Bottom-Up Corporate Governance*

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Abstract

In many instances, "independently minded" top ranking executives can impose strong discipline on their CEO, even though they are formally under his authority. This paper argues that the use of such a disciplining mechanism is a key feature of good corporate governance.

First, we provide robust empirical evidence consistent with the fact that firms with good internal governance are more efficiently run. We empirically label as "independent from the CEO" a top executive who joined the firm *before* the current CEO was appointed. In a very robust way, firms with a smaller fraction of independent executives tend to exhibit a higher level of managerial slack and a lower level of profitability. The positive relation between internal governance and corporate performance is most pronounced in high uncertainty industries. These results are unaffected when we control for traditional governance measures like board independence or other well-studied shareholder friendly provisions.

Secondly, we propose a theory to derive normative implications from our findings. In our model, top executives differ from outsiders only to the extent that they are the ones who implement the CEO's strategy; they do not have an informational advantage over shareholders. Top executives may have beliefs that differ from the CEO's: thus, in order to get his strategy implemented, the CEO needs to pay attention to their expected reactions. In equilibrium, some disagreement has the benefit of preventing bad projects from being implemented. The cost of disagreement is that it reduces top executives' incentives. Two implications of this model are (1) that one of the roles of the board of director should be to design the degree of consensus within the firm and (2) that executive independence matters *more* when CEOs hold more private information.

1 Introduction

Academics and practitioners have known for long that in the absence of tight monitoring, CEOs of large publicly held firms may take actions that are detrimental to their shareholders: they commit the firm's resources to value destroying "pet" projects,

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build unprofitable empires, prevent valuable takeovers from happening, or even, in some rare yet highly publicized instances, engage in fraudulent window dressing or asset tunneling. To set up counter-powers to the CEO, the consensus among practitioners and regulators has been to rely on a strong board of directors, independent from the management. In many countries, informal codes of corporate governance have been recommending the appointment of independent directors for more than a decade; and many large firms have been eager to comply with their guidelines.[1] In the US, the recent wave of corporate scandals has triggered a stronger regulatory response, making the hiring of independent directors mandatory for firms listed on the major stock exchanges.[2]

Unfortunately, the findings of the academic literature regarding the efficiency of independent boards are mixed. To be fair, independent boards of directors seem to pay more attention to corporate performance when it comes to CEO turnover (Weisbach (1988), Dahya, Mc Connel and Travlos (2002)). Also, there is some limited evidence that the stock market hails the appointment of independent directors with small abnormal returns (Rosenstein and Wyatt (1990)). The main problem is, however, that there is no evidence that independent boards improve profitability or even the value of corporate assets.[3]

As a result, corporate governance scholars have recently shifted their attention away from board composition towards other dimensions of corporate governance apparent in executive compensation, corporate charters, bylaws or in state takeover laws. The main finding of this literature is that investor-friendly corporate governance provisions boost the price of firms' assets by making them more vulnerable to takeovers (Gompers, Ishii and Metrick (2003), Cremers, Nair and John (2005)).[4] In fact, corporate governance provisions in charters, bylaws and corporate law seem to matter *only* to the extent that they allow shareholders to cash in takeover premia (Bebchuk and Cohen (2004)). Apart from increasing vulnerability to takeovers, they seem to have no effect on actual

[1]For instance, the Cadbury Report issued in the UK in 1992 recommends that "the majority of non-executives on a board should be independent of the company" . The 1998 " Viénot II" Report in France proposes that "independent directors should account for at least one-third of the Board of Directors". Compliance with these guidelines was not mandatory, but widespread. For instance, by 1996, more than 50% of the UK firms surveyed by Dahya, Mc Connel and Travlos (2002) claimed to comply with the Cadbury Report recommendations.

[2]The NYSE and the NASDAQ require since 2003 a majority of independent directors on the board of companies listed on their exchanges.

[3]In fact, the correlation might even be negative. A likely reason for this is that poorly performing firms tend to appoint more outside director (Kaplan and Minton 1994). Filtering this endogenity out yields no apparent correlation between profitability and board independence. (Baghat and Black (2003), Hermalin and Weisbach (2003)

[4]Gompers, Ishii and Metrick (2003) show that investor friendly firms have largely outperformed the market in the 1990s, and that the price of these firms' assets is larger. Bebchuk and Cohen (2004) show that the corporate governance provision that matters most is the presence of a staggered (classified) board. When the firm has such a board, it may take several years for a potential acquirer to gain control of the board; therefore classified boards deter takeovers. Cremers, Nair and John (2005) have indeed evidence that abnormal returns to investor-friendly corporate governance provisions are concentrated on firms vulnerable to takeovers.

corporate performance.[5] [6]

This paper suggests another way to measure corporate governance at the firm level. We start with the following hypothesis: in well governed firms, top executives are able to challenge and discipline CEO decision making, even though they are formally under his authority. As it turns out, an index of good "internal" governance based on this hypothesis is strongly (and positively) correlated with corporate performance in US data.

Our interpretation of this fact is the following: Subordinates may disagree with their CEO and as a result may cut down effort. Such a need to obtain the top executives' agreement acts as a disciplining device on the CEO and prevents him from undertaking controversial actions. Hence, disagreeing subordinates provide a very effective monitoring. The normative implication of this is that a crucial role of the board of directors is to design the degree of subordinates' independence from the CEO, rather than to engaging in hyper active direct monitoring.

The first part of this paper is empirical and provides robust evidence that firms with good internal governance are more profitable. On a panel of US listed corporations, we define our index of internal governance as the fraction of top ranking executives who joined the firm *before* the current CEO was appointed. Our underlying hypothesis is that the CEO is always involved in the appointment process of top executives, who will thus (1) share the same beliefs and/or (2) have an incentive to "return the favor". Therefore, we believe that our index captures the potential disagreement between executives and the CEO.

First, we find this index to be robustly and strongly correlated with various profitability measures (return on assets, on equity, market to book value of assets). Secondly, consistently with the corporate governance role of subordinates, we find managerial slack, as proxied through cash holdings, M&A activity, executive compensation or CEO turnover, to be lower in organizations where executives joined the firm before the CEO was appointed. Also, we find that internal corporate governance is more strongly correlated with performance for firms evolving in uncertain environments, where the information asymmetry between the CEO and the shareholders is likely to be the largest. Third, these findings are not affected when we control for traditional, "external" corporate governance measures (based on board independence or the takeover-related corporate governance index built by Gompers, Ishii and Metrick (2003)). One reason for this is that, in our sample, there is no clear correlation between external and internal governance. A second reason is that, as mentioned above, external governance is, *per se*, uncorrelated with firm performance, in our sample as well as in

[5] The only corporate governance provision that seems to affect corporate performance in a statistically meaningful way seems to be takeover laws. Using changes in state level takeover laws, Bertrand and Mullainathan (1999b,1999a,2003) find that decreased takeover vulnerability results in higher executive compensation, lower plant productivity, slower reactivity to industry shocks and higher wages.

[6] One possible reason for this apparent paradox is that corporate governance matters in extreme circumstances only. In well governed firms, corporate crises are dealt with in a quicker and more efficient way and obviously harmful acquisitions have more chance to be stopped; But because of the rarity of these events, the benefits of sound governance will not appear in average performance measures. In such a view, apart during corporate crises, it is not realistic to ask outside directors to monitor the management. Because meetings are rare and short, the board monitoring "technology" would mostly be suited to prevent catastrophes, and less apt to improve day to day management.

previous studies.

Hence, unrelated subordinates are associated with reduced CEO slack and improved overall profitability, particularly so in uncertain industries. Our interpretation is that unrelated executives are in a position to discipline the CEO. A possible reason could be that subordinates are simply more informed about the firm. The problem with independent directors would thus not be their independence from the CEO, which is a good thing in itself, but their ignorance of corporate matters. After all, information asymmetry between corporate insiders and outsiders is the leading paradigm prevailing in the corporate finance literature since at least Jensen and Meckling (1976) and Myers and Majluf (1984). If this was true, the solution to the corporate governance problem would simply be to provide independent directors with more information. Many practical recommendations have been going in this direction (since at least Lipton and Lorsch (1992)).

Yet there are reasons to believe that feeding outside directors with more information may not work. First, since director will never be a full-time job, the information asymmetry will always remain simply because information processing takes time even for talented individuals. Secondly, although there is little variation between firms in the amount of information received by directors, the existing evidence suggests that directors who meet more frequently, or directors who have more time to spend on preparing those meetings do not significantly improve the firm's operations.[7] In our sample, the share of former employees, who are likely to be better informed about the company's internal workings than purely independent directors is uncorrelated with corporate performance.

To study the normative implications of our empirical findings, we therefore start from a different hypothesis: It is the very fact that top executives receive orders from the CEO rather than a direct informational advantage of insiders over outsiders, that creates the possibility of efficient internal governance. Subordinates are by definition in charge of implementing strategies decided by the CEO. When top executives do not believe in the CEO's strategy choice, they will put in less effort. When executives are "independently minded" about what strategy is optimal, the CEO faces a tension between (1) choosing a project the executives like to obtain their full cooperation, and (2) ordering what he thinks is the right decision to make, at the potential cost of lower executive enthusiasm. The more independent executives' opinions are from the CEO's, the more they act as counter-powers by "evening out" extreme CEO prior beliefs, but the less incentives they have on average (much as in Van Den Steen (2004)).

In the context of this trade-off, what are the industries in which firms should rely more on "bottom-up governance" ? Intuitively, when we look at industries where the CEO has a strong informational advantage, or where his input is more crucial and difficult to assess, it should be optimal to hand him/her more power, not less. Our theory

[7] For example, Vafeas (1999) finds a negative cross sectional correlation between corporate performance and the frequency of board meetings. Abnormally frequent board meetings occur in response to a drop in performance and are in general followed a modest rebound in profitability, but this is more consistent with mean reversion than real board effectiveness.

In addition, a sizeable US literature on multi-directors (who hold several seats) or CEO-directors (who are CEOs of other firms) finds no evidence that these "busy" directors are less efficient at performing their tasks (see for instance, Ferris, Jagannathan and Pritchard (2004)).

suggests precisely the contrary. It is precisely when the informational advantage of the CEO is high, that bottom-up governance, that is, "independently minded" executives, matters. This result arises when we analyze the communication equilibrium of a game where the executives try to infer to what extent the CEO's order arises from his initial bias or from his private information. When the degree of information asymmetry between the CEO and the other parties (executives and shareholders) is large, disagreement improves the reactivity of the firm to new information.[8]

The normative implications of our analysis are twofold. First, CEO discipline is not only enforced by the threat of hostile takeovers or board monitoring, but also from the potential dissent of top executives with the CEO. This "bottom-up" monitoring is more likely to discipline management on a day-to-day basis. The good news from our statistical analysis is that the intensity of such internal governance can be at least partly observed and could be included in the various indexes of the quality of a firm's corporate governance. Second, "external governance" still matters a great deal, but the crucial role of the board also consists of optimizing the balance of powers within the firm, instead of closely monitoring the management. The human resource role of the board is not limited to the usually emphasized CEO succession problem: The board has to properly manage the mix of various influences within the firm.

The rest of the paper has three sections: section 2 looks at the empirical evidence of internal corporate governance. Section 3 describes our theoretical analysis. Section 4 concludes

2 Empirical Evidence

This section empirically explores the idea that good internal governance reduces CEO slack and improves performance. Our analysis rests on our measure of internal governance, which we compute as the fraction of top executives that joined the company before the CEO was appointed for the job. We believe that this measure captures the extent to which top executives have been hired by the CEO personally, albeit in a noisy way.

We first describe our dataset, and then move to our presentation of the empirical evidence in favor of the internal governance. We also discuss some of the limitations of our statistical approach; compared to existing evidence on "external" corporate governance, we believe however that our case for internal governance is not weaker.

2.1 Data and Measurement Issues

We use three datasets. The first dataset is EXECUCOMP, which provides details on CEOs and (at least) the five best paid executives in the firm for some 2,000 firms each

[8] In contrast to Dessein (2002), organizational diversity, instead of homogeneity, improves communication in our model of firm organization. The main difference between Dessein's model and ours is in the allocation authority. In Dessein's model, both CEO and subordinates propose a course of action. Hence, divergence in opinion reduces the ability of both parties to communicate. In our model, the subordinate *has* to implement the order given by the CEO; he cannot propose another project. Hence, divergence in opinion is included in the CEO's objective, and help him to "change his mind" more often and therefore be more reactive to the signal.

year between 1994 and 2002 (totalling 21,732 observation for which the CEO's salary is non missing). From this dataset, we extract the CEO's compensation (including salary, bonus and option grants), the executives' seniorities in the firm and the CEO's tenure as top ranking officer. We posit that an executive is *aligned* with the CEO when his seniority within the firm is smaller than the CEO's tenure as CEO of the firm. We then collapse the dataset at the firm-year level and use the fraction of executives hired *after* the CEO was appointed as our measure of CEO/executive alignment. We call this the fraction of *aligned* executives.

For each firm year, we then retrieve firm level accounting information from COMPUSTAT (we lose 165 observations in the merging process). We compute profitability as return on assets (ROA), return on equity (ROE). We construct Market to Book as the ratio of the firm's assets market value to their book value, as in Gompers, Ishii and Metrick (2003). We compute free cash as the share of cash holdings in total liabilities. We proxy firm size by log(total assets). We proxy firm age by taking the difference between the current year and the first year of presence in the COMPUSTAT panel. We construct the 48 Fama-French industry dummies using the firm's 4 digit SIC industry code. We construct an M&A dummy using the footnotes collected in COMPUSTAT. Variables constructions are presented in detail in appendix.

Last, we gather information on corporate governance from IRRC's corporate governance and directors dataset. This dataset provides us with commonly used proxies for corporate governance. We use this dataset to compute the fraction of independent directors, the number of directors sitting on the board and the fraction of former employees sitting on the board. These variables are available for the 1996-2001 period only. We also collect, for the firms present in our sample, Gompers, Ishii and Metrick's (hereafter GIM) index of corporate governance, which compiles various corporate governance provisions included in the CEO's compensation package, in the corporate charter and the board structure. the GIM index is available for 1990,1993,1995,1998 and 2001. In other years, we assume that it takes the value that it had in the most recent year when it was non missing.

All in all, we end up with 12,476 observations spread over 1993-2003, for which the share of related top executives, as well as well as accounting data from COMPUSTAT are available. We lose almost 50% of the observations because in many cases, the executives' seniorities are missing, which prevents us from computing the share of related executives. Including the GIM index of corporate further reduces the sample size, since it was computed for the largest firms. When we require accounting data, related executive fraction and the GIM governance index to be simultaneously non-missing, our sample size is down to 6,764 observations. Finally, note that the sample size may vary a little from regression to regression because all ratios (ROA, ROE, Market to Book) have been windsorized..

2.2 Internal Governance and Corporate Performance

The crux of our empirical approach is our proxy for "internal governance", which we define as the fraction of top executives who joined the company after the CEO began his tenure. The underlying assumption is that the CEO is directly or indirectly involved in the recruitment process of top executives. Hence, executives appointed during his

leadership are more likely to be loyal to him and share his beliefs than executives who were picked by his/her predecessor.

Notice that such a measure is noisy: most top executives have not joined the company at this level, so we will include in our pool of "independent" top executives employees who were recruited a long time ago, but who were promoted by the current CEO. This is likely to bias our estimates downwards. Another way to address this critique is to use the past employment history of executives from COMPUSTAT, and see when they enter the panel - which is the date at which they enter the group of the best paid executives surveyed by EXECUCOMP. We can then compute the share of executives whose tenure in the EXECUCOMP panel and within the firm exceeds the CEO's tenure as CEO. Using this alternative measure, we show that results very similar in terms of size and significant to those reported in tables 1 and 2 (see below) obtain. The only problem with this approach is that we have to restrict ourselves to firms for which at least one CEO turnover has been observed during the period. This biases sample composition towards the end of the period and firms who have experienced a turnover, so we merely view these alternative estimates as robustness checks.

We start with investigating the correlation between internal governance and corporate performance. To do this, we run the following regression:

$$Y_{it} = \alpha + \beta IG_{it-1} + controls_{it} + \varepsilon_{it} \tag{1}$$

where IG_{it-1} is our measure of internal governance, lagged one period. *Note that it is larger when internal governance is poorer*. One easily addressed problem is that IG_{it} is likely to be larger when the CEO or the executives have served longer in the firm. Since these variables may directly affect corporate performance, we include (1) the CEO's tenure as CEO and (2) the executives' average seniority within the firm as controls. Other controls are log(firm age), sales growth, log(assets), year and 48 Fama French industry dummies. These controls are also likely to directly affect the degree of internal governance: fast growing firms, young firms, small firms are likely to be the ones where new executives are frequently appointed; hence, for a given CEO tenure, this automatically increase our index of weak internal governance. For skeptical readers however, we include estimates with and without these controls. Since we have several observations per firm, it is very likely that the ε_{it} are not independent within each firm *i*. Hence, we allow the residuals to be correlated for observations of a given firm. Finally, the corporate performance measures that we look at are return on equity and return on assets.

Regression results are gathered in table 1. Column 1 to 3 use ROA as dependent variable in equation (1); columns 4 to 6 use ROE as left hand side variable. One standard deviation increase in our "internal governance weakness" measure results in a decrease of about 1 percentage point of ROA and 1.2 percentage point of ROE. This effect is not very large, but, as we will see, it is consistently significant and easily beats usual "external" corporate governance measures. Table 8 in appendix repeats the regressions of table 1, but looking at the market valuation of assets: unsurprisingly, the market valuation of assets is lower for firms with weak internal governance, once we control for plausible determinants of internal governance.

We first check the robustness of this correlation by looking at estimates of (1) for various years, from 1995 to 2002, and by computing Fama McBeth estimates. Again,

the correlation is consistently negative for both corporate performance measures across years. In the case of the ROA, it is significant for 7 out of 8 cross sections, with a coefficient between 4 and 6, except for 2002. In the case of the ROE, most of the significance is concentrated in the first part of the period, and the coefficients look slightly more volatile.

There are many stories consistent with the relation found in tables 1 and 2. Obviously, strong internal governance could be a way for the shareholder to "hold the CEO on a tight leash" and keep the firm away from undertaking crazy projects or empire building. One could, however, argue the causality runs in the opposite direction. In most firms, poor performance trigger a change in the management team; when the situation is critical, the newly appointed CEO has enough bargaining power to progressively dispose of all the members of the previous management team. Or alternatively, all management team, not just the CEO, is considered as responsible for the firm's poor performance (Hayes, Oyer and Schaefer (2005) provide evidence of this). If this happens, internal governance as we measure it weakens. This induces a negative cross section correlation between corporate performance and internal governance.

While we have no "smoking gun" to assess the causal relationship between internal governance and corporate performance, we can at least take preliminary steps to reduce the likelihood of "management team turnover" story by looking at the joint dynamics of internal governance and corporate performance. Do changes in corporate performance happen before, or after changes in internal governance ? To see this, we run the following two regressions:

$$Y_{it} = \alpha + \beta IG_{it-1} + \gamma Y_{it-1} + controls_{it} + \varepsilon_{it} \quad (2)$$

$$IG_{it} = a + bIG_{it-1} + cY_{it-1} + controls_{it} + \varepsilon_{it} \quad (3)$$

where Y_{it} is the firm's corporate performance at date t. If changes in corporate performance tend to happen *before*, we should not be able to reject that $c > 0$ and $\gamma = 0$. Such a test can be thought of as the panel data version of causality tests a la Granger in times series analysis.

Estimates of equations (2)-(3) are reported in table 3; the first two columns report estimates with industry and year dummies as only controls, while columns 3 and 4 also control for executive and CEO seniorities, as well as firm size. Results suggest that in general changes in internal governance happen *before* changes in corporate performance. Of course, this does not completely rule out the possibility that overall management turnover occurs in response to an expectation of *future* bad performance. Also, other stories remain possible, like for example exogenous events causing both bad performance and overall management turnover. Without a proper instrument, we cannot completely address this critique. We take evidence from table 3 as merely suggestive that weak internal governance reduces firm performance.

If strong internal governance acts as a disciplining mechanism on the CEO, we would expect measures of apparent managerial slack to be smaller in the presence of "independent" executives. We provide evidence consistent with this in table 4, where we estimate equations defined as:

$$Z_{it} = \alpha + \beta IG_{it-1} + controls_{it} + \varepsilon_{it} \quad (4)$$

where Z_{it} are various measures of managerial slack: a dummy variable equal to 1 in case of an upcoming CEO turnover (column 1), a dummy variable equal to 1 in case of a significant acquisition (column 2), the cash holding to assets ratio (column 3) and log(Total CEO compensation), including option grants in column 4. As in previous specifications, we include firm size, CEO and executive seniorities, year and industry dummies as controls in all these regressions. As firm profitability and asset values are also determinants of CEO turnover, the probability of making an acquisition, cash holdings and CEO compensation, we also include these variables as controls.

As it turns out, results from table 4 are consistent with managerial slack being higher in weak internal governance firms. The economic magnitudes of the effects are, however, small. A one standard deviation increase in internal governance increases the probability of CEO turnover by 1 percentage point (one thirtieth of this variable's standard deviation) and reduces the probability of an acquisition by 1.5 ppoint (one thirtieth of this variable's standard deviation).

2.3 External Versus Internal Governance

The evidence that we have gathered so far suggests a strong correlation between internal governance and accounting profitability; the dynamics of this correlation is more consistent with internal governance causing better performance than the opposite. As it turns out, firms with weak internal governance also tend to be those where managerial slack is significantly larger, though the magnitude of the correlation is small.

One possible story consistent with such evidence is that we are proxying for corporate governance in the "traditional" sense: firms with weak shareholders, weak boards and imperial CEOs are the ones where the CEO has all the power to appoint faithful executives. Hence, a well entrenched CEOs is more likely to replace executives who do not show enough loyalty and our measure of internal governance goes up. At the same time, weak boards have no mean to oppose large compensation packages, frequent acquisitions, the accumulation of cash pile in the balance sheet. Corporate performance decreases.

This alternative story puts external governance to the fore: when corporate governance is bad, the firm performs less well, and most executives are more junior than the CEO. If this were true, however, the existing literature on "external" governance would have had no trouble in finding a positive statistical relation between corporate performance and any measure of governance quality. As it turns out however, existing contribution have repeatedly failed to find a positive correlation between the share of outsiders in the board and profitability (see Baghat and Black (2003) and also Hermalin and Weisbach (2003) for a survey). Using corporate charter based measures of governance, Gompers, Ishii and Metrick (2003) do not find a consistent correlation between investor friendly firm level institutions and operating performance. Thus, the available evidence casts doubts on internal governance being a proxy of external governance in our regressions.

To investigate the issue further, we look at the correlation between our measure of internal governance and some measures of "external" governance that are usually used in the literature. To do this, we regress our internal governance proxy on (1) the Gompers-Ishii-Metrick index of governance (hereafter GIM, available from Andrew

Metrick's homepage), which takes large values for management-friendly corporate charters, (2) the size of the board (the number of directors), (3) the share of directors who are currently employees of the firm and (4) the share of past employees of the firm.

The results of these regressions, controlling for CEO and executive seniorities as well as firm size are reported in table 5. As it turns out, our index is not correlated at all with the charter based GIM index. Indices based on board composition have stronger and more significant correlations, but in the direction opposite to what the "external governance" story would predict ! Firms with larger board - which Yermack (1996) views as inefficient - tend to have better internal governance. Firms with more past or current employees on the board also have better internal governance. None of these results are consistent with internal governance being a proxy of external governance. One plausible interpretation along the line of our "internal governance matters" hypothesis is the following. The peculiarity of these board members is their intimate knowledge of human capital and power struggles within the firm. Insiders or ex-insiders sitting on the board have enough information about the competence of executives within the firm to prevent the CEO from arbitrarily putting aligned executives at a majority of the key-positions. By preventing the CEO from nominating new executives, they enforce a high level of internal governance.

To confirm the above analysis, table 6 gathers new estimates of equation (1) including external governance measures as further controls. In 5 out of 6 specifications, external corporate governance is not significantly correlated with accounting performance measures, whether we control for internal governance (reported results) or not (unreported, but available from the authors upon request).

Table 9 in appendix re-runs the same regressions using market to book as the dependent variables: as it turns out, board size and the GIM index are both negatively and significantly correlated with market value of assets, in a way fully consistent with Yermack (1996) and Gompers et al. (2003). The correlation however vanishes once we include our internal governance index in the regression, however.

2.4 Information Asymmetry and Internal Governance

We end our investigation by asking when corporate governance is most useful. It is likely that the need for good governance, in particular good internal governance, be higher when the degree of asymmetric information between the CEO and the shareholders is larger.

To test this, we estimate the following modified version of (1):

$$Y_{it} = \alpha + \beta.AI_i \times IG_{it-1} + \gamma.AI_i + \mu.IG_{it-1} + controls_{it} + \varepsilon_{it} \quad (5)$$

where AI_i is a measure of the information asymmetry surrounding the decisions that the CEO has to make. We expect β to be negative if internal governance matters more in asymmetric information environments (recall that IG_{it} is larger when internal governance is weaker).

Table 7 reports the regression results of such equation using 4 different proxies for information asymmetry. In column 1, it is measured by the firm being in an industry

whose average Q is above median in 1993. In column 2, we look at industries whose cross sectional dispersion of ROA is higher than the median in 1993. Column 3 looks at R&D intensive industry (again, in 1993) and column 4 looks at industries whose average stock return volatility is above median in 1993.[9] We assume that these measures of uncertainty also proxy for the amount of information asymmetry: everybody knows what to do when uncertainty is low.

The results reported in table 7 provide the consistent view that internal governance matters *only* when firms are operating in more volatile environment. For firms operating under low uncertainty, internal governance is not correlated with corporate performance (μ is not significantly different from zero). All the effect is concentrated on firms operating in uncertain environments.

3 A Model of Internal Governance.

We now study the normative implications of our empirical findings. As stated in the introduction, a natural interpretation since at least Lipton and Lorsch (1992) is that independent directors lack the information that subordinates have. The normative implication of such a model is to provide more information to independent directors.

We show here that there is an alternative interpretation of our results. Top executives implement the CEO's strategy. It is the fact of having to do this that gives executives power over the CEO. When executives and the CEO disagree, the CEO has to incorporate his executives' beliefs into his strategy choice and orders, for if he does not do it, executives are likely to lack enthusiasm and put in too little implementation effort. Disagreement is good, in that it compels the CEO to "average" his own beliefs with those of his executives. Decision making is biased, at the cost of reduced incentives. This section fleshes out this intuition.

The intuition

The main intuition of our model is as follows. Assume that the manager of a firm receives a private signal on which project the firm should pursue. When the information is opposite to his initial prior, the manager of a homogeneous organization under-reacts to the signal. He does so more than in a diverse organization because he overvalues the marginal value of his (aligned) workers effort or in other words overestimates the opportunity cost of "disappointing" them. On the contrary, in an organization with diverse executives, the manager has lower incentives to lie as he ignores the project the executives believe in. Therefore, diversity of opinions inside the firm makes the reaction to negative information more efficient.

On the other hand, having executives with diverse opinions does not come without cost. Diverse organizations are more prone to disagreements among the management team over the project to implement, leading to a lower level of expected effort (Van den Steen (2004)).

[9] Volatility is computed at the firm level by taking the stock return volatility over 60 months before the end of fiscal year 1993.

This trade-off between reactivity to new information and incentives crucially depends on the precision of the private information detained by the manager. When information accurate enough, the value of reactivity for the shareholder is high and therefore diversity tends to be the optimal organizational form because of the value of "bottom-up governance".

3.1 Timeline and assumptions

The organization

We model "internal governance" using as a building-block the theory of managerial vision developped by Van den Steen (2004). A shareholder chooses the organizational form of a firm composed of a manager and an executive. The shareholder is the owner of the organization and has formal authority over the organizational design of the organization. The manager is the decision-maker: he has formal authority over which project the organization should pursue. The executive is the performer: he receives an order from the manager and implements it.

Project structure

The organization faces two projects, namely project A and B. There are two states of the world (which we also call A and B). In state of the world i, project i is successful for sure whereas project j is doomed to failure. The common ex-ante prior is that both projects are equally likely. Once hired though, the manager and the executives will form an opinion regarding what the true state of the world is. **We assume that these probabilities are drawn from $\{1-\mu,\mu\}$ with probability $\left\{\frac{1}{2}\right\}$, and $\mu \geq \frac{1}{2}$.** The success of a project gives a payoff R to the shareholders and γ_m (resp γ_e) to the manager (resp. the executives) ; failure brings zero to the three agents.

The timeline

The timeline of the model is the following (and as represented in figure 1):

- At time 0, the shareholder chooses an organizational form: homogeneous or diverse (internal governance). He also hires a manager and an executive.
- At time 1, the beliefs of the manager are drawn. They are either $\mu \geq \frac{1}{2}$ with probability $\frac{1}{2}$ or $1-\mu$ with probability $\frac{1}{2}$: μ can be interpreted as the scope for potential disagreement in the industry.
  - If the organization is homogeneous, the beliefs of the executives comes from the same draw.
  - If the organization is diverse, the beliefs of the executives are drawn independently.
- At time 2, a signal $\sigma \in \{\text{"}A\text{"},\text{"}B\text{"}\}$ is privately observed by the manager who updates his priors according to Baye's law.

- At time 3, the subordinate receives the order from the manager to do either project A or B and he discovers the effort cost $e \sim U[0,1]$. He then chooses whether to perform the effort or shirk.

Informational Assumptions

1. We assume that the structure of the signal is common information. More precisely, everyone know the precision α of the signal, *alpha* being defined as:

$$\mathbf{P}[\sigma = \text{“}A\text{”}|A] = \mathbf{P}[\sigma = \text{“}B\text{”}|B] = \alpha \geq \frac{1}{2}$$

2. We assume that the signal σ is private information to the manager. We support this assumption for two reasons. First, it seems natural to give a particular role to the manager: we think it is safe to assume that he may have some technological advantage in screening the states of the world. Second, assume that the signal was also observed by the executive. Then, it would not be very difficult for the shareholder to design a mechanism extracting the true value of the signal (see e.g. Moore (1992)): communication would then no longer be an issue and our governance mechanism would therefore be useless.

3. We assume that the beliefs of both manager and executive are not observable by the shareholder, but the project undertaken by the manager is public information. This is also a crucial assumption as relaxing it would allow the shareholder to discover the nature of the signal for some parameters and would once again minimize the role played by communication in our model.

3.2 Analysis of the equilibria

We begin this section by defining the equilibrium concept used to solve the model (see Fudenberg and Tirole (1991) for details).

Definition 1 *A perfect Bayesian equilibrium of the game is defined by an order function O:* $\{\sigma, \mu\} \mapsto \{\text{“}A\text{”}, \text{“}B\text{”}\}$ *and a belief function b:* $\{O(\{\sigma, \mu\}), \mu'\} \mapsto \mathbb{R}^2$ *of the executive, such that, conditional on the beliefs function of the executive, the order O given by the manager is individually rational.*

As a benchmark, consider the case where both the manager and the executive subordinate hold unbiased initial beliefs ($\mu = 1/2$) about the state of the world. The signal then dictates what the manager should order: there is no motive for the manager to conceal information to his subordinate. The situation changes when beliefs are biased for two reasons: first, the initial bias of the manager might be strong enough to prevent him changing his mind about which the preferable project is ; second, in a homogeneous organization, the manager is certain about the executive's opinion and therefore

internalizes the effect of its order on the executive's beliefs and therefore effort. However, because of his optimism, he tends to overweight the option value of preserving the executive's initial belief. This particular effect is at the core of the communication advantage of diverse organization: in such organizations, the manager can only imperfectly take account of the participation constraint of the executive as he ignores his exact belief. Moreover, orders of the managers have less of an impact on the executive's beliefs, as he does not know if they are due to the manager's initial priors or to the intermediate signal.

We now turn to the determination of equilibria. For each type of organization and each $\{\mu,\alpha\} \in \left[\frac{1}{2},1\right]^2$, we characterize the unique Bayesian equilibrium.

3.2.1 Equilibrium in the homogeneous organization

We begin by analyzing the case of a homogeneous organization, where the manager and the executive share the same belief on the state of nature, and both know that their beliefs are identical. The equilibrium is determined in the following proposition:

Proposition 2 *In a homogeneous organization, and for each $\alpha \in \left[\frac{1}{2},1\right]$, there exist two thresholds $\mu^\star(\alpha) < \mu^{\star\star}(\alpha)$, such that the unique Bayesian equilibrium depends on the relative value of the initial prior μ with respect to the thresholds:*

1. *When $\mu \in \left[\frac{1}{2},\mu^\star(\alpha)\right]$, the equilibrium is fully revealing: the manager always stick to the signal and the executive knows that the order reflects the true content of the signal. We call this region the communication region.*

2. *When $\mu \in [\mu^\star(\alpha),\mu^{\star\star}(\alpha)]$, the manager adopts a mixed strategy that imperfectly reveals the content of the signal. More precisely, if the manager is biased toward action A, he will react to a signal "B" by ordering randomly action A or B. Communication is thus "scrambled" in this region.*

3. *For $\mu \in [\mu^{\star\star}(\alpha),1]$, the manager does not react on a signal conflicting his opinion: this is the no-communication region.*

We can derive the intuitions from the different regions of equilibrium:

- If the initial prior is high enough (the manager and the executive are very biased toward action *A*), the manager will never want to revise his opinion, even if he faces a negative signal ($S =$ "*B*"). Therefore the order is completely uninformative for the executive who stick to their initial belief.

- If the initial prior is close enough to $\frac{1}{2}$, the manager has "weak" preferences over an action. Therefore, he is more likely to revise its opinion when confronted with a conflicting signal. As the executive observes manager's belief, he knows that it is individually rational for him to be "sincere". Thus, in that zone, the reactivity to the signal is efficient and the order fully reveals to the employee the signal that the manager received.

- There is an intermediate zone: by playing one of the pure strategy mentioned above, the manager would always want to deviate (when facing a conflicting signal, he does not want to tell the truth because he has too strong an opinion, but he also does not want to fully lie because he has too weak an opinion). Therefore, the only bayesian equilibrium is for him to randomly lie when facing a conflicting signal.

Proof. See appendix E ■

To understand the nature of this equilibrium, it is important to see how the CEO's decision differs from what the shareholder would order if he had the CEO's information:

Proposition 3 *at the neighborhood of $\mu = \mu^\star$, an unbiased decision maker in possession of the CEO's information would strictly prefer to order B if the signal is B. In other words, there is under-reaction to contrarian news in this equilibrium..*

The fact that the CEO internalizes the impact of his order on managerial beliefs and therefore effort is not inefficient per se (this effect should be part of the efficient decision). The inefficiency stems from the fact that due to his initial bias, the CEO overestimates the option value of not disappointing the manager. Consider the decision of a $\mu-$manager facing a contrarian signal B in the zone where there is reactivity. Then, by ordering action B, the manager reveals that the signal is B, triggering a revision of beliefs by the executive. More precisely, he is now convinced that the signal was "B", and therefore believes that the probability of the state being B is $\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}$.

Therefore, the manager, by sticking to the equilibrium strategy, expects a payoff:

$$U^1 = \underbrace{\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}}_{\text{probability of success}}\gamma_m \underbrace{\left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\gamma_e\right)}_{\text{expected effort of executives}}$$

This is *smaller* than the objective payoff:

$$U^1_{obj} = \underbrace{\alpha}_{\textit{true}\text{ probability of success}} \gamma_m \underbrace{\left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\gamma_e\right)}_{\text{expected effort of executives}}$$

Similarly, if the manager deviates from the equilibrium, ordering A although the signal is "B", he expects a pay-off:

$$U^2 = \underbrace{\frac{\mu(1-\alpha)}{\mu(1-\alpha)+(1-\mu)\alpha}}_{\text{manager's belief that } S=A}\gamma_m \left(\underbrace{\frac{\mu\alpha}{\mu\alpha+(1-\mu)(1-\alpha)}}_{\text{executive belief that } S=A}\gamma_e\right)$$

This is *higher* than the objective payoff of reacting to the signal:

$$U^2 = \underbrace{(1-\alpha)}_{\text{true probability that } S=A} \gamma_m \left(\underbrace{\frac{\mu\alpha}{\mu\alpha+(1-\mu)(1-\alpha)}}_{\text{executive belief that } S=A} \gamma_e \right)$$

It follows than when the manager becomes indifferent between these two strategies ($\mu > \mu^\star$), he under-reacts to the signal compared to the efficient decision.

3.3 Diverse Organization

We now turn to the case of a diverse organization: the manager's and the executive's beliefs come from independent draws. In that case, the manager and the subordinate know imperfectly each other's belief: they only know it has been drawn from $\{\mu, 1-\mu\}$.

The following proposition characterizes the unique Bayesian equilibrium according to the value of μ:

Proposition 4 *In a diverse organization, the unique Bayesian equilibrium is characterized by:*

1. *full communication when* $\mu \in [1-\alpha, \alpha]$,
2. *no communication when* $\mu \in [0, 1-\alpha] \cup [\alpha, 1]$.

The intuition for this result is the following. First, take the perspective of a manager of belief μ who receives a signal B. If $\mu < \alpha$, his posterior is that project B is more likely to be successful. The incentive effect of ordering B vs. A is neutral, since the executive is as likely to be ex-ante pro-B as pro-A. Therefore, the manager orders B. How does the executive interpret the signal ? Whether they are aligned or misaligned (i.e. $\tilde{\mu} = \mu$ or $1-\mu$) the executive knows that the manager is not too extreme ($\max(\mu, 1-\mu) < \alpha$). Therefore, they know that the order directly reflects the signal and update accordingly. When the manager becomes too "extreme", executives know that the signal has no influence on his decision, and therefore draw no inference from the order.

3.4 Comparison

The relative efficiency of the two organizational forms depends on two things: First, the level of effort they implement. Second, the responsiveness of the firm's strategy to new informations: In both organizations, managers tend to under-react to news that come against their initial prior, but this under-reaction is more pronounced in homogeneous organizations. A manager facing managers that share is initial beliefs is more prone to ignore information that recommends a change in strategy. The reason is that he overestimates the cost of the demotivating impact of a change of strategy on his troups. In other words, the conflicting beliefs of executives create a virtuous internal governance pressure: the CEO is more prone to adapt the firm's strategy to new information. This is what the following proposition implies:

Proposition 5 *Diverse organization is always weakly more reactive to information than homogeneous organizations.*

More precisely, there a is a whole range of initial beliefs ($\mu \in [\mu^{\star\star}, \alpha]$) for which the manager is inefficiently unreactive to the signal in a homogeneous organization contrary to a diverse organization:

$$\mu^{\star\star} < \alpha$$

Proof. See annex G ■

This proposition suggests that when reactivity to new information is relatively important, the diverse organization might dominate the homogeneous one. To characterize for what range of parameters this actually happens, we compute the ex-ante organization values, from the shareholder point of view. We remind that a shareholder is *a priori* neutral with regard to project's choice. He therefore only trades off between the two effects that we have already pinned down, namely reactivity vs. incentives. In the computation of firm value, two terms arise: the probability, from the shareholder ex-ante point of view, that the "good" action is undertaken by the manager ; the mean expected effort exerted by the executives. The following lemma provides the detailed value of both type of organization:

Lemma 6 *In a homogeneous organization, the value of the firm can be written as:*

$$V(\mu,\alpha) = \begin{cases} \underbrace{\frac{\alpha\gamma_E R}{2}\left(\frac{\mu\alpha}{\mu\alpha+(1-\mu)(1-\alpha)} + \frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\right)}_{} \text{ if } \mu \in \left[\frac{1}{2}, \mu^{\star}\right] \\ \frac{\gamma_E R}{2}\left(\mu\frac{(\alpha+\rho(\mu)(1-\alpha))^2}{(\mu\alpha+(1-\mu)(1-\alpha))+\rho(\mu)\left(\mu(1-\alpha)+(1-\mu)\alpha\right)} + (1-\rho(\mu))\alpha\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\right) \text{ if } \mu \in [\mu^{\star}, \mu^{\star\star}] \\ \frac{\mu\gamma_E R}{2} \text{ if } \mu \in [\mu^{\star\star}, 1] \end{cases}$$

In a diverse organization, the firm's value is given ex-ante by:

$$V(\mu,\alpha) = \frac{\gamma_E R}{2}\begin{cases} \alpha\left(\frac{\mu\alpha}{\mu\alpha+(1-\mu)(1-\alpha)} + \frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\right) \text{ if } \mu \in \left[\frac{1}{2}, \alpha\right] \\ \frac{1}{2} \text{ if } \mu \in [\alpha, 1] \end{cases}$$

Proof. The proof is direct using the expression of executive's effort determined in the other proofs. One can view how firm values evolve with (α, μ) in figure 3 and 4. ■

We now are in position to compare both type of organization. This is the object of theorem 7:

Theorem 7

1. *for $\mu < \mu^{\star}(\alpha)$, firm values are similar in both type of organization (both are fully reactive to information)*
2. *for $\mu^{\star}(\alpha) < \mu < \alpha$, a diverse organization is reactive and dominates a heterogeneous organization (which is not reactive).*

3. *for $\alpha < \mu < 1$, a homogeneous organization dominates a diverse organization (both are not reactive to contrarian information).*

To understand the comparative statics implied by this proposition, consider the case where we fix the scope-of-disagreement parameter μ to μ^0 and let the signal's precision, α vary. First, when the signal is very precise, there is no failure of reactivity, because in both types of organization, both the manager and the executive are convinced to make up their mind according to the signal. At the same time, the incentives provided in both firms are ex-ante equal: in a homogeneous firms, effort is good if signal confirms the prior (ex-ante probability $\frac{1}{2}$) but only "average" if signal contradicts the prior (ex-ante probability $\frac{1}{2}$) ; in a diverse organization, the executive is aligned with the order (whatever the order) with probability $\frac{1}{2}$ and misaligned also with probability $\frac{1}{2}$. Overall, provision of effort is the same. This situation arises as long as reactivity is perfect in both organization, that is as long as $\mu < \mu^\star(\alpha)$.

Now for some "mean" precision of the signal, reactivity becomes imperfect in homogeneous organization, whereas diversity allows to maintain a perfect reactivity to the signal. The higher ex-ante probability of choosing the appropriate project outweighs the cost in incentives implied by internal governance (as this organization always leaves some scope for misalignment between manager and executive. This intermediate zone corresponds to precision of the signal such that $\mu^0 < \alpha < \mu^{\star -1}(\mu^0)$.

Finally when the signal becomes quite uninformative, the manager is not reactive in both types of organizations. Therefore, the incentives issue becomes crucial. As a homogeneous organization leaves no scope for disagreement with respect to the "good" project to pursue, it will strictly dominates internal governance.

Proof. See Appendix H ■

The following corollary states two direct and intuitive consequences of the theorem:

Corollary 8
1. *If there is no informative content in the signal ($\alpha = \frac{1}{2}$), the optimal organizational design for the manager is to choose an homogeneous organization: incentives being the crucial issue, internal governance is of no help*
2. *There are more frequent "corporate crisis" events (where the subordinate refuses to obey to the order) in diverse than homogeneous organizations.*

If the choice of organization was left to the CEO at time zero, he would be biased towards choosing an aligned executive (compared to the efficient decision. The reason is simple. The CEO, due to his own bias, always overestimates the value of an homogeneous organization (he overweights the probability of not adapting and underestimates the cost of not adapting) and underestimates the value of a diverse organization (he underestimates the value created by adapting to a contrarian signal). We can even make a stronger statement about the cost of delegating organizational choice (i.e. hiring decisions) fully to the CEO: the exist a range of parameters for which the CEO chooses a homogeneous organization, when the optimal choice is diverse. To see this, consider

the right neighborhood of $\mu^\star$: By definition, $\mu^\star$ is the threshold where the CEO is indifferent between adapting to conflicting signals or not. The CEO's ex-ante valuation of organizations is not discontinuous in $\mu^\star$, but the true value is. Since the CEO strictly prefers the homogeneous organization on the left of $\mu^\star$, he will also do so in a right neighborhood of $\mu^\star$, even though the optimal organization is the diverse one.

Proposition 9 *1. The preferences of a CEO are biased towards homogeneous organizations*

2. A CEO to whom organizational; choice is delegated makes the inefficient choice of choosing homogeneity in a right neighborhood of $\mu^\star$

A last proposition, in line with our empirical results deal with the relative volatility of cash-flows in the two types of organization. In our model, the form that dominates has the smallest cash-flow volatility:

Proposition 10 *The coefficient of variation of the cash-flows of the organizational form that dominates is lower than in the other form.*

proof: The expected cash-flow (the value of the firm) is simply : $V = pR$, where p is the ex-ante probability of success of the project that is undertaken. The variance is therefore: $[p(1-p)^2 + (1-p)p^2]R^2 = p(1-p)R^2$. The coefficient of variation is therefore $\left(\frac{1-p}{p}\right)^{1/2}$, which varies inversely of the expected cash-flow value pV.

We view the insight of our model as the following: When there is uncertainty ex-ante about which project is the best for the firm, there is a natural trade-off between the positive "evening-out" effect of diversity of opinions in the organization (extreme views are mitigated) and the "motivation effect" of aligned opinions (such as described by Van den Steen [2004]). Therefore, the stronger the dispersion of beliefs is, the more valuable it is to have internal governance (i.e. diversity) to neutralize the more extreme beliefs a CEO might embrace. However, such a simple intuition is incomplete, and in particular insufficient to make comparative statics statements. Indeed, industries with strong belief dispersion might also be those where the CEO plays a more crucial role, for example by having more private information about the firm's optimal strategy. If the CEO has more input in the firm's success, one might want to give him more power, not less. Our model shows why this last intuition is not right: The more information the CEO has, the more valuable it actually is to rely on "internal governance". The reason is that when the bias of the CEO and his employees are aligned, the reactivity of the CEO to new signals becomes inefficiently lower. In the presence of disagreeing executives, the CEO becomes more prone to change the course of the firm's strategy, which tends to make the diverse organization more efficient.

4 Conclusion

TO BE WRITTEN

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A Tables

Table 1: Accounting Performance and Internal Governance

	Return on Assets			Return on Equity		
	(1)	(2)	(3)	(1)	(2)	(3)
Internal governance	-6.2***	-5.1***	-3.0***	-11.7***	-7.3***	-6.6***
(delayed by 1 year)	(1.0)	(0.9)	(0.8)	(1.6)	(1.6)	(1.5)
Mean executive seniority	-	0.2***	0.1**	-	0.2*	0.1
in the firm ($\times$10 y.)		(0.1)	(0.0)		(0.1)	(0.1)
CEO tenure as CEO	-	1.3***	0.6***	-	1.6***	1.0**
($\times$10 y.)		(0.3)	(0.2)		(0.4)	(0.4)
Log(assets)	-	1.1***	0.8***	-	2.4***	2.2***
		(0.2)	(0.1)		(0.3)	(0.3)
Log(Firm Age+1)	-	-0.4	0.1	-	0.4	1.3***
		(0.3)	(0.2)		(0.5)	(0.5)
Sales Growth	-	7.9***	8.7***	-	9.7***	10.0***
		(0.6)	(0.5)		(1.2)	(1.2)
Initial profitability		-	0.4***	-	-	0.2***
			(0.2)			(0.0)
Year effects	yes	yes	yes	yes	yes	yes
48 Industry effects	yes	yes	yes	yes	yes	yes
Observations	9,721	9,563	9,281	9,664	9,496	9,106

Source: Huber-White-Sandwich estimates, allowing for correlation of all observations of a given firm. "Internal Governance" is the share of EXECUCOMP executives who joined the company after the CEO was appointed. Corporate performance of measured through Return on Assets (first three columns) and through Return on Equity (last three columns). All regressions use log(book assets), year dummies and the 48 Fama French industry dummies. In columns 2 and 5, we add the CEO's tenure as CEO, the executives' average tenure in the firm, log of firm age (as proxied by date of entry in COMPUSTAT) and sales growth as further controls. Columns 3 and 6 also add the firm's profitability computed in its first year of presence in COMPUSTAT after 1991, as a limited attempt to control for firm level unobserved heterogeneity.

Table 2: Accounting Performance and Internal Governance - Robustness

	ROA	ROE
1995	-5.6***	-5.1
	(2.1)	(4.8)
1996	-4.6**	-7.8**
	(2.0)	(3.5)
1997	-6.1***	-9.7***
	(1.8)	(3.7)
1998	-7.7***	-7.9**
	(1.8)	(4.0)
1999	-5.6***	-3.3
	(1.9)	(3.7)
2000	-4.8***	-7.4*
	(1.8)	(4.0)
2001	-6.2***	-7.9**
	(1.8)	(3.6)
2002	-3.6**	-8.8**
	(1.5)	(4.5)
Fama-Mac Beth	-5.5***	-7.2***
	(0.4)	(0.7)

Source: OLS estimates. Regressions or corporate performance on internal governance and controls are run each year separately. Internal governance is measured as the share of EXECUCOMP executives who joined the company after the CEO was appointed. The coefficients on internal governance and their standard error are reported. Each column correponds to the choice of one corporate performance measure (ROA or ROE). Corporate performance is then regressed on one-year-lagged internal governance, controlling for CEO and executive seniority, log(assets), log(firm age), sales growth and 48 industry-dummies. The specification is identical to table 1, columns 2 and 5. The bottom row indicates the Fama-Mac Beth estimate.

Table 3: Accounting Performance and Internal Governance - Granger Causality

	Internal Governance	ROA	Internal Governance	ROA
Internal governance	0.87***	-0.01***	0.81***	-0.02***
(lagged 1 yr)	(0.01)	(0.00)	(0.01)	(0.00)
ROA	-0.02*	0.77***	-0.03*	0.75***
(lagged 1 yr)	(0.01)	(0.01)	(0.01)	(0.01)
CEO tenure as CEO	-	-	2.95***	0.18**
($\times$ 10 yrs)			(0.26)	(0.09)
Executives' Seniority	-	-	-0.38***	0.05***
in the firm ($\times$ 10 yrs)			(0.04)	(0.02)
Log(Assets)	-	-	-0.30***	2.79***
			(0.10)	(0.52)
Log(1+Firm Age)	-	-	-1.03***	0.48***
			(0.20)	(0.10)
Sales Growth	-	-	1.78***	7.32***
			(0.49)	(0.40)
48 industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	9,171	9,626	9,033	9,486

Source: Hubert-White-Sandwhich estimates, allowing for residuals correlated across observation of each firm. In the first panel, column 1 reports the estimate of a regression of internal governance on past internal governance and past corporate performance. Column 2, we report the result of a regression of corporate performance on past internal governance and past corporate performance. Both regressions control for industry and year fixed effects. The second panel reports the same regression results, with additional firm level controls, as reported in the table. Internal governance is measured as the share of EXECUCOMP executives who joined the company after the CEO was appointed. Corporate performance is measured through Return on Assets. Standard errors are between parentheses.

Table 4: Agency Costs of Weak Internal Governance

	CEO Turnover	M&A	Cash / Assets	CEO Total Compensation
Internal Governance	-5.4***	6.3**	6.1***	0.29***
	(1.6)	(3.1)	(1.6)	(0.09)
CEO tenure as CEO	1.8***	0.5	-0.0	-0.09***
($\times$ 10 yrs)	(0.5)	(1.0)	(0.0)	(0.03)
Executive mean sen.	-0.1	-0.5**	-0.0	-0.02***
in the firm ($\times$ 10 yrs)	(0.1)	(0.2)	(0.1)	(0.01)
ROA	-0.1***	0.3***	-4.2	0.36**
(delayed by 1 yr)	(0.0)	(0.1)	(3.4)	(0.18)
M/B	-	0.7	-	-
(delayed by 1 yr)		(0.5)		
log(assets)	0.7***	1.6***	-3.1***	0.42***
	(0.2)	(0.4)	(0.2)	(0.01)
Year dummies	Yes	Yes	Yes	Yes
48 Industry dummies	Yes	Yes	Yes	Yes
Observations	8,219	8,626	9,692	9,580

Source: OLS estimates, allowing for heteroskdastic residuals. Each column correposnds to the choice of one executive bonding variable and one corporate performance measure. Corporate performance is then regressed on executive bonding, controlling for log(assets), 48 industry-dummies, CEO seniority, a dummy equal o one when the CEO has been hired from outside the firm and a dummy equal to one when the firm belongs to the S&P500. The bottom rows indicate Fama-Mac Beth estimates. Measure #1 is the share of EXECUCOMP executives who joined the company after the CEO was appointed. Measure #2 is the share of EXECUCOMP executives who joinde the company less than 1 year after the CEO was appointed. Corporate performance of measured through Return on Assets, Return on Equity and Market to Book ratio.

Table 5: Are Internal and External Governance Related ?

	Internal Governance			
	(1)	(2)	(3)	(4)
GIM Governance index	0.2	-	-	0.0
	(0.2)			(0.2)
Board size	-	-0.3	-	-0.5**
		(0.2)		(0.2)
Frac directors	-	-	-14.7***	-11.2**
who are current employees			(4.2)	(4.9)
Frac indep. directors	-	-	-11.5**	-9.5
who are former employees			(5.2)	(5.9)
CEO/Firm controls	Yes	Yes	Yes	Yes
48 industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	6,199	4,252	4,252	3,178

Source: OLS estimates, allowing for heteroskdastic residuals. Internal governance (see table 1) is regressed on various corporate governance indicators, controlling for log(assets), log(firm age), sales growth, 48 industry-dummies, year fixed effects, CEO tenure and executive seniority. Columns 1 to 4 add various corporate governance controls. Column 1 uses the corporate charter based corporate governance index from Gompers,Ishii and Metrick (2003). Column 2 uses the number of directors on the board as a measure of board effectiveness. Columns 3 uses two classical measures of board dependence to the CEO: the share of currently employed directors and the share of past employees. Column 4 uses all four measures simultaneously.

Table 6: Internal Versus External Governance

	Return on Assets			Return on Equity		
	(1)	(2)	(3)	(1)	(2)	(3)
Internal governance	-2.9***	-3.5***	-3.5***	-6.2***	-5.1**	-5.2**
(delayed by 1 year)	(1.0)	(1.2)	(1.2)	(1.9)	(2.3)	(2.4)
GIM governance index	-0.0	-	-	0.1	-	-
	(0.1)			(0.1)		
Board size (# directors)	-	-0.0	-	-	0.2	-
		(0.1)			(0.2)	
% Directors currently	-	-	2.4	-	-	1.2
employed			(1.7)			(3.6)
% Directors previously	-	-	-1.7	-	-	2.5
employed			(2.5)			(5.2)
Firm/CEO controls	yes	yes	yes	yes	yes	yes
Year effects	yes	yes	yes	yes	yes	yes
48 Industry effects	yes	yes	yes	yes	yes	yes
Observations	5,515	3,753	3,753	5,386	3,697	3,697

Source: Huber-White-Sandwich estimates, allowing for correlation of all observations of a given firm. The measure of internal governance is the share of EXECUCOMP executives who joined the company after the CEO was appointed. Corporate performance is measured through Return on Assets (first three columns) and through Return on Equity (last three columns). All regressions use as controls: CEO and executive seniorities, sales growth, log(book assets), log(Firm age), year dummies and the 48 Fama French industry dummies. Columns 1 and 4 use the corporate charter based corporate governance index from Gompers,Ishii and Metrick (2003). Columns 2 and 5 use the number of directors on the board as a measure of board effectiveness. Columns 3 and 6 use two classical measures of board dependence to the CEO: the share of currently employed directors and the share of past employees. The limited availability of corporate governance data is responsible for the drop in observation number.

Table 7: Internal Governance, Firm Profitability and Uncertainty

	ROA			
Uncertainty measure	(1)	(2)	(3)	(4)
Internal governance	-2.0	-2.9***	-2.6**	-2.6**
(Lagged one year)	(1.6)	(1.1)	(1.1)	(1.3)
Internal governance (-1) ×	-5.5***	-	-	-
High Ind. 1992 Q	(1.7)			
Internal governance (-1) ×	-	-4.5***	-	-
High Ind. 1992 ROA Sd		(1.7)		
Internal governance (-1) ×	-	-	-5.2***	-
High Ind. 1992 R&D/sales			(1.8)	
Internal governance (-1) ×	-	-	-	-3.8**
High Ind. 1992 Stock Ret. Volat.				(1.7)
Firm/CEO controls	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
48 Industry dummies	Yes	Yes	Yes	Yes
Observations	9,563	9,563	9,089	9,563

Source: Hubert-White-Sandwich estimates, allowing for heteroskdastic residuals: residuals may be correlated across observations of each firm. ROA is the dependent variable in all regressions and is regressed on our measure of internal governance, a measure of industry level uncertainty and the interaction of both. Controls are industry and year fixed effects, CEO tenure, executive seniority, firm log(assets), log(Firm age) and sales growth. Each column corresponds to the choice of one uncertainty measure. Column 1 uses a dummy equal to 1 if the industry median q in 1992 is above median. In column 2, the dummy is equal to 1 if the industry s.d. of ROA in 1992 is above median. In column 3, it is equal to 1 if the industry median R&D / sales ratio is above median. In column 4, it is equal to 1 if the industry's average stock return volatility in 1993 is above median; stock return volatility is computed in the 60 months to the end of fiscal 1993. Standard errors are between parentheses.

B Additional Tables

Table 8: Market Value of Assets and Internal Governance

	Tobin's Q		
	(1)	(2)	(3)
Internal governance	0.05	-0.29***	-0.31***
(delayed by 1 year)	(0.12)	(0.12)	(0.10)
Mean executive seniority	0.02**	0.03***	0.02***
in the firm ($\times$10 y.)	(0.01)	(0.01)	(0.01)
CEO tenure as CEO	0.62	0.06	0.06*
($\times$10 y.)	(0.42)	(0.04)	(0.03)
Log(assets)	-	-0.05***	-0.00
		(0.02)	(0.02)
Log(Firm Age+1)	-	-0.14***	0.00
		(0.04)	(0.04)
Sales Growth	-	0.96***	0.72***
		(0.07)	(0.07)
Q_0	-	-	0.42***
			(0.04)
Observations	8,983	8,839	7,953

Source: Huber-White-Sandwich estimates, allowing for correlation of all observations of a given firm. The measure of internal governance is the share of EXECUCOMP executives who joined the company after the CEO was appointed. Corporate performance is measured through market to book value assets (see appendix for the definition) . Controls are log(book assets), log(firm age), log(sales growth), CEO and executives' seniorities. All regression also include year dummies and the 48 Fama French industry dummies. Columns 1 to 3 report estimates of the regressions of market to book on internal governance using various controls.

Table 9: Market Value of Assets: External vs Internal Governance

	GIM Governance Index		Board Size		Board Composition	
Internal governance	-	-0.37***	-	-0.46***	-	-0.44***
(delayed by 1 year)		(0.15)		(0.18)		(0.18)
GIM governance index	-0.02**	-0.01	-	-	-	-
	(0.01)	(0.01)				
Board Size	-	-	-0.25**	-0.26*	-	-
log(# board directors)			(0.11)	(0.14)		
Frac. current employees	-	-	-	-	0.26	0.49
on the board					(0.24)	(0.31)
Frac. past employees	-	-	-	-	-0.07	-0.08
on the board					(0.29)	(0.39)
Observations	9,115	5,137	5,936	3,449	5,936	3,449

Source: Huber-White-Sandwich estimates, allowing for correlation of all observations of a given firm. The measure of internal governance is the share of EXECUCOMP executives who joined the company after the CEO was appointed. Corporate performance is measured through market to book value assets (see appendix for the definition) . Controls are log(book assets), log(firm age), log(sales growth), CEO and executives' seniorities. All regression also include year dummies and the 48 Fama French industry dummies. Columns 1,3 and 5 report estimates of the regressions of market to book on various external governance measures (as defined in table 5) using these controls. Columns 2,4 and 6 also add our "internal" corporate governance measure.

C Variable Definitions

C.1 From ExecuComp

Executive seniority is computed as the tenure of the executive *within the firm* in years. It is computed as the difference between the current fiscal year (YEAR) and the year in which the executive joined the company (JOINED_C).

CEO seniority is the *number of year spent as CEO of the firm*. It is computed as the difference between the current fiscal year (YEAR) and the year in which the CEO was appointed as CEO (BECAME_CE).

The **share of related executives** is the fraction of executives whose seniority within the firm is lower than the CEO's tenure as CEO.

CEO compensation is the CEO's "total compensation including option grants" (TDC1).

C.2 From Compustat

Return on Assets (ROA) is Operating Income Before Depreciation (item 13) minus Depreciation and Amortization (item 14) over Total Assets (item 6).

Return on Equity (ROE) is Net Income (item 172) over Common Equity (item 60)

Assets if Total Assets (item 6)

Market to Book is the ratio of market to book value of assets (item 6). The market value is computed as Total Assets (item 6) plus the number of common shares outstanding (item 25) times share price at the end of the fiscal year (item 199) minus Common Equity (item 60) minus Deferred Taxes (item 74).

Cash over Assets is the ratio of cash holdings in the balance sheet (item 1) over total assets (item 6)

The **M&A** dummy is computed using the footnotes and is equal to one as soon as one significant acquisition has been undertaken. More formally, it is equal to 1 if "sales growth reflect a merger or acquisition" (item aftnt1 equals "AA", "AS", "FA", "FB" or "FC"), if "sales growth reflect a significant merger or acquisition whereby the effects on the prior year's sales constitute 50% or more of the reported sales for that year" (aftnt1 equals "AB").

Industry dummies are computed using the four digit SIC codes as reported in COMPUSTAT, and then aggregating them into the 48 Fama and French industries. The correspondance table was taken from Kenneth French's web site.

D Figures

Figure 1: Timeline of the model

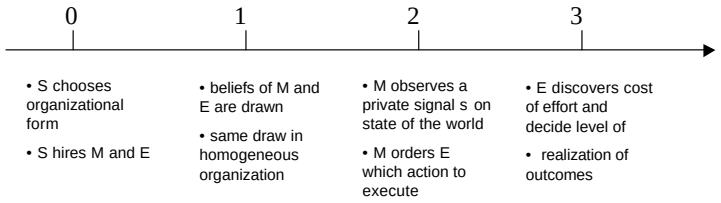


Figure 2: (α, μ) region of equilibria

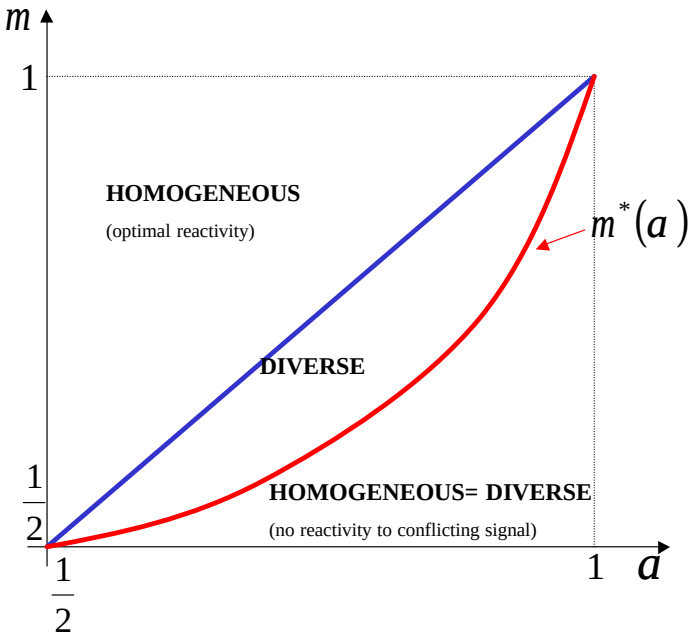


Figure 3: Value of homogeneous vs. diverse organizations for $\mu \in [0.5, 1]$ and α=0.75. Internally governed firm is in blue ; homogeneous organization is in green

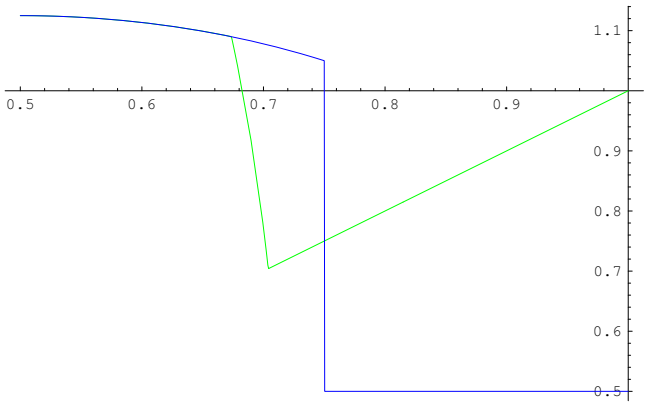
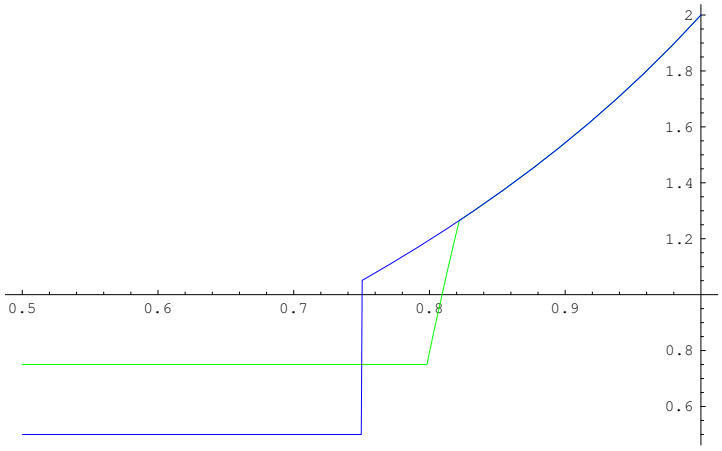


Figure 4: Value of homogeneous vs. diverse organizations for $\alpha \in [0.5, 1]$ and μ=0.75. Internally governed firm is in blue ; homogeneous organization is in green



E Proof of Proposition 2

To prove this proposition, we consider successively the potential forms that the equilibrium can take and show they exist on the intervals stated by the proposition.

Full communication equilibrium

We look for a revealing equilibrium. Consider thus an order function of the manager given by the following:

- if $\sigma =$ "A", the manager orders action A,
- if $\sigma =$ "B", the manager orders action B.

And a belief function b of the executive defined by:

- if the manager orders A, then the executive believes with probability one that the signal is "A"
- if the manager orders B, then the executive believes with probability one that the signal is "B"

We determine the condition under which this is indeed an equilibrium (individually rational constraint). Assume that the manager has drawn opinion $\mu \geq \frac{1}{2}$, that we are at equilibrium and signal is "B"[10]. Then, by ordering action B, the manager reveals that the signal is B, triggering a revision of beliefs by the executive. More precisely, he is now convinced that the signal was "B", and therefore believes that the probability of the state being B is $\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}$.

Therefore, the manager, by sticking to the equilibrium strategy, obtains a payoff:

$$U^1 = \underbrace{\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}}_{\text{probability of success}}\gamma\underbrace{\left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\gamma\right)}_{\text{expected effort of executives}}$$

Similarly, if the manager deviates from the equilibrium, ordering A although the signal is "B", he then receives expected pay-off:

$$U^2 = \underbrace{\frac{\mu(1-\alpha)}{\mu(1-\alpha)+(1-\mu)\alpha}}_{\text{manager's belief that } S=A}\gamma\left(\underbrace{\frac{\mu\alpha}{\mu\alpha+(1-\mu)(1-\alpha)}}_{\text{executive belief that } S=A}\gamma\right)$$

To interpret this equation, note that there is on the left a cost from deviating due to a smaller expected probability of success but also (on the right) a gain coming from the higher incentives of the manager who gets fooled in believing $S=A$.

Now the manager will not deviate as long as:

$$U^1 > U^2 \Leftrightarrow \frac{(1-\mu)^2\alpha}{(1-\mu)\alpha+\mu(1-\alpha)} > \frac{\mu^2(1-\alpha)}{\mu\alpha+(1-\mu)(1-\alpha)} \Leftrightarrow \psi(\mu) > 0$$

Where:

$$\psi(\mu) = (2\alpha-1)\mu^3 + 2\alpha(1-2\alpha)\mu^2 + \alpha(4\alpha-3)\mu + \alpha(1-\alpha)$$

This determines a threshold $\mu^\star(\alpha)$ such that the equilibrium is sustainable as long as $\mu \leq \mu^\star(\alpha)$ [11]

[10] it is immediate to check that, as long as $\mu > \frac{1}{2}$, the manager has no incentive to deviate from equilibrium

[11] One can show that:

$$\forall\alpha, \exists\mu^\star(\alpha) \in [0,1] \text{ such that: } \forall\mu < \mu^\star(\alpha),\ \psi(\mu) > 0$$

No Communication Equilibrium

We look for an equilibrium with no communication. Therefore consider the following order and belief functions, for $\mu > \frac{1}{2}$:

$$\begin{cases} O(\sigma,\mu) = A \\ b(O(\sigma,\mu),\mu') = \mu' \end{cases}$$

The manager always stick to its prior, and the executive draw no inference from the manager's order. Off-equilibrium, when the manager orders B although he is known to have a bias $\mu > \frac{1}{2}$, we'll assume that it is common belief that the executives believes that signal "B" was received.

We determine the conditions under which this forms an equilibrium. Consider the case when the signal is B and the manager has drawn a belief $\mu > \frac{1}{2}$. The expected payoff of a manager playing the equilibrium and ordering A in spite of the signal is given by the product:

$$U^1 = \underbrace{\frac{\mu(1-\alpha)}{(1-\mu)\alpha+\mu(1-\alpha)}\gamma}_{\text{expected pay-off for manager if effort is exerted}} \quad \underbrace{(\mu\gamma)}_{\text{expected effort of executives}}$$

Consider now a deviation from the equilibrium by the manager who orders action B ; his expected pay-off becomes:

$$U^2 = \underbrace{\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\gamma}_{\text{expected pay-off for manager if effort is exerted}} \quad \underbrace{\left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}\gamma\right)}_{\text{expected effort of executives}}$$

Therefore, the no-communication equilibrium is sustainable if and only if:

$$U^1 > U^2 \Leftrightarrow \phi(\mu) \geq 0 \Leftrightarrow \mu \geq \mu^{\star\star}(\alpha)$$

Where $\mu^{\star\star}(\alpha)$ is defined by:

$$\phi(\mu) = (1-\alpha)(1-2\alpha)\mu^3 - \alpha^2\mu^2 + 2\alpha\mu - \alpha, \quad \text{and} \phi(\mu^{\star\star}) = 0$$

[12]

To see why $\mu^\star < \mu^{\star\star}$, consider the following:

$$\begin{aligned} \frac{\psi(\mu^{\star\star})}{((1-\mu^{\star\star})\alpha+\mu^{\star\star}(1-\alpha))\,(\mu^{\star\star}\alpha+(1-\mu^{\star\star})(1-\alpha))} &= \frac{(1-\mu^{\star\star})^2\alpha}{(1-\mu^{\star\star})\alpha+\mu^{\star\star}(1-\alpha)} - \frac{(\mu^{\star\star})^2(1-\alpha)}{\mu^{\star\star}\alpha+(1-\mu^{\star\star})(1-\alpha)} \\ &= \left((\mu^{\star\star})^2(1-\alpha)\right)\left(1 - \frac{1)}{\mu^{\star\star}\alpha+(1-\mu^{\star\star})(1-\alpha)}\right) < 0 \end{aligned}$$

And because ψ is decreasing on $[0,1]$, this proves that: $\mu^{\star\star} > \mu^\star$.

Imperfect communication equilibrium

We look for an equilibrium where the manager imperfectly reacts to a conflicting signal. Therefore consider the following order and beliefs functions for a $\mu \geq \frac{1}{2}$:

- when signal is "A", the manager orders action A ; when signal is "B", the manager orders A with probability ρ and B with probability (1-ρ)

[12] We have: $\phi(\frac{1}{2}) = \frac{1-3\alpha}{4} < 0$, $\phi(1) = (1-\alpha)^2 > 0$ and one can show that ϕ is increasing on $[0,1]$ when $\alpha < \frac{3}{4}$ or inverse U-Shaped on $[0,1]$ when $1 > \alpha > \frac{3}{4}$. Therefore, in both cases, that means there is a unique $\mu^{\star\star} \in \left[\frac{1}{2},1\right]$ such that $\phi(\mu^{\star\star}) = 0$.

- when executive is ordered to do A, he revises his belief according to Baye's Law and the order function of the manager, and therefore believes that[13]

$$P(A|ordre = A) = \mu \frac{\alpha + \rho(1-\alpha)}{(\mu\alpha + (1-\mu)(1-\alpha)) + \rho\left(\mu(1-\alpha) + (1-\mu)\alpha\right)}$$

We look now for this mixed-communication equilibrium to be sustainable. When the signal is "B" and initial beliefs are $\mu \geq \frac{1}{2}$, the expected pay-off from the equilibrium strategy is given by:

$$U = \rho\left(\frac{\mu(1-\alpha)}{\mu(1-\alpha) + (1-\mu)\alpha}\right)\left(\mu \frac{\alpha + \rho(1-\alpha)}{(\mu\alpha + (1-\mu)(1-\alpha)) + \rho\left(\mu(1-\alpha) + (1-\mu)\alpha\right)}\gamma_E\right)\gamma_M + (1-\rho)\left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha + (1-\alpha)\mu}\right)^2 \gamma_M\gamma_E$$

For this to be an equilibrium, it must be the case that the expected payoff when ordering A is equal to the expected payoff when ordering B: otherwise, the manager has always an incentive to play another mixed strategy $\rho' > \rho$ for instance is the payoff of ordering A is higher than the payoff of ordering B. Therefore, the mixed equilibrium is an equilibrium if and only if:

$$\left(\frac{\mu(1-\alpha)}{\mu(1-\alpha) + (1-\mu)\alpha}\right)\left(\mu \frac{\alpha + \rho(1-\alpha)}{(\mu\alpha + (1-\mu)(1-\alpha)) + \rho\left(\mu(1-\alpha) + (1-\mu)\alpha\right)}\right) = \left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha + (1-\alpha)\mu}\right)$$

Call

$$\chi(\rho) = \left(\frac{\mu(1-\alpha)}{\mu(1-\alpha) + (1-\mu)\alpha}\right)\left(\mu \frac{\alpha + \rho(1-\alpha)}{(\mu\alpha + (1-\mu)(1-\alpha)) + \rho\left(\mu(1-\alpha) + (1-\mu)\alpha\right)}\right)$$

It is easily seen that $\frac{\partial \chi'}{\partial \rho} < 0$ so that χ is strictly decreasing on $[0,1]$, from $\mu^2(1-\alpha)\frac{\alpha}{\mu\alpha+(1-\mu)(1-\alpha)} = \chi(0)$ to $\mu^2(1-\alpha) = \chi(1)$.

Noticing that $\chi(0) = \mu^2(1-\alpha)\frac{\alpha}{\mu\alpha+(1-\mu)(1-\alpha)} \Leftrightarrow \mu = \mu^\star$ and $\chi(1) = \mu^2(1-\alpha) \Leftrightarrow \mu = mu^{\star\star}$, we can also prove that for each $\mu \in \left[\frac{1}{2}, 1\right]$, there is a unique $\rho(\mu) \in [\mu^\star, \mu^{\star\star}]$, such that:

$$\chi(\rho(\mu)) = \left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha + (1-\alpha)\mu}\right)$$

F Proof of proposition 4

We first look for a revealing equilibrium. Consider therefore the following order and beliefs function :

- a manager always order as the signal says
- an executive always interprets the order as the signal

An executive therefore always revise its prior according to the order. For instance, by ordering action A, a μ-manager with $\mu \in \{1-\overline{\mu}, \overline{\mu}\}$ can expect the following mean effort from executives (according to whether the executive is aligned or mis-aligned):

$$E(order = A) = \frac{\gamma}{2}\left(\frac{\mu\alpha}{\mu\alpha + (1-\mu)(1-\alpha)} + \frac{(1-\mu)\alpha}{(1-\mu)\alpha + \mu(1-\alpha)}\right)$$

[13] Indeed, we can compute the following probabilities:

$$P(ordre = A) = P(signal = \text{"}A\text{"}) + \rho P(signal = \text{"}B\text{"}) = (\mu\alpha + (1-\mu)(1-\alpha)) + \rho\left(\mu(1-\alpha) + (1-\mu)\alpha\right)$$
$$P(ordre = A|A) = \alpha + \rho(1-\alpha)$$

Finally the result comes from Baye's Law: $P(A|ordre = A) = \frac{P(A)P(ordre=A|A)}{P(ordre=A)}$

Similarly, in this "truthful" zone, it is easy to compute the expected effort from an order B

$$E(order = B) = \frac{\gamma}{2}\left(\frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)} + \frac{\mu\alpha}{\mu\alpha+(1-\mu)(1-\alpha)}\right) = E(order = A) = E$$

Therefore, this truthful equilibrium is sustainable as long as the manager is willing to stick with signal "B", that is:

$$\begin{cases} \frac{\mu\alpha}{\mu\alpha+(1-\mu)(1-\alpha)}E > \frac{(1-\mu)(1-\alpha)}{\mu\alpha+(1-\mu)(1-\alpha)}E \\ \frac{(1-\mu)\alpha}{(1-\mu)\alpha+\mu(1-\alpha)}E > \frac{\mu(1-\alpha)}{(1-\mu)\alpha+\mu(1-\alpha)}E \end{cases}$$

This is equivalent to:

$$\alpha > \mu > 1-\alpha$$

The proof that the no-communication equilibrium exists for $\mu < 1 - alpha$ and $\mu > alpha$ goes exactly along the same lines.

How come then that there is no longer scope for mixed equilibrium ? Because the manager ignores the true belief of his executive, there is no incentives gain to deviation from equilibrium (the manager has always with probability $\frac{1}{2}$ a mis-aligned executive, whatever the order). Therefore, the deviation decision depends only on the manager's own belief: as long as his opinion is less "extreme" than the signal's precision α, the manager believes the signal more than its opinion, and therefore chooses to "go for the signal". When his beliefs are more polarized than the precision of the signal, then, no matter what the signal says, he will believe the right action is the one he initially believes in.

G Proof of proposition 5

The demonstration of this result is easy. Simply look at the following equation:

$$\frac{\phi(\alpha)}{((1-\mu)\alpha+\mu(1-\alpha))^2} = \frac{\alpha}{2} - \frac{1}{4} \geq 0$$

ϕ increasing on $[0,1]$ proves that : $\mu^{**} < \alpha$

H Proof of Theorem 7