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Abstract:
Evidence concerning the impact of boards on firms' governance and performance remains controversial. We explore the issue of board effectiveness by examining the supervisory role boards play and their advisory function. We examine the importance of these two roles in various contexts and control for the endogenous nature of the representative variables in boards. Our paper uses a sample of European firms to highlight that in certain settings, the advisory function of boards provides higher explanatory power for performance than does the monitoring function, and that larger and less independent boards may improve governance and consequently enhance performance.

Keywords: Corporate Governance, Board of Directors, Monitoring and Advising Functions, GMM, System Estimator.

JEL Classification: G32, G34

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1. Introduction

Boards of directors are undoubtedly one of the main mechanisms controlling firms. Over the past 20 years, interest in exploring the efficiency and activities of boards has been at the core of numerous studies in the field of corporate governance. These papers have heralded a fresh desire, in both academic and business circles, to see strong boards of directors, particularly when other governance mechanisms are inactive. Studies that address board effectiveness have run parallel to the papers that tackle governance in general. The first generation of mainly empirical papers, which was linked to the Anglo-American business world, assessed the efficacy of boards of directors within a context marked by a separation between ownership and management, and by the loss of strength of other governance mechanisms such as corporate market control. A second generation of papers transposed these ideas directly to other countries with different institutional and corporative frameworks. This interest led to the publication of numerous studies, again empirical in nature, which addressed the relevance and effectiveness of boards of directors in large and small, and listed and non-listed companies, in countries all over the world.

This flow of governance literature yields empirical constants that have at least rekindled interest in understanding the effectiveness of boards. The impact of these studies is reflected in recommendations put forward in the Codes of Good Governance published in most developed countries. Recommendations such as reducing board size, including outsider board members, encouraging commissions on the board and proactive meetings, or separating the positions of chairman and CEO, are put forward.

Yet, these studies have been criticized for a variety of reasons (Hermalin and Weisbach, 2003). First, although it is true that certain consistent empirical tenets seem to have been established, no concise models of how boards should behave or function have yet been found. Thus, studies remain essentially empirical and offer an out-of-equilibrium view. Second and closely linked to the previous point, certain findings have been called into question due to the endogenous nature of the links between board characteristics and efficiency. This potential endogeneity complicates any analysis and makes it hard to interpret with any degree of certainty the relations between board and monitoring, or between the board and performance. If the endogenous nature of the relations is not taken into account, findings are not easy to interpret, or, even worse, may prove wrong. Finally, the governance literature focuses on a single function of the board, management monitoring, and how conducting this task may

impact performance, thus neglecting other features more closely linked to advisory functions. These criticisms have had such an effect on research into boards that there is now a third generation of papers.

This generation is characterized by studies that try to fill the current theoretical gap, seeking optimal solutions to the problem of governance by modeling board behavior (Raheja, 2005; Adams and Ferreira, 2007; Drymiotes, 2007; Gillete et al., 2007; Hermalin and Weisbach, 2007; Harris and Raviv, 2008). Second, other papers highlight different board functions beyond simply monitoring, such as the advisory function. Recent papers have explored the circumstances in which each function is more prevalent (Coles et al., 2006; Lasfer, 2006; Adams and Ferreira, 2007; Boone et al., 2007; Drymiotes, 2007; Markarian and Parbonetti, 2007; Cheng, 2008; Linck et al., 2008). Econometric techniques have also come to the fore to provide, at least from the empirical standpoint, solutions to endogeneity problems inherent in relations between the characteristics and functioning of boards and performance.

Within this context, we explore how certain board features may lead not only to enhanced monitoring of managers, but also to efficient advising. We base our analysis of this issue on various assumptions: that efficient monitoring and advising lead to the creation of value; that certain features of the board may help it to effectively undertake one specific function, or another, or both, or one better than the other; and that the importance of each kind of function also depends on various characteristics of firms or the context in which they operate (see Adams and Ferreira, 2007; Coles et al, 2008). In other words, the relevance of the functions and the features of the board may be determined endogenously by performance or by other governance mechanisms, or exogenously by the area of business. One of the distinctive features of our paper is that we specify board effectiveness in monitoring and advising management according to the firm's ownership structure and knowledge intensity of the industries.

Our approach requires the use of econometric techniques that enable us to take account of potential endogeneity problems and the particular nature of each firm, those features that make it distinctive. Thus, our panel data regression uses the generalized method of moments (GMM), which provides efficient solutions to both previous questions.

Our sample period is 1996-2005. We use a panel of European firms drawn from the UK, France, Italy, and Spain, totaling 2800 observations. Our findings highlight that the

endogenous nature of the factors that define boards reveals substantial differences that underscore the contrasting role boards may play. In contexts exhibiting a greater convergence between ownership and management, or in high-technology sectors that require a greater level of specific know-how, the advisory role proves more important than monitoring, and both the number of board members as well as the proportion of insiders clearly evidences a positive and significant impact on business performance. By contrast, smaller and more independent boards provide more efficient governance in contexts in which monitoring prevails on advising

The paper is structured as follows. In section 2 we review the literature on boards of directors and pave the way for the hypotheses on which we base our empirical work in section 3. In section 4 we introduce the data, identify the variables and set out the method used. In section 5 we present the main findings of the empirical analysis and assess the implications. Section 6 concludes.

2. Review of Board of Directors Literature

Many papers that investigate boards of directors explore how various features or specific behaviors of the board impact performance, because these features reflect the board's capacity to discipline management, which action is central to monitoring. Underlying this approach is the issue of solving the problems that arise from the separation of shareholders and management. Management that enjoys a greater degree of freedom may take decisions that elevate its own interests to the detriment of shareholders. By monitoring and controlling, the board's key role is to ensure that this does not happen (John and Senbet, 1998).

The empirical literature on governance highlights that certain features of boards are more suited to undertaking this task than are others. Numerous papers (Baysinger and Butler, 1985; Yermack, 1996, Eisenberg et al., 1998; Rosenstein and Wyatt, 1997; Klein, 1998; Fernández et al., 1997; Andres et al., 2005) show that due to problems of coordination, control, and decision-making, oversized boards fail to monitor efficiently. Further, CEOs may use large boards for their own benefit. This belief has become so deep-rooted that it is hard to find any Code of Good Practices that does not include a recommendation to reduce the number of board members.

The same is true for board composition. Conventional wisdom proposes including outside (independent) board members who can monitor managers' behavior adequately without sparking any conflict of interests. These members can also represent (minority) shareholders who are not present on the board, defend the views of other stakeholders, or provide the necessary safeguard to restrict management's discretionary behavior. The logic behind the idea of including outsiders seems clear, yet the evidence for this idea is not. The findings on linking board composition to performance remain controversial and far from conclusive. Although certain papers have pointed to a positive link between independence and value (Baysinger and Butler, 1985; Rosenstein and Wyatt, 1990), others fail to find any conclusive evidence or have even posited a negative relation (Hermalin and Weisbach, 1991; Bhagat and Black, 1999)[1,] Nevertheless, including outsiders is a recommendation found in the majority of good governance practices.

Other issues concern how the board works to improve its performance. As a means of dealing with the problems that arise from oversized boards, an area various papers explore is the advisability of delegating the monitoring task to smaller commissions which may, depending on the issue in question, be more or less independent. In recent years, firms have set up commissions to deal with such matters as auditing (in many countries auditing commissions are compulsory), appointments, payment, or strategy. There is some evidence in favor of commissions as a means of enhancing the advisory role of the board (Klein, 1998). Another area to come under scrutiny has been the frequency of board meetings to discuss and decide which direction the firm should take. The limited amount of available evidence seems to point to the belief that more (less) frequent meetings are a reaction to poor company performance, rather than a desire to monitor and safeguard against poor results (Vafeas, 1999).

That monitoring and controlling managers is the board's main role does not of course imply that boards do not have other tasks to perform. Part of the board's job and that of its individual members is to assist, encourage, and advise management on the running of the firm

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[1] We have confined ourselves to citing just a few of the works exploring the link between board composition and value. Many others approach the impact of independence by other means. For instance, Weisbach (1988) finds favorable evidence to the effect that firms whose boards comprise a majority of independent members are able to perform certain specific tasks such as replacing the CEO much more effectively, or Rosenstein and Watts (1990), who partially show that share prices increase

by setting goals, assessing investment opportunities, and so on, and by making available to management both the general and specific knowledge individuals possess as board members. Recent papers, such as those by Helland and Sykuta (2004) and Adams and Ferreira (2007), stress the importance of this function. These authors argue that on some occasions to the advisory function prevails over the supervisory role.

Bearing this fresh viewpoint in mind, some of the previously stated hypotheses may be reconsidered or redefined. For instance, if the advisory function is considered to be more important, then having a larger board should not prove a stumbling block. This increase would obviously be a reasonable hypothesis if a greater number of board members implied enhanced knowledge and ability to advise. Depending on the knowledge required and the kind of business in question, a greater number of managers (insiders) should have no adverse effect. Insofar as insiders may have access to more information and a deeper understanding of the business, making this knowledge available to the board may help it perform its role more efficiently and create greater value for the firm (Adams and Ferreira, 2007; Harris and Raviv, 2008).

As Adams and Ferreira (2007) posit, there is a trade-off between the two functions of a board. If managers provide board members with information, then the board may in turn be able to advise the managers more efficiently. Nevertheless, such information may also determine which options are available to the board and thus allow the board to interfere in managers' decisions. The CEO may be reluctant to disclose too much information if the board is highly independent from management. The importance of either monitoring or advising may determine which kind of board proves more efficient for the firm, the more independent board that undertakes stricter monitoring, or the less independent that advises management. This twofold function may ultimately lead to a trade-off between board (in)dependence and the supply of information that could lead the board to carry out its mission more efficiently and create more value.

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when an independent member is appointed to the board. Listing each and every one of these works would prove impossible.

3. Hypotheses

Determining when one particular function proves more important than the other is core in our research. We assume that the supervisory role is closely linked to a separation of ownership and management. Depending on the degree of freedom enjoyed by managers, monitoring their behavior can prove vital in the pursuit of shareholder (and even other stakeholder) interests. Yet, if there was not such separation[2], for instance a controlling shareholder with a significant percentage of the shares, then the monitoring role becomes less important (Booth et al., 2002), because the controlling shareholders already have incentive enough to monitor management behavior, even though they are not actually directly involved in management (Demsetz and Lehn, 1985; Morck et al., 1988; Berstrom and Rydqvist, 1990; McConnell and Servaes, 1990; Lange and Sharpe, 1995; Ang et al., 2000; Demsetz and Villalonga, 2001). Therefore, we ask whether the non-separation between ownership and management means that the advisory function becomes important. Reducing the number of board members or encouraging board independence would thus prove less significant. Yet, the answer is by no means simple or straightforward. Although the supervisory function becomes less relevant, the board must act to safeguard the interests of the other (minority) shareholders as well as other stakeholders. Thus, it is essential to monitor the behavior of management and even the main controlling shareholder. In any case, holding a high percentage of decision rights cancels out the main drawbacks inherent in such a separation and consequently lessens the importance of monitoring, leaving greater room for advising.

Thus, in a non-separation context, we set out the following hypotheses, which link certain board features and performance:

H1: In firms with a higher ownership concentration, the advisory role of the board becomes more important than the monitoring role, such that (1) the link between performance and board size proves positive; (2) the link between performance and board independence proves negative; and (3) the link between performance and number of board meetings proves positive.

[2] Many studies show that separation between shareholders and management is not as frequent as is commonly thought to be the case (e.g., Barca and Betch, 2001). Even in the case of the U.S., researchers calculate that the concentration of voting rights in family groups or firms is greater than cash flow rights would seem to suggest (Villalonga and Amit, 2006). A recent paper by Holderness (2007) shows that 96% of U.S. firms have blockholders who hold an average of 39% of shares. This fact puts into perspective the extent of the separation between ownership and control.

If ownership structure favors the advisory role, this effect might also be evident in other situations. For example, when the particular features of a business, such as one in the high-tech sector, demand a high degree of specific knowledge, either because of the complex nature of the production process, R&D intensity, or the difficulty involved in processing information. In such firms, the boards of directors play a key role in putting forward valuable suggestions aimed at running the business, determining strategy, or interpreting business opportunities (Adams and Ferreira, 2007; Coles et al., 2008). In these contexts, any increase in the number of board members would not prove harmful if it were to provide management with useful advice. A less independent board size with more insiders would seem advisable if it were able to advise management efficiently. Depending on which information must flow from managers to advisors and vice versa, and how relevant that information is to running the business, a board with a greater (smaller) percentage of insiders (outsiders) would prove more suitable (Linck et al., 2008; Harris and Raviv, 2008). In such circumstances a highly independent board might even prove quite harmful to the firm[3].

As a result, we test the following hypothesis:

H2: In high-tech sectors, the advisory role of the board becomes more important than monitoring, such that (1) there is a positive link between performance and board size; (2) there is a negative link between performance and board independence; and (3) there is a positive link between performance and number of board meetings.

In short, the traditional hypotheses on the board characteristics needed to efficiently monitor management must be redefined to take account of the advisory role. Underlying this approach is the idea that the nature of the board reveals its capacity, or indeed its willingness, to monitor and advise efficiently, and that the latter function prevails in firms in which there is no separation between ownership and control and in firms operating in knowledge-intense sectors. This double function might enable us to account, at least in part, for the conflicting findings that emerge in the governance literature that studies the impact of board structure and value.

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[3] With regard to this question, Adams and Ferreira (2007) alert to the problems arising from the excessive pressure exerted on firms to appoint highly independent boards. Taken to extremes and in certain circumstances, a mainly independent board might actually be destroying value. In a further approach to the question, Almazan and Suárez (2003) evidence the advantages of having a less independent board in certain circumstances, in their case, CEO entrenchment.

Most theoretical and empirical studies focus on British and American firms, and particularly on the U.S. Therefore, knowledge remains scarce regarding the defining features of boards of directors in countries whose regulatory, institutional, and legal systems differ from those of the United States (Guest, 2008). The law and finance literature has reached consensus concerning the link between internal (firm-level) and external (country-level) control mechanisms. La Porta et al. (1998) find evidence to suggest that certain internal firm governance mechanisms, such as ownership concentration, may replace weaker government systems in place at a national level (Kim et al., 2007). It seems by no means far-fetched to assume that different functions of boards, as well as the degree of efficiency at which they are implemented, may differ from one legal context to another. Assessing board behavior in countries other than the U.S. may prove to be of enormous use in understanding how boards of directors function as a governance mechanism. Therefore, our research addresses a sample of large firms trading in the main European markets. We obtain our sample from countries where civil law (Spain, France, and Italy) as well as common-law (UK) is predominant.

4. Sample, Variables, and Econometric Approach

4.1. Data

The sample comprises individualized data from nonfinancial listed firms. We obtain our data from the Compustat, Amadeus, and Spencer Stuart Boards of Directors Index databases. Our sample covers Spain, France, Italy, and the UK for the 1996-2005 period. Tables 1 and 2 show the distribution of the firms in the sample by sectors and countries. The initial sample is made up of 435 firms and comprises 2,800 observations.

We filter the sample in several ways to ensure coherence in the proposed variables. We remove those observations with their own negative capital, and those with unusual extremes in the market and book value of their own capital, in total assets or turnover. We also remove those firms whose market value of shares is more than 20 times their book value.

4.2. Variables

Our dependent variable is a value-creation measure. We calculate it through the financial q, as defined in the following expression:

$$Q_{i,t} = \frac{IMV_{i,t} + DT_{i,t}}{TSE_{i,t} + DT_{i,t}} \tag{1}$$

where IMV is the market value of the shares, TSE is the book value of the shares, and DT is total debt. In all cases, our sample observations refer to firm i and to period t.

For the independent variables, we first include three variables that represent board activity and composition. Thus, $LNBOASIZE_{i,t}$ is the natural logarithm of the total number of board members, $OUTPRO_{i,t}$ measures the proportion that outsiders represent out of the total number of board members, and $LNMEYEAR_{i,t}$ represents the natural logarithm of the number of meetings held each year by the board.

When verifying the impact of specific board characteristics and behavior on firm performance, it is essential to know which of the two basic functions, controlling or advising, prevails in each situation. To achieve it, there are certain factors of both an endogenous and an exogenous nature that help us to characterize boards of directors and to shed some light on the controversial link between the nature and behavior of a board and firm performance. The first factor is the ownership concentration in the firm. Indeed, as noted earlier, an important block of ownership around the main shareholder or shareholders may prove decisive in solving the problem of supervising manager behavior and could lead to the board playing a predominantly advisory role. Thus, we construct a dummy variable (DC1P25) that takes the value of one if over 25% of the average ownership is in the hands of the main shareholder during the period for which observations exist for a specific firm, and zero otherwise.

The second factor that could impact the main function of the board is the nature of the firm's business. According to its nature, the firm will require a higher or lower level of specific knowledge. Knowledge-based business activity tends to be found in high-tech sectors. To pinpoint these sectors, the U.S. Bureau of Labor Statistics (BLS) drew up a list of high-tech sectors based on the Standard Industrial Classification (SIC) codes in 1999 (Hecker, 1999). However, the data published in the 2006 State Indicators are taken from the conversion of the SIC list of codes to the 1997 North American Industrial Classification System (NAICS). Table 3 shows the NAICS codes, which cover 39 categories. These categories are converted to SIC codes through a convergence table for the two classification systems (Heckel, 1999). Using this classification, we construct a variable dummy (HT) that takes the value of one when the firm belongs to a high-tech sector, and zero otherwise.

As control variables we consider the level of debt ($DTAB_{i,t}$), which we define as the quotient between total debt and assets; the size of the firm ($LNTAB_{i,t}$), which we define as the natural logarithm of the total value of assets. We also use dummy variables that allocate each firm to a specific business sector (SECTOR) or a specific country (COUNTRY), and also assign each observation to a specific year (YEAR). For allocation to a business sector, we use the SIC code obtained from the Compustat database, the main groups of which appear in Table 2. Therefore, the $SECTOR_j$, variable, j ranging from one to ten, is a dummy variable that takes the value of one when the firm belongs to sector j, and zero otherwise. The $COUNTRY_k$ variable, where k ranges between one and four, takes the value of one when the firm belongs to country k, and zero otherwise. $YEAR_m$ is a dummy variable that takes the value of one when the sample observation corresponds to year m, and zero otherwise.

4.3. Econometric approach

To contrast our hypotheses we construct a basic econometric model for estimation. Our main objective is to assess performance by examining specific features of board behavior, such as the total number of members, proportion of outsiders, and annual frequency of meetings. As control variables we include debt, size, and dummy variables that represent the sector, country, and year of observation. All of these factors combine to produce equation (2):

$$\begin{aligned} Q_{i,t} &= \alpha + \beta_1 \cdot LNBOASIZE_{i,t} + \beta_2 \cdot OUTPRO_{i,t} + \beta_3 \cdot LNMEYEAR_{i,t} + DTAB_{i,t} + \\ & LNTAB_{i,t} + \sum_{j=1}^{9} \gamma_j \cdot SECTOR_j + \sum_{k=1}^{3} \delta_k \cdot COUNTRY_k + \sum_{m=1}^{9} \lambda_m \cdot YEAR_m + \eta_i + \varepsilon_{i,t} \end{aligned} \qquad (2)$$

In all the equations, the subscript i refers to the firm and t to the time period. η_i represent the nonobservable fixed effects, constant over time and linked to each firm in the sample. ε_{it}, is the random disturbance and fulfills all the usual conditions of the classical linear regression model. To avoid multicollinearity problems, we introduce the dummy variables representing sector, country and year alternatively in the estimation of the model.

In the next estimations we include those variables that allow us to identify cases in which the advisory role of the board is more important than is the monitoring function. The first of these, which deals with ownership concentration, is the dummy variable DC1P25. To verify possible changes in the size of the coefficient for the explanatory variables related to the board in firms with a high concentration, we include the variable DC1P25 interactively. The new regression model we estimate is the equation 3:

$$Q_{i,t} = \alpha + \beta_1 \cdot LNBOASIZE_{i,t} + \beta_{1C} \cdot LNBOASIZE_{i,t} \cdot DC1P25_{i,t} + \beta_2 \cdot OUTPRO_{i,t} + \beta_{2C} \cdot OUTPRO_{i,t}.DC1P25_{i,t} + \beta_3 \cdot LNMEYEAR_{i,t} + \beta_{3c} \cdot LNMEYEAR_{i,t} \cdot DC1P25_{i,t} + DTAB_{i,t} + LNTAB_{i,t} + DUMMYVAR + \eta_i + \varepsilon_{i,t} \quad (3)$$

We then verify the impact of belonging to high-tech sectors by including the HT dummy variable interactively with the remaining variables. The resulting equation (4) is:

$$Q_{i,t} = \alpha + \beta_1 \cdot LNBOASIZE_{i,t} + \beta_{1HT} \cdot LNBOASIZE_{i,t} \cdot HT_{i,t} + \beta_2 \cdot OUTPRO_{i,t} + \beta_{2HT} \cdot OUTPRO_{i,t}.HT_{i,t} + \beta_3 \cdot LNMEYEAR_{i,t} + \beta_{3HT} \cdot LNMEYEAR_{i,t} \cdot HT_{i,t} + DTAB_{i,t} + LNTAB_{i,t} + DUMMYVAR + \eta_i + \varepsilon_{i,t} \quad (4)$$

The residual term is divided in two terms in each of the equations. The first of them, ε_{it}, covers all the other factors that impact business performance in any way, and which are not identified in the econometric model. This term constitutes the random disturbance and fulfills the usual conditions of the classical linear regression model. Nevertheless, the fixed effects linked to each firm (η_i), and possibly correlated with the set of explanatory variables, which might cause significant biases in the estimation, tend to be found within the error term. It is possible not only to identify this constant unobservable heterogeneity, but also to eliminate it. We do so by using the estimation of a first differences model, because it enables such effects to be removed and yields non-biased and efficient estimators of the effect of the independent variables on business performance. Further, the two-stage estimator, which takes account of the residual matrix from the first stage, provides estimators robust to autocorrelation and heterokedasticity (White, 1982).

Despite all these measures, if the hypothesis of strict exogeneity of explanatory variables is not fulfilled, it may lead to a serious problem in the proposed models. In our case, since we are dealing with variables that represent the board of directors, there is certain theoretical and empirical evidence to suggest possible endogeneity. Failing to take this concern into account in the estimation might lead to major shortcomings and to obtaining inconsistent estimators. There are several techniques we can use to overcome this problem, amongst which we highlight the estimator of the generalized method of moments (Arellano and Bond, 1991; Mairesse and Hall, 1996) or the asymptotic least squares estimator (Crepon et al., 1998).

However, the results we obtain by using these two approaches are somewhat sensitive to the estimation model proposed. Further, solving simultaneity or endogeneity may cause more problems than it actually solves (Griliches and Mairesse, 1995). In addition to correcting problems of simultaneity and measuring problems, the generalized method of moments (GMM) provides a structure of residuals that are robust to autocorrelation and heterokedasticity problems. Thus, applying this technique to each of the proposed models proves suitable.

5. Results

Table 4 shows the main characteristics of the sample. When we focus on the key variables, we see that one prominent feature is the mean value of firm performance in the sample, which has a Q value ratio equal to 2.32 (median is 1.5). Concerning the characteristics of the boards of directors, the mean number of board members is 11.37 (median is 11), and the distribution between insiders and outsiders yields mean values of 3.06 (median is 3) and 8.2 (median is 8), respectively. The mean percentage participation of insiders on the board is thus 28.31% (median is 27.27%), but for outsiders the figure reaches 71.69% (median is 72.72%). The mean value for the number of annual board meetings is 8.29 with a median of 8. With respect to the control variables, we note that the mean level of debt is 26.18%, and that the economic and financial returns show mean values of 3.80% and 8.06%.

Our first analysis deals with the traditional assessment of board features (size, independence, and number of meetings) as determinants of business performance. In Table 5 we show the main results of the equation (2) estimation. In column (1), our findings show a negative and significant impact of the logarithm of the number of board members, and a positive and significant impact for the proportion of outsiders and for the number of meetings. The signs prove robust when we include dummy variables that represent the country, sector, or year to which each sample observation belongs (columns 2, 3 and 4). These findings support the idea that large boards are linked to poor performance, and concur with the findings in other papers such as Yermack (1996), Fernández et al. (1997), Eisenberg et al. (1998), Huther (1997) and Andrés et al. (2005). An enhanced capacity to monitor is balanced by problems inherent in the large scale board set-ups. These problems can include such difficulties as those in communication and coordination amongst members, and free riding. By contrast, a greater presence of outsiders, and therefore a higher degree of independence, does seem to lead to

improved performance. The positive sign for the number of board meetings held every year evidences a proactive function, such that more intense monitoring (or advising) is reflected in enhanced performance. Both debt and size show a negative link with performance. The four cases also show that the models we estimate are statistically significant (Wald test). Further, the GMM specification proves valid, as no second-order correlation exists (AR2 test). Beside Hansen test confirms the validity of the tools used in the estimation.

Our goal is to ascertain whether there are any differences in the links assessed when we take into account not only monitoring, but also advising. Although the two functions can co-exist and might complement each other in boards of directors, managers may strike a trade-off between the advantages and drawbacks implicit in disclosing relevant information to board members. In such cases, shareholders could tip the balance in favor of one particular function or another, depending on certain features of the firm or the setting (Adams and Ferreira, 2007; Coles et al., 2008; Harris and Ravid, 2008). Thus, we first consider cases in which the main shareholder holds a significant ownership share, which we define as being over 25%, and in which monitoring of management behavior presumably ceases to prove crucial and leads to an enhanced advisory capacity. We assess this circumstance using the DC1P25 category variable in the estimations. This variable takes a value of one when the main shareholder's ownership stake is equal to or above 25%, and zero otherwise. Our interest lies not so much in ascertaining the impact of a greater shareholder concentration on business performance, but rather in analyzing possible changes in the link between the features of the board and performance in different ownership contexts.

Thus, we include the DC1P25 category variable interactively with the relevant variables in the analysis. The results in Table 6 evidence significant changes and remain robust when we include the impact of country, sector, or year of observation. The coefficient of the interactive variable (LNBOASIZE*dc1p25) refers to the incremental effect of board size on the performance of firms with a concentrated ownership compared to the reference group of firms with no ownership concentration. The LNBOASIZE estimator provides information on firms with a low degree of ownership concentration. Σ assesses the joint significance of the estimator for the reference group plus the interactive impact on the estimator of the group of firms with ownership concentration. In the three board features that we analyze, significant changes occur, depending on the group assessed. Thus, we can see how the link between board size and performance remains negative (Σ). However, for firms with concentrated

ownership the coefficient of the interactive term proves positive (LNBOASIZE*dc1p25), so the original link loses part of its relevance. Nevertheless, at least in this stage of the analysis, the joint significance of the two coefficients does not lead us to conclude that the impact of board size on performance is the opposite of what was we expected.

However, the changes we include in the estimated links for the proportion of outsiders and number of meetings proves more conclusive. The relation between independence and performance is negative for firms with a high ownership concentration. In contrast, the relation between meetings and performance is positive in this sample group. Linck et al. (2008) and Boone et al. (2007) show lower independence of those boards in which there is a strong alignment between insider incentives and the CEO regarding shareholders. Firms that show a greater degree of convergence between ownership and management illustrate how capital markets view a higher presence of insiders in board composition as a positive factor. This finding supports the hypothesis that including managers on the board is valuable, because they can provide the information required to conduct enhanced governance. Regarding the number of meetings, the significant and positive coefficient of the interactive (LNMEYEAR*dc1p25) variable shows that in firms with fewer monitoring requirements the advisory role prevails. Further, that the frequency of meetings may be better explained by the need to guide, inform, and determine strategy rather than as any reaction to poor performance.

We examine the robustness of our findings in table 7. Here, we provide the estimations that we obtain when we divide the sample in terms of the previously mentioned criteria and compare these results to the basic model. The findings support those obtained thus far. Indeed, they extend them even further in the particular case of the board size variable, to the point where they offer a positive relation between board size and performance for firms with concentrated ownership. This result supports the advisory role as a motivation for large boards being able to contribute their knowledge and experience to the running of the firm, which may be reflected in improved governance and enhanced value.

The findings highlight the significant differences in the traditional relations between board features and behavior and its performance, and they also account for a greater weight on advising over monitoring in cases in which there is no clear separation between ownership and control. Depending on the extent to which the former prevails over the latter, performance may be seen to improve as board size increases. The results obtained for the proportion of

outsiders supports the conclusion that they are precisely the insiders, who enjoy easier access to the information concerning the features of the business, who are then better able to advise the remaining board members and management more efficiently. It seems more likely that the board will be able to advise more effectively if the CEO proves more willing to share information. Therefore, we conclude that the advisory role becomes more important over monitoring when there is convergence between ownership and management.

The effect of the number of meetings held changes from positive to negative in firms with no ownership concentration. In this kind of firm, the board's monitoring role acquires greater relevance, and any increase in the number of meetings is seen as a defense mechanism against poor business performance. When we distinguish between concentrated and non-concentrated ownership, our results (not reported) are the same when the percentage of ownership in the hands of the main shareholder is equal to the median of the sample being analyzed.

Another situation in which the advisory role may be especially relevant is when the firm conducts its business activity in an area where acquiring and passing on highly specialized knowledge proves particularly valuable to the board members. Therefore, for firms in which information from directors can be especially valuable, boards should comprise a greater number of insiders and be controlled by the latter (Harris and Ravid, 2008). This situation is particularly important for firms in high-technology (HT) sectors. The approach we use is similar to that for the case of ownership. We present the most relevant findings in tables 8 and 9. In all cases the estimation proves statistically significant, and the values of the AR(2) and Hansen tests reflect the validity of the tools used in the GMM. The coefficients of the interactive variables with the HT variables indicate the significant variations in the link between performance and board structure.

The results show that both board size and the proportion of inside board members has a positive, significant impact on business performance for HT firms. By contrast, the size of the board proves counter-productive for the performance of firms in less technology-intense areas, whereas board independence, expressed through the proportion of outsiders, proves a positive factor. Coles et al. (2008) obtain similar evidence, distinguishing between firms involved in intense R+D or not, supporting the proposal of Klein (1998) and Raheja (2005). Our findings confirm the differing impact of the variables most representative of the board on one group or another of firms, highlighting the different roles boards of directors may play.

Moreover, when the presence of board members who have some link with the firm is well received, and when advising management is welcomed in complex environments requiring a high degree of specific knowledge (Coles et al., 2008), the number of board meetings does not discriminate the behavior in the two subgroups of firms. As a result, board activity generally tends to be proactive with regard to firm performance. This finding supports the one we obtain when estimating the basic model.

6. Conclusion

The last few years have witnessed an intense debate concerning the role played by boards of directors. This debate focuses on three key aspects. The first of these factors has been examined in a series of papers aimed at modeling the behavior, structure, and running of boards of directors from a theoretical viewpoint. The second issue is the endogenous nature of certain factors likely to impact many of the variables linked to board structure. These variables may, to a certain extent, be biasing the empirical evidence to emerge thus far on the relation between board structure and performance in firms. A third series of papers focuses on exploring the functions inherent in boards of directors, not only in terms of monitoring management, but also, and by no means less importantly, in terms of playing an advisory role.

Our paper is closely linked to the second and third aspects. Based on the assumption that efficient advising and monitoring have a positive impact on value, we posit that this relation depends to a large extent not only on the specific characteristics inherent in boards themselves that determine their structure, running, and efficiency when performing both functions, but also on certain features of the firm itself or the context in which it operates.

We explore two of the contexts that may have a great impact on the board's dedication to the task of advising and monitoring, and on its subsequent effectiveness, ownership structure and degree of involvement in high-tech sectors. We do not overlook the fact that the structure and composition of the board itself may be determined by performance as well as the nature of the board and the firm in which it is involved. We address the endogenous nature of the intervening variables by using the generalized method of moments (GMM) together with the panel method.

To achieve our goals we use a sample of 453 firms and 2,800 observations from Spain, France, Italy, and the UK. Our sample period covers between 1996 and 2005. The findings from our empirical research highlight the significant differences in the link between board structure and performance in each of the settings we examine. We find that in firms with less separation between ownership and control, both the number of board members and the proportion of insiders positively impact value, as compared to firms with less concentrated ownership. The number of board meetings also indicates major differences, as it shows a positive influence on value in the first group of firms and a negative influence in the second. Therefore, we conclude that the advisory role takes precedence over the monitoring function in settings where ownership and management converge. Management's propensity to supply information to the board and efficient advising is strengthened in larger boards and in boards with a greater proportion of insiders.

We reach a similar conclusion for firms in the sample involved in high-tech sectors. Our findings indicate that performance shows a significant link with board size and to the proportion of outsiders. This link is positive in the former and negative in the latter case. Conducting business in situations in which acquiring and conveying specific knowledge is particularly valued supports the prevalence of the advisory role over the monitoring role of the board.

Our research highlights the importance of suitably contextualizing any assessment of boards of directors as business governance mechanisms. It also emphasizes the need to take into account the differing functions these boards may carry out. Although it is clear that much work still remains to be done, the relevance of one function or another, depending on the contexts in hand, forces us to reconsider and reshape the empirical links traditionally evidenced in financial literature between performance and board structure. This fresh view could be useful to improve and precise the recommendations included in the Codes of Good Practices.

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Table 1. Distribution of number of firms by countries

COUNTRIES	Firms	%
1. Spain	75	17.24%
2. France	58	13.33%
3. Italy	154	35.40%
4. United Kingdom	148	34.02%
Total	**435**	**100%**

Table 2. Distribution of the number of firms by sectors. Standard Industrial Classification Division Structure

Divisions	Firms	%
Division A: Agriculture, Forestry, and Fishing	1	0.002%
Division B: Mining	8	2.37%
Division C: Construction	16	4.74%
Division D: Manufacturing	160	47.47%
Division E: Transportation, Communications, Electric, Gas, and Sanitary Services	67	19.88%
Division F: Wholesale Trade	9	2.67%
Division G: Retail Trade	31	9.19%
Division H: Finance, Insurance, and Real Estate	4	1.18%
Division I: Services	37	10.97%
Division J: Public Administration	4	1.18%
	337	100%

Table 3. 1997 NAICS codes constituting high-technology industries

NAICS code	Industry
32411	Petroleum refineries
3251	Basic chemical manufacturing
3252	Resin, synthetic rubber, and artificial and synthetic fibers and filaments manufacturing
3253	Pesticide, fertilizer, and other agricultural chemical manufacturing
3254	Pharmaceutical and medicine manufacturing
3255	Paint, coating, and adhesive manufacturing
3256	Soap, cleaning compound, and toilet preparation manufacturing
3259	Other chemical product and preparation manufacturing
332992	Ordnance and accessories manufacturing—small arms ammunition manufacturing
332993	Ordnance and accessories manufacturing—ammunition (except small arms) manufacturing
332994	Ordnance and accessories manufacturing—small arms manufacturing
332995	Ordnance and accessories manufacturing—other ordnance and accessories manufacturing
3331	Agriculture, construction, and mining machinery manufacturing
3332	Industrial machinery manufacturing
3333	Commercial and service industry machinery manufacturing
3336	Engine, turbine, and power transmission equipment manufacturing
3339	Other general purpose machinery manufacturing
3341	Computer and peripheral equipment manufacturing
3342	Communications equipment manufacturing
3343	Audio and video equipment manufacturing
3344	Semiconductor and other electronic component manufacturing
3345	Navigational, measuring, electromedical, and control instruments manufacturing
3346	Manufacturing and reproducing magnetic and optical media
3353	Electrical equipment manufacturing
33599	All other electrical equipment and component manufacturing
3361	Motor vehicle manufacturing
3362	Motor vehicle body and trailer manufacturing
3363	Motor vehicle parts manufacturing
3364	Aerospace product and parts manufacturing
3391	Medical equipment and supplies manufacturing
5112	Software publishers
514191	On-line information services
5142	Data processing services
5413	Architectural, engineering, and related services
5415	Computer systems design and related services
5416	Management, scientific, and technical consulting services
5417	Scientific research and development services
6117	Educational support services
811212	Computer and office machine repair and maintenance

Science and Engineering Indicators 2006

Table 4: Statistics

	Mean	Median	Std. dev.	Minimum	Maximum
BOASIZE	11.3761	11.000	3.5011	4.000	26.000
LNBOASIZE	2.3862	2.3978	0.3026	1.3862	3.2580
OUTSIDERS	8.2032	8.000	3.5129	0.000	21.000
INSIDERS	3.0691	3.000	1.8805	0.000	10.000
OUTPRO	0.7169	0.7272	0.1669	0.000	1.000
INSPRO	0.2831	0.2727	0.1669	0.000	1.000
MEYEAR	8.2906	8.000	3.6642	1.000	45.000
LNMEYEAR	2.0279	2.0794	0.3974	0.000	3.2580
DTAB	0.2618	0.2652	0.1367	0.000	0.7482
Q	2.3255	1.5055	4.3051	0.4635	118.4732
DTQ	0.9273	0.2954	3.0960	0.0168	39.6856
TOTAL ASSETS	9,479.86	2,826.00	20,211.78	16.00	206,914.00
LNTAB	7.8995	7.9221	1,6535	2.7729	12.2400
ISSUE MARKET VALUE	7,649.65	2,044.92	19.029,46	17.33	219,509.04
MTB	3.3033	1.9775	6,7909	0.1453	158.0441
C1	0.2789	0.1741	0,2531	0.000	1.000

Table 5. Equation 2. GMM Estimation.

This table presents the estimated coefficients and P>|z| in brackets. Hansen test is distributed following a χ^2 function with as many degrees of freedom as the estimated coefficients. Estimations in columns (1)-(4) include country, sector, and year dummies.

Dependent variable: Q				
	(1)	(2)	(3)	(4)
Lnboasize	-4.4038	-3.844	-3.9204	-1.1706
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Outpro	1.4963	4.6421	2.5903	1.6015
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Lnmeyear	0.7175	0.3728	0.209	0.3766
	(0.000)***	(0.000)***	(0.002)**	(0.000)***
Dtab	-7.3625	-4.2347	-8.9181	-3.8867
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Lntab	-0.2163	-0.5664	-0.2735	-0.1997
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
cons	13.8648	12.6996	13.001	5.891
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Country dummies (sig.)		Yes		
Sector dummies (sig.)			Yes	
Year dummies (sig.)				Yes
Wall test	614.28	1457.92	870.99	35961.12
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
AR (1)	1.04	1.07	1.05	1.04
	(0.299)	(0.284)	(0.293)	(0.296)
AR (2)	0.97	0.96	0.98	0.94
	(0.334)	(0.337)	(0.329)	(0.347)
Hansen test	118.94	114.93	96.26	228.22
	(0.150)	(0.162)	(0.473)	(0.108)

***, **, *: Significant at 1%, 5%, and 10% levels, respectively.

Table 6. Equation 3. GMM Estimation.

This table presents the estimated coefficients and shows P>|z| in brackets. Hansen test is distributed following a χ^2 function with as many degrees of freedom as the estimated coefficients. The dc1p25 dummy is included interactively. It takes a value of one if mean ownership in the hands of the main shareholder exceeds 25%, and zero otherwise. Estimations in the columns (1)-(4) include country, sector, and year dummies.

Dependent variable: Q	(1)	(2)	(3)	(4)
lnboasize	-1.0527	-0.9927	-0.6883	-1.5925
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
lnboasize*dc1p25	0.8073	0.6512	0.3811	0.9468
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
∑	-0.2453	-0.3415	-0.3073	-0.6457
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
outpro	3.0768	2.7861	2.7314	3.5044
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
outpro*dc1p25	-4.9721	-5.1475	-3.5091	-4.8208
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
∑	-1.8953	-2.3614	-0.7778	-1.3164
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
lnmeyear	0.0199	-0.5126	-0.2623	0.0134
	(0.214)	(0.000)***	(0.000)***	(0.557)
lnmeyear*dc1p25	0.8155	1.3033	0.8896	0.6147
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
∑	0.8353	0.7906	0.6273	0.6281
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
dtab	-5.4674	-4.4742	-5.2659	-5.0416
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
lntab	-0.197	-0.2238	-0.3315	-0.1773
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
cons	5.7093	6.0138	8.8248	6.3641
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Country dummies (sig.)		Yes		
Sector dummies (sig.)			Yes	
Year dummies (sig.)				Yes
Wall test	275696.82	195599.32	248392.97	195614.67
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
AR (1)	1.06	1.06	1.07	1.02
	(0.289)	(0.29)	(0.284)	(0.31)
AR (2)	0.96	0.96	0.96	0.94
	(0.338)	(0.337)	(0.336)	(0.345)
Hansen test	279.84	271.5	270.95	276.6
	(1.000)	(1.000)	(1.000)	(1.000)

***, **, *: Significant at 1%, 5%, and 10% levels, respectively.

Table 7. Equation 2. GMM Estimation by sub-samples depending on ownership structure.

This table presents the estimated coefficients and shows P>|z| in brackets. Hansen test is distributed following a χ^2 function with as many degrees of freedom as the estimated coefficients. The estimation in column (1) corresponds to the subsample of firms for which dc1p25 equals one. Column (2) corresponds to the subsample of firms for which dc1p25 equals zero.

Dependent variable: Q	(1)	(2)
lnboasize	0.367	-1.1805
	(0.000)***	(0.000)***
outpro	-1.1844	1.662
	(0.000)***	(0.000)***
lnmeyear	1.1472	-0.64
	(0.000)***	(0.000)***
dtab	-3.9226	-5.9736
	(0.000)***	(0.000)***
lntab	-0.1889	-0.2454
	(0.000)***	(0.000)***
cons	2.6207	8.8648
	(0.000)***	(0.000)***
Wall test	23324.45	36722.36
	(0.000)***	(0.000)***
AR (1)	1.22	0.88
	(0.223)	(0.379)
AR (2)	0.45	0.94
	(0.653)	(0.349)
Hansen test	142.6	126.38
	(1.000)	(1.000)

***, **, *: Significant at 1%, 5%, and 10% levels, respectively.

Table 8. Equation 4. GMM Estimation.

This table presents the estimated coefficients and shows P>|z| in brackets. Hansen test is distributed following a χ^2 function with as many degrees of freedom as the estimated coefficients. The ht dummy is included interactively. It takes the value of one if the firm belongs to a high-tech sector, and zero otherwise. Estimations in columns (1)-(4) include country, sector, and year dummies.

Dependent variable: Q				
	(1)	(2)	(3)	(4)
lnboasize	-0.7828	-0.6002	-0.9883	-1.3203
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
lnboasize*ht	1.2516	1.1144	1.3999	1.3027
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
∑	0.4688	0.5142	0.4116	-0.0176
	(0.000)***	(0.000)***	(0.000)***	(0.755)
outpro	1.3597	1.5012	1.6771	2.1426
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
outpro*ht	-4.2141	-4.3538	-4.4012	-4.9002
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
∑	-2.8544	-2.8526	-2.7241	-2.7576
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
lnmeyear	0.3202	0.2346	0.0443	0.1496
	(0.000)***	(0.000)***	(0.008)**	(0.000)***
lnmeyear*ht	-0.0277	0.2948	0.3848	0.1725
	(0.171)	(0.000)***	(0.000)***	(0.000)***
∑	0.2926	0.5294	0.4291	0.3221
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Dtab	-5.9904	-5.1079	-5.9193	-5.6985
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
lntab	-0.2116	-0.3427	-0.4251	-0.1951
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
cons	5.8153	6.0947	6.1647	6.2335
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Country dummies (sig.)		Yes		
Sector dummies (sig.)			Yes	
Year dummies (sig.)				Yes
Wall test	283910.09	154463.75	90600.97	123752.59
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
AR (1)	1.08	1.08	1.08	1.03
	(0.282)	(0.28)	(0.281)	(0.303)
AR (2)	0.96	0.95	0.96	0.94
	(0.338)	(0.34)	(0.338)	(0.347)
Hansen test	263.71	263.6	255.38	259.56
	(1.000)	(1.000)	(1.000)	(1.000)

***, **, *: Significant at 1%, 5%, and 10% levels, respectively.

Table 9. Equation 2. GMM Estimation by sub-samples depending on HT.

This table presents the estimated coefficients and shows P>|z| (in brackets). Hansen's (DATE) test is distributed following a χ^2 function with as many degrees of freedom as the estimated coefficients. Estimation of column (1) corresponds to the subsample of firms for which ht equals one (knowledge intensive). Column (2) corresponds to the subsample of firms for which ht equals zero.

Dependent variable: Q		
	(1)	(2)
lnboasize	0.182	-0.6963
	(0.677)	(0.000)**
outpro	-0.0871	1.6802
	(0.866)	(0.000)**
lnmeyear	-0.6699	0.5572
	(0.001)***	(0.000)**
dtab	-10.991	-3.8635
	(0.000)***	(0.000)**
lntab	-0.2624	-0.1559
	(0.000)***	(0.000)**
cons	8.2515	3.7272
	(0.000)***	(0.000)**
Wall test	164.32	49004.74
	(0.000)***	(0.000)**
AR (1)	1.01	0.46
	(0.314)	(0.642)
AR (2)	0.97	-0.2
	(0.334)	(0.845)
Hansen test	43.25	214.84
	(1.000)	(0.433)

***, **, *: Significant at 1%, 5%, and 10% levels, respectively.

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