Firm Performance: Do Non-Executive Directors Have a Mind Of Their Own? Evidence From UK Panel Data

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Abstract

This paper investigates the relationship between firm performance and ownership structure for a large panel of UK firms for the period 1991-2001. We focus on managerial ownership and, more in detail, on the role of non-executive directors. Using GMM-SYS estimations, we fail, to detect any significant impact by non-executive ownership, while we find evidence in support of a cubic relationship between executive shareholding and performance. On the other hand, the ratio of non-executives on total board seems to play a significant role in determining higher firm performance. Finally, a negative relationship between performance and block holding is detected.

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The connection between ownership structure and firm performance has been the subject of an important and ongoing debate in corporate finance literature dating back to the Berle and Means (1932) thesis, which suggests that an inverse correlation should be observed between dispersed shareholding and firm performance.

Jensen and Meckling (1976) formally derive a model in which the distribution of shares among the insiders and outsiders in a company can influence its value. Provided that managers' natural tendency is to allocate the firm's resources in their own best interests, the greater the managerial ownership the less inclined the managers are to divert resources away from value maximisation as their interests coincide more closely with those of outside shareholders. Firm performance then increases uniformly (alignment effect).

However, it is argued that the impact of managerial ownership is likely to be non-monotonic. Shleifer and Vishny (1989) contend that as the percentage of shares held by the manager increases, his discretion increases. He may pursue private benefits or use this discretion to appoint a board of directors that is unlikely to monitor. This in turn would impair the capacity of outside shareholders to monitor and influence managers (entrenchment effect).

The available empirical evidence on the impact of managerial ownership on firm performance is mixed. While there are a number of papers which do detect a non-monotonic relationship between ownership and value, little consensus has been reached on the exact shape of this relationship. Among others, McConnell and Servaes (1990, 1995) observe an inverse U-shaped relationship, while Hermalin and Weisbach (1991), Morck *et al.* (1988), Short and Keasey (1999) report a significant cubic relation between the two. In a recent study on the UK, Davies *et al.* (2004) report a quintic relationship.

On the other hand, there is a growing body of evidence which fails to detect any significant links between ownership and performance. Among others, Loderer and Martin (1997) using a simultaneous equation model in which Tobin's q and insider holdings are endogenous, report no relationship between managerial shareholding and Q (whilst firm value is a negative predictor of ownership). Cho (1998) also estimates a system of equations in which insider ownership and Q are simultaneously determined and suggests that Q affects ownership structure but not vice-versa. Demsetz and Villalonga (2001) using a 2SLS approach again show that, once endogeneity is considered, the direction of causality only runs from value to ownership.

One possible explanation for such variety of results is that they may be driven by the different empirical approaches adopted.

The first set of studies typically does not allow for the endogeneity of managerial ownership, an issue that was first discussed in Demsetz (1983) [1]. It is argued that a positive sign between managerial ownership and firm performance could be interpreted as evidence that, to a certain extent, owning ordinary shares makes the interests of managers aligned with those of external shareholders, resulting in a positive effect in performance. However, it is also possible that managerial ownership is higher in better performing firms simply because managers are more willing to accept ordinary shares as a part of their payment scheme in firms which perform better. As a result, studies which fail to control for this cross causality may only be capturing a spurious relationship.

Although the second set of studies discussed above adopts appropriate econometric techniques in order to control for this type of cross causality, it typically neglects another potentially important issue. As described in Himmelberg *et al* (1999), the common approach of estimating the impact of managerial ownership on firm value by regressing Tobin's q on such variables as the percentage of equity held by managers "is potentially misspecified because of the presence of firm unobserved heterogeneity". To the extent that managerial ownership is strongly correlated to unobservable firm specific characteristic (i.e. the contracting environment in the firm), studies which fail to control for this effect would obtain biased and inconsistent estimates.

As a consequence of the above mentioned issues, we study the relationship between firm performance and managerial ownership using the GMM methodology (Arellano Bond, 1991). By means of this technique, the endogeneity of all the explanatory variables can be efficiently addressed. Appropriate lags of the endogenous variables are used to obtain consistent estimates of the regressors. Furthermore, this methodology enables us to control for unobservable heterogeneity via first differencing.

In order to carry out this study we hand collected a novel data set of 1100 listed non-financial UK firms for the period 1991-2001, gathering information on ownership by the board of directors and by external shareholders as well as on board composition.

The original contribution of our work is to test in an explicit manner whether non-executive directors play an independent role from executives in determining firm performance. In fact, past studies in this area have typically used shareholding by the entire board as a proxy for managerial ownership. However, the fact that different board members

[1] Two notable exceptions are Davies *et al* (2004), who use a SEM and Hermalin and Weisbach (1991) who use a IV approach.

are have different incentives has been discussed by a large number of papers. Whereas the board of directors is supposed to act on behalf of the shareholders, as an important mechanism to monitor management discretionary behaviour, non-executive directors should act as "delegated monitors" charged by the shareholders to observe the actions of executive managers (Hart, 1995). According to Morck *et al.* (1988), since non-executive (outside) directors must monitor the performance of the executives (officers), they should be provided with strong personal financial interests in the firm. In line with this argument, other authors contend that non-executives do not have sufficient financial interests to be concerned about company performance (Hart, 1995) and that they may lack the necessary expertise to participate efficiently in planning the financial aspects that affect corporate value (Jensen, 1993).

From this perspective, we argue that it may be important to make a distinction between the stakeholding of the two categories to be able to investigate the determinants of firm performance.

The UK then, provides an excellent case study for this matter. Unlike in the US where boards generally have a predominance of outside (non-executive) directors, UK boards have tended until recently to be dominated by a high presence of executives. However, following the corporate scandals in the early nineties and the consequent issue of the so called "Codes of Best Practice", the corporate governance scenario has evolved considerably. In particular, the number of non-executives has steadily increased over time so that by the end of the decade the proportion of non-executives to executives was close to one. Furthermore, as we will show in Section I, while share ownership by executive directors has been steadily decreasing in time, the opposite holds for non-executives.

In consideration of these arguments, we first test the relationship between board ownership and firm value. Then, we split the board of directors between executives and non-executives and test whether ownership by non-executives is also a relevant factor. Furthermore, we check if the mere presence of outside directors on the board, is significantly linked to firm value.

In addition, in order to account for the possibility that non-executives may have stronger incentives to monitor effectively when they own greater amounts of shares, we introduce an interaction term.

Moreover, we investigate whether the presence of a large shareholder and its identity, besides firm capital and financial structure have an impact on the determination of firm

performance. A number of papers show the interdependence of these agency control mechanisms (Agrawal and Knoeber, 1996). For example, Stiglitz (1985) and Shleifer-Vishny (1997) maintain that large shareholders have greater incentives to be involved in the control process than smaller ones because they can more easily bear the high fixed costs of collecting information on management behaviour. Some authors also emphasize that different types of shareholders have different incentives and costs to be active monitors of the business activities in the firm (Pound, 1988; Brickley *et al.*, 1988).

It is also argued that an appropriate level of external debt (Jensen, 1986) or an appropriate amount of dividend payments (Easterbrook, 1984) can to some extent curb managerial discretion because they restrict the amount of free resources.

Our analysis reveals that the alignment/entrenchment effect as detected on the total board is really driven by the executive positions on the board. Contrary to the available empirical evidence (Morck *et al*., 1988) we fail to detect any significant relationship between ownership by non-executives and performance. On the other hand we detect a positive and significant impact of the ratio of non-executives to total board. Our results also suggest that the presence of a large outside shareholder and in particular of large institutional investors is negatively related to firm performance while investment in physical capital, cash flow and dividend payments exert a positive impact.

The rest of the work is organized as follows. Section I reviews the hypotheses we test in this work. Section II presents the data and the methodology. Section III presents the empirical results and Section IV presents our main conclusions.

I. Hypotheses

A. Managerial ownership and the role of non-executives

As mentioned above, the Berle and Means (1932) argument suggests the presence of a positive linear relationship between ownership concentration and firm performance since dispersion creates free riding problems and makes manager monitoring more difficult. From this perspective, managerial ownership may serve as an alignment mechanism as it provides managers with the right economic incentives towards firm value maximization (Jensen and Meckling, 1976). Nonetheless, since Demsetz and Lehn (1985) and Fama and Jensen (1983) a growing body of studies has started to recognize that the alignment effect may not be a linear function of managerial ownership. It is argued that increasing shareholding also delivers

increasing voting power and effective control over the firm which may enable the manager to extract company resources.

In order to test the relationship between managerial ownership and firm value we estimate a cubic model. At low levels of ownership we expect the alignment effect to be prevalent while at higher levels we expect the entrenchment effect to be the more predominant one. The cubic specification also allows the possibility that the relationship will become positive again at very high levels of managerial ownership. This may be due to the fact that when the degree of ownership concentration in the manager's hands is so elevated, the manager effectively becomes the manager-owner.

At first, we approximate managerial ownership as the total shares held by the board of directors[2].

However, as we argued in the introduction, a number of papers have highlighted the different incentives existing among various board members. This distinction may be particularly relevant when we consider the institutional differences between the US and the UK. American boards generally have a predominance of outside directors (non-executives), while the Chief Executive Officer is usually also the Chairman and strictly controls the board. In the UK, on the contrary, as a consequence of the corporate scandals in the early nineties, a lot of emphasis has been placed on the importance of the independent monitoring role by non-executives. Whereas before and up to the early nineties, UK boards were characterised by a high presence of executive directors, after the issuing of the Codes of Best Practice, the number of and average shareholding by non-executives has steadily increased.

So, as a second step in our analysis we explicitly investigate the impact of each of the two groups of board members in determining firm performance. To the best of our knowledge, only the paper by Morck *et al.* (1988) explicitly considers this issue and reports that "outside board members, like officers, respond to financial incentives and contribute more to corporate wealth as their ownership stakes rise. In addition[…] outside board members are capable of becoming entrenched".

As no theoretical work indicates the exact nature of this relationship we try different functional forms. While maintaining the cubic relationship for executive directors, we allow for a cubic, quadratic and finally linear specification for non-executive ownership.

[2] In Table 1 we report all the definitions of the variables used in this work.

Moreover, some studies have recently focused on how the nature of corporate governance determines firm value, highlighting the possibility that an effective monitoring role by non-executives may be played irrespective of any shareholding interests they may have. It is argued that both the reputation effect in the management labour market and the expertise acquired from their career history, could give enough incentives to non-executives to guarantee effective and independent monitoring inside the firm (Fama and Jensen, 1983). From this viewpoint, we may expect there to be a positive relationship between firm performance and the presence of non-executives. However, some authors argue that the reputation effect in the management labour market could also work in an opposite direction. For example, it is argued that "non-executives may owe their position to management" (Hart, 1995). In addition, Jensen (1993) highlights the relative lack of expertise by non-executives and also underlines that oversized boards are easier for the Chief Executive to control. If these phenomena are prevalent, then a null or negative relationship may be anticipated.

A growing number of works have analysed the impact of board composition on firm performance and the results are not unambiguous. Rosenstein and Wyatt (1990) used an event study methodology on, U.S. companies and reported a positive (but small) impact on the stock price following the appointment of an additional outside director. In a panel perspective, Yermack (1996) finds an inverse association between board size and Tobin's q. Agrawal and Knoeber (1996) study the impact of several agency control mechanisms and detect a negative relationship between the percentage of board seats held by non-officers and Tobin's q. Conversely, Bhagat and Black (1998) detect no relationship between the proportion of outside directors and future performance, concluding that "the direct relationship between board composition and firm performance, if it exists at all, is weak and perhaps variable over time". In addition, Holderness *et al.* (1999) find that changes in board composition or size do not account for the changes in the managerial ownership in the US.

As we argued earlier, the codes of best practice which have been issued in the past ten years give a series of recommendations on the structure and responsibilities of the board of directors, making the UK case a very interesting setting to test the hypothesis that the presence of non-executive directors plays a significant role in determining firm performance. This may be particularly interesting considering the information recently published in the Higgs Report (2003, P.30, 10.5):"A high level of informality surrounds the process of appointing non-executive directors. Almost half of the non-executive directors surveyed for the Review, were recruited to their role through personal contacts or friendships. Only four

per cent had a formal interview and one per cent had obtained the job through answering an advertisement[…]". The implication might be that the independence of monitoring action by English non-executives may be blurred and as Hart (1995) surmises, only "quiet non-executives" are appointed by firms.

Similarly to the US findings, the results of the empirical studies for the UK companies are not unambiguous. Faccio and Lasfer (1999) find little evidence to support the hypothesis that firm value is affected by the combination of managerial ownership and board structure. However, Weir *et al.* (2002) show that English firms with high performance have a greater proportion of independent non-executives both in the board and in the audit committees. Young (2000) shows that there is an increased demand for non-executive directors among firms with manager-dominated boards and that the compliance with the Cadbury recommendation concerning the minimum number of non-executives is positively related to the expected net benefits of adding further non-executives to the board. Peasnell *et al.* (2003) show that the potential contribution of outside directors to internal corporate control mechanisms seems to be important at any level of managerial ownership in the UK and that boards even in manager-owned companies are far from being passive. In a recent study Dahya *et al.* (2002) report a significant increase in management turnover following adoption of the Cadbury recommendation and an increased sensitivity of turnover to performance due to the increasing number of non-executives in the board.

In order to test the effectiveness of the presence of non-executives, we use the ratio (*Ratio*) of non-executive directors to total board, in line with the argument that "a greater use of outside directors can lead to more effective internal monitoring" (Agrawal and Knoeber, 1996). Moreover, in order to account for the possibility that the effect exerted on performance by the presence of non-executives in the board may depend on the (magnitude of) their shareholding, we also include an interaction term.

B. The role of the external shareholders: Block Holding

Stiglitz (1985) argues that larger shareholders have greater incentives to be involved in the control process than smaller ones because they can more easily bear the high fixed costs of collecting information on the behaviour of management. In addition, Shleifer-Vishny (1997) justify the greater monitoring role of large investors because of the resources they invest in the firm. These views suggest that a positive relationship should be expected.

Yet, the presence of a large shareholder may also lead to higher agency costs inside the firm since larger shareholders may seek the maximization of their own wealth, to the detriment of other investors (Shleifer-Vishny, 1997). Additionally, Burkart *et al.* (1997) show that the efforts exerted by managers to boost their private benefits may indeed be beneficial for firms as well. They suggest that even if tight control by shareholders is ex-post efficient, it may constitute an ex-ante expropriation threat that reduces managerial initiative. As a consequence, ownership concentration in the hands of external shareholders may also be detrimental to firm performance.

The empirical literature that analyses the impact of large shareholders on corporate control processes is quite extensive and generally suggests that the largest shareholders play an insignificant role. For instance, Holderness-Sheehan (1988), among others, find no differences in the performance of various firms whether shareholding in their corporations is concentrated or dispersed. McConnell-Servaes (1990, 1995) also report that the largest single block holder has an insignificant effect on firm performance. Similar results obtain for all the block holders and the dummy indicating the presence of a block holder in the firm. In line with this study, Agrawal and Knoeber (1996) also conclude that no significant role is played by block holding, while, for the UK companies they analysed, Faccio and Lasfer (1999) detect a significant negative impact of blockholding. Davies *et al.* (2004) find little evidence of a significant impact of the largest stakeholder, but report a strong, negative link between blockholder ownership and firm value.

We investigate these hypotheses by including the following two different proxies for ownership concentration: one for block holding (*Block Holding*), defined as the sum of the ownership held by non-managerial shareholders with more than 3% of firm stakes and one representing the shares of the largest non manager owner (*Largest non-managerial ownership)*.

C. The role of the external shareholders: Institutional Owners

It may be relevant in this contest to distinguish the outside shareholders according to their identity, as different types of owners may have different incentives.

According to the thesis proposed by Pound (1988), institutional investors are more efficient monitors than other typologies of shareholders due to their greater expertise (efficient monitoring hypothesis). On the other hand, he also contends that institutional investors may find it profitable to cooperate with managers (strategic alignment hypothesis),

or may even be forced to cooperate with them in order to protect other business relationships they may have with the firm (conflict of interest hypothesis).

It does seem important to control for the differences in monitoring incentives among different categories of shareholders, particularly in the light of the peculiarities of the UK institutional setting.

First, while private individuals are the largest category of shareholders in the US, UK financial institutions have increased their ownership of UK equities since 1963 (Stapledon, 1996) [3]. As reported in Table II, institutional investors are the largest category of shareholders over the last decade. Second, UK institutional investors face no legal restrictions on stock ownership, while US insurance companies are bound not to invest more than 2% of their assets in a single company. Finally, UK institutions face no legal barrier against activism[4].

In spite of this relative institutional freedom, the lack of activism by institutional investors has been the focus of many debates (see among others, Conyon-Peck, 1997). Renneboog and Goergen (2001) provide evidence of the fact UK institutional investors tend not to exercise their voting power effectively, thus increasing "the already significant power of directors". Additionally, Faccio and Lasfer (1999) provide evidence of the fact that UK pension funds are not effective monitors, and Cosh and Hughes (1997) also fail to detect any strong influence by institutional investors in determining either executive pay or dismissal policies. These results are borne out in a recent paper by Dahya *et al.* (2002), who report no evidence that ownership by institutions is relevant in determining management turnover. Indeed, the Hampel Code of Best Practice (1998) contains specific recommendations calling for an increased role for institutional investors in corporate governance issues (Webb *et al.* , 2003).

Following the indications from this large body of studies, an insignificant or negative relationship between institutional ownership and firm value may be expected.

The existing empirical evidence is mixed. Among others, Short and Keasey (1999) find that while institutional ownership plays no role in determining firm value, ownership by

[3] The recent work of Gadhoum *et al.* (2004) on the ultimate ownership in the US shows that in 1996 about 37% of the all listed firms in the US market are controlled by families, while only 16% are owned by financial institutions.

[4] In the US, for example, the schedule 13D filing obliges a shareholder group with more than 5% shares to disclose the group's plans with respect to the company. However, in trying to understand the institutional governance in the UK it is necessary to take into account the well-developed network of informal communication and coalitions among the institutional investors within the "London Square Mile" (Short-Keasey, 1997) that can contribute to reducing free riding problems for the institutions.

non-institutional owners is statistically significant in the UK and is positively related to performance. Also, Agrawal and Knoeber (1996) detect no influence of institutional ownership on firm value. Conversely, McConnell and Servaes (1990) not only report that the percentage of shares owned by institutions is positive and significant, but also that the inflection point between alignment and entrenchment increases when this proxy is included in the model. This result is interpreted as evidence in support of Pound's (1998) efficient monitoring hypothesis.

We investigate these hypotheses with the inclusion of four proxies. First we split ownership by all the external shareholders (*Block Holding*) into ownership by institutional investors (*Institutional Ownership*) which comprises banks, pension funds, fund managers and similar and ownership by non financial institutions (*Non-Institutional Ownership*) comprising private individuals, and non financial companies. Additionally, as a robustness check we also divide ownership by the largest non managerial investor into Institutional (*Largest Institutional Ownership*) and non-Institutional ownership (*Largest Non-Institutional Ownership*).

D. Control variables

We include a number of control variables that current literature has indicated as being potentially able to influence firm performance.

Total debt (*Leverage*) is included in order to control for a number of factors. On the one hand, a positive effect may be expected as a result of monitoring by lenders. As Jensen (1986) argues, raising external debt limits managerial discretion as managers are committed to paying out future cash flow in a durable and enforceable way. In a similar way, Stiglitz (1985) maintains that effective monitoring of managerial behaviour is exercised mainly by lenders rather than shareholders. Modigliani and Miller (1963) also predict a positive relation between leverage and performance with the argument of valuable tax shields, as does Ross (1977) with the argument of leverage as signal. On the other hand, (existing) leverage may hamper the firm's capability in raising new debt and as a consequence force it to pass up valuable investment opportunities. This is related to the problem of underinvestment analysed by Myers (1977). Furthermore, a higher leverage increases the risk of bankruptcy and this, in turn, may worsen the market perception of the firm. We define leverage (*Leverage*) as the ratio of total debt to total assets.

We control for the effect of firm size as larger firms may find it easier to generate funds internally and access external resources. Moreover, larger firms could benefit from

economies of scales by creating entry barriers with consequent positive effects on performance (Short-Keasey, 1999). However, average managerial shareholding is larger in smaller firms and this could create scope for potentially higher managerial entrenchment (McConnell-Servaes, 1990; 1995). In our work, size (*Size*) is equal to the natural logarithm of total assets at 1991 prices.

Following Morck *et al.* (1988), McConnell and Servaes (1990) and Cho (1998) we include a proxy for investments, both in intangible assets using reported R&D expenses (*RD Expenditures)* and investment in fixed capital (*Capital Expenditures*). It is argued that investments may positively affect firm performance (Jensen-Meckling, 1976). Moreover, there is evidence of a positive reaction by the US stock market to announcements of increases in planned capital expenditure (McConnell-Muscarella, 1985) and R&D expenses (Chan et al., 1990). In line with these findings, we expect that an increase in investments has a positive impact on firm performance.

As argued by Jensen (1986), agency conflicts between managers and shareholders can become more severe when managers exercise more discretion on liquid assets. From this perspective, free cash flow we may expected to be a negative predictor of firm performance. However, a higher cash flow may also mean that firms can finance their investments through internal funds. This allows firms to reduce the risk of facing underinvestment and bankruptcy problems. So, a positive relationship between performance and cash flow could be observed. Furthermore, the inclusion of a proxy for the availability of internal funds may be appropriate in this context, because it may be strongly correlated with investments (Fazzari *et al*, 1996). We approximate the free cash flow (*Cash Flow*) as the ratio of pre-tax profits plus depreciation to total assets.

A number of papers contend that, like leverage, dividend payments may in fact reduce free resources in the firm and mitigate potential manager-shareholder conflicts (Easterbrook, 1984; Jensen, 1986). As a result, a positive relation between dividend payout and firm performance could be predicted. Nonetheless, it may also be argued that higher dividends are related to the presence of low growth opportunities. That is to say, firms with low profitable investment opportunities may pay higher dividends rather than undertake negative net present value projects (Smith-Warner, 1979; Milgrom-Roberts, 1992). Dividend payouts (*Dividends*) are equal to the ratio of ordinary dividends net of Advance Corporation Tax, to total assets.

II. Data and methodology

A. Ownership Structure

We hand-collected data on ordinary shareholding by managers and external shareholders, as well as on board composition for a panel of approximately 1100 non financial UK listed firms for the period 1991-2001 (Marchica and Mura, 2005). Ownership data mainly come from the Price Waterhouse Corporate Register (Dec. issue). Among the external shareholders, ordinary shares held above the 3% threshold are reported[5]. Additionally, we collected information regarding the typology of the external owners, distinguishing between financial firms, non financial firms, individuals and state. Unlike what applies to external shareholders, ownership by management must always be disclosed, so this allows us to detect the presence of managers even when they hold no shares.

We have gone to considerable lengths to check for consistency in the dataset. We were particularly careful in controlling that the sum of all reported shareholding would not exceed 100. Also, we also checked that the sum of all shareholding would equal the reported number of shares outstanding. Firms which failed these test were dropped from the dataset.

Preliminary descriptive statistics are provided in Table II. The figures suggest that the distribution of ownership by external shareholders shows a certain degree of volatility but no clear trend. The average level of block holding remains around 30%, Institutional Ownership around 20% while ownership by non-institutions is on average around 10% for the ten years under analysis. What is interesting to underline here, is that average shareholding by the largest non-managerial owner is increasing over time.

However, the opposite is true for board ownership: on average, the total ordinary shares held by the board of directors decreased by approximately 5% in ten years, half of which took place between 1991 and 1993, right after the Cadbury Report was issued (1992). This general decreasing trend may be partly explained by the escalating number of outstanding shares in the market as reported in the table[6]. However, the trend only seems to involve executive directors, since average shareholding by non-executives is increasing.

Table III provides a detailed analysis of the evolution of board composition in the UK. In 1991 the average board was composed of 7 individuals, a number that had remained more

[5] The requirement to disclose share blocks was introduced in 1967. Until 1976 it was set up at 10%, then lowered to 5% until 1989 and further reduced to 3% from 1990. However, the Corporate Register for the 1991 edition maintains the disclosure threshold at 5%.

[6] This is in line with Franks *et al.* (2003) who show a similar trend for their sample of UK firms over the last century.

or less constant over time. Nonetheless, following recommendations outlined in the Codes of Best Practice, board composition seemed to change quite significantly. In 1991 there were an average of 4.73 executives and 2.44 non-executives, while by 2001 non-executives constituted almost half of the average board.

These figures corroborate findings by Faccio and Lasfer (1999), Peasnell *et al.* (2003), and Dedman (2003). Similar trends are found when considering the average number of executives and non-executives who actually do hold shares.

B. Economic Performance

One of the central issues in this literature is what variable should be used to measure firm performance . The vast majority of existing literature has focused attention on Tobin's q, defined as the ratio of the market and replacement values of a firm's assets, for which various approximations have been proposed. The original idea by Tobin (1969) was that the replacement cost of assets would be the logical measure of the "alternative use" of assets. So if firms cannot employ assets to create as much (market) value as their opportunity cost, then they are not being efficient.

Calculating the replacement cost of assets however poses a number of problems. As noted by Claessens (2002): "the data required to calculate the replacement values are generally not available […]". As a consequence, various studies have suggested a number of approximations of this measure, all belonging to the family of "market-to-book-ratios". Consistent with Claessens *et al.* (2002) and La Porta *et al.* (2002), we approximate Tobin'q using the following definition: the ratio of the book value of total assets minus the book value of equity, plus the market value of equity to the book value of assets[7].

All economic variables were collected from *Datastream.* Brief descriptive statistics are reported in Table IV.

C. Methodology

As argued in the introduction, there are two relevant factors that need to be controlled for in estimating the relationship between managerial ownership and firm performance, i.e. unobservable heterogeneity and endogeneity.

[7] Robustness checks were conducted using a definition more similar to the one used in Himmelberg *et al* (1999), Demsetz and Villalonga (2001), Agrawal and Knoeber (1996), where Q is defined as the market value of common equity plus the (estimated) market value of preferred stock plus the book value of total debt all divided by the book value of total assets. Results are virtually unaltered with this slightly different definition of Q.

We estimate the following model:

$$Q_{it} = \alpha_1 Q_{it-1} + \alpha_2 Man_{it} + \alpha_3 Man_{it}^2 + \alpha_4 Man_{it}^3 + \alpha_5 Block_{it} + \alpha_6 Ratio_{it} + \alpha_7 Size_{it} + \alpha_8 Div_{it} +$$

$$\alpha_9 Lev_{izt} + \alpha_{10} RDex_{it} + \alpha_{11} Capex_{it} + \alpha_{12} CFlow_{it} + \eta_i + \eta_t + u_{it} \quad (1)$$

where η_i represents the time-invariant unobservable heterogeneity, η_t represents a firm-invariant time effect which needs to be considered in order to take macro-economic factors (such as market shocks) into account. For the moment, we assume the idiosyncratic term u_{it} to be homoschedastic and serially uncorrelated.

The choice of a dynamic model was motivated by results of the preliminary autocorrelation tests, which tend to hint at the misspecification of the mean function in the static form. The dynamic setting seems, instead, to yield consistent estimates. This tallies with the argument by Bond (2002) that "even when coefficients on lagged dependent variables are not of direct interest, allowing for dynamics in the underlying process may be crucial for recovering consistent estimates of other parameters"[8].

The inclusion of the η_i parameter enables us to account for possible firm specific characteristics that may be correlated with the explanatory variables. As highlighted above, Himmelberg *et al.* (1999) emphasize the importance of this factor in estimating the relationship between value and ownership. They provide the following example. Assume that firms have different capabilities in monitoring managers. Better firms will be able to minimize the diversion of resources and thus register higher valuations. They will also have less need to use the alignment instrument. Consequently, the amount of shares held by managers is negatively correlated to the firm's ability to monitor and the ownership value relationship will be negative simply because of this omitted variable bias. In this case OLS estimations would be biased and inconsistent. Furthermore, as noted in Bond (2002), the dynamic specification implies that at least the lagged endogenous variable is necessarily (positively) correlated with the time-invariant component of the error term. In this case, we would expect an OLS estimation of the autoregressive parameter of model 1 to be biased upwards.

The usual solution to this problem is to adopt some transformation of the data in order to partial out η_i. The standard procedure of the Within Group estimation for example would be to transform all the variables in difference from their time means. Since the term η_i is time

[8] Robustness checks were also conducted on a static specification and results are virtually identical to those obtained under the dynamic specification.

invariant, the WG transformation would allow us to eliminate it. Nonetheless one major shortcoming of this procedure is that unless all right hand side variables are strictly exogenous, this procedure introduces a non-negligible correlation between non-exogenous variables and the time-demeaned error term. Consider the case in which managerial ownership is predetermined, that is to say: E(Man_{it} ; u_{it-1}) ≠ 0 but E(Man_{it} ; u_{it}) = 0. In this case, following the notation in Bond (2002), the time-demeaned regressor is:

$$\overline{Man_{it}} = Man_{it} - \frac{1}{T-1}(Man_{i2} + Man_{i3} + ...Man_{iT})$$

while the error term can be expressed as follows: $\bar{u}_{it} = u_{it} - \frac{1}{T-1}(u_{i2} + u_{i3} + ...u_{iT})$.

Now $\overline{Man_{it}}$ and $\bar{u}_{it}$ are correlated since all Man_{it} terms are correlated with all the corresponding u_{it-1} terms. Another interesting fact to note is that, the autoregressive parameter estimated via the WG transformation, is known to be biased downwards due to the negative correlation this methodology introduces with the time-demeaned error term.[9]

The fact that the OLS and WG estimators are biased in opposite directions has been used in a number of studies to infer that a consistent estimator should lie in between them (Bond, 2002).

Arellano and Bond (1991) derived a Generalised Method of Moments (GMM-DIFF) estimator. This methodology consists in taking the first differences of the model and then using suitable lagged levels of the dependent variables as instruments.

If we first difference model 1, we obtain:

$$\Delta Q_{it} = \Delta\alpha_1 Q_{it-1} + \Delta\alpha_2 Man_{it} + \Delta\alpha_3 Man_{it}^2 + \Delta\alpha_4 Man_{it}^3 + \Delta\alpha_5 Block_{it} + \Delta\alpha_6 Ratio_{it} + \Delta\alpha_7 Size_{it} + \Delta\alpha_8 Div_{it}$$

$$+ \Delta\alpha_9 Lev_{it} + \Delta\alpha_{10} RDex_{it} + \Delta\alpha_{11} Capex_{it} + \Delta\alpha_{12} CFlow_{it} + \Delta\eta_t + \Delta u_{it} \qquad (2)$$

Although the process of first differencing effectively transforms predetermined variables into endogenous ones, it does not introduce all realizations of the disturbances into the error term. As a consequence, we can use second (and earlier) lags as instruments for any endogenous variables, under the assumption that there is no serial correlation in the error term[10]. However, if the error term in model(1) is in fact MA(1), then the first differenced error

[9] See Bond (2002) and Nickell (1981) for a more technical treatment.

[10] Consider again for example that managerial ownership is predetermined. While in model 1 it is only influenced by past values of the error term (E(Man_{it} ; u_{it-1}) ≠ 0), when we use model 2 we are effectively introducing contemporaneous correlation since: E[(Man_{it} - Man_{it-1});(u_{it-1}- u_{it-2})] ≠ 0. However, contrarily to the WG procedure, now the second lagged level Man_{it-2} is a valid instrument as it is orthogonal to the error term.

term is an MA(2). As a result, the second lag would not be a valid instrument but the third (and earlier) lags are.

Additionally, even if the error term is not serially correlated, the first differencing methodology introduces serial correlation of order one by construction. Because the validity of the GMM estimations rely heavily on the absence of serial correlation of higher order, then the two tests of correlation in the error term of order one and two are included (m1 and m2).

Moreover, the choice of an appropriate set of instruments is crucial in this type of analysis. The validity of the instrument set can be tested via the Sargan test of over-identifying restrictions, which tests the null hypothesis of the absence of correlation between the instruments and the error term. Rejection of the Sargan test would cast doubt on the validity of the instruments.

Another point of concern arises when there is a high degree of persistence in the data. Under such conditions, lagged levels have a low correlation with the first differences and so the standard linear GMM-DIFF estimator has been found to suffer from a "weak instruments problem", because it displays poor finite sample properties. In particular, Blundell, Bond and Windmeijer (2000) show that in multivariate models where the individual series are highly persistent, the standard GMM difference estimator may have serious finite sample biases.

Arellano and Bover (1995) propose an estimator that considers the equation in levels, with both lagged first-differenced and lagged level terms as instruments in the first-difference equation. This is examined in detail by Blundell and Bond (1998), who illustrate the significant asymptotic efficiency gains in this GMM-SYS estimator. They also highlight the fact that the finite sample bias of the GMM-DIFF is likely to be in the direction of the WG estimator when weak instruments are present.

In the light of all the issues described above, we chose to carry out our empirical analysis using the GMM-SYS methodology[11]. The Sargan Difference test is reported in order to test the restrictions imposed by the GMM-SYS and its validity with respect to the GMM-DIFF.

In order to construct the final sample, firms in the broadcasting sector and public utilities were excluded due to the peculiarities in their operational and regulatory conditions. Firms with dual class shares were also excluded since they violate the "one share one vote" rule. Furthermore missing firm-year observations for any variable were dropped. Finally, in

[11] A preliminary analysis of the persistency of the data revealed that most of the autoregressive coefficients were in the range of 0.8.

line with the indications specified by Arellano Bond (1991), only firms with at least five consecutive years of observations were kept. This left us with an unbalanced panel of 672 firms and 5667 observations.

III. Empirical Results

In Table V, following the sequence of ideas outlined above, we compare the results of the OLS, WG, GMM-DIFF and GMM-SYS estimations. As expected, while the OLS model reports positively biased estimates of the autoregressive parameter, results obtained via the WG methodology are biased in the opposite direction.

In line with the predictions outlined in the previous section, the GMM-DIFF estimator seems to be biased in the direction of the WG, while the GMM-SYS estimator seems to provide consistent and efficient estimates as the coefficient of the autoregressive component now lies between the OLS and WG values. The Wald (joint) test provides evidence that the regressors included in the model are all jointly significant, while the Wald (time) test provides support to the inclusion of time dummies. The Sargan statistic confirms the validity of the instrument set while the Sargan Difference test provides strong evidence in support of the restrictions imposed by the GMM-SYS. As expected, we detect serial correlation of the first order but not of order two.

In our work we explicitly allow all regressors to be endogenously determined. Since instruments lagged at t-2 appear to be correlated with the error term, as indicated by the Sargan statistic in model 3, all GMM estimations are carried out using the lagged levels at t-3 and t-4 of all the variables for the equations in first difference and the difference lagged at t-2 for all the variables in the level equation[12]. We adopt this parsimonious specification rather using than all the available moment conditions in the first differenced equation since this could result in potentially severe overfitting bias (Bond, 2002). Furthermore, according to Bowsher (2002) the power of the Sargan statistic of detecting invalid restrictions can decline dramatically if an excessive number of moment conditions are used.

A. Ownership and control characteristics: Managerial Ownership

[12] The result in the Sargan statistic in Model 3 could be due to the persistency in the data. Consider the case of an endogenous variable. If X_{it-2} is very similar, or in other words, highly correlated to X_{it-1}, then this may result in correlation between X_{it-2} and ΔU_{it}.

In order to investigate whether the non-monotonic relation between managerial ownership and firm performance is significant, our first step is to analyse the impact of ownership held by all directors on the board. In the GMM-SYS model shown in Table V, we find support for the cubic relationship between insider ownership and firm performance. For low values of board ownership up to around 15%, consistent with the alignment hypothesis, we detect a positive effect on firm performance. Alternatively, this may imply that the market perceives insider ownership as a positive signal of reduced agency problems inside the firm. Nonetheless, a further rise in managerial ownership increases the likelihood that managers will become entrenched and this has a negative effect on firm value. Only at very high level of ownership, between 15% and 45%, does the entrenchment effect seem to be prevalent. This may be due to the fact that managers actually become the owners of the firm and at this point manager-shareholder conflicts fade.

Our results tend to suggest that managers become entrenched at higher levels of ownership than their US counterpart (for instance, Morck *at al*., 1988). As already argued by Short-Keasey (1999) and Faccio and Lasfer (1999), this may be a consequence of the institutional differences between the UK and the US systems in terms of legal restriction on stock ownership, legal activism in corporate control and board composition.

In our second step, in order to test whether estimated alignment/entrenchment effects apply to both categories of directors, we split board members between executives and non-executives (Table VI). As we discussed above, there is no clear theoretical prediction to be tested in literature on the functional form. Therefore we estimate three different models where we allow ownership by non-executives to follow a cubic, quadratic and then linear relation to firm value. Further, in order to account for the possibility that the way ownership by non-executives influences performance may also depend on their relative presence in the board, we introduce an interaction term.

All four models in Table VI provide consistent estimates in terms of the control variables and estimated turning points. No model seems to provide support to the hypothesis that share ownership by non-executives plays any role in determining firm performance. On the other hand, results do indicate that executive directors follow the previously detected cubic relationship and that the relationship between ownership by all board members and performance is really only linked to the executive positions in the board. The relative stability in the estimated turning points tends to corroborate this conclusion.

Our findings are in contrast with those of Morck *et al.* (1988) for US companies. Their results indicate that not only do outside board members respond to financial incentives and contribute to corporate wealth as officers do, but they also tend to become entrenched.

The figures in our analysis may be consistent with different interpretations. On the one hand, they may indicate that outside directors are truly independent in the UK and so, are not subject to any alignment/incentive effects in terms of their shareholding. On the other hand, this may be interpreted as evidence of executive directors' ability to create a board that is not likely to monitor. Alternatively, and in line with the argument by Hart (1995), it may be interpreted as evidence of the fact that non-executives in the UK still do not have enough financial incentives to be active monitors of executives decisions. In fact, as reported in Table II, ownership by non executives is substantially lower than ownership by executives, especially in the early nineties.

However, according to all our results, the larger the fraction of outside directors in the board, the better a firm seems to perform. This is in line with the findings in Faccio-Lasfer (1999) and may further corroborate the hypothesis that UK non-executive directors are effectively independent. Moreover, this is consistent with findings by Dahya *et al.* (2002), who detect an increased sensitivity of turnover to performance due to an increase in the non-executives presence in the board. Dahya *et al.* (2003), also concluded that firms which increased the number of non-executives experienced a significant improvement in performance. On the contrary, this evidence is in contrast with the study by Franks *et al.* (2001) on the determinants of executive board turnover in the UK from 1988 to 1993. Our results are also in contrast with Agrawal and Knoeber (1996) who reported that in US companies, more outsiders are actually associated with faltering firm performance.

As a robustness check, we include an interaction term which allows the impact of non-executive shareholding on value to depend on the proportion of non-executives in the board. What we find (Table VI model 9) is that there is no a significant improvement in the firm performance when we interact non-executive ownership and their proportion in the board, confirming that in UK companies, non-executive directors do not seem to respond to financial incentives in the way they do in the US market [13].

B. Ownership and control characteristics: Large external shareholders

[13] Unreported tables also show that the interaction is insignificant when we include the quadratic and the cubic specification for non-executive ownership.

As far as ownership concentration is concerned, we detect a negative relation between block holders and Tobin's q, which appears not to be sensitive to the adoption of different specifications for outsider ownership. Our findings are in line with those in Faccio and Lasfer (1999) and Davies *et al.* (2004), but in contrast with Dahya *et al.* (2002), who fail to detect any significant role for blockholders in determining CEO turnover in UK companies between 1989 and 1996.

This result seems to tally with the argument of Burkart *et al.* (1997) who contend that too much block ownership will overly constrain management and reduce their ability to take value maximizing investment decisions.

Another possible explanation might be that disclosed shareholding is too dispersed, so that no individual shareholder has the incentive to actively monitor managerial behaviour because the coordination costs are higher than the benefits singly received by each of them. However, this interpretation does not hold when we take into account only the first largest non-managerial owner. In fact, Table VII model 11 shows, as before, the same negative relation between the largest non-managerial shareholder and Q. Furthermore, results for both block holding and individual largest shareholding are in contrast with the findings reported by McConnell and Servaes (1990; 1995), who fail to detect any significant impact of large external shareholders on firm performance in the US case[14]. Our results are also different from Davies *et al*. (2004), who also report no significant impact by the largest stakeholder.

The identity of owners also provides further insight into the relationship between external shareholders and firm performance.

C. Ownership and control characteristics: Identities of large external shareholders

The data we collected allows us to discriminate between the various typologies of investors. In Table VII we sub-divide ownership by external and largest non-managerial investors (models 10 and 12) into ownership by institutions and non-institutions. We find no evidence in support of the hypothesis that different owners have a different impact on firm value, whether as a group or as a largest shareholder.

Our results suggest that non-institutional owners can negatively affect firm value. This may happen for instance if they collude with managers in the company at the expense of the

[14] With the exception of low-growth firms in the years 1986 and 1988, when all outside shareholders seem to positively contribute to firm value

minority investors or in cases when they are passive and unwittingly allow managers to expropriate firm resources.

This is not in line with the findings presented in Short-Keasey (1999), who report a positive impact of non-institutional shareholders on firm value. Also Frank *et al.* (2001) report a positive relationship between individuals and industrial companies with regard to executive board turnover for the worst performing English companies. This result is cited in support of the hypothesis that there is a certain degree of monitoring action by this kind of shareholder on manager behavior.

On the other hand, results for institutional shareholders seem to support the thesis that institutional investors are either passive or, alternatively, they connive and collaborate with managers. In both cases, corporate performance will suffer. For the UK companies, Dahya *et al.* (2002) fail to detect any significant impact of institutional shareholders on management turnover from 1989 through 1996. This figure is also in line with Short-Keasey (1999), who report no significant positive impact of English institutional owners on their proxy for Tobin's q. Instead, McConnell-Servaes (1995) provide evidence that the influence of institutional investors on Q for US companies is highly significant.

D. Economic variables

We find that dividends, cash flow and capital expenditures are all highly significant in determining firm value. The positive relation between dividends and Q seems to support the Easterbrook (1984) and Jensen (1986) argument that dividends are a means to mitigate manager-shareholder conflict within the firm, producing an improvement in its market evaluation. This result is partly in line with findings by Farinha (2003) who shows an increase in dividend payments for UK firms, when managers are entrenched.

On the other hand, the positive impact of cash flow on firm value seems to suggest that the availability of internal funds may have a positive impact on the valuation of the company. One interpretation of this result might be that internally generated funds allow the firm to reduce the risk of underinvestment and pursue valuable growth opportunities. In all the models we detect a positive relation between investments and firm value though only expenditures in tangible assets are statistically significant[15]. Our results are consistent with

[15] One explanation for the insignificancy in intangible assets expenses is that a large number of firms reported zero RD expenditures. As a result, the data may not have sufficient variability to show a significant relationship in the econometric specification we adopted.

those reported in Davies *et al.*(2004), while for US firms Morck *et al.* (1988) and McConnell-Servaes (1990; 1995) show a significant impact on R&D expenditures as well.

Finally, in none of the models estimated do we detect any significant impact of leverage or size .

IV. Conclusions

This paper studies the relationship between firm performance and ownership structure of firms using an original panel data set of around 1100 UK listed non-financial firms for the period 1991-2001. More in detail, we investigate whether non-executive directors play a separate role from executives in determining firm performance.

Our analysis fails to detect any evidence of a significant relationship between ownership by non-executive directors and Tobin's q. We show that the alignment/entrenchment effect as detected on the total board is in fact driven by the executive positions on the board. Nonetheless, our results tend to indicate that the proportion of non-executives on the board exerts a positive role on corporate value. This result is robust to the introduction of an interaction effect between the ratio of non-executives and their shareholding.

These results are consistent with diverse interpretations. On the one hand they may suggest that non-executive director are truly independent in the UK and as such not sensitive to incentive mechanisms. On the other hand, in line with the argument by Hart (1995) they may also indicate that financial incentives for non-executives are still insufficient. This interpretation is particularly interesting when considering the recent increasing trend in non-executive shareholding for UK firms.

In line with recent findings for the UK, we also detect a negative relationship between performance and block holding. We investigate this issue more in depth by separating the identity of external owners and results show that institutions and private investors seem to influence corporate value in the same way. We also analyze the role of the largest non-managerial owner and its identity. Results tend to confirm the negative role played by external shareholders on firm performance.

Additionally, our results indicate that investment in physical capital, cash flow and dividend payments play an important positive role in determining firm performance.

Finally, we show that our results are valid after allowing for the presence of individual heterogeneity and for all dependent variables to be endogenously determined.

Table I. Definitions of variables

Variables	Definitions
Tobin's q	defined as the ratio of book value of total assets minus the book value of equity plus the market value of equity to book value of assets.
Board ownership (Man)	Sum of ordinary shareholding by all directors (%)
Executive ownership	Sum of ordinary shareholding by executive directors (%)
Non-Executive ownership	Sum of ordinary shareholding by non-executive directors (%)
Block Holding (Block)	Sum of the external shareholding above 3%
Institutional Ownership	Ownership by financial institutions (pension funds, banks, insurance companies, fund managers)
Non-Institutional Ownership	Defined as ownership by private individuals, other non-financial companies
Largest non-managerial Ownership	Represents shareholding by the largest non-managerial shareholder in the firm
Ratio	Defined as the proportion of non-executive directors on total board
Size	Defined as the natural logarithm of total assets in 1991 prices
Dividends (Div)	Defined as the ratio of ordinary dividends net of Advance Corporation Tax, to total assets.
Leverage (Lev)	Defined as the ratio of total debt to total assets
RD Expenditures (Rdex)	*RD expenditures*
Capital Expenditures (Capex)	Defined as the capital expenditures on total assets
Cash Flow (Cflow)	Defined as the ratio of pre-tax profit plus depreciation to total assets.

Table II. Average percentage of ordinary shares held by outsiders and insiders

	1991*	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Block Holding	20.72*	31.61	33.21	29.11	29.87	31.09	32.39	33.13	33.80	33.40	32.43
Institutional Ownership	12.63*	22.31	23.22	20.52	20.96	22.84	23.38	24.51	24.52	24.00	22.30
Non-Institutional Ownership	8.10*	9.30	9.99	8.59	8.90	8.25	9.01	8.62	9.28	9.40	10.13
Largest Non Managerial	8.53*	9.10	9.67	10.03	10.32	10.78	11.01	11.42	11.00	11.83	11.45
Board Ownership	15.26	13.71	13.13	11.88	12.24	10.99	10.80	10.28	10.51	10.19	10.70
Executive Directors	13.34	11.93	11.30	9.97	9.94	8.94	8.54	8.16	8.15	7.43	7.61
Non-Executive Directors	1.92	1.77	1.83	1.90	2.29	2.06	2.26	2.11	2.36	2.76	3.09
Float	64.02	54.69	53.66	59.01	57.90	57.92	56.81	56.59	55.69	56.41	56.87
Total sample firms	565	583	611	645	666	667	661	606	501	440	395
Average number of outstanding shares (in millions)	145	154	165	174	203	185	184	314	247	290	288

* Reported disclosure rule is 5%

Block holding represents the average shareholding by external shareholders who own at least 5% of the shares

Ownership by Institutions is the sum of the shareholding by financial firms

Ownership by non-institutions is the sum of the shareholding by private individuals and other non financial firms

Board Ownership represents the average shareholding by managers as either "Executive" or "Non-Executive" Directors, including Chairman and Chief Executive Officer.

Float is the average percentage of shares being held under the disclosure threshold of 3%, except for 1991.

Table III. Board Size and Board Composition

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total Board Size	7.17	7.13	7.18	7.17	7.33	7.32	7.28	7.33	7.38	7.39	7.35
Executive Directors	4.73	4.59	4.44	4.31	4.24	4.15	4.05	4.00	3.94	3.92	3.82
Non-Executive Directors	2.44	2.54	2.74	2.86	3.10	3.18	3.23	3.32	3.44	3.47	3.53
Proportion of Non-executives to Total Board	0.34	0.36	0.38	0.40	0.42	0.43	0.44	0.45	0.47	0.47	0.48
Executive Directors cum-shares	4.04	3.91	3.81	3.68	3.69	3.60	3.55	3.56	3.50	3.47	3.39
Non-Exec Directors cum- shares	1.90	1.92	2.02	2.13	2.37	2.47	2.49	2.64	2.73	2.78	2.81

This table shows the average number of members on the Board of Directors. Executive Directors here include Chief Executive Officer and Executive Chairman and Non-executives include the Chairman. Executives and Non-executives cum-shares are those who effectively own shares in the company.

Table IV. Economic Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Tobin's q	6340	1.5617	0.9491	0.3628	9.7329
Leverage	6340	0.1722	0.1328	0	0.9404
Size	6340	11.2897	1.8370	5.7434	18.0256
Dividends	6340	0.0287	0.0334	0	1.2857
RD Expenditures	6340	0.0087	0.0257	0	0.3816
Capital Expenditures	6340	0.0727	0.1099	-0.1134	2.1300
Cash flow	6340	0.0700	0.1288	-1.4431	0.7136

This table shows the descriptive statistics for the economic variables used in this work. Variable definitions are provided in Table I.

Table V: Multivariate Analysis Regressions using OLS, WG, GMM-DIFF, GMM-SYS

	Model1		Model2		Model3		Model4		Model5	
	OLS		WG		GMM DIFF		GMM DIFF		GMM SYS	
	Coeff	p-val	Coeff	p-val	Coeff	p-val	Coeff	p-val	Coeff	p-val
Tobin's q (-1)	0.6888	0.000***	0.3937	0.000***	0.4366	0.000***	0.2311	0.002***	0.5145	0.000***
Board ownership	0.0009	0.818	-0.0071	0.318	0.0018	0.943	-0.0213	0.440	0.0403	0.016**
Board ownership ^{2}	-5.39E-06	0.977	0.0004	0.208	-9.48E-05	0.920	0.0003	0.771	-0.0018	0.042**
Board ownership ^{3}	3.53E-07	0.873	-3.99E-06	0.248	1.71E-07	0.987	-2.13E-06	0.863	1.97E-05	0.079*
Block holding	-0.0018	0.000***	-0.0016	0.039**	-0.0036	0.225	-0.0058	0.111	-0.0056	0.039**
Ratio	0.1906	0.002***	0.0476	0.590	0.0324	0.924	-0.4695	0.258	0.4580	0.108
Leverage	0.1466	0.123	0.3475	0.030**	0.1244	0.791	0.0623	0.916	0.1041	0.716
Size	-0.0240	0.001***	-0.2061	0.000***	-0.3286	0.053*	-0.8261	0.000***	-0.0355	0.409
Dividends	2.3387	0.000***	2.3015	0.001***	5.0730	0.178	1.6188	0.087*	4.0564	0.005***
RD Expenditures	2.4142	0.000***	0.7998	0.572	2.4266	0.530	4.4568	0.224	1.9185	0.191
Capital Expenditures	0.3278	0.016**	0.2994	0.073*	0.9679	0.320	0.5724	0.415	1.7385	0.029**
Cash flow	0.7936	0.000***	0.9909	0.000***	1.7074	0.010***	1.7189	0.005***	1.2894	0.025**
Observations	5667		5667		5667		5667		5667	
Implied Turning Points									(15.06 ; 45.43)	
Wald (joint)	2412	0.000***	431.3	0.000 ***	146.6	0.000***	90.72	0.000***	597.2	0.000***
Wald (time)	141.1	0.000***	107.6	0.000 ***	19.55	0.021**	34.92	0.000***	20.78	0.023**
Sargan					120.2	0.048**	178.4	0.165	255.7	0.511
Sargan Difference									77.3	0.919
m1 test	1.952	0.051**	-0.6567	0.511	-6.082	0.000***	-4.391	0.000***	-6.750	0.000***
m2 test	0.5822	0.560	-3.548	0.000 ***	-0.6296	0.529	-0.6154	0.538	-0.8787	0.380

Please refer to Table I for the definition of all the variables. Model 1 is estimated in OLS in levels. Model 2 is estimated with the WG methodology. Models 3 and 4 contain the GMM-DIFF estimations while Model 5 reports the results from the GMM-SYS. For the equations in first differences, levels dated [t-2] of all the regressors are used as instruments in Model3 while levels dated [t-3, t-4] are used in models 4 and 5. In the equations in levels, first differences dated [t-2] are used as instruments. Time dummies were included in all estimations. Asymptotic standard errors robust to heteroskedasticity were used in the estimations. m1 and m2 are tests for the absence of first-order and second-order correlation in the residuals. These test statistics are asymptotically distributed as N (0,1) under the null of no serial correlation. The Sargan test statistic is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null of valid instruments, with k degrees of freedom. The Wald (Joint) test reports a test on the joint significance of all regressors. Wald (time) reports a test of joint significance of the time dummies. *significant at 10%; ** significant at 5%; *** significant at 1%

Table VI: Executives and Non-Executives

	Model 6		Model 7		Model 8		Model 9	
	Coeff	p-val	Coeff	p-val	Coeff	p-val	Coeff	p-val
Tobin's q (-1)	0.5191	0.000***	0.5157	0.000***	0.5139	0.000***	0.5210	0.000***
Executive ownership	0.0479	0.011**	0.0432	0.025**	0.0437	0.027**	0.0447	0.015**
Executive ownership^2	-0.0023	0.023**	-0.0020	0.059*	-0.0021	0.051*	-0.0022	0.028**
Executive ownership^3	2.68E-05	0.035**	0.0000	0.086*	0.0000	0.068*	0.0000	0.039**
Non-Executive ownership	0.0171	0.618	-0.0262	0.179	-0.0089	0.248	0.0057	0.747
Non-Executive ownership^2	-0.0025	0.291	0.0007	0.293				
Non-Executive ownership^3	5.43E-05	0.121						
*Non-Exec ownership*Ratio*							-0.0241	0.515
Block Holding	-0.0063	0.034**	-0.0056	0.04**	-0.0056	0.028**	-0.0060	0.019**
Ratio	0.8360	0.016**	0.8426	0.005***	0.8723	0.003***	0.9635	0.002***
Leverage	-0.0784	0.838	0.0012	0.997	0.0916	0.798	0.1995	0.562
Size	-0.0496	0.195	-0.0459	0.237	-0.0554	0.177	-0.0581	0.197
Dividends	4.1290	0.011**	4.1356	0.015**	4.9145	0.029**	5.2434	0.028**
RD Expenditures	0.9200	0.492	1.5205	0.285	1.8010	0.215	1.8036	0.207
Capital Expenditures	1.8099	0.039**	1.9970	0.01***	1.6890	0.023**	1.5366	0.057*
Cash flow	1.1840	0.041**	1.3732	0.019**	1.3254	0.022**	1.2115	0.025**
Observations	5659		5659		5659		5659	
Implied Turning Points	(14.53 ; 42.46)		(14.62 ; 42.77)		(14.05 ; 42.26)		(13.56 ; 42.57)	
Wald (joint)	538.8	0.000***	574.2	0.000***	530.9	0.000***	528.7	0.000***
Wald (time)	21.52	0.018**	28.65	0.001***	28.5	0.001***	34.31	0.000***
Sargan	350.0	0.215	331.9	0.167	302.8	0.236	323.8	0.257
m1 test	-6.804	0.000***	-6.899	0.000***	-6.83	0.000***	-6.815	0.000***
m2 test	-0.7962	0.426	-0.8269	0.408	-0.9671	0.334	-0.9641	0.335

Please refer to Table I for the definition of all the variables. All estimations are carried out with the GMM-SYS methodology. For the equations in first differences, levels dated [t-3,t-4] of all the regressors are used as instruments. In the equations in levels, first differences dated [t-2] are used as instruments. Time dummies were included in all estimations. Asymptotic standard errors robust to heteroskedasticity were used in the estimations. m1 and m2 are tests for the absence of first and second-order correlation in the residuals and are asymptotically distributed as N (0,1) under the null of no serial correlation. The Sargan test statistic is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null of valid instruments, with k degrees of freedom. The Wald (Joint) test reports a test on the joint significance of all regressors. Wald (time) reports a test of joint significance of the time dummies. *significant at 10%; ** significant at 5%; *** significant at 1%

Table VII: Identities of the External Shareholders

	Model 10		Model 11		Model 12	
	Coeff	p-val	Coeff	p-val	Coeff	p-val
Tobin's q (-1)	0.5249	0.000***	0.5424	0.000***	0.5469	0.000***
Executive ownership	0.0414	0.017**	0.0402	0.045**	0.0439	0.044**
Executive ownership^2	-0.0020	0.032**	-0.0020	0.059*	-0.0021	0.055*
Executive ownership^3	0.0000	0.044**	0.0000	0.064*	0.0000	0.059*
Non-Executive ownership	0.0034	0.847	0.0055	0.759	0.0043	0.801
*Non-Exec ownership*Ratio*	-0.0167	0.644	-0.0185	0.642	-0.0180	0.623
Institutional Ownership	-0.0061	0.023**				
Non-Institutional Ownership	-0.0077	0.025**				
Largest non-managerial Ownership			-0.0054	0.081*		
Largest Institutional Ownership					-0.0057	0.133
Largest Non- Institutional Ownership					-0.0058	0.045**
Ratio	0.9668	0.002***	0.9059	0.001***	0.8998	0.002***
Leverage	0.0549	0.854	0.2138	0.526	0.1092	0.732
Size	-0.0597	0.168	-0.0207	0.639	-0.0159	0.695
Dividends	4.8318	0.012**	5.0954	0.016**	4.5649	0.011**
RD Expenditures	1.7565	0.217	1.9908	0.175	1.6356	0.26
Capital Expenditures	1.3644	0.082*	1.6528	0.031**	1.4339	0.072*
Cash flow	1.2114	0.017**	1.2154	0.025**	1.1758	0.021**
Observations	5659		5659		5659	
Implied Turning Points	(13.39 ; 42.01)		(13.50 ; 40.60)		(13.96; 40.63)	
Wald (joint)	558	0.000***	556.5	0.000***	579.3	0.000***
Wald (time)	42.56	0.000***	34.97	0.000***	36.12	0.000***
Sargan	329.4	0.499	326.6	0.343	363.3	0.205
m1 test	-6.773	0.000***	-6.889	0.000***	-6.84	0.000***
m2 test	-0.9529	0.341	-0.8495	0.396	-0.8759	0.381

Please refer to Table I for variable definitions. All estimations are carried out with the GMM-SYS methodology. For the equations in first differences, levels dated [t-3,t-4] of all the regressors are used as instruments. In the equations in levels, first differences dated [t-2] are used as instruments. Time dummies were included in all estimations. Asymptotic standard errors robust to heteroskedasticity were used in the estimations. m1 and m2 are tests for the absence of first and second-order correlation in the residuals and are asymptotically distributed as N (0,1) under the null of no serial correlation. The Sargan test statistic is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null of valid instruments, with k degrees of freedom. The Wald (Joint) test reports a test on the joint significance of all regressors. Wald (time) reports a test of joint significance of the time dummies. *significant at 10%; ** significant at 5%; *** significant at 1%

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