the Anglo-Saxon model of corporate governance are more likely to disclose IC information than companies which adopt either of the classical (Latin or Continental) models of corporate governance.*

Control Variables

We selected company size, industry, listing on sustainability indexes, ownership concentration, and reporting year, as control variables.

Several previous studies have found that firm size influences voluntary disclosure (Chow and Wong-Boren, 1987; Meek *et al.,* 1995; Bozzolan *et al.,* 2003; Oliveira *et al.,* 2006; Cerbioni and Parbonetti, 2007; Lopes and Rodrigues, 2007; Hidalgo *et al.,* 2011).

Consistent with previous research in Portugal (Oliveira *et al.,* 2006; 2010), we partitioned companies into "high intangibles intensive" and "low intangibles intensive." High intangibles industries include chemicals, electronics, technology, telecommunications and finance. Our sample included six "high intangibles intensive" companies and nine "low intangibles intensive" companies.

We include listing on sustainability indexes as a proxy for reputation, consistent with Michelon and Parbonetti (2012). This variable was included in studies by Dragomir (2010), Gallego-Alvarez *et al.* (2011), and Prado-Lorenzo *et al.* (2009).

Prior empirical research on the association between voluntary corporate disclosures and ownership concentration has reported mixed results. However, most studies have found an inverse relationship between these variables (for example, Gul and Leung, 2004; Firer and Williams, 2005; Barako *et al.,* 2006).

The variable "year" controls for the effects of the financial crisis on IC disclosure. A study by Ahmed and Mohd (2012) of major listed Malaysian companies, 2008 to 2010, showed a significant increasing trend over time in the human capital disclosure index. However, Manolopoulou and Tzelepis (2014) found that IC reporting significantly decreased during the period of crisis in Greece. There are plausible grounds to believe that companies would reduce disclosure levels in a financial crisis: for example, to save costs. Indeed, the turmoil of a financial crisis could cause companies become more focused on operational efficiency rather than on stakeholder impression management, and legitimacy-seeking through voluntary disclosure.

RESEARCH DESIGN

Sample

We sample annual reports, sustainability reports, and reports which are a combination of both of these types of reports, for 2007 to 2011, for companies listed on the Lisbon Stock Exchange at 31 December 2012. Initially, we intended to sample all companies comprising the PSI 20 index.[5] However, because some PSI 20 companies did not include information on corporate social responsibility (CSR), we included other companies that were not part of the index in 2012, but had been so in the period 2007 − 2011 (and had reported information on CSR). The latter step seems justifiable in view of the large overlap of CSR and IC indicators found by Cordazzo (2005), Pedrini (2007) and Oliveira *et al.* (2010). We are mindful of the potential to understate IC disclosure levels if sustainability reports and annual reports were not both considered.

We selected 15 companies that were included on the PSI 20 index during the five years of this study. These companies, and the industries to which they belong, are listed in Appendix A. Reports were accessed on each company's website. We used pooled data with 75 firm-year observations: that is, 15 companies for 5 years each. The companies were from the following industries: Basic Materials (n = 1); Consumer Services

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[5] The PSI 20 is a benchmark stock market index of companies trading on Euronext Lisbon. It tracks the prices of the twenty largest listings according to market capitalization and share turnover in the general market of the Lisbon Stock Exchange.

(n = 2); Financial (n = 4); Industrial (n = 3); Oil and Energy (n = 1); Telecommunications (n = 2); and Utilities (n = 2).

Variables and data collection

Dependent Variable

Our dependent variable was an IC disclosure index (ICI). This was constructed using content analysis (Guthrie *et al.,* 2004; Beattie & Thomson, 2007). Such a method allows repeatability and valid inferences from data according to the context (Krippendorf, 1980). The content analysis technique involves codifying information into pre-defined categories to derive patterns in the presentation and reporting of information (Cerbioni and Parbonetti, 2007). It analyses published information systematically, objectively and reliably (Krippendorf, 1980). This method has been used in previous studies of disclosure of information (Guthrie *et al.,* 2004; Bukh *et al.,* 2005; García-Meca *et al.,* 2005; Cerbioni and Parbonetti, 2007; Singh and Van der Zahn, 2008; Oliveira *et al.,* 2010; Hidalgo *et al.,* 2011; Allegrini and Greco, 2013).

We assumed all items were relevant to all firms and were calculable by them. Thus, the total score of ICI for a company is:

$$ICI = \frac{\sum_{i=1}^{m} d_i}{m}$$

where

$d_i = 0$, if the disclosure item is not found

$d_i = 1$, if the disclosure item is found

$m =$ the maximum number of items a company can disclose

$ICI =$ Intellectual Capital Index (of disclosure)

We pilot tested three randomly chosen reports to obtain a list that better reflected the diverse nature of disclosed items. The final list included 88 IC items that firms could disclose (Strategy – 22; Processes – 10; Innovation, Research and Development [IRD] – 8; Technology – 5; Customers – 14; Human Capital – 29) (see Table 1). The data disclosures identified in our content analysis of the full sample were coded manually since software-assisted searches for words or sentences are insufficiently robust to capture the nature of IC

disclosures (Beattie and Thomson, 2007; Oliveira *et al.,* 2010). Content analysis of the entire sample was performed by the first author, informed by her prior coding of an initial sample of four annual reports with the second author. An inter-coder reliability test revealed the scale of coding errors (Scott's *pi* = 85.1%) to be "an acceptable level of inter-coder reliability" (Hackston and Milne 1996, p. 87).

Independent Variables

The hypotheses tested included independent variables for board size, proportion of independent directors, board activity, CEO duality, board composition as measured by the presence of female directors, and governance model. We proceeded consistent with studies by Barako *et al.* (2006), Cerbioni and Parbonetti (2007), Lim *et al.* (2007), Barako and Brown (2008), Li *et al*. (2008), Prado and García (2010), Hidalgo *et al.* (2011), and Allegrini and Greco (2013). Our independent variables were:

Board size: number of members of the board of directors.

Independent directors: percentage of independent directors comprising the board of directors.

Board activity: number of meetings of the board of directors during a financial year.

CEO duality: dummy variable with a value of 1 in case of CEO duality, and 0 otherwise.

Gender composition: percentage of females on the board of directors.

Governance model: dummy variable with a value of 1 if the Anglo Saxon model is used, and 0 if the Latin or dual Continental model is used.

Control Variables

Company size: logarithm of the number of employees (Subramaniam and Youndt, 2005)

Industry: a dummy variable that takes the value of 1 if a company belongs to a high intangibles intensive industry, and 0 otherwise (Oliveira *et al.,* 2006; 2010).

Listing on sustainability indexes: a dummy variable that takes the value of 1 if a company is included in sustainability indexes (e.g., Dow Jones Sustainability Index (DJSI) or FTSE4Good), and 0 otherwise (Prado-Lorenzo *et al.,* 2009; Dragomir 2010; Gallego-Alvarez *et al.,* 2011).

Ownership concentration: proportion of ordinary shares owned by substantial shareholders (with equity of 5% or more) (Lopes and Rodrigues, 2007).

Year: four dummy variables were included in the model to control for the effects of year of publication (0 = reference year = 2007; 1 = Y2 = 2008; 2 = Y3 = 2009; 3 = Y4 = 2010; and 4 = Y5 2011) (Costa *et al.*, 2013).

Research models

The four econometric models we used are based on linear regression techniques. They test hypotheses H1 to H6, consistent with approaches in prior disclosure studies by García-Meca *et al.* (2005), Oliveira *et al.* (2010) and Hidalgo *et al.* (2011). We developed a pooled regression (or data pool) estimate using an Ordinary Least Squares (OLS) approach, in accord with similar studies (for example, by Cheng and Courtenay, 2006). We began by analysing the independent variables in Models 1 and 2. To control for any nonlinear relationship between board size and the level of IC disclosures, we also considered the square of the LnBoardSize variable (model 2). We also considered the square of the board size variable in Models 3 and 4. Our logarithmic transformation of variables for board size, and board activity avoids potential problems of heteroscedasticity, facilitates data interpretation, and improves the quality of results (Haniffa and Hudaib 2006; La Rosa and Liberatore, 2014). In Model 3 we considered the independent and control variables. To control the unobservable events common to all companies for yearly differences, dichotomous variables (time dummies for each year) were incorporated into Model 4, consistent with Al-Akra *et al.* (2010) and Cardamone *et al.* (2012).

Model 1

$ICI = \beta_0 + \beta_1 LnBoardSize_{it} + \beta_2 IndependentDirectors_{it} + \beta_3 LnBoardActivity_{it} + \beta_4 CEO\ duality_{it} + \beta_5 Gender_{it} + \beta_6 GovernanceModel\ Dummies + \varepsilon$

Model 2

$ICI = \beta_0 + \beta_1 LnBoardSize_{it} + \beta_2 (LnBoardSize)^2_{it} + \beta_3 IndependentDirectors_{it} + \beta_4 LnBoardActivity_{it} +$

$\beta_5 CEO\ duality_{it} + \beta_6 Gender_{it} + \beta_7 GovernanceModel\ Dummies + \varepsilon$

Model 3

$ICI = \beta_0 + \beta_1 LnBoardSize_{it} + \beta_2 (LnBoardSize)^2_{it} + \beta_3 IndependentDirectors_{it} + \beta_4 LnBoardActivity_{it} + \beta_5 CEOduality_{it} + \beta_6 Gender_{it} + \beta_7 GovernanceModel\ Dummies + \beta_8 Ln\ Size_{it} + \beta_9 Industry_{it} + \beta_{10} Listing\ on\ sustainability\ indexes_{it} + \beta_{11} Ownership\ concentration_{it} + \varepsilon$

Model 4

$ICI = \beta_0 + \beta_1 LnBoardSize_{it} + \beta_2 (LnBoardSize)^2_{it} + \beta_3 IndependentDirectors_{it} + \beta_4 LnBoardActivity_{it} + \beta_5 CEO\ duality_{it} + \beta_6 Gender_{it} + \beta_7 GovernanceModel\ Dummies + \beta_8 Ln\ Size_{it} + \beta_9 Industry_{it} + \beta_{10} Listing\ on\ sustainability\ indexes_{it} + \beta_{11} Ownership\ concentration_{it} + Year\ Dummies + \varepsilon$

where:

LnBoardSize	= natural logarithm of the Board
LnBoardSize²	= square of the natural logarithm of the Board Size
LnBoardActivity	= natural logarithm of the Board Activity
GovernanceModel	= two dummies (Latin and dual)
Ln Size	= natural logarithm of the number of employees
Year	= four dummies (2008, 2009, 2010, 2011)

Table 5 presents the results of regression models using the robust option of STATA 12.1 software for estimating standard errors.

RESULTS

Descriptive Analysis

Table 1 reports the frequency with which the 88 items in the ICI were disclosed. Generally, there was a high incidence of disclosure. Fifty-six items were disclosed in more than 75% of the 75 company year observations. However, 11 ICI items were disclosed in fewer than 25% of the 75 observations. These were principally disclosures relating to patents, customers, and employee training and experience.

TABLE 1 ABOUT HERE

Table 2 presents descriptive statistics for the data reported in Table 1. It reveals the levels of disclosure for the ICI overall, and for its six sub-indexes. The ICI scores per company ranged from 0.557 to 0.875. On average, the annual report and the sustainability report (or combined report) disclosed information in respect of 72.8 per cent of the total disclosure items, with a standard deviation of 7.3%. In terms of sub-indexes, the three highest average levels were for Strategy (91%), Processes (80%) and Human Capital (76%). The three lowest average levels were for Technology (63%), Innovation, Research and Development (40%), and Customers (55%). These results are consistent with previous studies by García-Meca *et al.* (2005) and Oliveira *et al.* (2010). As with Oliveira *et al.* (2010), the standard deviation for the Innovation, Research and Development category was also the highest (0.275).

TABLE 2 ABOUT HERE

Table 3 presents descriptive statistics for the independent and control variables. Board size ranged from 6 to 30, with a mean of 15.6. In 1994 the mean board size was 9; in 1999 it was 11; and in 2004 it was 15 (Silva *et al.,* 2006). The increasing size of the board is associated mainly with regulatory pressures to include non-executive directors. The size of the board in Portugal is similar to that found in other Continental European countries, but it is larger than in UK (9) or US (11) (Silva *et al.,* 2006). On average, 27.7% of directors were classified as independent. This complies with the Portuguese Corporate Governance Code requirement that at least one quarter of directors be independent.

On average, the boards met 12 times per year. Females comprised only about 4% of members, although this number is increasing gradually.[6] In 77% of observations, the roles of the CEO and board chair were separate, in accord with Portuguese corporate governance regulations. In Portugal, the Anglo-Saxon model

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[6] In 2012, women represented 7.4% of the board members of the twenty largest listed companies in Portugal. This was significantly less than the average of 15.8% in the EU. The rate of increase of women on boards between 2003 and 2012 was 0.4 percentage points per annum. "At this rate of change, boards with at least 40% of each gender would not be seen for at least 75 years." (EC, 2013).

of corporate governance was more dominant (45%). The Latin governance model was important too (41%). The dual model was not significant (13%). There was a high level of ownership concentration: 61% of ordinary shares were held in individual shareholdings of 5% or more. Forty per cent of the companies belonged to high intangibles intensive industries. Seventy-three per cent of observations were not included in any sustainability index, while 27% were part of at least one index.

TABLE 3 ABOUT HERE

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Bivariate analysis

The bivariate analysis results in Table 4 reveal ICI is correlated positively with board size, board activity, listing on sustainability indexes, and the dual governance model; and correlated negatively with CEO duality. The results are similar from year to year. These bivariate relationships are consistent with the results obtained in previous studies (Eng and Mak, 2003; Cerbioni and Parbonetti, 2007; Barako and Brown, 2008; Li *et al.,* 2008; Dragomir 2010; Oliveira *et al.,* 2010; Prado and García, 2010; Hidalgo *et al.,* 2011; Allegrini and Greco, 2013).

TABLE 4 ABOUT HERE

Independent directors are more likely to be found in larger companies that adopt the Anglo-Saxon or dual corporate governance models, and to have lower levels of ownership concentration. Board activity is correlated positively with board size, listing on sustainability indexes, adoption of a dual corporate governance model, and lower levels of ownership concentration. The percentage of females on boards of directors is very low. Gender is not a significant factor. However, more females on boards are found in companies with lower levels of ownership concentration.

Companies which adopt the Anglo-Saxon model lf corporate governance typically belong to sustainability indexes, have a large board of directors, and low levels of ownership concentration. Companies with the Continental corporate governance model are bigger, have a higher proportion of

independent directors, larger boards, and higher levels of ownership concentration than companies which adopt the Latin model of corporate governance.

The correlation coefficients do not indicate collinearity. No pair-wise correlation coefficient is greater than 0.80 (Gujarati, 1995, p. 335).

Multivariate analysis

We validated the models using specification tests. To verify whether the models had omitted variables, the *Ramsey Reset test* was performed. To detect the presence of autocorrelation in the residuals (prediction errors) from a regression analysis, we applied the *Durbin-Watson test*. The overall significance of the models was assessed using an *F-test*. The models were significant globally at the 1 per cent level (*F-test*=5.331, 5.23, 5.555 and 4.021, respectively).

For Model 1, the only significant variable was board activity at the 5% level ($\beta3 = 0.033$, $t = 2.41$). This is consistent with results reported by Allegrini and Greco (2013) for a study of non-financial companies listed on the Italian Stock Exchange in 2007. Board size is not significant ($\beta1 = 0.038$, $t = 1.29$) − a result similar to of Cheng and Courtenay (2006). The latter authors found no association between the level of disclosure and board size. They argued that large boards lead to a decrease in monitoring capabilities.

When we included the variable $(LnBoardSize)^2$ in Model 2, board size was also significant (5% level). The coefficient of the LnBoardSize variable was positive ($\beta1= 0.446$) and the variable $(LnBoardSize)^2$ was negative ($\beta2= -0.087$). That is, the quadratic term of the proposed model resulted in a curve represented by an inverse "U", where the number of directors is related positively with the level of disclosure of IC up to a certain maximum, beyond which the level of disclosure of IC information decreases. Thus, board size increases IC disclosures up to a maximum point, beyond which board size is related negatively to ICI. This is consistent with Cormier *et al.* (2011) and Hidalgo *et al.* (2011).

In Model 2, the variable CEO duality is related negatively (10% level) to IC disclosure. Thus, when the CEO is also the Chair, disclosure of IC is reduced. These results accord with Cerbioni and Parbonetti (2007), Barako (2008), Li *et al.* (2008), Hidalgo *et al.* (2011) and Allegrini and Greco (2013).

When control variables are added (Model 3), ICI is related positively and significantly to board size at the 0.1% level ($\beta1 = 1.055$, $t = 3.93$; $\beta2 = -0.204$, $t = -3.97$; respectively), board activity at the 10 per cent

level ($\beta 4 = 0.029$, $t = 1.91$) and the dual governance model at the 5% level ($\beta 7 = 0.120$, $t = 2.23$). Moreover, ICI is related negatively to independent directors at the 5% level ($\beta 3 = -0.148$, $t = -2.22$), corroborating the findings of Eng and Mak (2003) and Gul and Leung (2004). Firm size (5%), industry (1%) and listing on sustainability indexes (0.1%) are also related positively to ICI, in accord with results obtained by Eng and Mak (2003); Cerbioni and Parbonetti (2007); Dragomir (2010); Oliveira *et al.,* (2010); and Hidalgo *et al.,* (2011). The year of reporting (Model 4) is not statistically significant: the level of disclosure was similar over the period 2007-2011. The financial crisis in that period does not seem to have influenced levels of disclosure of IC.

TABLE 5 ABOUT HERE

We used Model 4 to test for the relationship between ICI and all sub-indexes (see Table 6). The *Ramsey Reset test* indicates that Model 4 is well specified only in the case of the following sub-indexes: Strategy, Processes, and Human Capital. Disclosures in the sub-indexes for Innovation, Technology, and Customers do not seem to be explained by governance or firm characteristics.

Strategy disclosures are related positively to size and the Latin corporate governance model (both at the 5% level), and board activity (at 10%); and they are related negatively to CEO duality (at 10%). Disclosures in the sub-index Processes are related positively to board size and industry (both at 1%), and listing on sustainability indexes (at 10%); and they are related negatively to gender (at 5%). Finally, disclosures in the sub-index Human Capital are related positively to board size (at the 0.1% level), to listing on a sustainability index (at 5%), and industry (at 10%); and they are related negatively to independent directors (at 5%).

TABLE 6 ABOUT HERE

DISCUSSION AND CONCLUSIONS

Recent regulatory initiatives in Portugal and elsewhere in the EU regarding corporate governance are motivated, implicitly at least, by belief that beneficial disclosures of corporate information would flow from mandating a more heterogeneously composed board of directors — in particular, boards that include more females and a substantial proportion of independent directors.

Our results are inconclusive with respect to the idea that increased gender diversity will increase IC disclosure (H5). As well, they point to the need for caution in believing that simply adding extra external independent directors to an existing board will improve disclosure outcomes. In Portugal, increases in board size seem to be related more to the need to comply with corporate governance regulations to increase the number of external independent directors, than to desire to include more females on boards. Portuguese capital markets and Portuguese corporate governance regulations do not seem to have been influenced by the policy debate, in September 2010, when the EC adopted its *Strategy for Equality between Women and Men (2010-2015)* and announced "targeted initiatives to get more women into top jobs in decision-making" (EU, 2012). It is timely to consider whether reluctance to appoint women to boards of directors has the potential to damage the financial situation and reputation of Portuguese companies.

The White Book issued by the IPCG in 2006 noted that, in Portugal, there was no clear identification of directors who are truly independent from those who are non-independent. This is due to the absence of information allowing any clear connection to be established between the directors and the company's main shareholders. Perhaps because of the absence of independence, our study reveals that independent directors influence IC disclosure negatively. Another explanation is the substitution effect detected by Eng and Mak (2003) and Gul and Leung (2004). From the perspective of agency theory, independent directors do not appear to monitor the behavior of managers to ensure managers operate in the interests of shareholders (H2).

IC disclosure did not decrease between 2007 and 2011 — a period of deep financial crisis in Portugal. Our data reveal that this occurred independently of a company's ownership concentration (please see Table 4). This can be explained using a RBP view: one in which directors are conceived to have a role in helping a firm attain valuable resources to facilitate its competitive advantage. If that competitive advantage is lost because of a decrease in IC investment, this can reduce a company's reputation (e.g., in terms of innovation). This seems attributable, in part, to directors being conscious of the possibility of damaging their firm's

image (associated, for example, with speculation about their financial situation).[7] A plausible case can be made that they use disclosure as a means of legitimising the company's existence − and to maintain or empower its image. This reveals the utility of a RBP view in analysing a company's IC disclosures. The high visibility and reputation of the companies in our sample seems likely to have prompted them to maintain levels of IC disclosure to avoid reputational damage. Directors had an incentive to maintain IC disclosures so as to influence people to continue considering their company to be modern and competitive.

The Portuguese setting reinforces previous research that has found a quadratic relationship between board size and IC disclosure (H1b). This finding implies that large boards should be avoided if IC disclosures are regarded as important. Although a board's monitoring capacities increase with the number of directors, the costs involved (such as slower decision making and less candid discussions of managerial performance) could outweigh the benefits. This finding, and the results showing a negative relationship between IC disclosure and independent directors (H3), and CEO duality (H4), should interest the Portuguese CMVM in devising its future reform agenda. Additionally, given the token number of females appointed to boards at the moment, the CMVM should consider undertaking enforcement measures to ensure compliance with EU objectives.

The level of board activity is related slightly to IC disclosure (H3). This is explainable by the fact that active boards have ample opportunities to convey information to society. Such information includes messages that a company is well managed, that stakeholders' interests are taken into account, and that the board of directors is functioning well as a value-protection mechanism, thereby legitimising the company's behavior. Our results confirm that IC disclosures are more likely to occur with the Continental governance model than with the Anglo Saxon model (contrary to the view of the CMVM).

Company size is a proxy for company visibility. More visible companies which belong to high intangibles intensive industries and which are listed on sustainability indexes disclose more IC information. This accords with a resource-based perspective because it emphasizes the role of the board of directors in contributing to the firm's image and reputation.

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[7] This was the case of Banco Espírito Santo. Although this bank declared bankruptcy at the end of 2013, it kept disclosures at the same level in the analysis period.

It is important to continue researching how corporate governance characteristics influence IC disclosure. A particularly beneficial line of investigation would be to explore associations between IC disclosures and features of various sub-committees of a board of directors. As well, it would be beneficial if future research used larger samples, less visible companies, and companies in countries facing deep financial crises (e.g., Spain, Italy and France) to better understand whether levels of IC information disclosures are maintained during periods of financial crisis. Another line of future enquiry might be to explore family-held, publicly-traded companies to assess the influence of the compositional dynamics of the board of directors of such companies on voluntary disclosures of IC.

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Table 1. Frequency of intellectual capital items disclosed by firms

Items	Observations n = 75	(%) 2007-2011
Strategy – 22 items		
1. Corporate governance	75	100
2. New products or services and technology	73	97
3. Investments in new business	73	97
4. Strategic alliances or agreements	74	99
5. Acquisitions and mergers	38	51
6. Leadership	65	87
7. Network of suppliers and distributors	73	97
8. Supplier evaluation policy	66	88
9. Image and brand	73	97
10. Corporate culture	68	91
11. Best practices	71	95
12. Organisational structure	71	95
13. Environmental investments	50	67
14. Community involvement	74	99
15. Corporate social responsibility and objective	74	99
16. Shareholders' structure	62	83
17. Price policy	49	65
18. Business vision, objectives and consistency of strategy	74	99
19. Quality of products and or services	75	100
20. Marketing activities	66	88
21. Stakeholder relationships and or engagement	75	100
22. Risk management	75	100
Processes – 10 items		
1. Working environment, safety and hygiene	65	87
2. Internal sharing of knowledge and information	72	96
3. External sharing of knowledge and information	75	100
4. Measure of internal or external failures	40	53
5. Environmental approvals and statements and or policies	55	73
6. Utilisation of energy, raw materials, and other inputs	71	95
7. Efficiency	74	99
8. Business model	43	57
9. Litigations and or law suits and or sanctions	35	47
10. Quality approvals and statements and or policies	68	91
Innovation. research and development – 8 items		
1. Policy, strategy and or objectives of IRD activities	74	99
2 IRD expenses	36	48
3 IRD in basic research	37	49
4. IRD in product design and or development	33	44
5. Future IRD projects or IRD projects in progress	35	47
6. Details of firm patents	10	13
7. Patents, licences, papers, etc.	8	11
8. Patents pending	5	7
Technology – 5 items		
1. Investments in information technology – description	71	95
2. Information technology systems and facilities	74	99
3. Software assets	55	73
4. Web transactions	34	45
5. Number of visits to the web	1	1
Customers – 14 items		
1. Number of customers	38	51
2. Sales by customer	7	9
3. Annual sales per segment or product	73	97
4. Average customer size	4	5
5. Customer relationships	72	96
6. Customer satisfaction and or survey	67	89
7. Education and or training of customers	44	59
8. Customers by employee	5	7
9. Value added per customer or segment	1	1
10. Market share by country and or segment and or product	63	84
11. Relative market share to competitors	48	64
12. Customer seniority and loyalty	40	53

Items	Observations n = 75	(%) 2007-2011
13. Customer complaints	67	89
14. New customers	53	71
Human capital – 29 items		
1. Labour and unions	69	92
2. Staff community involvement	45	60
3. Staff entrepreneurship (new ideas)	54	72.
4. Staff by age	69	92
5. Staff by gender	69	92
6. Staff by job function and or business area	64	85
7. Staff by level of education	35	47
8. Staff by geographic area and or country	67	89
9. Staff by type of contract	66	88
10. Staff turnover	63	84
11. Changes in number of employees	66	88
12. Staff health and safety	71	95
13. Absenteeism	59	79
14. Staff interview and or employee survey	57	76
15. Policy on competence development	75	100
16. Description of competence development programs and activities	75	100
17. Education and training policy	72	96
18. Education and training expenses	15	20
19. Education and training hours ÷ number of employees	68	91
20. Employee expenses ÷ number of employees	5	7
21. Recruitment policies	66	88
22. Job rotation opportunities	69	92
23. Career opportunities	75	100
24. Remuneration and evaluation systems	74	99
25. Incentive systems and fringe benefits	67	89
26. Pensions	60	80
27. Value added per employee or production per employee	2	3
28. Employee quality and experience	45	60
29. Management quality and experience	33	44

Table 2. Descriptive statistics for ICI and sub-indexes

	2007	2008	2009	2010	2011	2007-2011
Intellectual Capital (ICI)						
mean	0.710	0.720	0.724	0.733	0.751	0.728
sd	0.066	0.071	0.082	0.077	0.072	0.073
max	0.841	0.830	0.864	0.875	0.875	0.875
min	0.568	0.602	0.557	0.614	0.602	0.557
Strategy – 22 items						
mean	0.903	0.918	0.885	0.903	0.918	0.905
sd	0.071	0.062	0.080	0.087	0.083	0.076
max	1.000	1.000	0.955	1.000	1.000	1.000
min	0.773	0.818	0.727	0.727	0.682	0.682
Processes – 10 items						
mean	0.747	0.807	0.787	0.807	0.840	0.797
sd	0.119	0.110	0.113	0.139	0.130	0.123
max	0.900	1.000	1.000	1.000	1.000	1.000
min	0.500	0.600	0.600	0.600	0.700	0.500
Innovation, research and development – 8 items						
mean	0.392	0.350	0.383	0.408	0.450	0.397
sd	0.291	0.251	0.273	0.301	0.287	0.275
max	0.875	0.625	1.000	1.000	1.000	1.000
min	0.000	0.125	0.125	0.125	0.125	0.000
Technology – 5 items						
mean	0.587	0.627	0.640	0.627	0.653	0.627
sd	0.220	0.128	0.172	0.183	0.160	0.172
max	0.800	0.800	0.800	0.800	0.800	0.800
min	0.000	0.400	0.200	0.200	0.400	0.000
Customers – 14 items						
mean	0.543	0.548	0.552	0.557	0.571	0.554
sd	0.132	0.166	0.154	0.153	0.132	0.144
max	0.714	0.786	0.714	0.857	0.857	0.857
min	0.214	0.214	0.214	0.286	0.357	0.214
Human capital – 29 items						
mean	0.740	0.743	0.772	0.770	0.779	0.761
sd	0.090	0.076	0.086	0.102	0.101	0.090
max	0.897	0.862	0.897	0.862	0.897	0.897
min	0.586	0.517	0.586	0.517	0.517	0.517
N (observations)	15	15	15	15	15	75

Table 3. Descriptive statistics for independent and control variables

Panel A: Continuous Variables	2007	2008	2009	2010	2011	2007-2011
Board size						
mean	14.7	15	15.800	16.300	16.300	15.600
sd	6.9	6.180	6.720	6.500	6.260	6.370
max	30.0	26	27	27	25	30
min	6.0	7	7	8	9	6
Independent directors						
mean	0.273	0.264	0.300	0.258	0.292	0.277
sd	0.148	0.139	0.141	0.137	0.131	0.136
max	0.444	0.444	0.500	0.500	0.560	0.560
min	0	0	0	0	0	0
Board Activity						
mean	9.47	9.27	12.40	13.50	16.70	12.3
sd	4.09	3.84	10.50	11.30	16.10	10.4
max	18.00	18.00	48.00	50.00	58.00	58.00
min	5.00	5.00	5.00	5.00	5.00	5.00
Gender						
mean	0.035	0.026	0.033	0.042	0.062	0.0396
sd	0.087	0.058	0.061	0.071	0.077	0.0707
max	0.333	0.214	0.214	0.267	0.308	0.333
min	0.000	0.000	0.000	0.000	0.000	0.000
Firm size						
mean	12847	14450	15134	15849	18612	15378
sd	12885	15089	16211	17491	22906	16882
max	41300	53375	53977	61061	72046	72046
min	802	793	738	728	734	728
Ownership concentration						
mean	0.576	0.596	0.610	0.625	0.635	0.608
sd	0.178	0.191	0.174	0.163	0.178	0.173
max	0.777	0.812	0.770	0.844	0.844	0.844
min	0.099	0.099	0.169	0.286	0.174	0.099
N (observations)	15	15	15	15	15	75

Panel B: Dummy Variables	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
CEO duality												
Frequency	10	5	12	3	12	3	11	4	13	2	58	17
Percentage (%)	67	33	80	20	80	20	73	27	87	13	77	23
Latin or Continental governance												
Frequency	8	7	9	6	9	6	9	6	9	6	44	31
Percentage (%)	53	47	60	40	60	40	60	40	60	40	59	41
Anglo-Saxon governance												
Frequency	9	6	8	7	8	7	8	7	8	7	41	34
Percentage (%)	60	40	53	47	53	47	5	47	53	47	55	45
Dual governance												
Frequency	13	2	13	2	13	2	13	2	13	2	65	10
Percentage (%)	87	13	87	13	87	13	87	13	87	13	87	13
High intangibles intensive industries												
Frequency	9	6	9	6	9	6	9	6	9	6	45	30
Percentage (%)	60	40	60	40	60	40	60	40	60	40	60	40
Listing on sustainability indexes												
Frequency	12	3	11	4	11	4	11	4	10	5	55	20
Percentage (%)	80	20	73	27	73	27	73	27	67	33	73	27
N (observations)	15		15		15		15		15		75	

Table 4. Correlations (Pearson and Spearman)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]
[1] Intellectual Capital	**1.00**	0.57**	0.53**	0.73**	0.21	0.67**	0.64**	0.29*	-0.10	0.32**	-0.24*	-0.02	0.13	0.12	0.27*	-0.19	-0.18	0.27*	0.00	-0.12	-0.05	-0.02	0.03	0.16
[2] Strategy	0.60**	**1.00**	0.25*	0.34**	-0.11	0.54**	-0.03	-0.13	-0.16	0.11	-0.34**	0.06	0.24*	-0.04	-0.21	-0.01	-0.42**	0.09	0.37**	-0.02	0.08	-0.14	-0.02	0.08
[3] Processes	0.52**	0.24*	**1.00**	0.35**	-0.06	0.25*	0.21	-0.05	-0.02	0.02	-0.07	-0.15	-0.03	0.08	0.09	0.09	0.09	-0.09	-0.03	-0.21	0.04	-0.04	0.04	0.17
[4] Innovation	0.73**	0.42**	0.34**	**1.00**	-0.11	0.21	0.44**	0.16	-0.17	0.27*	-0.06	0.11	0.12	-0.31**	0.31**	0.02	-0.02	0.00	0.02	-0.01	-0.09	-0.02	0.02	0.10
[5] Technology	0.11	-0.21	-0.12	**-0.19**	**1.00**	0.37**	0.11	0.20	0.20	0.14	-0.05	0.11	0.23*	0.45**	0.26*	-0.29*	-0.08	0.21	-0.07	-0.12	0.00	0.04	0.00	0.08
[6] Customers	0.68**	0.52**	0.29*	0.22	0.26*	**1.00**	0.10	0.17	-0.04	0.13	-0.46**	-0.15	0.29*	0.40**	0.01	-0.29*	-0.44**	0.36**	0.19	-0.04	-0.02	-0.01	0.01	0.06
[7] Human capital	0.60**	0.04	0.13	0.44**	0.19	**0.10**	**1.00**	0.47**	-0.03	0.34**	0.07	-0.03	-0.21	0.09	0.39**	-0.19	0.17	0.29*	-0.37**	-0.12	-0.10	0.06	0.05	0.10
[8] Board size (log)	0.24*	-0.17	-0.07	0.14	0.20	0.14	0.50**	**1.00**	0.25*	0.33**	-0.31**	-0.07	0.24*	0.35**	0.55**	-0.49**	0.32**	0.41**	-0.60**	-0.10	-0.05	0.01	0.06	0.07
[9] Independent directors	-0.07	-0.06	-0.02	-0.11	0.16	0.01	0.02	0.11	**1.00**	-0.02	-0.09	0.04	0.46**	-0.04	0.17	-0.44**	0.25*	0.28*	-0.45**	-0.02	-0.05	0.08	-0.07	0.05
[10] Board activity (log)	0.25*	0.07	0.02	0.28*	0.08	0.09	0.34**	0.32**	-0.11	**1.00**	0.15	-0.10	0.01	0.08	0.25*	-0.30**	-0.13	0.44**	-0.17	-0.12	-0.14	0.01	0.07	0.18
[11] CEO duality	-0.26*	-0.29*	-0.07	-0.06	0.04	-0.42**	0.06	-0.27*	-0.05	0.25*	**1.00**	-0.12	-0.44**	-0.12	0.11	0.22	0.15	-0.21	0.00	0.13	-0.03	-0.03	0.05	-0.11
[12] Gender	0.06	0.06	-0.12	0.03	0.25*	0.01	0.02	0.10	0.09	-0.10	-0.28*	**1.00**	0.15	-0.10	-0.16	0.07	0.02	-0.08	0.03	-0.04	-0.10	-0.05	0.02	0.16
[13] Size (log)	0.06	0.18	-0.07	0.07	0.05	0.19	-0.09	0.24*	0.55**	-0.04	-0.41**	0.12	**1.00**	0.07	0.09	-0.53**	0.08	0.22	-0.24*	-0.05	0.00	0.00	0.01	0.04
[14] Industry	0.07	-0.12	0.07	-0.35**	0.46**	0.38**	0.06	0.34**	-0.10	0.12	-0.12	0.06	0.04	**1.00**	0.12	-0.31**	0.08	0.08	-0.13	0.00	0.00	0.00	0.00	0.00
[15] Listing on sustainability indexes	0.23	-0.09	0.06	0.29*	0.26*	0.03	0.42**	0.55**	0.16	0.21	0.11	-0.06	0.10	0.12	**1.00**	-0.34**	0.36**	0.12	-0.44**	-0.08	0.00	0.00	0.00	0.08
[16] Ownership concentration	-0.04	0.08	0.17	0.05	-0.33**	-0.20	-0.15	-0.42**	-0.52**	-0.09	0.19	-0.06	-0.68**	-0.29*	-0.46**	**1.00**	0.08	-0.80**	0.47**	-0.09	-0.03	0.00	0.05	0.08
[17] Anglo-Saxon governance model	-0.23	-0.38**	0.07	-0.05	-0.04	-0.41**	0.17	0.34**	0.18	-0.05	0.15	-0.09	0.14	0.08	0.36**	-0.11	**1.00**	-0.36**	-0.76**	-0.05	0.01	0.01	0.01	0.01
[18] Dual governance model	0.30**	0.06	-0.09	0.02	0.24*	0.41**	0.32**	0.37**	0.30**	0.29*	-0.21	0.05	0.27*	0.08	0.12	-0.59**	-0.36**	**1.00**	-0.33**	0.00	0.00	0.00	0.00	0.00
[19] Latin governance model	0.02	0.35**	-0.01	0.04	-0.12	0.13	-0.39**	-0.60**	-0.39**	-0.14	0.00	0.05	-0.33**	-0.13	-0.44**	0.51**	-0.76**	-0.33**	**1.00**	0.05	-0.01	-0.01	-0.01	-0.01
[20] 2007	-0.13	-0.04	-0.18	-0.02	-0.08	-0.04	-0.14	-0.12	0.02	-0.11	0.13	-0.12	-0.06	0.00	-0.08	-0.12	-0.05	0.00	0.05	**1.00**	-0.25*	-0.25*	-0.25*	-0.25*
[21] 2008	-0.05	0.07	0.05	-0.08	-0.04	0.00	-0.14	-0.05	-0.03	-0.10	-0.03	-0.14	0.00	0.00	0.00	-0.04	0.01	0.00	-0.01	-0.25*	**1.00**	-0.25*	-0.25*	-0.25*
[22] 2009	-0.01	-0.14	-0.03	-0.02	0.05	0.03	0.06	0.02	0.07	0.02	-0.03	-0.06	0.00	0.00	0.00	0.03	0.01	0.00	-0.01	-0.25*	-0.25*	**1.00**	-0.25*	-0.25*
[23] 2010	0.02	0.01	0.01	0.02	0.01	-0.01	0.08	0.07	-0.08	0.06	0.05	0.03	0.02	0.00	0.00	0.03	0.01	0.00	-0.01	-0.25*	-0.25*	-0.25*	**1.00**	-0.25*
[24] 2011	0.17	0.10	0.15	0.11	0.07	0.02	0.15	0.08	0.01	0.13	-0.11	0.29*	0.04	0.00	0.08	0.10	0.01	0.00	-0.01	-0.25*	-0.25*	-0.25*	-0.25*	**1.00**

NOTE: Pearson correlation coefficients are above the diagonal (shown in bold). Spearman correlation coefficients are below the diagonal.
** Significant at the 0.01 level (two-tailed).   * Significant at the 0.05 level (two-tailed).

Table 5. Regression Models

Independent variables	Hypothesis	Predicted sign	Model 1 (robust) b (t)	Model 2 (robust) b (t)	Model 3 (robust) b (t)	Model 4 (robust) b (t)
(Constant)			0.565*** (6.45)	0.036 (0.13)	-1.031** (-2.72)	-1.095* (-2.60)
Board size (log)	H1a	+	0.038 (1.29)	0.446* (2.14)	1.055*** (3.93)	1.093*** (3. 72)
Board size^2 (log)	H1b	-		-0.077† (-1.89)	-0.204*** (-3.97)	-0.212*** (-3. 77)
Independent directors	H2	?	-0.071 (-1.16)	-0.087 (-1.43)	-0.148* (-2.22)	-0.151* (-2. 18)
Board Activity (log)	H3	+	0.033* (2.41)	0.036* (2.54)	0.029† (1.91)	0.030† (1.79)
CEO duality	H4	-	-0.035 (-1.63)	-0.037† (-1.72)	-0.035 (-1.64)	-0.036 (-1. 64)
Gender	H5	+	0.006 (0.07)	-0.027 (-0.31)	-0.049 (-0.56)	-0.053 (-0. 58)
Latin Corporate Governance Model	H6	+	0.022 (0.94)	0.020 (0.83)	0.018 (0.81)	0.017 (0.72)
Dual Corporate Governance Model	H6	+	0.024 (0.92)	0.024 (0.88)	0.120* (2.23)	0.127* (2.25)
Size (log)		+			0.024* (2.17)	0.026* (2. 14)
Industry		+			0.058** (2.96)	0.060** (2. 87)
Listing on sustainability indexes		+			0.088*** (3.82)	0.091*** (3. 60)
Ownership concentration		-			0.210 (1.67)	0.231† (1.70)
2008						-0.014 (-0.70)
2009						-0.010 (-0.41)
2010						-0.014 (-0.57)
2011						-0.010 (-0.36)
N			75	75	75	75
R-squared			0.236	0.260	0.426	0.430
Durbin-Watson			2.269	2.216	2.253	2.252
F test			5.331***	5.23***	5.555***	4.021***
(p-value)			(0.000)	(0.000)	(0.000)	(0.000)
Ramsey Reset test			0.09	0.58	0.69	0.75
(p-value)			(0.967)	(0.629)	(0.564)	(0.526)

NOTE: †$p<0.10$; *$p<0.05$; **$p<0.01$; ***$p<0.001$

Model 1: Pooled OLS (Indep. variables). Model 2: Pooled OLS (Indep. variables with board size and board size squared). Model 3: Pooled OLS (Indep. Variables, with board size and board size squared, and control variables). Model 4: Pooled OLS (Indep. Variables, with board size and board size squared, control variables and time-effect).

Table 6. Regression Model 4 for sub-indexes

Independent variables	Hypothesis	Predicted sign	Strategy (robust)	Processes (robust)	Innovation (robust)	Technology (robust)	Customers (robust)	Human Capital (robust)
			b	*b*	*b*	*b*	*b*	*b*
			(t)	*(t)*	*(t)*	*(t)*	*(t)*	*(t)*
(Constant)			0.587	-1.718†	-4.912**	-0.303	-1.391*	-1.096*
			(1.22)	(-1.75)	(-3.17)	(-0.27)	(-2.01)	(-2.06)
Board size (log)	H1a	+	0.004	1.830**	3.281**	-0.108	0.726	1.446***
			(0.01)	(2.98)	(3.18)	(-0.13)	(1.48)	(3.94)
Board size^2 (log)	H1b	-	-0.006	-0.378**	-0.611**	0.003	-0.153	-0.267***
			(-0.08)	(-3.24)	(-3.03)	(0.02)	(-1.64)	(-3.86)
Independent directors	H2	?	-0.061	-0.078	-0.799**	0.275*	-0.092	-0.169*
			(-0.85)	(-0.61)	(-3.38)	(2.02)	(-0.87)	(-2.09)
Board Activity (log)	H3	+	0.031†	0.030	0.141*	-0.008	-0.001	0.019
			(1.91)	(0.95)	(2.47)	(-0.23)	(-0.04)	(0.97)
CEO duality	H4	-	-0.050†	-0.076	-0.047	0.050	-0.098*	0.007
			(-1.93)	(-1.65)	(-0.59)	(1.04)	(-2.62)	(0.27)
Gender	H5	+	-0.012	-0.427*	0.236	0.469**	-0.357*	0.023
			(-0.1)	(-2.42)	(0.77)	(2.84)	(-2.59)	(0.2)
Latin Corporate Governance Model	H6	+	0.051*	-0.059	0.062	0.067	0.092**	-0.040
			(2.23)	(-1.57)	(0.85)	(1.47)	(2.68)	(-1.46)
Dual Corporate Governance Model	H6	+	0.057	0.047	-0.004	0.355**	0.411***	0.066
			(1.02)	(0.46)	(-0.02)	(3.07)	(5.08)	(1.23)
Size (log)		+	0.023*	0.018	0.089*	0.052**	0.065**	-0.011
			(2.00)	(0.76)	(2.18)	(2.01)	(3.31)	(-0.92)
Industry		+	0.006	0.118**	-0.121	0.229***	0.191***	0.040†
			(0.27)	(3.24)	(-1.62)	(5.78)	(5.33)	(1.73)
Listing on sustainability indexes		+	0.006	0.107†	0.286**	0.186**	0.126**	0.062**
			(0.21)	(1.99)	(3.35)	(2.69)	(3.35)	(2.73)
Ownership concentration		-	0.121	0.221	0.194	0.672*	0.694**	0.028
			(0.81)	(0.89)	(0.39)	(2.62)	(3.46)	(0.21)
2008			0.007	0.022	-0.102	0.030	-0.038	-0.015
			(0.33)	(0.51)	(-1.27)	(0.53)	(-1.14)	(-0.54)
2009			-0.029	0.011	-0.067	0.026	-0.031	0.018
			(-1.19)	(0.24)	(-0.79)	(0.43)	(-0.86)	(0.59)
2010			-0.014	0.031	-0.101	0.009	-0.033	0.001
			(-0.58)	(0.6)	(-1.13)	(0.14)	(-0.87)	(0.02)
2011			-0.010	0.048	-0.096	0.003	-0.041	0.006
			(-0.31)	(0.87)	(-1.04)	(0.06)	(-0.95)	(0.16)
N			75	75	75	75	75	75
R-squared			0.393	0.288	0.499	0.459	0.661	0.550
Durbin-Watson			1.79	2.335	2.115	1.839	2.122	2.156
F test (p-value)			3.30***	2.16*	4.66***	7.28***	8.23***	5.24***
Ramsey Reset test (p-value)			0.72 (0.544)	0.46 (0.709)	5.82 (0.002)	11.88 (0.000)	5.88 (0.001)	0.24 (0.865)

NOTE: †p<0.10; *p<0.05; **p<0.01; ***p<0.001

Model 4: Pooled OLS (Indep. Variables, with board size and board size squared, control variables and time-effect).

Appendix. Sample companies and industry

Banif –Banco Internacional do Funchal	Financial
BCP – Banco Comercial Português	Financial
BES –Banco Espírito Santo	Financial
BPI – Banco Português de Investimento	Financial
Brisa	Industrials
Cimpor	Industrials
EDP	Utilities
Galp	Oil &Gas
J. Martins	Consumer Services
M.Engil	Industrials
Portucel	Basic materials
PT-Telecom	Telecommunications
REN	Utilities
Sonae	Consumer Services
Sonaecom	Telecommunications