# Ownership Concentration, Monitoring and Optimal Board Structure

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Abstract

The paper analyzes the optimal structure of board of directors in a …rm with ownership concentrated in the hands of a large shareholder who sits on the board. We focus our attention on the choice between one-tier board who performs all tasks and two-tier board where the management board is in charge of project selection and the supervisory board is in charge of monitoring. We consider the case in which the large shareholder sits on (and controls) the supervisory board but not the management board. We show that a two-tier structure can limit the interference of large shareholder and can restore manager's incentive to exert e¤ort to become informed on new investment projects without reducing the large shareholder's incentive to monitor the manager. This results in higher expected pro…ts in a two-tier board than in one-tier board and the difference in pro…ts can be su¢ciently high to induce large shareholder to prefer a two-tier board despite the fact that in this case the manager selects his preferred projects rather than the project preferred by large shareholder. The paper has interesting policy implications since it suggests that two-tier boards can be a valuable option in Continental Europe where ownership structure is concentrated. It also o¤ers support to some recent corporate governance reforms, like the so-called Vietti reform in Italy, that have introduced the possibility to choose between one-tier and two-tier structure of boards for listed …rms.



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# 1 Introduction

Recently, in the wake of corporate scandals like Enron, the reform of internal governance mechanisms has been a highly debated issue. In particular, the structure of board of directors has been under scrutiny and several reform projects have been proposed. Despite the debate, the theoretical literature on boards of directors is still very limited[1]. Furthermore, the few theoretical models of how board of directors function are implicitly cast in a dispersed ownership setting where no shareholder has the incentive to monitor the CEO. However, recent studies on corporate governance systems in both rich and developing countries have suggested that the presence of a large shareholder active in …rm's management is much more common than previously thought. Contrary to what happens in public company with dispersed ownership, a major problem when ownership structure is concentrated is an "excessive" involvement of owners in …rm's management rather than lack of monitoring.

The present paper is a …rst attempt to provide a model that examines the optimal structure of board of directors with a controlling shareholder actively involved in corporate governance. It analyzes the choice between a one-tier structure and a two-tier structure of board of directors in a …rm where ownership is concentrated in the hands of a large shareholder who sits on the board. The main …nding is that a two-tier structure can be optimal because it reduces the large shareholder's incentive to interfere with the manager's initiative without a¤ecting her incentive to monitor the manager's ability. Thus, the paper suggests that a two-tier structure of board may be a valuable option in Continental Europe where …rms' ownership (including large corporation) is concentrated. Furthermore, it o¤ers support to some recent reform projects like, for example, the proposal of the High Level Group of Company Law expert of the European Commission that recommended that listed companies have the option to choose between one-tier and two-tier structure of boards.

The paper is related to two streams of literature. The …rst one focuses on

[1] See for example the survey by Hermalin and Weisbach (2001)

CEO monitoring by board of directors. In this literature the ability of the CEO is unknown and the board is in charge of assessing CEO quality in order to decide whether to retain or dismiss him. Monitoring is regarded as the most important task performed by the board. See for example Hermalin and Weisbach (1998), Hirshleifer and Thakor (1998), and Warther (1998). Hirshleifer and Thakor study the impact of takeover threat on the board's decision whether to retain or dismiss the CEO and they show that the possibility of a takeover makes the board stricter in the sense that CEO dismissal is more likely. Hermalin and Weisbach analyze a situation where CEO and directors bargain over CEO compensation and over the level of independence of the board. Their main result is that board's independence is decreasing in CEO' ability and tenure, and that in the long run boards will be "captured by the CEO". Warther instead, shows that the board of directors is an important source of discipline, despite the lack of debate and apparent passivity.

A broader view on the tasks of boards of directors is taken by Graziano and Luporini (2003) and Adams and Ferreira (2003). These papers analyze models where boards of directors have more than one task. Graziano and Luporini, study the board's retention/dismissal decision in a setting where the board is in charge first of selecting the CEO and then, of deciding whether to confirm or replace him. The paper shows that the collusive behavior between board and CEO may emerge as an attempt to hide the board's inability to accomplish the first task (CEO selection) by distorting the second task (CEO retention/dismissal decision). Adams and Ferreira (2003) consider the advisory role of the board as important as the monitoring role and focus on the tradeoff between these two tasks. On the one hand, if the manager shares his information with the board he can get better advises from the directors. On the other hand the information provided by the manager increases the risk to be fired. Although the sole board structure in their model is the first-best solution, in a sole board the CEO may restrain from sharing information with the board. Hence, the authors conclude that there are cases in which it is better to separate advisory and monitoring role using a dual board structure.

The second stream of literature related to our work analyzes the incentive problems arising from the con‡icting interests of manager and large shareholder and the role of ownership concentration as a commitment device for large shareholder not to interfere with manager's decision. Recently, a few studies have pointed out that the ownership structure can serve as commitment device for large shareholder not to interfere with manager's initiative in project selection. Burkart, Gromb and Panunzi (1997) show that interference in the project selection by a large shareholder reduces managerial discretion and prevents the manager from appropriating private bene…ts. However, "managerial discretion comes with bene…ts" because it can induce the manager to make …rm-speci…c investment. For example, the manager can exert e¤ort to select a new investment project. In this case, the large shareholder's right to reverse manager's decision and in general to interfere with his initiative, can destroy manager's incentive to take initiative and to make uncontractible investments. An appropriate ownership structure can alleviate this problem because, by decreasing her own stake in the …rm, the large shareholder decreases her incentive to interfere with manager's decision and this, in turn, can restore the manager's incentive to make …rm-speci…c investment[2].

The negative e¤ects induced by an "excessive control" are documented in an experiment conducted by Falck and Kosfeld (2004) who analyze the interaction of motivation and control in a principal-agent setting where the principal decides whether to leave a choice to the agent's discretion or to limit the agent's choice set. They show that "the decision to control signi…cantly reduces the agent's willingness to act in the interest of the principal. Explicit incentives back…re and performance is lower if the principal controls compared to if he trusts" (Falck and Kosfeld 2004, page 1)

The present model analyzes the optimal board structure building on the intuition that there are cases in which it is better to separate the advisory and

[2] Another theoretical paper that deals with the advantages of manager's discretion in project selection is Inderst and Muller (1999). They show that managerial discretion can alleviate the agency problem between shareholders and debtholders because the manager may avoid the excessive risk taking in project selection that characterize shareholders' behavior when project is …nanced by debt. Then, as in the previous paper, ownership structure can be a useful commitment device to leave the manager with discretion in project choice.

the monitoring role. It investigates how the separation of the two tasks can alleviate the problem of large shareholder's interference underlined by Burkart, Gromb and Panunzi. In particular, it shows that, a two-tier structure can restore the manager's incentive to exert effort and get informed without reducing the large shareholder's incentive to monitor the manager. To this end the paper compares a one-tier structure where all tasks are performed by the sole board controlled by the large shareholder, with a two-tier structure where some tasks are allocated to the management board and other tasks to the supervisory board. In a one-tier board, project selection is discussed in board's meeting and the large shareholder can impose the project preferred by her. After the project is selected, the board/large shareholder also performs its monitoring task and decides whether to replace him. In a two-tier board, the management board chooses the project and the supervisory board has the task to monitor the manager. We focus on the case in which large shareholder controls the supervisory board but not the management board. The two boards act independently and their behavior reflects the different objectives of their members.

We show that manager can exert more effort in the dual board case where he can choose the investment project without interference by the large shareholder. This in turn, leads to higher expected profits in a two-tier structure. The difference in profits can be sufficiently high to induce the large shareholder to prefer a two-tier board despite the fact that in this case the manager chooses his preferred project rather than the project preferred by the large shareholder.

The rest of the paper is organized as follows. Section 2 presents the basic framework. The choice of the monitoring intensity by large shareholder is analyzed in Section 3. Section 4 and 5 illustrate the choice of effort by manager and board/large shareholder in a one-tier and in a two-tier structure, respectively. Section 6 compares the two board structures and presents the main results of the paper. Finally, Section 7 offers some concluding remarks.

## 2 The model

Consider a firm run by a risk neutral manager who operates under advice and supervision of the board of directors. Ownership is concentrated in the hands of a large shareholder who holds a fraction $\alpha$ of shares and sits in the board of directors. The remaining $(1 - \alpha)$ of shares are dispersed among small investors not represented on the board. The board has a dual role. First, it gives advice and supports the manager in making investment decisions and, more importantly, it approves the choice of investment projects. Then, once a project has been undertaken, it supervises the behavior of the manager and decides whether to retain or dismiss him. We assume that there are two types of manager: high (H) and low (L) ability. Manager's ability is unknown to the board/large shareholder. However, as we explain below, the large shareholder (and/or the board) can engage in monitoring to find out whether the manager is high or low ability.

Project Choice

Following Burkart et al. (1997) we assume that the firm faces $N$ investment projects, but only three of them are relevant. The other $N - 3$ projects (indexed from 4 to $N$) yield negative return and negative benefits. Neither the manager nor the large shareholder wants to undertake them.

Project 1 is a safe project, whose return is known and normalized to zero. It does not give any private benefit, neither to the large shareholder nor to the manager.

Expected monetary return for project 2 and 3 are positive and dependent on manager's ability. Both projects are successful with probability $p$ if the manager is high ability and with probability $q$ if the manager is low ability, with $p > q > 0$. When successful, the two projects yield profits $\tilde{\pi} = \pi$, and they yield zero profits ($\tilde{\pi} = 0$) when unsuccessful. This assumption is equivalent to say that projects' profits are a random variable whose realization can be positive or equal to zero depending on the (unknown) ability of the manager and on an unobservable component. When such component takes very low (high) realizations, profits are equal to zero (to $\pi$), no matter the ability of the manager. For intermediate realizations of the state of nature, the manager makes the di¤erence.

Manager's type a¤ects …rm's pro…ts also in the long run. Since our model is not dynamic, we capture this by introducing second period pro…ts and by assuming that these pro…ts are the discounted value of all future pro…ts. Second period pro…ts are $\overline{\pi}$ if the manager is high-ability type and $\underline{\pi}$ if the manager is low-ability type, with $\overline{\pi} > \underline{\pi}$. These pro…ts depend only on manager's type and are independent of the project's choice.

The fraction of high ability managers in the population is $\lambda$. Thus, $\lambda p$ + (1 ¡ $\lambda$)$q$ denotes the probability of success in the project, i.e. the expected probability of receiving $\pi$.

The two projects di¤er in the private bene…ts they yield to the large shareholder and to the manager[3]. Project 2 yields private bene…ts $b$ to the manager and zero to the large shareholder. Project 3, on the contrary, is the project preferred by the large shareholder: it yields her private bene…ts $B$ and zero to the manager. Private bene…ts are obtained in all states of nature, even in case of zero pro…ts. For example, the bene…t may be the possibility of hiring a friend or relative. Summarizing, the overall return of project 2 is $\pi$ + $b$ in case of success, and it is 0 + $b$ in case of failure. Similarly, total return from project 3 is $\pi$ + $B$ if successful and 0 + $B$ otherwise.

Board Structure

As to the structure of the board, we consider two di¤erent cases. First, we analyze a one-tier structure where both tasks, investment selection and monitoring of the manager, are attributed to a sole entity. Then, we examine a two-tier structure where the management board deals with investment decisions and the supervisory board controls the behavior of the manager. In the dual board case we assume that the large shareholder sits in the supervisory board. As a consequence the large shareholder does not take part in the investment decision

[3] The possibility to extract private bene…ts has been largely documented in the literature. For a discussion of the possible ways in which controlling shareholders may expropriate minority shareholders see for example Shleifer and Vishny (1997).

taken by the management board. The management board is composed mainly by managers with executive functions in the …rm and close to the CEO. Therefore, we focus on a situation where the preferences of the management board are aligned to those of the CEO. In particular, we assume that the board can enjoy part of the private bene…ts $b$. For example, the CEO can expand the …rm beyond the optimal size for the personal prestige and power derived from being the CEO of a large …rm. However, this is a bene…t enjoyed by all members of the management board, not only by the CEO. The monitoring function is performed by the supervisory board where the large shareholder has the majority.

In the sole board case the large shareholder controls the board. As a result, she controls both tasks: project selection and CEO monitoring. Thus, if large shareholder and manager disagree on the choice of the project the large shareholder is able to impose her decision on the manager. In the dual board case, on the contrary, the large shareholder has no say on the project selection and controls only the monitoring.

Information structure

Except project 1 that is immediately identi…able, all other projects cannot be distinguish from one another without additional information.

The manager has to become informed to choose the "good" project. By exerting e¤ort $e$, he becomes informed with probability $e$, at cost $e^2/2$.

Also the board of directors can obtain some information by exerting e¤ort $\varepsilon$ at cost $\varepsilon^2/2$, but in order to use this information it needs the information gathered by the manager. How board's and manager's information combine, depends on the structure of the board.

On the basis of his personal interest, the manager decides if and how much information to share with the board/large shareholder. We model this feature by assuming that manager's and board/large shareholder's e¤orts combine in the following way:

$$\Pr(manager\ and\ board\ are\ informed) = e(z + \varepsilon) \qquad (1)$$

where $0 \leq z \leq 1$ is a parameter under manager's control. The latter's incentive to share information depends on the structure of the board since this in turn determines who chooses the project. In the sole board structure, the large shareholder can impose her decision on the manager. Thus, if the large shareholder is informed, the manager knows that project 3 will be chosen. If instead, the large shareholder is not informed but the manager is, project 2 will be chosen. Then, given that project 2 is the favorite project of the manager, the latter will set the lowest possible value for $z$, i.e. $z = 0$ so that he is informed with probability $e$ while large shareholder is informed with probability $e\varepsilon$.

In the dual board case, CEO's and management board's objectives are aligned: they both like project 2. In this case only project 1 or 2 will be selected. The manager wants to maximize the probability of implementing project 2 and consequently shares his information with the board by setting $z = 1$. Then, project 2 is chosen with probability $e(1 + \varepsilon)$ and project 1 with complementary probability.

Note however, that our result does not depend on the assumption that manager can set the value of $z$. Indeed, it holds true even if we assume that the probability of getting informed for the board/large shareholder is always $e\varepsilon$.

Monitoring

When either project 2 or 3 has been undertaken, a signal $s$ on future profits becomes available to the large shareholder/board. We assume that the signal is perfectly informative and that its probabilities are equal to the true probabilities of the return from the project. Thus, the signal is $s = \pi$ with probability $p$ if the manager is high ability and with probability $q$ if the manager is low ability, and $s = 0$ with complementary probabilities.

At this stage, monitoring on the manager's ability by the large shareholder/board may take place. According to the result of such monitoring, the manager can be confirmed or fired. Given her stake in the firm, the large shareholder has the strongest incentive to engage in monitoring. Since other board members tend to free ride, we consider monitoring $M$ as a function performed by the large shareholder. Monitoring allows the shareholder to become informed on the ability of the manager with probability $M$.

If the incumbent is …red and a new manager is hired, the …rm incurs in …ring costs $C$. The …ring cost captures the fact that the hiring process is costly and it may take a while before a new manager is selected. Furthermore, the new manager needs some time to become fully operational in the new environment. The new manager cannot change the project selected by his predecessor. However, the probability of success in the project depends on the ability of the new manager. Hence a gain, both in the …rst-period and second period pro…ts, may occur only if a low ability manager is replaced by a high ability one.

Monitoring depends on the choice of the project. If project 1 is selected, …rst-period pro…ts are zero no matter the ability of the manager. In this case case, manager's ability is relevant only for second-period pro…ts. When instead, project 2 or project 3 are chosen, manager's type is relevant for both …rst and second-period pro…ts. Then, the large shareholder has the strongest incentive to monitor when either project 2 or 3 have been selected.

Summarizing, the sequence of events is the following:

- board/large shareholder randomly selects from the population a manager of unknown ability

- manager learns his ability and decides how much e¤ort to exert to get informed about projects

- (management) board/large shareholder decides e¤ort level to get informed about projects

- manager decides if and how much information to share

- given the overall information available, either the manager (in a dual board structure) or the large shareholder (in a sole board structure) decides which project to undertake

- after observing project's choice and a signal $s$ on project's return, the large shareholder chooses monitoring intensity

- according to the information obtained through the monitoring activity, the large shareholder decides whether to …re or retain the manager

- if incumbent manager is …red, a new manager is hired. The new manager cannot change the project but he can a¤ect pro…ts realization.

- project's monetary return (…rst-period pro…ts) and private bene…ts are realized

- second-period pro…ts are realized.

When making their decisions on the level of e¤ort, both the manager and the large shareholder anticipate the latter's subsequent choice of monitoring intensity. We then proceed by backward induction, examining …rst the large shareholder's decision on monitoring and using this result to analyze the choice of e¤ort levels.

# 3 Monitoring

After the project is selected, the large shareholder chooses monitoring intensity. To make the analysis interesting we concentrate our attention on monitoring only when project 2 or 3 are undertaken[4]. In these cases, the large shareholder observes a (precise) signal $s$ on project's return. Given the signal, she decides whether and how much to invest in monitoring the manager. Monitoring provides information on manager's ability. If the large shareholder chooses to monitor the manager with intensity $M$, she knows with probability $M$ whether the manager is good while with probability (1 ¡ $M$) she is unable to identify the type of the manager despite monitoring. The cost of monitoring is $M^2/2$. We focus on the case where the large shareholder invests in monitoring only when the observed signal is bad: $s = 0$. In such a case she knows that under the

[4] Monitoring may be valuable also when project one is chosen, since second-period pro…ts depend on manager's type.In this case the analysis is similar to the one presented in this paragraph, but it is less interesting since project 1 does not require any e¤ort and therefore moniroring has no e¤ect on subsequent analysis.

incumbent manager …rst-period pro…ts will be zero, but still the manager can be high ability and therefore it may pay to keep him. In fact, if the manager is good there is no possibility to increase project's return by replacing him and there is always the risk to replace him with a low-ability manager reducing in this way second-period pro…ts.

When instead the signal is good, $s = \pi$, the large shareholder knows for sure that she will receive …rst-period pro…ts and, since a positive signal is more likely when the manager is good, a good signal provides, although indirectly, some information on the probability of high second-period pro…ts. Let denote the incumbent manager with $I$ and the replacement with $R$. Formally, monitoring only when the signal is bad ($s = 0$) is more pro…table than monitoring irrespective of the signal when the following inequality holds:

$$\overline{\pi}\Pr(I = H|s = \pi)+\underline{\pi}\Pr(I = L|s = \pi) > \lambda\overline{\pi}+(1-\lambda)\underline{\pi}+M\Pr(I = H|s = \pi)(1-\lambda)(\overline{\pi}-\underline{\pi})$$

where the left-hand-side represents expected pro…ts with no monitoring after a good signal and the right-hand-side is the expected pro…ts with monitoring after a good signal. Observe that since $\Pr(I = H|s = \pi) > \lambda$ the above inequality always holds if we drop the last term on the right hand side. Then, it is easy to see that when the di¤erence in second-period pro…ts $(\overline{\pi}-\underline{\pi})$ is not "too" large the inequality is satis…ed.

We assume that the …ring cost $C$ is su¢ciently small so that the manager will be replaced when monitoring is unsuccessful. When $s = 0$ the monetary return of the project under the incumbent manager is zero while expected project return is positive if the incumbent is replaced. Furthermore, after observing $s = 0$ the large shareholder revises her prior on manager's ability and on second period pro…ts. Indeed, since $\Pr(I = H|s = 0) < \Pr(R = H) = \lambda$ also the expected value of second period pro…ts is higher under a replacement than under the incumbent manager. Let $\Pi$ denote the overall pro…ts of the …rm, i.e., the sum of …rst and second period pro…ts. Then, in order to make the …ring of the incumbent manager pro…table when the monitoring does not provide information on manager's type the following inequality must hold true:

$$E(\Pi \mid s = 0, \text{manager is fired}) \geq E(\Pi \mid s = 0, \text{manager is retained})]$$

where

$$E(\Pi \mid s = 0, \text{manager is fired}) = \alpha \{\pi \Pr(\pi \mid s = 0, R = H)\lambda + \overline{\pi}\lambda + \underline{\pi}(1 - \lambda)\} - C$$

and

$$E(\Pi \mid s = 0, \text{manager is retained}) = \alpha \{\overline{\pi} \Pr(I = H \mid s = 0) + \underline{\pi} \Pr(I = L \mid s = 0)\}$$

It is immediate to see that $\overline{\pi}\lambda + \underline{\pi}(1 - \lambda) > \overline{\pi}\Pr(I = H \mid s = 0) + \underline{\pi}\Pr(I = L \mid s = 0)$ since $\Pr(I = H \mid s = 0) < \lambda$ and $\Pr(I = L \mid s = 0) > (1 - \lambda)$. We can thus define a cutoff value $\overline{C}$ such that

$$E(\Pi \mid s = 0, \text{manager is fired}) = E(\Pi \mid s = 0, \text{manager is retained})]$$

Then, for $C \leq \overline{C}$ the large shareholder prefers to fire the manager when monitoring does not provide information on his type.

Recall that monitoring takes place only when project 2 or project 3 are chosen and that the ability of the manager affects only the probability of obtaining profits, not the probability of having private benefits. For a given ability of the manager, both project 2 and project 3 have the same expected profits. Therefore we can analyze monitoring independently of the choice between such projects. With both projects, the manager is retained when the signal is good, and a high ability manager is retained also when the signal is bad but monitoring has revealed his ability. Recall also that the type of the manager is decisive in determining the return from the project only in intermediate states of nature. In very bad states of nature even a good manager can do nothing to improve the project's outcome. As a consequence a good manager will not be fired even if the signal indicates that project's return will be zero, since there would be no improvement in replacing him. Summarizing, a good manager is retained with probability $p + (1 - p)M$.

A low ability manager, instead, is retained only when the signal on project's profits is good, $s = \pi$, and as a result the large shareholder does not monitor.

If instead the signal is bad ($s = 0$), a low ability manager is fired because there is a positive probability of getting a good new manager. In intermediate states of nature replacing a bad with a good manager is profitable. Since the large shareholder does not know the realization of the state of nature, a manager that the monitoring has revealed to be low ability will always be replaced. As a consequence a bad manager is retained with probability $q$.

When choosing monitoring intensity the large shareholder maximizes her expected total profits that are given by the sum of project's expected monetary return (first-period profits) and second-period expected profits.

$$
\begin{aligned}
E(\Pi) = {} & \alpha\pi \Pr(I = L|s = 0) \Pr(\pi|R = H, s = 0)\lambda + \\
& \alpha\overline{\pi}M \left[\Pr(I = H|s = 0) + \Pr(I = L|s = 0)\lambda\right] \\
& +\alpha\overline{\pi}(1 - M) \left[\Pr(I = H|s = 0) + \Pr(I = L|s = 0)\right] \lambda \\
& +\alpha\underline{\pi}M \Pr(I = L|s = 0)(1 - \lambda) \\
& +\alpha\underline{\pi}(1 - M) \left[\Pr(I = H|s = 0) + \Pr(I = L|s = 0)\right] (1 - \lambda) \\
& -M^2/2 - C(1 - M) - CM \Pr(I = L|s = 0)
\end{aligned}
$$

The first term on the RHS is project return, which is independent of monitoring. The second and third terms represent respectively expected second-period profits when incumbent manager is high-ability type and when the incumbent is replaced by a high-ability type if monitoring is not successful. In the same manner the fourth and fifth terms represent expected second-period profits when the incumbent manager is low-ability type and when the incumbent is replaced by a low-ability type if monitoring is not successful, respectively. Finally, the last two terms represent the firing costs when monitoring is not successful and when it is, respectively. Then, from the first order condition we obtain the optimal monitoring intensity:

$$
M^* = \Pr(I = H|s = 0) \left[C + \alpha(1 - \lambda)(\overline{\pi} - \underline{\pi})\right]
$$

The monitoring intensity $M^*$ is positively correlated with the expected cost of firing a high-ability manager if the decision is based only on the signal on project's return ($\Pr(I = H|s = 0)C$), with the large shareholder's fraction of shares $\alpha$, and finally with the difference in expected second-period profits if the manager is replaced.

## 4 The choice of efforts in a sole board structure

Let us first consider the manager's choice of effort in a one-tier structure. Project selection is discussed in the board where the large shareholder has the majority of votes. The large shareholder wants to maximize $B + \alpha E(\cdot)$ while the manager wants to maximize $b + \delta E(\cdot)$ where $\delta E(\cdot)$ represents the variable component of his salary, having normalized to zero the fixed component.[5] Given that an informed large shareholder imposes the choice of project 3 on the manager, in a sole board structure there is no information sharing because the manager has no incentive to cooperate with the large shareholder in processing information, i.e. the manager sets $z = 0$. As a consequence the manager becomes informed with probability $e$, while the large shareholder is informed with probability $e\varepsilon$. The latter represents the probability of project 3 being selected. With probability $e(1 - \varepsilon)$ only the manager is informed and in this case he can choose his preferred project, i.e. project 2. Finally, with probability $(1 - e)$ neither the manager nor the owner is informed and project 1 is chosen yielding zero profits and zero private benefits.

The maximization problem of the manager

When making his decision, the manager knows his own type. Hence, a high ability manager chooses the optimal level of effort $e_S^{H*}$(where subscript $s$ stands for sole board) taking into account that if project 2 is selected, he will be retained with probability $p + (1 - p)M^*$. He then solves:

$$\max_e \; e\varepsilon_S^* p\delta\pi + e(1 - \varepsilon_S^*)\left[b\left(p + (1 - p)M^*\right) + p\delta\pi\right] - e^2/2.$$

[5] For simplicity we rule out the possibility that the manager owns shares of the firm. $\delta\pi$ is received only if the manager is still employed by the firm when profits are realized.

In case of interior solution, from the first-order condition we obtain:

$$e_S^H = (1 - \varepsilon_S^*)b[p + (1 - p)M^*] + p\delta\pi. \tag{2}$$

Hence

$$e_S^{H*} = \min\left[e_S^H, 1\right].$$

Analogously, a low ability manager chooses the optimal level of effort $e_S^{L*}$ taking into account that if project 2 is selected, he will be retained with probability $q$. He then solves:

$$\max_e \; e\varepsilon_S^* q\delta\pi + e(1 - \varepsilon_S^*)q(b + \delta\pi) - e^2/2.$$

In case of interior solution, from the first-order condition we obtain:

$$e_S^L = (1 - \varepsilon_S^*)bq + q\delta\pi. \tag{3}$$

Hence

$$e_S^{L*} = \min\left[e_S^L, 1\right].$$

Since $p > q$, and $b(1 - p)M^* > 0$, it immediately follows that

$$e_S^H > e_S^L,$$

implying

$$e_S^{H*} \geq e_S^{L*} \quad with \quad e_S^{H*} = e_S^{L*} \quad iff \quad e_S^{L*} = 1.$$

Manager's effort is negatively correlated with the effort (hence the probability) of the large shareholder to become informed $\varepsilon_S^*$. This is so because a higher value of $\varepsilon_S^*$ reduces the probability of implementing project 2, the preferred project of the manager.

Notice that the effort of the good manager depends (positively) on the level of monitoring exerted by the large shareholder, while the effort of the bad manager does not. This happens because, the higher the monitoring intensity, the higher is the probability that a good manager will be confirmed, which in turn increases the incentive to exert effort. The bad manager instead is always fired when the return of the project is zero, independently of the outcome of monitoring. In fact he is fired both when the large shareholder is able to identify his type and when she is not.

The maximization problem of the Board (Large Shareholder)

Since in the sole board case the large shareholder controls the board, we identify the board with the large shareholder. When making its decision on the optimal level of effort $\varepsilon_S^*$, the large shareholder does not know the type of the manager. Taking into account that a bad manager will be replaced with probability $(1-q)$, she then solves:

$$\max_{\varepsilon} \varepsilon \left\{ \lambda e_S^{H*}[B+\alpha\pi p] + (1-\lambda)e_S^{L*}[B+\alpha\pi(q+(1-q)\gamma)] \right\} + (1-\varepsilon)\left\{ \lambda e_S^{H*}\alpha\pi p + (1-\lambda)e_S^{L*}[\alpha\pi(q+(1-q)\gamma)] \right\} - \frac{\varepsilon^2}{2}.$$

where $\gamma = \Pr(\pi | R = H, s = 0)\Pr(R = H)$ is the probability of obtaining first-period profits $\pi$ when a bad manager is replaced following the observation of $s = 0$.

In case of interior solution, we obtain:

$$\varepsilon_S = Be_S^*. \tag{4}$$

where $e_S^* \equiv \lambda e_S^{H*} + (1-\lambda)e_S^{L*}$.

Hence

$$\varepsilon_S^* = \min[\varepsilon_S, 1].$$

The effort level chosen by the large shareholder depends positively on her private benefit $B$ and on the manager's effort $e_S^*$. When the private benefit tends to zero also the large shareholder's effort to become informed tends to zero since in this case she is indifferent between project 2 and 3. For $B$ positive but smaller than 1, the optimal effort level is smaller than one: $\varepsilon_S^* < 1$. Finally, when the private benefit is sufficiently large (say equal or greater than $\overline{B}$), the optimal effort becomes equal to one, $\varepsilon_S^* = 1$. When the share of profits of the manager is high enough to induce him to make the highest possible effort, i.e. $e_S^{H*} = e_S^{L*} = 1$, also the large shareholder makes the highest effort provided that her private benefit is not smaller than 1(since in this case $\overline{B} = 1$). Observe that when $\varepsilon_S^* = e_S^{H*} = e_S^{L*} = 1$, the large shareholder is informed with certainty, which implies that she will choose her preferred project, i.e. project 3. In general the large shareholder's effort is positively correlated with the manager's effort because the higher is $e_S^*$, and the higher is the marginal effect of an increase in $\varepsilon_S^*$ in terms of an increase in the probability of choosing project 3. The probability of choosing project 3 is higher than that of choosing project 2 only if $\varepsilon_S > 1/2$. However, since the effort of the manager is needed for large shareholder to become informed, for low values of $e_S^*$ the large shareholder has no incentive to exert high level of $\varepsilon_S$ because the probability of choosing project 3 is low compared to that of choosing project 1.

Substituting the values of $e_S^H$ and $e_S^L$, (4) becomes:

$$\varepsilon_S = \frac{B[\delta\pi(\lambda p + (1 - \lambda)q) + b[\lambda(p + (1 - p)M^*) + (1 - \lambda)q)]}{1 + Bb[\lambda(p + (1 - p)M^*) + (1 - \lambda)q)]} \tag{5}$$

Note that if the manager does not receive any share of profits, i.e., $\delta = 0$, then the optimal effort of large shareholder is smaller than one, $\varepsilon_S^* = \varepsilon_S < 1$. In this case, when her private benefits $B$ increases, her effort to become informed increases as well ($\partial\varepsilon_S/\partial B > 0$) but never reaches 1. At the same time $e_S^{H*}$ and $e_S^L$ asymptotically tend to 0.

If we substitute back the optimal value of $\varepsilon_S$ in the effort levels chosen by the manager we get:

$$e_S^H = \delta\pi p + \frac{[1 - B\delta\pi(\lambda p + (1 - \lambda)q)]b(p + (1 - p)M^*)}{1 + Bb[\lambda(p + (1 - p)M^*) + (1 - \lambda)q)]}$$

$$e_S^L = \delta\pi q + \frac{[1 - B\delta\pi(\lambda p + (1 - \lambda)q)]bq}{1 + Bb[\lambda(p + (1 - p)M^*) + (1 - \lambda)q)]}$$

Define:

$Z_H \equiv b(p + (1 - p)M^*)$,

$Z_L \equiv bq$

$Z \equiv \lambda Z_H + (1 - \lambda) Z_L \equiv b[\lambda(p + (1 - p)M^*) + (1 - \lambda)q)]$,

$¢_H$ ´ $\delta\pi p$

$¢_L$ ´ $\delta\pi q$

$¢$ ´ $\lambda ¢_H + (1$ ¡ $\lambda) ¢_L = \delta\pi(\lambda p + (1$ ¡ $\lambda)q)$

We can then write:

$e_S^H = ¢_H + \frac{Z_H(1 ¡ B ¢)}{1+BZ}$, $\quad e_S^L = ¢_L + \frac{Z_L(1 ¡ B ¢)}{1+BZ}$ $\quad \epsilon_S = \frac{B(¢+Z)}{1+BZ}$.

Since the way e¤orts change as private bene…ts increase is crucial for our result, we establish the following lemma.

Lemma 1: $\varepsilon_S^{¤}$ is continuously increasing in $B$, from $\varepsilon_S^{¤} = 0$ for $B = 0$ to $\varepsilon_S^{¤} = 1$ for $B = \overline{B}$ where $\overline{B} = 1/¢$ if $¢$ · 1 while $\overline{B} = 1$ if $¢ > 1$.. $e_S^i$ is continuously decreasing from $e_S^{¤i} = \overline{e}_S^i$ to $e_S^{¤i} = \underline{e}_S^i$ where $\overline{e}_S^i = ¢_i + Z_i$ if $¢_i + Z_i < 1$, and $\overline{e}_S^i = 1$ if $¢_i + Z_i$ ¸ 1 while $\underline{e}_S^i = ¢_i$ if $¢_i < 1$,$\underline{e}_S^i = 1$ if $¢_i$ ¸ 1, $i = H, L$.

Proof: The result immediately follows from the fact that $\frac{\partial \varepsilon_S}{\partial B} = \frac{¢+Z}{(1+BZ)^2} > 0$ and $\frac{\partial e_S}{\partial B} = \frac{¡Z_i(¢+Z)}{(1+BZ)^2} < 0$.¤

# 5 The choice of e¤orts in a dual board structure

Let us now consider a two-tier structure with a management and a supervisory board. As discussed above we consider the case where the large shareholder sits on the supervisory board where she has the majority. Recall also that we assume that the management board is composed mainly by managers close to the CEO and that they can enjoy part of the manager's private bene…ts $b$. In particular, we assume that the board can enjoy a fraction $\beta_1$ of the bene…ts $b$ and that this does not reduce the private bene…ts of the CEO. In other words we are considering the bene…ts $b$ as a sort of "public" good with respect to the CEO and the members of the management board. Directors care also for the …nancial return of the project. Their objective function is $\beta_1 b + \beta_2 E(¦)$.

This implies that both the management board and the CEO have the same preferences among investment projects. If they are informed they will always choose project 2, otherwise they will choose project 1. As a consequence, the value of $z$ in eq.(1) will be set equal to 1, implying that project 2 will be selected with probability $e(1+\varepsilon)$ while project 1 will be chosen with probability $1-e(1+\varepsilon)$.

The maximization problem of the manager

A high ability manager chooses the optimal level of effort $e_D^{H*}$ taking into account that if project 2 is selected, he will be retained with probability $p+(1-p)M^*$. He then solves:

$$\max_e \; e(1+\varepsilon_D^*)\left[b\left(p+(1-p)M^*\right)+p\delta\pi\right]-e^2/2.$$

In case of interior solution, from the first-order condition we obtain:

$$e_D^H = (1+\varepsilon_D^*)\left[b(p+(1-p)M^*)+p\delta\pi\right]. \tag{6}$$

Hence

$$e_D^{H*} = \min\left[e_D^H, 1\right].$$

Analogously, a low ability manager chooses the optimal level of effort $e_D^{L*}$ taking into account that if project 2 is selected, he will be retained with probability $q$. He then solves:

$$\max_e \; e(1+\varepsilon)q\left[b+\delta\pi\right]-e^2/2.$$

In case of interior solution, from the first-order condition we obtain:

$$e_D^L = (1+\varepsilon_D)q\left[b+\delta\pi\right]. \tag{7}$$

Hence

$$e_D^{L*} = \min\left[e_D^L, 1\right].$$

Since $p>q$, it immediately follows that

$$e_D^H > e_D^L.$$

Again, the effort of the good manager depends on the monitoring by the large shareholder, while the effort of the bad manager does not, because the bad manager is always fired when the return of the project is known to be zero.

The maximization problem of the Management Board

When making its decision on the optimal level of effort $\varepsilon_D^*$, the board does not know the type of the manager[6]. Taking into account that a bad manager will be successfully replaced with probability $(1 - q)\gamma$, it then solves:

$$\max_{\varepsilon} \lambda e_D^H (1+\varepsilon)\left[\beta_1 b + \beta_2 \pi p\right] + \\ (1-\lambda) e_D^L (1+\varepsilon)\left[\beta_1 b + \beta_2 \pi \left(q + (1-q)\gamma\right)\right] - \frac{\varepsilon^2}{2}$$

In case of an interior solution, the first-order condition gives:

$$\varepsilon_D = \lambda e_D^H \left[\beta_1 b + \beta_2 \pi p\right] + (1-\lambda) e_D^L \left[\beta_1 b + \beta_2 \pi \left(q + (1-q)\gamma\right)\right]. \tag{8}$$

Substituting for the values of the manager's effort $e_D^H$ and $e_D^L$, we obtain:

$$\varepsilon_D = \frac{\lambda A + (1-\lambda) C}{1 - \left[\lambda A + (1-\lambda) C\right]} \tag{9}$$

where

$$A \equiv b\left[p + (1-p)M^* + p\delta\pi\right]\left[\beta_1 b + \beta_2 \pi p\right]$$

and

$$C \equiv q\left[b + \delta\pi\right]\left[\beta_1 b + \beta_2 \pi \left(q + (1-q)\gamma\right)\right].$$

This implies that an interior solution exists, if $\lambda A + (1-\lambda) C < 1/2$,[7]while $\varepsilon_D = 0$ otherwise. Hence

$$\varepsilon_D^* = \max\left[0, \varepsilon_D\right].$$

Note that if $e_D^{H*} = e_D^{L*} = 1$, $\varepsilon_D^* = 0$ In fact, when the manager is informed with certainty, there is no reason for the management board to acquire additional information because of the information sharing.

Finally, if we substitute back the value of $\varepsilon_D$ in the expressions for the manager's effort, we obtain:

[6] In the dual board case it may be reasonable to assume that the management board knows the type of the CEO. Our main result still holds under this assumption. However, for symmetry with the sole board case we prefer to maintain that the board doesn't know whether the CEO is high or low ability.

[7] Note that this is also a necessary and sufficient condition for $\varepsilon_D < 1$.

$$e_D^H = \frac{b\,[p + (1 - p)M^*] + p\delta\pi}{1 - [\lambda A + (1 - \lambda)C]}$$

and

$$e_D^L = \frac{q\,[b + \delta\pi]}{1 - [\lambda A + (1 - \lambda)C]}.$$

# 6 One-Tier versus Two-Tier board

We are now in a position to make a comparison between the sole and the dual board structure. First of all we consider the e¤orts. Comparing (2) with (6), (3) with (7) and (5) with (9) it immediately follows:

Lemma 2: The level of e¤ort exerted by the manager is higher in a dual board structure independently of his type: $e_D^{*i} \geq e_S^{*i}$ with $e_D^{*i} = e_S^{*i}$ i¤ $e_D^{*i} = e_S^{*i} = 1$, $i = H, L$. The level of e¤ort exerted by the board is higher in a dual board than in the sole board structure ($\varepsilon_D > \varepsilon_S$) if and only if the large shareholder's private bene…ts $B$ are lower than the threshold value $\hat{B}$ where $\hat{B}$ is de…ned by:

$$\hat{B} \equiv \frac{\varepsilon_D}{\delta\pi(\lambda p + (1 - \lambda)q)} + \frac{\varepsilon_D}{(1 - \varepsilon_D)b[\lambda(p + (1 - p)M^*) + (1 - \lambda)q)]}$$

The level of e¤ort exerted by the manager is higher in a dual board structure because the manager, by choosing project 2 when informed, can appropriate private bene…ts $b$. As to the e¤ort exerted by the board, we have to consider the private bene…ts of the owner relatively to the threshold level $\hat{B}$, which is lower the lower are $b$, $\beta_1$, $\beta_2$ and $\gamma$. In other terms we have to compare the private bene…ts of the large shareholder (in the sole board case) with the gains appropriable by the management board (in the dual board case). Only if such gains are particularly high, $\varepsilon_D > \varepsilon_S$, otherwise the e¤ort exerted by the board will be higher in the sole board structure. This can be better understood in the special case in which neither the manager nor the members of the management board receive any share of pro…ts, i.e. when $\delta = \beta_2 = 0$. In this case $\hat{B} = \frac{\beta_1 b}{1 - 2[\lambda(p + (1 - p)M) + (1 - \lambda)q)]\beta_1 b^2}$. The positive relationship between the value of $\hat{B}$ and the private bene…t of the management board is immediately evident. On the contrary, note that when the amount of profits appropriable by the manager is particularly high, $e_S^* = 1$ implying $\varepsilon_D = 0$ and $\varepsilon_S > \varepsilon_D$.

Expected profits are equal to

$$E(\Pi_S) = e_S^{H*}\lambda p\pi + e_S^{L*}(1 - \lambda)\left[q + (1 - q)\gamma\right]\pi \tag{10}$$

under the sole board structure, and to

$$E(\Pi_D) = e_D^{H*}(1 + \varepsilon_D^*)\lambda p\pi + e_D^{L*}(1 + \varepsilon_D^*)(1 - \lambda)\left[q + (1 - q)\gamma\right]\pi \tag{11}$$

under the dual board structure. The question is whether expected profits are higher in the sole or in the dual structure. Since the value of the firm depends on expected profits, minority shareholders obviously prefer the structure that maximizes $E(\Pi)$. This is not necessarily the case for the large shareholder who is also interested in private benefits. Recalling that private benefits are obtained when project 3 is undertaken, i.e. with probability $e_S^*\varepsilon_S^*$, the expected gain to the large shareholder is:

$$\begin{aligned} E(G_S) = \varepsilon_S^* B(\lambda e_S^{H*} + (1 - \lambda)e_S^{L*}) + \\ + \alpha\pi \left\{ e_S^{H*}\lambda p + e_S^{L*}(1 - \lambda)\left[q + (1 - q)\gamma\right] \right\} - (\varepsilon_S^*)^2/2 \end{aligned} \tag{12}$$

under the sole board structure, and

$$E(G_D) = \alpha\pi(1 + \varepsilon_D^*) \left\{ e_D^{H*}\lambda p + e_D^{L*}(1 - \lambda)[q + (1 - q)\gamma] \right\} \tag{13}$$

under the dual board structure.

Proposition: Expected profits are higher under the dual board structure, i.e. minority shareholders are better off in a dual board structure.

If $\delta = 0$, either $E(G_D) \geq 1/2$ and the large shareholder always prefers the dual board structure or $E(G_D) < 1/2$ and there exists a threshold value $\hat{B} > 0$ such that the large shareholder prefers the dual board structure iff $B < \hat{B}$.

If $\delta > 0$, either $\Delta_L + Z_L < 1$ (implying $\overline{e}_L^S < 1$) and there exists a threshold value $\hat{B} > 0$ such that the large shareholder prefers the dual board structure if $B < \hat{B}$, or $\Delta_L + Z_L > 1$ (implying $\overline{e}_L^S = 1$) and there exist cases in which the large shareholder prefers the sole board structure independently of the value of $B$.

Proof: see the Appendix.

The above proposition shows that, as long as the private bene…ts of the large shareholder are not "too large", the higher e¤ort exerted by manager in the two-tier board structure may lead the large shareholder to prefer such a structure to the one-tier board. Thus, there are cases in which the objective of large shareholder and minority shareholders are aligned. The proposition indicates that the large shareholder is more likely to prefer the dual board structure when the manager does not receive any incentive pay, i.e. $\delta = 0$. This is so, because when $\delta = 0$ the manager does not have other incentive to exert e¤ort than the private bene…t he obtains if project 2 is chosen. However, in the sole board structure project 2 is less likely to be implemented and this in turn implies a smaller managerial e¤ort than in the dual board case. When $\delta > 0$ there may exist cases in which the sole board structure is preferred by the large shareholder even for low values of $B$. Note, however, that a necessary (but not su¢cient) condition for this to happen is that $\bar{e}_L^S = 1$ (implying that also $\bar{e}_H^S = \bar{e}_L^D = \bar{e}_H^D = 1$) which restricts this case to a quite small range of the parameters. We can then conclude that generally for low enough values of the private bene…ts $B$, the large shareholder prefers the dual board structure.

# 7 Conclusions and Extensions

We have shown in a very simple setting that, when ownership is concentrated in the hands of a large shareholder, a two-tier board of directors where the large shareholder sits on the upper-level board can be a useful device to commit not to interfere with manager's initiative. By comparing a two-tier with a one-tier structure we show that the two-tier board has the advantage to leave initiative to the lower level board (the management board). As a result, manager's e¤ort in gathering information on projects is higher in the two-tier structure and this in turn leads to higher profits than in the one-tier structure where large shareholder controls the board. The higher managerial effort comes with no reduction in shareholder's monitoring on manager's quality. Indeed, the monitoring intensity is equal in the two cases. We restricted our attention to the choice between one-tier versus two-tier board of directors, but the result of the paper may extend to other possible organizations of the board that limit the power and interference of large shareholder. The dual board structure represents just an opportunity for the large shareholder to commit not to interfere with the management. In the absence of such a structure, it would be more difficult for the large shareholder to credibly commit not to reverse the project choice made by the management, even if ex-ante it could be profitable for her to do so.

The paper has important policy implications since the dual board structure is quite common in Continental Europe where concentrated ownership is still the norm. In some countries, as Germany, Austria, Belgium, the dual structure is mandatory, in other countries as France and Italy companies can choose between different board models. Our paper shows that indeed dual boards may be optimal in these countries given their ownership structure, and it offers support to some corporate reforms, like the recent reform in Italy, that has introduced the choice between one-tier and two-tier board structure (for a discussion of recent European corporate reforms see Hopt and Leyens (2004)).

Another important result is that the controlling shareholder can choose the optimal structure of the board even if she has private benefits. The amount of private benefits must only be not "too large". This in turn implies that any policy that restricts the amount of private benefits the controlling shareholder can extract has a positive effect since it makes more likely the optimal choice of board structure.

Finally, observe that if the large shareholder sits in the supervisory board and does not interfere with manager's decision there is also an important effect on the conflict of interest between majority and minority shareholders. Indeed, the large shareholder by restricting her interference in firm management restricts also her ability to expropriate wealth from minority shareholders. Although there may be other instruments to limit the ability to expropriate minority shareholders, as corporate law or the role of independent directors (see for example Anderson and Reeb 2003) also a two-tier structure of board of directors, by separating …rm's management and control, goes in this direction.

In this paper we have assumed that private bene…ts do not a¤ect pro…ts, i.e. the consumption of private bene…ts does not reduce the cash ‡ow obtained from the project. A natural extension of the paper is to assume that private bene…ts have a monetary cost re‡ected in a lower level of pro…ts and that the level of private bene…ts is not exogenously given but is chosen by the recipient (either the manager or the large shareholder). This introduces an asymmetry between the consumption of private bene…ts by the manager and by large shareholder. If manager's bene…ts reduce the level of pro…ts this increases the probability that the manager will be removed. Thus the manager has to tradeo¤ the utility of consuming the bene…ts and the increased risk of being …red. This put a limit on the optimal quantity of bene…ts he wants to appropriate. When instead private bene…ts are consumed by the large shareholder there is no limitation in the quantity of bene…ts consumed other than the reduction in the pro…ts she can appropriate but it is well known that this constrain is ine¢ cient when the fraction of shares held is small. We are currently working on this extended setup that has the advantage to take into consideration, in addition to the con‡ict between manager and large shareholder, also the con‡ict of interest between majority and minority shareholders which is very common in countries with concentrated ownership.

# 8 References


Adams, R. and D. Ferreira (2003) "A Theory of Friendly Board" Stockholm University Working Paper

Anderson, R.C. and D.M. Reeb (2003) "Who Monitors the Family?" Stanford Law School Working Paper N.

Burkart,M., Gromb, D. and F. Panunzi (1997) "Large Shareholders, Monitoring and the Value of the Firm" Quarterly Journal of Economics , 112, 693-728.

Falck, A. and M. Kosfeld (2004) "Distrust- The Hidden Cost of Control" CEPR Discussion paper N. 4512, August.

Graziano, C. and A. Luporini .(2003) " Board E¢ciency and Internal Corporate Control Mechanisms", Journal of Economics and Management Strategy, 12, 495-530.

Hermalin, B.E. and M. Weisbach (1998) "Endogenously Chosen Boards of Directors and Their Monitoring of the CEO" American Economics Review, 88, 96-118.

Hermalin, B.E. and M. Weisbach (2001) "Boards of Directors as an Endogenously Determined Institution: a Survey of the economic Literature" Economic Policy Review- Federal Reserve Bank of New York, 9.

Hirshleifer, D. and A. Thakor (1998) "Corporate Control Through Dismissals and Takeovers", Journal of Economics and Management Strategies, 7, 489-520.

Hopt, K.J. and P.C. Leyens (2004) "Board Models in Europe: Recent Development of Internal Corporate Governance Structures in Germany, the United Kingdom, France and Italy" ECGI Working Paper N. 18/2004 (January 2004)

Inderst, R. and H. Muller (1999) "Delegation of Control Rights, Ownership Concentration and the Decline of External Finance" University of Mannheim Working Paper

Shleifer, A. and R.W Vishny (1997) "A Survey of Corporate Governance" Journal of Finance, 52, 737-783.

Warther, V.A. (1998) "Board E¤ectiveness and Board Dissent: a Model of the Board's Relationship to Management and Shareholders", Journal of Corporate Finance, 4, 53-70.

# 9 Appendix

Proof of the Proposition. That expected profits are higher under the dual board structure follows immediately from (10), (11) and the above Lemma.

To prove the part on expected gains note that $\hat{B}$ is the value of $B$, that equates (12) to (13). Define:

$X_H \equiv p\pi,$

$X_L \equiv [q + (1 - q)\gamma]\pi,$

We can then write:

$$E(G_S) = \alpha\left[X_H\lambda e_S^{H*} + X_L(1 - \lambda)e_S^{L*}\right] + \varepsilon_S^* B e_S^* - \frac{(\varepsilon_S^*)^2}{2}$$

The proof is divided in two cases according to $\delta$ being positive or equal to 0.

Case 1: $\delta > 0$. This implies $\Delta_H, \Delta_L > 0$.

Recalling that $e_D^{i*} \geq e_S^{i*}$, $i = H, L$, where the equality holds iff $e_S^{i*} = 1$, we know that for $B = 0$:

$$E(G_S)_0 = \alpha\left[X_H\lambda\bar{e}_S^H + X_L(1 - \lambda)\bar{e}_S^L\right] \leq \alpha\left[X_H\lambda e_D^{H*} + X_L(1 - \lambda)e_D^{L*}\right] \leq E(G_D)_0.$$

Note that these holds as equalities if and only if $\bar{e}_S^L = 1$ (i.e. $\Delta_L + Z_L > 1$), implying that also $\bar{e}_S^H = e_D^{H*} = e_D^{L*} = 1$ while $\varepsilon_D^*$=0. We will divide the present case into three steps: step 1 will consider the case of $B \geq \overline{B}$, step2 the case of $B < \overline{B}$ and $\Delta_L + Z_L < 1$, while step 3 will consider the case of $B < \overline{B}$ and $\Delta_L + Z_L > 1$.

We now want to show that $E(G_S)$ is first continuously decreasing and then continuously increasing in $B$, implying that the threshold level $\hat{B} > 0$ exists.

First of all however note that, given (4),

$$E(G_S)_{\overline{B}} = \alpha\left[X_H\lambda\underline{e}_S^H + X_L(1 - \lambda)\underline{e}_S^L\right] + \frac{1}{2} = \alpha[X_H\lambda\Delta_H + X_L(1 - \lambda)\Delta_L] + \frac{1}{2} \quad \text{for } B = \overline{B}.$$

Step 1. Consider first the case of $B \geq \overline{B}$ and $\varepsilon_S^{*} = 1$ implying $e_S^i = \underline{e}_S^i$ $i = H, L.$ The expected gain of the large shareholder becomes

$$E(G_S) = \alpha \left[ X_H \lambda \underline{e}_S^H + X_L (1 - \lambda) \underline{e}_S^L \right] + B \underline{e}_S - \tfrac{1}{2}$$

which is clearly continuously increasing in $B$, from $E(G_S)_{\overline{B}}$ for $B = \overline{B} = 1/¢$ to 1 .

Step 2. Consider then the case of $B < \overline{B}$ and $¢_L + Z_L < 1$.

The derivative of the expected gain can be written as:

$$\frac{\partial E(G_S)}{\partial B} = \alpha \left[ X_H \lambda \frac{\partial e_S^H}{\partial B} + X_L (1 - \lambda) \frac{\partial e_S^L}{\partial B} \right] + \varepsilon_S \frac{\partial \varepsilon_S}{\partial B} = \frac{¢ + Z}{(1 + BZ)^2} [ - M + \varepsilon_s ]$$

where $M$ can take one of the following values:

$M_1 = \alpha X_L (1 - \lambda) Z_L$

$M_2 = \alpha [X_H \lambda Z_H + X_L (1 - \lambda) Z_L].$

First of all note that if $\alpha X_L (1 - \lambda) Z_L \geq 1$, $\frac{\partial E(G_S)}{\partial B}$ is always negative for $B < \overline{B}$, implying that $E(G_S)$ is continuously decreasing from $E(G_S)_0$ to $E(G_S)_{\overline{B}}$. When $\alpha X_L (1 - \lambda) Z_L < 1$, three cases are possible: i) $M = M_1$ for $B$ going from 0 to $\overline{B}$; ii) $M = M_1$ for $B$ going from 0 to $B(M_1)$ then $M = M_2$; iii) $M = M_2$ for $B$ going from 0 to $\overline{B}$.

i) $\frac{\partial E(G_S)}{\partial B}$ is negative for $\varepsilon_s < M_1$ and positive for $\varepsilon_s > M_1$, implying that $E(G_S)$ is first continuously decreasing and then increasing;

iii) if $M_2 \geq 1$, $\frac{\partial E(G_S)}{\partial B}$ is always negative for $B < \overline{B}$, implying that $E(G_S)$ is continuously decreasing from $E(G_S)_0$ to $E(G_S)_{\overline{B}}$. If $M_2 < 1$, is negative for $\varepsilon_s < M_2$ and positive for $\varepsilon_s > M_2$, implying that $E(G_S)$ is first continuously decreasing and then increasing;

ii) three subcases are possible: a) if $\varepsilon_s \geq M_2$ for $B = B(M_1)$, $\frac{\partial E(G_S)}{\partial B}$ is negative for $\varepsilon_s < M_1$ and positive for $\varepsilon_s > M_1$, implying that $E(G_S)$ is first continuously decreasing and then increasing; b) if $\varepsilon_s < M_2 < 1$ for $B = B(M_1)$, $\frac{\partial E(G_S)}{\partial B}$ is negative for $\varepsilon_s < M_1$, positive for $M_1 < \varepsilon_s < E_s(B(M_1))$, negative for $\varepsilon_s(B(M_1)) < \varepsilon_s < M_2$ and positive for $\varepsilon_s > M_2$, implying that $E(G_S)$ is first continously decreasing, then increasing, then decreasing, and finally increasing; c) if $\varepsilon_s < M_2$ for $B = B(M_1)$ with $M_2 \geq 1$, we have the same result as in case b) except that now it cannot be $\varepsilon_s > M_2$.

In conclusion, considering also step1, when $\Delta_L + Z_L < 1$, $E(G_S)$ is either first monotonically increasing decreasing and then monotonically increasing, or it alternates decreasing and increasing intervals up to $B = \overline{B}$, and then continously increases up to infinity. In any case, since $E(G_S)_0 < E(G_D)_0$ and $E(G_S)$ is bounded up to $B = \overline{B}$, the existence of $\hat{B} > 0$ follows.

Step 3. Consider then the case of $B < \overline{B}$ and $\Delta_L + Z_L > 1$.

If $\Delta_L \geq 1$ (implying $\Delta_L + (1 - \overline{B})Z_L \geq 1$ since $\overline{B} = 1$), $e_S^{i*} = 1$, $i = H, L$, independently of the value of $B$, and $\varepsilon_s = B$. The expected gain of the large shareholder becomes:

$$E(G_S) = \alpha [X_H \lambda + X_L (1 - \lambda)] + \frac{B^2}{2}$$

which is clearly continuously increasing in $B$, from $\alpha [X_H \lambda + X_L (1 - \lambda)]$ for $B = 0$ to $\alpha [X_H \lambda + X_L (1 - \lambda)] + 1/2$ for $B = \overline{B}$ (recall that in this case $\overline{B} = 1$).

If $\Delta_L < 1$ (implying $\Delta_L + (1 - \overline{B})Z_L < 1$, since $\overline{B} > 1$), . The derivative of the expected gain can again be written as:

$$\frac{\partial E(G_S)}{\partial B} = \alpha \left[ X_H \lambda \frac{\partial e_S^H}{\partial B} + X_L (1 - \lambda) \frac{\partial e_S^L}{\partial B} \right] + \varepsilon_S \frac{\partial \varepsilon_S}{\partial B} = \frac{\Delta + Z}{(1 + BZ)^2} [-M + \varepsilon_s]$$

where $M$ can now take one of the following values:

0

$M_1 = \alpha X_L (1 - \lambda) Z_L$

$M_2 = \alpha [X_H \lambda Z_H + X_L (1 - \lambda) Z_L]$.

Two cases are possible: i) $M = 0$ for $B$ going from 0 to $B(M_1)$, then $M = M_1$ up to $\overline{B}$; ii) $M = 0$ for $B$ going from 0 to $B(M_1)$, then $M = M_1$ up to $B(M_2)$, then $M = M_2$ up to $\overline{B}$.

i) if $\varepsilon_s \geq M_1$ for $B = B(M_1)$, $\frac{\partial E(G_S)}{\partial B}$ is positive and $E(G_S)$ is continously increasing from $B = 0$ to $B = \overline{B}$. If $\varepsilon_s < M_1$ for $B = B(M_1)$, $\frac{\partial E(G_S)}{\partial B}$ is positive for $B < B(M_1)$ then for $B > B(M_1)$ it is negative for $\varepsilon_s < M_1$ and positive for $\varepsilon_s > M_1$.As a consequence $E(G_S)$ is first increasing, then decreasing and then increasing again.

ii) four subcases are possible: a) $\varepsilon_s \geq M_1$ for $B = B(M_1)$ and $\varepsilon_s \geq M_2$ for $B = B(M_2)$.Then $\frac{\partial E(G_S)}{\partial B}$ is everywhere positive and $E(G_S)$ is continously increasing from $B = 0$ to $B = \overline{B}$;

b) $\varepsilon_s < M_1$ for $B = B(M_1)$ and $\varepsilon_s \geq M_2$ for $B = B(M_2)$. $\frac{\partial E(G_S)}{\partial B}$ is positive for $B < B(M_1)$,then for $B > B(M_1)$ it is negative for $\varepsilon_s < M_1$ and positive for $\varepsilon_s > M_1$.As a consequence $E(G_S)$ is first increasing, then decreasing and then increasing again;

c) $\varepsilon_s < M_1$ for $B = B(M_1)$ and $\varepsilon_s < M_2 < 1$ for $B = B(M_2)$. $\frac{\partial E(G_S)}{\partial B}$ is positive for $B < B(M_1)$,then for $B(M_1) < B < B(M_2)$ it is negative for $\varepsilon_s < M_1$ and positive for $\varepsilon_s > M_1$,.while for $B > B(M_2)$ it is negative for $\varepsilon_s < M_2$ and positive for $\varepsilon_s > M_2$.As a consequence $E(G_S)$ is first increasing, then decreasing, then increasing, then decreasing and finally increasing.

d) $\varepsilon_s < M_1$ for $B = B(M_1)$ and $\varepsilon_s < M_2$ for $B = B(M_2)$ with $M_2 > 1$. We have the same result as in case c) except that now it cannot be $\varepsilon_s > M_2$.

Now for $B = 0$, $E(G_D) = E(G_S)$. Since for $B > 0$ $E(G_S)$ is either continously increasing, or becomes increasing after an interval in which it alternates increasing and decreasing spans we know that the threshold level $\hat{B}$ does not exist. Nevertheless we cannot exclude cases in which after a first interval in which $E(G_D) < E(G_S)$, there is one (or there are two) intervals in which $E(G_D) > E(G_S)$. In any case sooner or later $E(G_S)$ becomes again greater than $E(G_D)$.

Case 2: $\delta = 0$. This implies ¢ = 0. The efforts' levels now become:

$e_S^i = \frac{Z_i}{1+BZ}, i = H, L$ $\qquad$ $\varepsilon_S = \frac{BZ}{1+BZ}$

with derivatives:

$\frac{\partial e_S}{\partial B} = \frac{-ZZ_i}{(1+BZ)^2} < 0 \qquad \frac{\partial \varepsilon_S}{\partial B} = \frac{Z}{(1+BZ)^2} > 0$

$\varepsilon_S = 0$ when $B = 0$ and is increasing in $B$, but never reaches 1. When $\varepsilon_S = 0$, $e_S^i = \overline{e}_S^i = Z_i$. As $\varepsilon_S$ approaches 1 for $B \to \infty$, $e_S^i$ asymptotically tends to 0.

The expected gain of the large shareholder can still be written as:

$$E(G_S) = \left[X_H \lambda e_S^H + X_L (1-\lambda) e_S^L\right] + \frac{\varepsilon_S^2}{2}$$

Note that $E(G_S) = \alpha X \overline{e}_S = \alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L]$ when $B = 0$, while $E(G_S) = 1/2 - x$ with $x$ arbitrarily small when $B \to \infty$.

Deriving the above expression with respect to $B$, we still obtain:

$$\frac{\partial E(G_S)}{\partial B} = \alpha \left[X_H \lambda \frac{\partial e_S^H}{\partial B} + X_L (1-\lambda) \frac{\partial e_S^L}{\partial B}\right] + \varepsilon_S \frac{\partial \varepsilon_S}{\partial B} =$$

$$\frac{Z}{(1+BZ)^2} \left\{-\alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L] + \varepsilon_S\right\}$$

Hence:

for $\alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L] \geq 1$, $\frac{\partial E(G_S)}{\partial B}$ is negative independently of the value of $B$, implying that $E(G_S)$ is continuously decreasing from

$\alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L]$ for $B = 0$ to $1/2 - x$ for $B \to \infty$.

for $\alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L] < 1$, $\frac{\partial E(G_S)}{\partial B}$ is negative for

$\varepsilon_S < \alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L]$ and positive for higher values of $\varepsilon_S$, implying that $E(G_S)$ is first continuously decreasing (starting from $\alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L]$ for $B = 0$) and then continuously increasing as $\varepsilon_S$ approaches 1, up to $1/2 - x$ for $B \to \infty$.

As a consequence, $E(G_S)$ is maximized for $B = 0$ if $\alpha [X_H \lambda Z_H + X_L (1-\lambda) Z_L] \geq 1$ and for $B \to \infty$ otherwise.

We know that for $B = 0$ $E(G_D) > E(G_S)$. Hence $\hat{B}$ exists only when $E(G_D) < 1/2$ and $E(G_S)$ is maximized for $B \to \infty$.