The Impact of Intangible Assets on Financial and Governance Policies: A Simultaneous Equation Analysis

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Abstract

Using two UK cross-sectional samples, this paper examines the impact of the level and the type of the intangible assets on six major financial and governance policies that directly depend on the interactions between managers, shareholders and debt holders – financial structure, dividend pay-outs, external ownership concentration, managerial share ownership, board of directors' structure and auditing demand. The results suggest that the level and type of intangible assets (measured by the amount of all intangible assets, the stock of RD expenditures and the amount of intangible assets other than RD) fail to have a significant impact on the four governance policies investigated in this paper – managerial equity ownership, external block ownership, board structure and auditing demand. In contrast, it is found that intangible assets (measured by those three variables) have significant negative impact on debt and dividend payout. From a theoretical point of view, these results suggest that the accumulated amount of high agency costs of debt, bankruptcy costs, information asymmetry and non-debt tax shields associated with intangible/RD assets are cancelled out by important equity agency costs and signalling arguments for all four governance policies but not for the two financial policies.

1 Introduction

Intangible assets show a set of characteristics - namely high risk and uncertainty, firm-specificity, long term nature and human capital intensity (Lev [1]; Holmstrom [2]; Dierickx and Cool [3]) - that make them markedly distinct from other types of assets. These characteristics potentially have important impacts on the levels of agency costs of debt (due to asset-substitution and under-investment problems) and equity (hidden action and hidden

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information problems), information asymmetry levels between debt holders, shareholders and managers, transaction costs of debt and equity, and the magnitude of non-debt taxes shields. These effects are likely to affect the maximisation of the utility functions of managers, shareholders and debt holders, who have different reward structures, diversification levels, risk preferences and business expertise levels. Consequently, it is anticipated that the design of financial and governance policies reflects the characteristics of intangible assets. Moreover, since intangible assets are not a homogeneous category of assets, it is also expected that the type of intangible assets determines the choice of financial and governance policies. Nevertheless, the nature of those influences on managers, shareholders and debt holders remains open. Also, there is not a developed theoretical framework to interpret the independencies among them, particularly incorporating the impact of firms' asset structure. Most existing theories are partial and lead to conflicting predictions.

As such, it is not surprising that an increasing number of studies call for further research into the determinants of financial policies and the effectiveness of governance structures, in the context of the growing importance of intangible assets. In this vein, Myers [4] regrets the absence of theories of capital structure analysing the conditions for efficient co-investment of human and financial capital while, earlier, Harris and Raviv [5] suggest the potential usefulness of incorporating strategic variables such as advertising and research and development (RD) expenditures into the study of financial structures. Recently, Zingales [6:1641] recognises, "*The changing nature of the firm forces us to re-examine much of what we take for granted in corporate finance*", and Bah and Dumontier [7:690] emphasise the need to improve "*the theoretical analysis between the characteristics of R&D-intensive firms and their financial choices*".

In terms of the corporate governance research agenda, Keenan and Aggestam [8:270] emphasise the existence of unexplored "*important connections between the concept of intellectual capital, which focuses on forming and leveraging an organisation's intangible capital, and corporate governance, which focuses on patterns of stakeholder influences that affect managerial decision-making*". Finally, Goyal, Lehn and Racic [9] propose further research about how growth opportunities affect dividends and governance structures.

The major unanswered issue resulting from the existing financial and governance literature – which is the *raison d'être* of this paper - is the potential impact of the level and the nature of the intangible assets on financial and governance policies. This study aims to contribute to the understanding of this issue by studying the impact of intangible assets on financial and governance policies in the UK.

The rest of the paper is structured as follows. In the section two, we provide an overview of the theoretical foundations about interactions between intangible assets, financial and corporate governance theories. In section three, we develop testable hypotheses. Then we describe the research methodology and variable measurement in section four. The sample selection process and characteristics of the sample are presented in section five. The results and discussion of study are reported in section six. We provide sensitivity tests in section seven. Finally, the paper's main conclusions are presented in section eight.

2 Financial and Governance Theories

Intangible assets have impacts on multiple, key dimensions of a firm, such as the level of non-debt tax shields, bankruptcy costs, agency costs, information asymmetry and

transaction costs. So, although it is common to choose a single theoretical paradigm and develop the theoretical/empirical work within that selected paradigm, the nature of the intangible assets seems to require the use of complementary theoretical perspectives. This complementarity of theoretical perspectives seems particularly important for understanding how intangible assets' characteristics have an impact on managers, shareholders and debt holders' decisions and, consequently, the way these decisions affect the design of financial and governance policies.

Under assumptions of symmetric information, no transactions costs, perfect and complete markets, no taxation and rational behaviour, Modigliani and Miller (MM) [10] demonstrate the irrelevance of financial policies. The first challenge to the original MM model came from models incorporating taxes. Alongside the "interest tax shield", these models consider the existence of non-interest tax shields. It is expected that non-interest tax shields generate a lower level of debt, *ceteris paribus* (DeAngelo and Masulis [11]). As expenditures on intangible assets are usually treated as expenses when incurred, they generate non-interest tax shields (making "interest tax shields" redundant), leading to low debt (Balakrishnan and Fox [12]; Bradley, Jarrell and Kim [13]).

In a further step, the trade-off theory brought in financial distress costs, which mainly come from bankruptcy costs (Castanias [14]). Since "*asset liquidity is an important determinant of the costs of financial distress*" (Shleifer and Vishny [15:1364]) and the value of most intangible assets depends on the existence of the firm as a "*going concern*" (Myers [16]), bankruptcy costs will be relatively higher in intangible asset intensive firms. As a consequence of both high non-interest tax shields and high financial distress costs, the level of debt is expected to be low in intangible assets intensive firms.

The asymmetric information approach assumes, in contrast with the MM model, that managers have superior information about future returns and growth opportunities of the firm. One can anticipate that the level of insiders' "superior information" is higher in intangible asset intensive firms. Signalling theory argues that managers have incentives to disclose their superior information to capital markets through their financial choices, namely through financial structure (Ross [17]) and dividend policy (Bhattacharya [18]). Since the intensity of the signal should depend positively on the size of the information asymmetry gap (because the benefits resulting from using the signal are maximised), and good (low risk) firms are typically more debt-financed, the signalling arguments suggest that managers of intangible asset intensive firms should use more debt.

Information asymmetry models also argue that insiders have incentives to sell overvalued claims to new investors. This would generate adverse selection, leading to under-investment by firms. Consequently, the capital structure would be designed to mitigate inefficiencies in firms' investment decisions caused by the information asymmetry phenomenon (so, against the MM prediction, there is a link between investment and financing policies). Accordingly, pecking order theory (Myers and Majluf [19]; Myers [20]) argues that firms favour financing sources requiring lower levels of information disclosure. Therefore, first of all, firms use internally generated cash flows, after that debt and, finally, new equity issues.

Within information asymmetry models, signalling theory suggests that the "informational content of dividends" enables a reduction in levels of information asymmetry between managers and investors about the future prospects of the firm (Ross [17]). The credibility of dividend policy as a signal comes partially from the fact that it is too costly for "bad" firms to use it as a signalling device. So, intangible asset intensive firms, if they want to signal "good quality", should have high dividend payouts. Signalling theory also argues that, alongside dividends, firms use other financial characteristics (such as financial structure)

(Ross [17]; Easterbrook [21]) and ownership structure (Leland and Pyle [22]) as signals. Finally, pecking order theory (Myers and Majluf [19]; Myers [20]) argues that firms select financing sources that require lower levels of information disclosure, which means preference for profit retention. As firms with more intangible assets are characterised by high information asymmetry, one anticipates that intangible asset intensive firms show low dividend payouts in order to mitigate the under-investment problem. So, contradicting MM's prediction, there is a link between dividend payments and investment policy.

Models considering the existence of incentive problems have attracted significant theoretical and empirical attention. Agency theory argues that financial policies are determined by agency costs. Given intangible asset characteristics, agency costs are expected to be high in intangible asset intensive firms. Jensen and Meckling [23] identify two sources of conflict: the separation of ownership and control and the equity-holder/debt holder conflict. Shareholders can reduce the size of the conflict with managers (but not eliminate it) through a "remuneration package" that trades off performance incentives and risk-sharing, enabling, for instance, managers to become equity holders (Jensen and Meckling [23]). Increased debt also reduces the agency conflict since it increases managers' share in the equity and decreases the amount of free cash flow available for over-investment by managers (Jensen [24]). In its turn, the equity-holder/debt holder conflict results from the "asset substitution" (or risk-shifting) problem, which is exacerbated by intangible asset characteristics.

Agency theory also suggests that managers, who have their non-diversifiable human capital invested in the firm, want to ensure the future viability of the firm (Fama [25]; Zingales [6]). Since managers are risk averse (and intangible assets investments are particularly risky), one way of reducing their overall risk is decreasing the firm's debt (Friend and Lang [26]; Berger, Ofek and Yermack [27]). Given the relevance of managers' human capital and the asymmetry of expertise between managers and shareholders, the impact of the hidden action and hidden information problems seems crucial in the design of the financial structures in intangible assets intensive firms.

Expanding the implications of Jensen and Meckling's [23] agency theory, the role of dividends as a disciplining device is initially found in Rozeff [28] and Easterbrook [21]. The governance effects of dividends result from the need for new equity issues in the primary capital markets, leading to increased monitoring of managers' performance and firms' future investments' profitability by investment banks, stock exchanges, auditors and capital suppliers (Rozeff [28]). Given the sophistication level of the first three categories of institutions and the self-interest of the potential investors, monitoring by capital markets emerges as an efficient controlling device. Transaction-cost economics theory directly challenges other assumptions of the MM model, since actual firms face transaction costs, which depend on firms' characteristics. Williamson [29] argues that financial structures depend mainly on the characteristics of their assets: redeployable assets are financed by debt (based on explicit contracts), while non-redeployable assets (such as most intangible assets) are financed by equity (since equity allows greater flexibility). Hence, debt and equity must be seen not only as alternative financial sources but also as alternative governance mechanisms. Transactions costs are also relevant when considering alternative financing sources, influencing consequently the dividend policy.

Summing up, there are many arguments – non-debt tax shields, bankruptcy costs, agency costs, information asymmetry and transaction costs – suggesting the relevance of the characteristics of intangible assets on the design of the financial structures. This potential relevance is explored in section three.

The bulk of corporate governance research aims to understand the consequences of the separation of ownership from control on firms' performance. In other words, corporate governance analyses the effects of Smith's [30] old warning about the "negligence and profusion" arising when people run companies, which are "rather of other people's money than of their own" in contrast with the "anxious vigilance" of the owners. In this sense, "*corporate governance is, to a large extent, a set of mechanisms through which outside investors protect themselves against expropriation by the insiders*" (La Porta, Silanes, Shleifer and Vishny [31:4]). Contrasting with this perspective based on conflicting interests, the stewardship approach defends the existence of a collaborative relationship between managers and shareholders. The adoption of one of these two divergent perspectives has significant impact on the choice of devices that can be used as monitoring mechanisms and the nature of the relationship (complementary or substitutability) between them.

Agency problems play a central role in the emergence of governance structures. "*Agency problems arise because contracts are not costlessly written and enforced*" (Fama and Jensen [32:304]). Since contracts are not complete, moral hazard and adverse selection problems remain.

Particularly in intangible asset intensive firms, managers can improve their bargaining position by developing "manager-specific investments". Also, the level of contracts' incompleteness seems to increase with the level of intangible asset intensity. The costs of writing and enforcing (increasingly incomplete) contracts become severe when managers possess better business expertise than financiers (shareholders and debt holders).

From the shareholders' point of view, since innovation projects are risky, unpredictable, long-term, labour intensive and idiosyncratic, "*it turns out that contracting under this set of circumstances is particularly demanding*" and, as a consequence, "*the agency costs associated with innovation are likely to be high*" (Holmstrom [2:309]). Moreover, in the presence of intangible assets, the agency problem seems to move away from the classical managerial propensity to excessive remuneration and perquisites consumption to other components of a manager's utility function.

From the debt holder's perspective, "*because the assets of high growth firms are largely intangible, debt holders have more difficulty observing how stockholders use assets in high growth firms*" (Goyal, Lehn and Racic [9:45]). Consequently, as the scope for discretionary behaviour is higher in more intangible asset intensive sectors than in traditional industries, the asset substitution (risk shifting) and under-investment problems increase, exacerbating adverse selection problems. So, facing high agency costs, high information asymmetry and high bankruptcy costs, debt holders limit the amount of credit to intangible asset intensive firms.

3 Testable Hypotheses

Within the theoretical frameworks presented in the previous section, this section aims to formulate the hypotheses concerning the impact of the level and the type of the intangible assets on financial and governance policies. The result of the interactions within a heterogeneous "stakeholder structure" - debt holders, shareholders and managers - is reflected in six major financial and governance policies: financial structure, dividend policy, managerial equity ownership, external block ownership, board structure and audit demand.

Financial Structure: Given the characteristics of intangible assets, it is likely that the marginal costs of debt offset the marginal benefits of debt at low levels of leverage. As intangible assets require highly specialised expertise (held by managers), they are associated with high agency costs (of debt and equity). As "*we would expect to see specialisation in the use of the low agency cost arrangement*" (Jensen and Meckling [23:355]), shareholders prefer equity instead of debt to finance intangible assets in order to save the costs of debt holder requirements (Myers [16]). Transaction-cost economics theory also supports the preference for equity when asset-specific investments are involved, since it enables the firm to save on transaction costs. Debt is more suitable for re-deployable assets (Williamson [29]). Finally, as financial distress costs are high in intangible asset intensive industries and expenses with intangible assets generate non-interest tax shields, the level of debt is expected to be low in intangible asset intensive industries. Sen and Oruç [33] find a negative relationship between debt and intangible assets.

Contradictorily, pecking order theory predicts the preference for debt when financiers face high levels of information asymmetry, since a new debt issue requires less information disclosure than an equity issue. In this vein, Al-Najjar and Taylor [34] and Salawu and Agboola [35] find a positive relationship between intangible assets and debt.

There are several studies about financing policies. Marsh [36] models the debt-equity decision by considering, alongside timing and market conditions, a set of variables reflecting firm-specific characteristics: size, asset structure and risk. He finds that small firms, with less fixed assets and higher potential bankruptcy risk, are more likely to favour new equity financing. Bennett and Donnelly [37] investigate the determinants of total leverage, short-term leverage and long-term leverage. Their results suggest that non-debt tax shields and profitability are negatively related with leverage while size and fixed assets are positively related with debt.

So, we hypothesise that:

H1a$_0$: *The financial structure is the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.*
H1a$_1$: *The financial structure is not the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.*

H1b$_0$: *The financial structure is the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.*
H1b$_1$: *The financial structure is not the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.*

H1c$_0$: *The financial structure is the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.*
H1c$_1$: *The financial structure is not the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.*

Dividend Policy: The role of dividend policy as a monitoring device is initially found in Easterbrook [21] and Rozeff [28], extending Jensen and Meckling's [23] agency theory. High dividend payouts, increasing the need for new equity issues, lead to further monitoring of managers' performance by investment banks, stock exchanges, auditors and capital suppliers (Rozeff [28]; Easterbrook [21]). Finally, complementing Easterbrook's

[21] and Rozeff's [28] hypotheses, Jensen [24] argues that dividends reduce the over-investment costs arising from the existence of free cash flow (cash flow exceeding the amount of positive NPV investments faced by the firm).

As external credit markets require high premiums for intangible asset intensive firms, the internal credit market becomes the lowest cost-financing source. Consequently, "*R&D intensive firms tend to pay little or no dividends*" (Chan, Lakonishok and Sougiannis [38:2436]). This belief is consistent with pecking order theory (Myers and Majluf [19]). As intangible assets are characterised by high levels of information asymmetry (Aboody and Lev [39]) and financing choices are determined by the relative costs of alternative financing sources, intangible asset intensive firms are preferably financed by profit retention. The reason for this choice is that this financing source does not require any external information disclosure. Two other reasons can justify the low level of dividend payments in intangible asset intensive industries. First, as a significant proportion of intangible asset intensive firms are not profitable, they do not pay dividends. Second, some intangible asset intensive firms do not have production activities (for instance, the "pure" RD firms in the biotechnology sector). So, as they do not have a foreseeable and stable stream of cash inflows, it is not rational to pay dividends to investors today and ask for fresh money from financial markets tomorrow.

Incorporating the opposing arguments, we hypothesise that:

H2a$_0$: The dividend policy is the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.
H2a$_1$: The dividend policy is not the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.

H2b$_0$: The dividend policy is the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.
H2b$_1$: The dividend policy is not the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.

H2c$_0$: The dividend policy is the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.
H2c$_1$: The dividend policy is not the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.

Managerial Equity Ownership: As intangible asset intensive firms are largely based on managerial human capital and intangible assets' performance is difficult to measure (especially in the early stages of the investment in intangible assets), market-based performance incentives are expected to replace fixed compensation and bonuses based on accounting numbers in intangible asset intensive firms. There is a large panoply of market-based performance incentives, such as share options plans, long-term incentive plans and managerial equity ownership. Among these alignment mechanisms, managerial equity ownership reflects a more long-term commitment with the firm and makes the manager a true "residual claimant". In other words, managerial shareholdings are expected to reduce the level of agency conflicts because managers bear a proportion of the wealth effects (a gain or a loss, not only a gain) as a shareholder and bear all the costs/benefits associated with the losses/gains in the value of his/her non-diversified human capital (Fama [25]). High managerial ownership also signals to financial markets

about the high quality of a firm's projects (Leland and Pyle [22]). Given that intangible asset investments have a long-term nature, equity holdings by managers also increase managerial loyalty to the firm. In this vein, Joher, Ali and Nazrul [40] report a positive relationship between managerial equity ownership and intangible assets.

Contrasting with this positive point of view, an increasing number of authors suggest that managerial holdings may lead to increasing opportunism by managers. At some point, management entrenchment occurs (Morck, Shleifer and Vishny [41][3]; Short and Keasey [42][4]).

Finally, using US data, Morck, Shleifer and Vishny [41] find that, in fast growing/new firms, managerial holdings play a more important (signalling or compensation) role than in old, large firms. Demsetz and Lehn [43], on the other hand, find that managerial ownership is positively related (but at decreasing rates) with monitoring difficulty. Nevertheless, instead of alignment effects, since managers of intangible asset intensive firms have better knowledge than external shareholders about the firm's activities, they can use this information asymmetry to extract additional rents by holding the firm's equity (Grinblatt and Titman [44]).

In the presence of conflicting theoretical propositions, we hypothesise:

H3a$_0$*: Managerial equity ownership is the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.*
H3a$_1$*: Managerial equity ownership is not the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.*

H3b$_0$*: Managerial equity ownership is the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.*
H3b$_1$*: Managerial equity ownership is not the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.*

H3c$_0$*: Managerial equity ownership is the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.*
H3c$_1$*: Managerial equity ownership is not the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.*

External Equity Ownership: Due to the nature of intangible assets, intangible asset intensive firms are characterised by high agency costs (Holmstrom [2]). The discretionary power and the scope for opportunistic behaviour by managers are high since they have a higher business expertise than shareholders. The hidden action and hidden information problems become severe. As concentrated ownership has incentives to monitor and influence management to protect their significant investments, the free rider problem is

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[3]Morck, Shleifer and Vishny [41] find a U shape relationship between managers' alignment and managers' equity holdings. They suggest the existence of managers' entrenchment for stockholdings between 5% and 25%, and convergence of interests below and above those thresholds.
[4]Short and Keasey [42] find a similar non-linear relationship between firm performance and managerial ownership in the UK. However, the "entrenchment range" occurs between 12% and 40%. They point out two reasons for these higher entrenchment levels. First, UK managers have more difficulty in setting up takeover defences than their US counterparts. Second, UK institutional investors seem more able to coordinate their monitoring actions.

mitigated, leading to lower agency costs (Shleifer and Vishny [45]; Demsetz and Lehn [43]; Yafeh and Yosha [46]), off-setting in this way the high costs of block equity ownership. Concentrated ownership, creating liquidity problems to investors, also generates a long-term relationship between managers and shareholders (mitigating potential "short-termism" of shareholders) and increases shareholders' incentives to reduce information asymmetry (Lee and O'Neill [47]).

However, large shareholders may collude with managers and pursue their own interests at the expense of other outside shareholders (Shleifer and Vishny [48]; Pound [49]). In this sense, large shareholdings create their own agency problems, leading Agrawal and Knoeber [50:380] to ask "*who monitors the monitors?*". Large blockholders may damage a firm's performance due to their large exposure to a firm's risk (Demsetz and Lehn [43]). Moreover, as external investors can diversify their portfolios, shareholders seem to "*not be interested in directly controlling the management of any individual firm*" (Fama [25:295]). So, once more, in the presence of conflicting arguments, we hypothesise that:

H4a$_0$: *External equity ownership is the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.*
H4a$_1$: *External equity ownership is not the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.*

H4b$_0$: *External equity ownership is the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.*
H4b$_1$: *External equity ownership is not the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.*

H4c$_0$: *External equity ownership is the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.*
H4c$_1$: *External equity ownership is not the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.*

Board Structure: The board can be seen as an instrument by which managers control other managers. As described by Fama [25:293], "*if there is competition among the top managers themselves (all want to be the boss of bosses), then perhaps they are the best ones to control the board of directors*". However, boards dominated by NEDs may result in oppressive strategic actions, excessive monitoring, lack of business knowledge and real independence (Haniffa and Cooke [51]).

The Hampel Report [52], combining agency and resource dependency theories, emphasises that NEDs should have a monitoring function and contribute with valuable expertise to the firm. As intangible asset intensive firms require high expertise and are characterised by a high managerial discretionary power, NEDs are expected to perform a central role as governance devices in this sort of firm. In contrast, Bushman and Smith [53] argue that when accounting numbers do a poor job in reflecting the true managerial performance (which seems to occur in intangible asset intensive firms), firms may respond by placing a high proportion of inside directors on the board.

So, we hypothesise that:

H5a$_0$: The board structure is the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.
H5a$_1$: The board structure is not the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.

H5b$_0$: The board structure is the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.
H5b$_1$: The board structure is not the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.

H5c$_0$: The board structure is the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.
H5c$_1$: The board structure is not the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.

Audit Demand: Agency theory argues that the propensity to demand independent audits increases with the extent of the separation of ownership from control (Chan, Ezzamel and Gwilliam [54]). The reduction of accounting manipulation seems to play a crucial role in curbing the level of agency costs by limiting managers' ability to deceive shareholders.
A weaker internal control system (Jensen [55]), a lower reliability of intangible assets' financial reporting (Lev [1]; Lev and Zarowin [56]) and a lower observability of managers' actions create space for managerial opportunistic behaviour (Tsui, Jaggi and Gul [57]) in intangible asset intensive firms. So, the characteristics of intangible assets may generate a higher audit demand. In this vein, O'Sullivan [58], using UK data, reports a positive relationship between RD expenditures and audit fees.
So, we hypothesise that:

H6a$_0$: Audit demand is the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.
H6a$_1$: Audit demand is not the same in more intangible asset intensive firms as in less intangible asset intensive firms, ceteris paribus.

H6b$_0$: Audit demand is the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.
H6b$_1$: Audit demand is not the same in more non-RD intangible asset intensive firms as in less non-RD intangible asset intensive firms, ceteris paribus.

H6c$_0$: Audit demand is the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.
H6c$_1$: Audit demand is not the same in more RD intensive firms as in less RD intensive firms, ceteris paribus.

4 Research Methodology and Variable Measurement

Since each financial and governance policy is associated with different marginal costs and benefits, which depend on their own characteristics, the relative use of other financial and governance policies (endogeneity effects) and firms' specific characteristics, we need to

control the effect for those endogeneity and firm-specific characteristics. Hence, the hypotheses established in section three are tested using cross-sectional data and a simultaneous equations model (henceforth SEM). SEM provides evidence about the existence of complementarity or substitution between financial and governance policies, direction of causality effects among those variables (considering endogeneity effects), and endogenous nature of those policies. This potential makes SEM preferable to ordinary least squares (henceforth OLS). Thus, the model developed consists of a set of linear equations, which models the determination of financial structure, dividend policy, managerial equity ownership, external equity ownership, board structure and audit demand.

Given our research objectives, variables reflecting the level and type of intangible assets are common to all equations. As the objective is to test the impact of all intangible assets and of the two different sorts of intangible assets on financial and governance policies two sets of equations specifications are necessary. For the sake of simplification, only the equations specifications for STRD (the stock of RD expenditures) and OTHERIA (the amount of intangible assets other than RD) are presented. The structure of all equations specifications for ALLIA (the amount of all intangible assets) is the same. In these equations the experimental variables STRD and OTHERIA are replaced by ALLIA. Other exogenous variables are specific to each monitoring device. The use of each of these control variables in each equation is grounded in the literature.

It follows the specification of each equation.

1) The leverage equation

$$DEBT_i = \beta_0 + \beta_1 DIROWN_i + \beta_2 OUTOWN_i + \beta_3 POUT_i + \beta_4 BOARD_i + \beta_5 AUDIT_i + \beta_6 OTHERIA_i + \beta_7 STRD_i + \beta_8 PPE_i + \beta_9 SIZE_i + \varepsilon_i$$

2) The dividend policy equation

$$POUT_i = \gamma_0 + \gamma_1 DEBT_i + \gamma_2 DIROWN_i + \gamma_3 OUTOWN_i + \gamma_4 BOARD_i + \gamma_5 AUDIT_i + \gamma_6 OTHERIA_i + \gamma_7 STRD_i + \gamma_8 CASH_i + \gamma_9 PROFIT_i + \omega_i$$

3) The director's equity ownership equation

$$DIROWN_i = \alpha_0 + \alpha_1 DEBT_i + \alpha_2 OUTOWN_i + \alpha_3 POUT_i + \alpha_4 BOARD_i + \alpha_5 AUDIT_i + \alpha_6 OTHERIA_i + \alpha_7 STRD_i + \alpha_8 VOL_i + \alpha_9 SIZE_i + \eta_i$$

4) The external equity ownership equation

$$OUTOWN_i = \delta_0 + \delta_1 DEBT_i + \delta_2 DIROWN_i + \delta_3 POUT_i + \delta_4 BOARD_i + \delta_5 AUDIT_i + \delta_6 OTHERIA_i + \delta_7 STRD_i + \delta_8 CASH_i + \delta_9 SIZE_i + \pi_i$$

5) The board structure equation

$$BOARD_i = \phi_0 + \phi_1 DEBT_i + \phi_2 DIROWN_i + \phi_3 OUTOWN_i + \phi_4 POUT_i + \phi_5 AUDIT_i + \phi_6 OTHERIA_i + \phi_7 STRD_i + \phi_8 SIZE_i + \phi_9 DUAL_i + \xi_i$$

6) The audit demand equation

$$AUDIT_i = \partial_0 + \partial_1 DEBT_i + \partial_2 DIROWN_i + \partial_3 OUTOWN_i + \partial_4 POUT_i + \partial_5 BOARD_i + \partial_6 OTHERIA_i + \partial_7 STRD_i + \partial_8 SIZE_i + \partial_9 DIRCASH_i + \sigma_i$$

Intangible assets are not homogeneous. The measure of the level of intangible asset intensity should reflect the diverse nature of its components whenever they are associated with different levels of agency costs, information asymmetry, financial distress costs, transaction costs or tax-shield effects. The only internally generated intangible asset that has separate disclosure is RD, as an asset in the balance sheet and as an expense in the profit and loss account[5]. Costs incurred with other intangible assets are not separately disclosed. So, since market values are available and reflect the value of all assets, and there is financial information available about one intangible asset component (RD), proxies for the accumulated stock of RD and the level of all intangible assets other than RD can be developed. As argued previously, it is anticipated that RD is associated with more severe agency costs, information asymmetry, transaction costs and bankruptcy problems than other types of intangible assets. In this way, more than a single measure of the level of intangible asset intensity can be used to investigate the impact of the level and type of intangible assets on financial and governance policies. Thus, three variables are used to measure the level and the type of a firm's intangible assets: one variable aims to measure all intangible assets, another variable the amount of intangible assets other than RD and, finally, a further variable measures the stock of RD. This seems to be the only possible approach, given the availability of data in the UK for the period analysed.

The following table (Table 1) presents the calculation processes for the intangible asset intensity variables (Panel A), the six key financial and governance variables (Panel B), and the other seven variables reflecting firm-specific characteristics (Panel C).

Table 1: Measures and Definitions of Variables

Panel A: Intangible Asset Intensity Variables

- All Intangible Assets: Market value/Assets
- Accumulated Stock of RD : Stock of RD expenditures[6]/Market value
- Intangible Assets other than RD: (Market value − (Assets + Stock of RD)) / Market value

Panel B: Key Financial and Governance Variables

- Financial Structure: Debt / Market value (henceforth DEBT)
- Dividend Policy: Average Payout ratio (year n) = (Payout ratio (year n) + Payout ratio (year n-1) + Payout ratio (year n-2) + Payout ratio (year n-3))/4 where Payout ratio (year i) = Dividends per share (year i) / Net earnings per share − full tax (year i) (henceforth POUT)
- Managerial Equity Ownership: Proportion of shares owned by executive members of the board (henceforth DIROWN)
- External Equity Ownership: Proportion of shares owned by all reported external shareholders (henceforth OUTOWN)
- Board of Directors' Structure: Non-executive directors / Number of directors (henceforth BOARD)
- Audit Demand: Auditors remuneration / Market value (henceforth AUDIT)

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[5]There is another 'intangible asset' – goodwill – that is disclosed in the financial statements.
[6]Following Chan, Lakonishok and Sougiannis [38] and Lev and Sougiannis [73], the undeflated stock of RD is calculated as: $RD_0+0.8*RD_{-1}+0.6*RD_{-2}+0.4*RD_{-3}+0.2*RD_{-4}$.

Panel C. Variables Reflecting Firm-Specific Characteristics

- Fixed Assets: Property, plant and equipment / Market value (henceforth PPE)
- Liquidity: Cash and equivalents / Market value (henceforth CASH)
- Profitability: Operating profit - adjusted / Market value (henceforth PROFIT)
- Volatility: Degree of fluctuation of the share price in the year (henceforth VOL)
- Directors' Cash Remuneration: Directors Remuneration / Market value (henceforth DIRCASH)
- Duality: It is a dummy variable. It is one if the same person performs the role of chairperson and CEO. It is zero, otherwise (henceforth DUAL)
- Size: Log (Market value of equity) (henceforth SIZE)

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5 Sample Selection and Characteristics

The initial samples include all UK companies listed on the London Stock Exchange (LSE). A total of 1,427 and 1,420 companies are found in the FBRIT file (Datastream International database) at the end of the years 2000 and 2001, respectively. Financial companies (226 and 231 firms in 2000 and 2001, respectively) are excluded since they face different regulatory environments than those of the other companies. These different regulatory environments have significant impact on financial policies (for instance, concerning capital adequacy regulations) and governance mechanisms (for example, supervision by governmental authorities) that are in place. Companies (404 and 369 firms in 2000 and 2001, respectively) with missing data in at least one variable are also excluded. Companies with average negative payouts (52 companies in 2000 and 54 companies in 2001) and average payouts ratios above 1 (31 companies in 2000 and 33 companies in 2001) are excluded from the sample due to the lack of economic meaning of these values. Companies (12 and 11 firms in 2000 and 2001, respectively) with dual class shares are also excluded because they potentially introduce distortion to the analysis (Short and Keasey [42]; Conyon and Florou [59]). Finally, in order to assure that firms included in the sample are in a "steady state" (for instance, they are not too young, they have not been recently listed), the existence of financial data in the Datastream database for five years is required. This requirement leads to the exclusion of 328 and 366 firms in 2000 and 2001, respectively. As a result, the final sample sizes are 374 companies in the year 2000 and 356 firms in the year 2001.

Table 2 presents the samples' descriptive statistics for the years 2000 and 2001 (respectively) for the sixteen variables used throughout this research.

Table 2: Summary of Descriptive Statistics of the Variables

Variables		Mean	Median	Std.Dev.	Min.	Max.	1st Quart.	3rd Quart.
Intangible asset variables								
ALLIA	2000	2.017	1.267	2.587	0.460	25.440	0.947	2.070
	2001	1.688	1.355	1.349	0.360	18.410	1.017	1.943
STRD	2000	0.017	0.000	0.483	0.000	0.410	0.000	0.004
	2001	0.035	0.000	0.111	0.000	1.240	0.000	0.006
OTHERIA	2000	0.184	0.187	0.414	-1.20	0.960	-0.071	0.497
	2001	0.201	0.252	0.359	-1.810	0.880	-0.001	0.460
Financial and governance variables								
DEBT	2000	0.401	0.379	0.239	0.010	0.990	0.206	0.568
	2001	0.385	0.358	0.202	0.010	0.970	0.243	0.519
POUT	2000	0.349	0.356	0.245	0.000	0.970	0.139	0.505
	2001	0.320	0.325	0.256	0.000	0.980	0.053	0.490
DIROWN	2000	0.083	0.000	0.151	0.000	0.670	0.000	0.090
	2001	0.081	0.000	0.138	0.000	0.650	0.000	0.106
OUTOWN	2000	0.355	0.337	0.195	0.030	0.970	0.203	0.488
	2001	0.356	0.332	0.188	0.030	0.940	0.209	0.500
BOARD	2000	0.470	0.500	0.150	0.000	0.830	0.375	0.571
	2001	0.473	0.500	0.159	0.000	1.000	0.375	0.571
AUDIT	2000	0.001	0.001	0.002	0.000	0.010	0.000	0.002
	2001	0.001	0.001	0.002	0.000	0.010	0.000	0.002
Firm-specific characteristics variables								
PPE	2000	0.271	0.191	0.275	0.000	1.930	0.057	0.394
	2001	0.254	0.152	0.273	0.000	1.590	0.048	0.381
CASH	2000	0.071	0.038	0.094	0.000	0.590	0.014	0.088
	2001	0.080	0.038	0.128	0.000	0.950	0.013	0.090
DUAL	2000	0.174	0.000		0.000	1.000		
	2001	0.160	0.000		0.000	1.000		
VOL	2000	7.401	6.000	3.630	3.000	20.000	5.000	9.000
	2001	8.053	7.000	4.523	2.000	20.000	5.000	10.000
DIRCASH	2000	0.010	0.004	0.016	0.000	0.110	0.004	0.012
	2001	0.011	0.005	0.019	0.000	0.180	0.002	0.014
SIZE	2000	11.632	11.579	2.157	7.530	18.880	9.954	13.040
	2001	11.537	11.410	2.107	6.610	17.840	9.832	13.073
PROFIT	2000	0.046	0.060	0.087	-0.560	0.240	0.026	0.089
	2001	0.042	0.056	0.088	-0.500	0.240	0.019	0.085

Notes: ALLIA represents the market value of the firm deflated by the book value of
assets; STRD represents the stock of RD expenditures deflated by the market value of the
firm; OTHERIA stands for all intangible assets other than RD deflated by the market
value of the firm; DEBT represents the debt level deflated by the market value of the
firm; POUT is the dividend payout ratio; DIROWN represents managerial equity

ownership; OUTOWN stands for the outside block ownership; BOARD represents the board of directors' structure; AUDIT stands for the level of audit demand deflated by the market value of the firm; PPE stands for the level of fixed assets deflated by the market value of the firm; CASH represents the liquidity (cash and equivalents) deflated by the market value of the firm; DUAL stands for duality; VOL stands for the shares price volatility; DIRCASH represents directors' cash remuneration deflated by the market value of the firm; SIZE represents the firm's size; PROFIT stands for EBIT deflated by the market value of the firm.

Some important conclusions arise from table 2. Descriptive statistics confirm that intangible assets (variable ALLIA) constitute a large proportion of firm value. The differences between the means and the medians of ALLIA suggest the existence of highly intangible asset intensive firms alongside firms with a low level of intangible asset intensity in our samples.

For financial and governance variables, ratios show significant stability between the two years. DEBT represents on average 40.1% of the firms' value in the year 2000 (with a median of 37.9%), decreasing to 38.5% (with a median of 35.8%) in 2001. Considering the payout ratios (computed as an average of the payout ratios of the last four years), about 34.9% and 32.0% of the firms' profits are distributed to shareholders through dividend payouts (variable POUT) in 2000 and 2001, respectively. For equity ownership structure, the mean of DIROWN is around 8.2% (with a median of 0.0%) in both years. Hence, DIROWN shows positive skewness, suggesting the existence of high managerial ownership in some firms (confirmed by the high maximum values for the variable in 2000 and 2001). The mean of OUTOWN is around 35.5% with a median around 33.5%. Hence, on average, "small" investors (external investors with less than 3% of all shares) hold about 56% of the capital of a typical UK listed firm. This finding provides strong evidence about the separation of ownership and control in the UK. However, as most small investors do not exercise their voting rights, the effective power of the voting shareholders is well above their nominal shareholding. About 47.2% (with a median of 50%) of the board members of the typical UK listed company are NEDs. The mean for AUDIT is around 0.1% of the market value of the firm (with a median around 0.1%).

6 Results and Discussion

6.1 Results of SEM Estimation for ALLIA

This section provides the SEM results for the six equations developed in section four for the experimental variable ALLIA. So, hypotheses H1a, H2a, H3a, H4a, H5a and H6a are tested.

The following table 3 provides the SEM results.

Table 3: Results of SEM Estimation
Experimental variable: ALLIA

VARIABLES	YEAR	Financial and governance policies					
		DEBT	DIROWN	OUTOWN	POUT	BOARD	AUDIT
Financial and governance policies							
Intercept	2000	0.435	1.497*	-0.274	10.202**	-1.263	0.000
	2001	3.759**	0.833*	1.314**	0.569**	-0.879	0.017**
DEBT2sls	2000	-	0.202	0.294	-3.965**	-3.449*	-0.000
	2001	-	-0.299*	0.068	0.122	0.054	-0.004**
DIROWN2sls	2000	0.184	-	1.209	-18.560**	-10.612*	0.003
	2001	-0.026**	-	-1.396*	0.173	-1.101	-0.012*
OUTOWN2sls	2000	0.254	-1.581	-	5.675*	6.858*	0.004
	2001	-0.020**	-0.801*	-	-0.735*	1.739*	-0.012*
POUT2sls	2000	0.111	-0.378	0.265	-	1.544	-0.001
	2001	-0.413	0.595	0.145	-	-0.192	0.003
BOARD2sls	2000	0.846	0.119	1.560	-16.981**	-	-0.002
	2001	-1.468	0.628	-0.276	a	-	0.008*
AUDIT2sls	2000	-30.723	-28.977	-28.320	56.175	416.399*	-
	2001	-112.031**	-4.020	-32.176	-27.937	36.906	-
Experimental variable							
ALLIA	2000	-0.027**	0.000	0.024	-0.270**	-0.077*	-0.000
	2001	-0.061**	-0.004	0.013	-0.017	0.022	-0.002
Control variables							
PPE	2000	0.200**					
	2001	0.305**					
CASH	2000			0.294	-2.494**		
	2001			0.202	-0.135		
VOL	2000		-0.008				
	2001		0.005				
SIZE	2000	-0.046	-0.066	-0.039		0.049	-0.000
	2001	-0.126**	-0.075**	-0.068**		0.065	-0.001**
PROFIT	2000				-2.320*		
	2001				0.655**		
DUAL	2000					0.613*	
	2001					0.162*	
DIRCASH	2000						0.047**
	2001						0.032*
R sq adj.	2000	0.404	0.116	0.135	0.176	0.113	0.555
	2001	0.351	0.127	0.081	0.162	0.083	0.564
F value	2000	33.098	7.114	8.285	10.944	6.953	59.065
	2001	25.006	7.443	4.896	10.787	5.022	58.419

Notes: DEBT stands for the debt level deflated by the market value; DIROWN represents managerial equity ownership; OUTOWN stands for outside block ownership; POUT is the dividend payout ratio; BOARD represents the board of directors' structure; AUDIT stands for the level of audit fees deflated by the market value; DEBT2sls stands for the variable corresponding to the predicted values of the DEBT reduced-form equation. DIROWN2sls stands for the variable corresponding to the predicted values of DIROWN reduced-form equation. OUTOWN2sls stands for the variable corresponding to the predicted values of OUTOWN reduced-form equation. POUT2sls stands for the variable corresponding to the predicted values of POUT reduced-form equation. BOARD2sls stands for the variable corresponding to the predicted values of BOARD reduced-form equation. AUDIT2sls stands for the variable corresponding to the predicted values of

AUDIT reduced-form equation. ALLIA stands for the market value of the firm deflated by assets; PPE stands for the level of fixed assets deflated by the market value; CASH represents cash deflated by the market value; DUAL stands for duality; VOL stands for the share price volatility; DIRCASH represents the directors' cash remuneration deflated by the market value; SIZE represents the firm's size; PROFIT stands for EBIT deflated by the market value. [a] SPSS excludes variables showing CI above 1,000 from the analysis; **Significance level of 0.01 *Significance level of 0.05.

6.2 Results of SEM Estimation for STRD and OTHERIA

This section provides SEM results for the six equations developed in section four for the experimental variables OTHERIA and STRD. So, hypotheses H1b, H2b, H3b, H4b, H5b and H6b and H1c, H2c, H3c, H4c, H5c and H6c are tested.
The following table 4 provides the SEM results, which shows that empirical findings are quite consistent regarding the experimental variables OTHERIA and STRD when results from the years 2000 and 2001 are compared.

Table 4: Results of SEM Estimation
Experimental variables: OTHERIA and STRD

VARIABLES	YEAR	Financial and governance policies					
		DEBT	DIROWN	OUTOWN	POUT	BOARD	AUDIT
Financial and governance policies							
Intercept	2000	-0.255	0.207	-0.691	-10.256**	0.111	-0.002
	2001	4.317**	0.757	1.052	1.854**	1.136	0.020**
DEBT2sls	2000	-	0.318	-2.161	-6.144**	0.359	-0.007
	2001	-	-0.307*	0.677	-2.425*	-0.362	-0.005**
DIROWN2sls	2000	2.701*	-	6.538	28.121**	-0.733	0.020
	2001	0.033**	-	-1.618*	0.487	-2.564	-0.015**
OUTOWN2sls	2000	-0.580	0.111	-	-0.007	0.091	-0.003
	2001	-0.027**	-0.786**	-	-0.545*	0.258	-0.014**
POUT2sls	2000	0.137	-0.072	0.241	-	-0.063	0.000
	2001	-0.246	0.701	0.288	-	-0.204	0.002
BOARD2sls	2000	3.172**	-1.066	7.422	25.761**	-	0.021
	2001	-1.068	0.739	-2.232	a	-	0.005
AUDIT2sls	2000	-112.259**	35.448	-276.072	-615.798**	30.440	-
	2001	-121.516**	0.784	-18.946	-80.162**	-15.163	-
Experimental variables							
OTHERIA	2000	-0.467**	0.153	-1.257	-3.543**	0.156	0.003
	2001	-0.308**	0.007	0.315	-1.031**	-0.109	-0.001
STRD	2000	-0.467*	0.118	-1.217	-2.219**	0.174	-0.003
	2001	-0.703**	0.037	0.133	-1.019*	-0.430	-0.001

Control variables

PPE	2000	0.014					
	2001	0.128**					
CASH	2000			-0.145	-0.777**		
	2001			0.587	-1.390**		
VOL	2000		-0.001				
	2001		0.006				
SIZE	2000	-0.058	0.014	-0.123**		0.017	-0.000
	2001	-0.166**	-0.078*	-0.078**		-0.027	-0.001**
PROFIT	2000				2.549**		
	2001				0.216		
DUAL	2000					-0.008	
	2001					0.150	
DIRCASH	2000						0.011
	2001						0.026**
R sq adj.	2000	0.602	0.140	0.133	0.169	0.116	0.551
	2001	0.412	0.127	0.079	0.182	0.086	0.571
F value	2000	63.709	7.758	7.376	0.427	6.463	51.864
	2001	28.683	6.740	4.389	10.885	4.726	53.507

Notes: DEBT stands for the debt level deflated by the market value of the firm; DIROWN represents managerial equity ownership; OUTOWN stands for outside block ownership; POUT is the dividend payout ratio; BOARD represents the board of directors' structure; AUDIT stands for the level of audit fees deflated by the market value of the firm; DEBT2sls stands for the variable corresponding to the predicted values of the DEBT reduced-form equation. DIROWN2sls stands for the variable corresponding to the predicted values of DIROWN reduced-form equation. OUTOWN2sls stands for the variable corresponding to the predicted values of OUTOWN reduced-form equation. POUT2sls stands for the variable corresponding to the predicted values of POUT reduced-form equation. BOARD2sls stands for the variable corresponding to the predicted values of BOARD reduced-form equation. AUDIT2sls stands for the variable corresponding to the predicted values of AUDIT reduced-form equation. OTHERIA stands for all intangible assets other than RD deflated by the market value of the firm; STRD represents the stock of RD expenditures deflated by the market value of the firm; PPE stands for the level of fixed assets deflated by the market value of the firm; CASH represents cash and equivalents deflated by the market value of the firm; DUAL stands for duality; VOL stands for the share price volatility; DIRCASH represents the directors' cash remuneration deflated by the market value of the firm; SIZE represents the firm's size; PROFIT stands for EBIT deflated by the market value of the firm. [a] SPSS excludes variables showing CI above 1,000.00 from the analysis; ** Significance level of 0.01 *Significance level of 0.05.

6.3 Discussion of the Findings[7]

As discussed in section two, it is likely that the impact of intangible assets on financial and governance policies is explained by a number of theoretical arguments. Most of these theoretical arguments are just "different" rather than "conflicting" arguments since they do not share the same set of assumptions. As a consequence, the set of hypotheses formulated in section three about the potential impact of the level and type of intangible assets on each particular financial and governance policy are not directional. Therefore, our results do not allow the assertion that a specific theory gets empirical support or not. Results only suggest that the arguments provided by a theory (or a set of theories) outweigh or cancel out the arguments presented by another theory (or set of theories).

Results suggest that ALLIA, OTHERIA and STRD have a negative impact on DEBT (OLS results suggest the same impact, results not reported here). This result is not novel since the same sort of negative relationship between the amount of advertising/RD expenditures and leverage is found in many studies using US data (e.g., Jensen, Solberg and Zorn [60]; Bradley, Jarrell and Kim [13]; Titman and Wessels [61]; Long and Malitz [62]) and UK data (e.g., Rajan and Zingales [63]). The net negative relationships between ALLIA, OTHERIA and STRD, and DEBT suggest that the impact of intangible asset characteristics – e.g., firm-specificity, low debt collateralisation, high risk and uncertainty and human capital intensity (embodied in managers) – on agency costs of debt (Jensen and Meckling [23]; Myers [16]), information asymmetry (Myers and Majluf [19]), transaction costs (Williamson [29]), bankruptcy costs and non-debt tax shields arguments (DeAngelo and Masulis [11]) prevail over the signalling theory (Ross [17]) and agency costs of equity (Jensen and Meckling [23]) arguments. The first set of arguments seems to limit the supply of debt to intangible asset/RD intensive firms. Firms may also wish to set low financial risk levels to balance the high business risk arising from investment in intangible assets/RD in order to keep total risk at a manageable level. Moreover, the negative relationships between DEBT and ALLIA, OTHERIA and STRD mean that not only do intangible assets not have debt capacity (the estimate of the coefficient would be zero) but, indeed, they have negative debt capacity. In other words, in line with Barclay, Morellac and Smith [64] arguments, ALLIA, OTHERIA and STRD seem to make the whole firm riskier, leading to lower leverage. ALLIA, OTHERIA and STRD may also generate important non-debt tax shields that make debt-related tax shields redundant, leading to lower leverage[8]. From a governance perspective, the observed low levels of debt in intangible asset/RD intensive firms isolate managers from creditors' monitoring

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[7]Despite the institutional differences affecting the way governance devices work in the US and the UK (Short and Keasey [42]), and the differences in governance practices in both countries (Vafeas and Theodorou [74]), we still use some relevant US empirical evidence when discussing our results. Vafeas and Theodorou [74] point out that duality is more common in the US than in the UK, US boards show a larger proportion of NEDs than UK boards, boards tend to be smaller in the UK than in the US, monitoring committees have a larger proportion of executives in the UK and, finally, task delegation to sub-committees is less frequent in the UK. Nevertheless, whenever possible, UK evidence is used.

[8]O'Brien [75] argue that some level of financial slack, isolating the firm against cash flow volatility, is needed to sustain the competitive advantage of innovative firms by ensuring stable, continuous investments in research over a period of several years, the availability of funds to launch new products and the expansion of their knowledge base through acquisitions when necessary.

and the discipline of debt-related payments. The financial structure seems to protect the value of managers' human capital and debt holders' financial capital.

Results suggest that ALLIA, OTHERIA and STRD have a negative impact on POUT (contrasting, OLS results suggest that ALLIA, OTHERIA and STRD do not have an impact on POUT since none of the null H2 hypotheses is rejected at conventional significance levels, results not reported here). Hence, it seems that increasing agency costs of debt, information asymmetry costs (pecking order theory arguments) and transactions costs associated with new securities issues, which would result from large dividend payouts, outweigh the benefits coming from reducing agency costs of equity and signalling effects[9].

Results suggest that ALLIA, OTHERIA and STRD do not have any impact on DIROWN[10] (OLS results suggest the same impact, results not reported here). This result suggests that managerial equity ownership is not used to align managers' and shareholders' interests (as suggested by the agency theory) and as a signalling device (as suggested by the signalling theory) in intangible asset/RD intensive firms. Potential alignment and signalling arguments traditionally credited to managerial equity ownership seem to be just cancelled by possible countervailing entrenchment and risk aversion effects. Since managers have all their human capital invested in the firm (which invests in intangible assets or in risky RD projects), to invest a large stake of financial wealth in the same firm may seem too costly for managers. Additionally, if one concedes that large equity holdings generate rents for managers (the entrenchment argument) and managerial entrenchment is likely to occur at lower levels of equity ownership in intangible asset/RD intensive firms (because of the key role of managers' human capital), then decreasing (or, at least, not increasing) managerial equity ownership might be suitable from the shareholders' perspective to rebalance the relative power of managers and shareholders.

ALLIA, OTHERIA and STRD seem not to have any significant impact on OUTOWN[11] (OLS results suggest the same impact, results not reported here). These results suggest that potential closer monitoring and/or private benefits coming from more concentrated external ownership (particularly important when firms' environments are not stable) are just cancelled by the costs of inadequate portfolio diversification and further monitoring by external shareholders. Shareholders seem to react to high levels of information asymmetry by diversifying their portfolios. The exercise of voting rights might also be too expensive and, to some extent, ineffective since, as argued by Zeckhauser and Pound [65], the benefits of concentrated ownership are based on the assumption of "well-informed" shareholders, which is plausibly not the case in intangible asset/RD intensive sectors[12]. It seems that one way to shift the risks associated with intangible assets/RD projects is to

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[9]Gaver and Gaver [76] find that growth firms show lower dividend payouts than non-growth firms in the US.

[10]In the US, Himmelberg, Hubbard and Palia [77] find that RD has a negative impact on DIROWN, while advertising (a major component of OTHERIA) has a positive impact on DIROWN. Jensen, Solberg and Zorn [60] find no significant relationship between managerial ownership and RD, while Clinch [78] finds that there is very little or no difference in managerial equity holdings between high and low RD companies.

[11]Similarly, Agrawal and Knoeber [50] find no relationship between RD and external block ownership.

[12]In the UK, Myners [79] report a low sophistication level of institutional investors, which own over half of the quoted stocks. Consequently, most shareholdings above 3% considered in our analyses, are indeed hold by institutional investors, a situation that creates its own agency problems.

spread them across a wide range of investors. As suggested by Arrow (in Goodacre and Tonks [66]), dispersed (internal and external) ownership can be used to mitigate under-investment problems, although exacerbating incentive problems.

There is no evidence suggesting that ALLIA, OTHERIA and STRD have a distinct impact on BOARD, since none of the H5 null hypotheses is systematically rejected at conventional significance levels (OLS results suggest the same impact, results not reported here). Therefore, the benefits of using additional NEDs to reduce agency costs and information asymmetries (by reducing the "expertise gap" between managers and shareholders) and guarantee a source of specialised expertise for managers (as argued by the resource dependency theory) seem cancelled by the absolute costs of NEDs and the absence of noteworthy benefits of their activities (a possible result of their limited specialised expertise).

Finally, the results suggest that the experimental variables ALLIA, OTHERIA and STRD do not have a systematic impact on AUDIT (OLS results suggest the same impact, results not reported here). Contrasting with O'Sullivan [58], who reports a positive relationship between RD expenditures and audit costs, our results do not suggest a clear pattern of relationship. So, although requiring more qualified audit staff due to greater complexity and risk of the auditing work, financial statements of intangible asset/RD intensive firms seem not to have too much to be audited (Chan, Ezzamel and Gwilliam [54]). It seems that, given the limitations of the auditing work in intangible asset/ RD intensive firms, the benefits of further auditing demand are cancelled out by the additional audit costs when other firm specific characteristics are considered.

Concluding, overall, the results suggest that, given the characteristics of intangible assets, the levels of bankruptcy costs, debt transaction costs, non-debt tax shields and agency costs of debt are cancelled out by agency costs of equity and signalling arguments when the level of intangible assets/RD intensity increases. Consequently, the levels of intangible/RD assets do not have a significant impact on managerial equity ownership, external block ownership, board structure and audit demand.

None of the six financial and governance policies – debt, dividend payouts, managerial equity ownership, external block ownership, board structure and audit demand – seem clearly designed to provide monitoring and disciplining effects from the shareholders' point of view in intangible asset/RD intensive firms. This implies that there are possibly better explanations for using those six policies than the theories concerning agency costs of equity and the signalling effects. Alternatively, the results may suggest that the effectiveness of traditional financial and governance devices in the presence of intangible assets needs to be questioned. Indeed, for instance, one can question the adequacy of NEDs' level of expertise to monitor and provide advice when firms develop very specialised RD projects; the trade-off between risk, incentives and wealth diversification of managerial equity ownership (particularly when stock options plans enable the same alignment effects without the downside risk and wealth constraints for managers); the monitoring ability of external shareholders when investments are firm-specific and based on highly qualified human capital; and, the scope of the auditing work when a firm's assets are mainly RD-in-progress projects.

The results also suggest that the six financial and governance policies do not equally protect the three categories of stakeholders – debt holders, managers and shareholders - analysed in this paper. Both financial policies (leverage and dividend payouts) seem designed to protect debt holders' and managers' interests, while none of the four governance policies seems particularly designed to protect the shareholders' interests.

Finally, the impact of the two categories of intangible assets - OTHERIA and STRD - on each of the six financial and governance policy analysed seems to not differ between the two types of intangible assets.

7 Sensitivity Analyses

In this section we check whether or not assumptions are met, namely, no multicollinearity, homocedasticity and absence of influential observations. Potential industry effects, the use of alternative deflators, the exclusion of RD "capitalisers" from the samples and the use of alternative variables are also tested.

Multicollinearity: VIF and CI statistics (not reported here) suggest the existence of severe multicollinearity problems in the SEM models. Multicollinearity is associated with a set of "symptoms" in terms of statistical results that we find in our results. Wrong signs and implausible coefficients' magnitudes are common symptoms of multicollinearity (Greene [67]). These symptoms are particularly strong in the DEBT and POUT equations. We also find that small changes in the data set originate significant changes in the coefficients estimates[13]. Finally, we find low significance levels for the individual parameters when using t tests (because of the large variances), although they are jointly significant and regressions present reasonable R^2. These sorts of results suggest the existence of multicollinearity (Greene [67]).

Heteroscedasticity: The scatterplots (not reported here) suggest the existence of heterocedasticity in the DEBT, OUTOWN and AUDIT equations. Heteroscedasticity can be remedied by transforming the dependent variable (Hair, Anderson, Tatham and Black [68]). As suggested in Hair, Anderson, Tatham and Black [68] and Gujarati [69], we transform DEBT, OUTOWN and AUDIT variables by computing their natural logarithms. Potential heterocedasticity seems to disappear when transformed variables are used in the estimations reported previously. When logarithmic transformations of DEBT, OUTOWN and AUDIT are used to reduce potential heteroscedasticity problems, the significance levels of some coefficients change, particularly in the POUT, BOARD and AUDIT equations. In what concerns the experimental variables, there are some changes in the significance levels. Some evidence emerges about a significant negative impact of intangible assets on the level of audit demand. Indeed, ALLIA is consistently negatively related with AUDIT and there is some weak evidence of a negative impact of OTHERIA and STRD on AUDIT. The negative impact of OTHERIA and STRD on POUT seems to disappear.

Influential observations: Analysis of the observations with extreme values is performed to evaluate the existence of influential observations. Where outliers are found (namely in the variables PROFIT, DIRCASH and AUDIT), winserization is used to test the robustness of the results. Extreme values (defined as values that are more than three standard deviations away from the mean) are replaced by values that are exactly three standard deviations away from the mean. Results (not reported here) controlling for the existence of influential observations do not substantially differ from results presented previously in tables 3 and 4. Thus, the impact of influential observations on the results seems not to be important.

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[13]This is a finding that emerges when I exclude the RD "capitalisers" from the sample.

Industry effects: Industry effects are potentially important determinants of financial and governance policies. To gain additional insights into the determinants of the six financial and governance variables, we repeat the analyses controlling for the existence of industry effects. We segregate the companies into nine sectors: basic industries (BASIC), cyclical consumer goods (CYCGOODS), cyclical consumer services (CYCSERV), general industries (GENIND), high technology (HIGHTECH), non-cyclical consumer goods (NCYCGOODS), non-cyclical consumer services (NCYCSERV), resources (RESOURCES) and DIV (other sectors). Dummy variables are used to control for sector effects.

Overall, SEM results (not reported here) incorporating potential industry effects are quite consistent with results not incorporating those effects. In terms of the experimental variables, ALLIA now shows a systematic negative impact of POUT. Surprisingly, STRD seems to have no impact on DEBT. Industry effects seem not be relevant in the design of financial and governance policies.

Alternative deflator: Total assets are the most widely used deflator in financial economics empirical research (e.g., Jensen, Solberg and Zorn [60]; Agrawal and Knoeber [50]; Mao [70]; Goyal, Lehn and Racic [9]). Despite its particular inadequacy in the context of this study, we test its impact on our results as an alternative deflator.

Results using the amount of total assets as deflator of financial variables are unexpected. In contrast with existing empirical evidence and the literature surveyed in this paper, it is found that ALLIA and OTHERIA are positively related with DEBT. STRD is negatively related with DEBT. The negative impact of ALLIA, OTHERIA and STRD on POUT suggested by previous results seems to disappear.

Excluding RD "capitalisers": The decision by some firms regarding the capitalisation of RD expenditures as assets can potentially introduce some noise in the empirical findings because of its impact on ALLIA, OTHERIA and STRD. Results excluding firms that capitalise RD from the samples are quite consistent with previous results. Indeed, overall, ALLIA, OTHERIA and OTHERIA have a negative impact on DEBT and POUT, while no other systematic effects are found.

Alternative Variables Definitions: We test the impact of using some alternative variables definitions on SEM results. In this vein, DEBT is replaced by LOANS (a measure of financial debt deflated by the market value of the firm), POUT is replaced by DY (the dividend yield of the year), BETA replaces VOL and LnEV (the natural logarithm of the market value of the firm) replaces SIZE. SEM coefficients seem, to a large extent, consistent with results presented in tables 3 and 4. However, there is no impact of ALLIA on DY (while a negative relationship between ALLIA and POUT has been reported in results) and a negative impact of OTHERIA on AUDIT is found.

Overall, the several sensitivity analyses conducted largely corroborate the results presented in tables 3 and 4.

8 Summary and Conclusions

In this paper a particular, distinctive focus is placed on the impact of intangible assets on financial and governance policies. Despite the existence of a large number of empirical studies investigating the impact of firms' characteristics on financial policies or governance mechanisms that are in place to deal with agency problems (particularly in the US), quite surprisingly there is no research explicitly investigating (empirically or theoretically) the

impact of intangible assets on financial and governance policies. Consequently, this study empirically investigates the impact of the level and type of intangible assets on six financial and governance mechanisms – debt, dividend policy, managerial equity ownership, external equity ownership concentration, board structure and audit demand. These mechanisms are analysed since they are widely considered to be the most important financial policies and governance devices upon which shareholders, managers and debt holders take joint decisions. Shareholders, debt holders and managers provide inputs of different natures to the firm. Shareholders and debt holders provide financial capital (of different natures, hence vested with different rights), whereas managers provide human capital. Shareholders, managers and debt holders have different risk preferences, different payoffs, different levels of diversification and different levels of business expertise. Therefore, it is likely that the level and nature of intangible assets – and, as a consequence, the level of agency costs, information asymmetry, transaction costs, non-debt tax shields and bankruptcy costs - influences the nature of the inter-relationships between those stakeholders. The consequences of those inter-dependencies on the choice of the portfolio of financial and governance policies are considered.

Three key contributions emerge from SEM analysis. First, intangible assets (measured by the amount of all intangible assets, the stock of RD expenditures and the amount of intangible assets other than RD) fail to have a significant impact on the four governance policies (managerial equity ownership, external block ownership, board structure and auditing demand) investigated in this paper. In contrast, it is found that intangible assets have significant negative impact on debt and dividend payout. From a theoretical point of view, these results suggest that the accumulated amount of high agency costs of debt, bankruptcy costs, information asymmetry and non-debt tax shields associated with intangible/RD assets are cancelled out by important equity agency costs and signalling arguments for all four governance policies but not for the two financial policies.

Second, the two categories of intangible assets (intangible assets other than RD and the stock of RD expenditures) seem to have the same kind of impact on the two financial policies (both have a negative impact on debt and dividends) and no impact on the governance policies. These results suggest that the nature of the agency, information asymmetry, transaction costs, bankruptcy and tax issues does not differ between categories of intangible assets. Or, alternatively, despite the existence of differences, they just cancel each other out. Consequently, intangible assets other than RD and RD seem not to require different financial and governance policies.

Third, the final design of the portfolio of financial and governance policies seem not to protect all categories of stakeholders uniformly. In fact, none of the six financial and governance devices seems to be designed to provide the kind of monitoring and disciplining effects that theory, from the shareholders' perspective, suggests. Both financial policies seem designed to protect debtholders' financial capital and managers' human capital. This finding suggests a deep change in the balance of power between managers and shareholders, a possible consequence of the widening "expertise gap". From the debt holders' point of view, low debt and low dividend payout in the presence of intangible/RD assets reduce debt holders' agency costs and protect them from potentially high bankruptcy costs. From the managers' point of view, those policies levels protect the value of their (non-diversified) human capital, isolate them from both the disciplining effects of debt and dividends and monitoring activity by creditors and potential suppliers of new equity. The proportion of NEDs on the board also does not depend on the level and nature of the intangible assets. This may reflect a "box ticking" attitude or the potential inadequacy of NEDs as a source of

advice and monitoring expertise. Finally, audit demand does not depend on the level of intangible assets/RD. So, no alternative governance devices to absent disciplining financial policies are found in intangible asset/RD intensive firms.

The analysis reported upon in this study has some limitations. First, our research do not consider "external" governance mechanisms (the managerial labour market (Fama [25]), the market for corporate control (Jensen and Ruback [71]), product-market competition (Hart [72]), and capital markets scrutiny (security analysts)). As the different governance mechanisms act interdependently, the behaviour of the mechanisms considered in this research may be influenced by the impact of those ignored mechanisms. Consequently, the insignificant impact of the level and type of intangible assets on the governance policies reported in this paper can result from the existence of other more efficient financial and governance devices to deal with the effects of the intangible assets characteristics. It seems clear that the analysis we perform in this paper is a small piece of a larger puzzle. Second, in research of this kind, one can always defend the inclusion of additional "endogenous" variables. In fact, at least in the long run, it is arguable that most financial and governance variables are endogenous. Third, since listed companies tend to be large, the use of only listed companies may induce some level of size bias. Fourth, this work ignores the impact of different ownership structures in qualitative terms. Fifth, this study ignores the dynamics of the ownership structure, particularly the way managers have acquired their current equity ownership (Does it result from the exercise of stock options? Are managers divesting founders?). Finally, the use of the debt level alone ignores that debt holder power depends on the debt composition (bank debt versus bonds, for instance), debt holder structure (the degree of concentration), specific debt covenants (for instance, board representation) or debt maturity.

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