The London School of Economics and Political Science

An Essay in Corporate Finance: Managerial Incentives, Financial Constraints and Ownership Concentration.

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Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

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Abstract

I investigate the role of internal discipliners in the form of optimal equity ownership for the purpose of committing the management to the pursuit of shareholder value in the presence of separation between ownership and control. By rooting the conflicts of interests between managers and shareholders upon the control of internal funds, a simple model allows to analyse the link between profit uncertainty, growth options and decisional powers. I derive implications for the optimal degree of equity concentration, the effect of firm fundamentals on the allocation of income and control rights, and the pay for luck phenomenon. First, optimal equity ownership is positively related to the short-term performance of the firm and negatively related to both its growth options and riskiness. Second, optimal equity ownership is negatively related to the probability of the firm being financially constrained, in the sense that the level of desired investment exceeds internally available resources. Furthermore, I also show that straight debt alone does not implement the second best, in absence of a large shareholder. Finally, I show that, in presence of financial constraints, pay for luck is associated in equilibrium to a lower optimal degree of ownership concentration. In other words, pay for luck and looser governance, as implemented by the internal discipliner of equity concentration, emerge as the equilibrium result of a constrained incentive problem.

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1 Introduction.

The managerial corporation is the most pervasive form of industrial organization worldwide. Virtually everywhere, notwithstanding marked cross-countries differences in terms of financial structure and legal framework, a crucial source of capital for non-financial corporations is outside equity, a large part of it typically dispersed in the hands of a multitude of small shareholders. Managers run the firm on a day-by-day basis with little, if any, explicit interference from investors. Furthermore, as a large part of the on-going investment is financed from cash from continuing operations, the manager enjoys a degree of discretion about the split of current cash-flows in pay-out and investment. Starting with the seminal contribution by Berle and Means (1932), the issue of the separation between ownership and control, and the ensuing lack of managerial commitment to the pursuit of shareholder value, has been the object of constant debate. A host of issues are constantly discussed. What are the checks and balances able to limit the potential for managerial misbehaviour? What is a desirable extent of investors control - symmetrically, of managerial discretion? What are the determinants of the allocation of control rights to insiders vs. outsiders?

The chance of management removal whereby a take-over from an hostile raider combined with the disciplining effect of market monitoring via trading in the firm's stock have been widely seen as effective control mechanisms. Indeed, most of the research has focused on the US, where the market for corporate control has flourished, against the backdrop of highly developed capital markets. However, the "external" discipliner view is not entirely convincing: on a logical level, it requires that some external discipliner is continuously present during all the life of the firm. Outside the Anglo-American world, not only are stock markets much less developed, in terms of capitalization, liquidity, sectoral diversification and investor base, and therefore less reliable for the purpose of accurate monitoring, but the take-over threat itself seems of limited relevance as take-overs are much less common events. Second, even though in the Anglo-American world take-overs are a frequently used device to transfer ownership and/or control, historically they seem to appear in clusters, instead of being homogenously distributed over time. Finally, even in the US take-over laws exhibit a large degree of variability at the federal level and have been changing over time, while corporations charters often include provisions that make take-overs more difficult.

In parallel, the literature has also stressed the strategic role of large shareholders for curbing managerial opportunism and therefore increasing efficiency. Empirically, it is usual to distinguish two models: the Anglo-American model relies on external/market discipliners while the Continental Europe model relies on internal mechanisms based on the presence of large shareholders. Indeed, a certain degree of concentration of ownership is the norm outside the Anglo-American world, where instead equity tends to be more disperse. This is especially true for continental Europe, markedly in France, Germany and Italy. However, some authors[1] have challenged on the empirical side this standard dichotomy, showing that the presence of large shareholders in the US corporations is much more relevant than commonly thought.

With these considerations in the background, this paper presents a theory of the managerial firm abstracting from external discipliners, in order to emphasize the role of internal discipliners for the purpose of the maximization of shareholders' value. I focus on the interplay between firm fundamentals (like the time pattern of profits, growth potential, riskiness, availability of internal cash flows), managerial incentives and the concentration of outside equity.

The driving force of our model is the well known trade-off incentives vs. control in presence of free cash flows. Managerial opportunism creates a time-consistency problem in terms of the optimal pay-out/investment rule. Ex-ante, the objective of value maximization makes a case for managerial extended control over short-term profits, while tighter investors' control is the ex-post efficient arrangement. Hence, the efficient ex-ante pay-out policy is different from the ex-post rule. An appropriate control-switch mechanism is needed to strike an efficient trade-off between managerial initiative leading to value creation on the one side and rent-seeking behaviour leading to value destruction on the other side. Otherwise stated, investors' effective control powers must be fine-tuned between the two extremes of passivity and continuous intervention, in order to limit managerial discretion in absence of a credible commitment to behave.

The analysis relies on five fundamental modelling hypotheses:

- short-term cash flows are subject to uncertainty beyond the control of economic agents (*exogenous* or *intrinsic uncertainty*);

[1]See Anderson and Reeb (2004, and the references therein) for evidence in this sense.

- firm-specific non-contractible investment on behalf of management affects both managerial utility and long-term profitability;
- continuation project (growth option) requires further investment from internal funds, beyond the original funding provided by outside investors;
- managerial non-contractible private benefits are explicitly defined on retained earnings;
- shareholders can, subject to an exogenous cost of intervention, overrule managerial decisions and implement their favourite policy.

The paper builds on the model developed by Burkart, Gromb and Panunzi (1997). Assuming non-contractible asset-specific effort and ex-ante monitoring, they show that a concentrated claim in the hands of a relatively large monitoring investor maximises the value of the firm. Given the static set-up of their model, when investors' control takes the form of ex-ante monitoring, the nature of the claim remains ambiguous between debt and equity, as the pay-off profile is the same for both securities. Instead, when ex-ante monitoring is substituted by an interim costly intervention threat, they show that equity can be associated with state-contingent effective control rights, and a clear-cut case for concentrated equity emerges.

Compared to Burkart, Gromb and Panunzi (1997), the novel features of our analysis are twofold. First, the introduction of exogenous uncertainty about short-term earnings captures the role of financial constraints at the reinvestment stage. Second, the distinction between short and long-term performance allows us to explicitly root the conflict of interests on the control over the internal funds (free cash flows) accruing to the firm in the short-run. In this respect, I assume that the reinvestment decision is non-contractible, thereby building on Myers' (2000) insight that "verifying new investment at the moment cash is committed requires [...] understanding of the purposes for which cash is spent".

The first step of the analysis regards the characterization of the optimal contract. The second best contract is shown to display *state-contingency*[2] of *both security* and *control (intervention)* rights. Furthermore, it has the nature of a residual claim on the value of the firm, which internalizes the effect of managerial incentives on the growth option and is aligned with the interest of minority

[2]With respect to the source of exogenous uncertainty.

investors. I then show that an appropriate ownership concentration of outside equity implements the second best contract. As standard in incentive vs. control theories, the trade-off leads to an equity capital structure where a relatively large blockholder coexists with a large number of atomistic shareholders. The large shareholder exerts the dividend pressure forcing the manager to stick to the ex-ante efficient pay-out policy. Her threat of intervention has the nature of a public good, due to the free riding behavior of the dispersed equityholders.

The new results and empirical predictions I derive can be classified in two cathegories:

- The relationship between firm fundamentals and equity ownership,
- The *pay for luck* phenomenon.

The relationship between firm fundamentals and concentration.

First, the optimal concentration is (strictly) negatively related to the growth options of the firm and (weakly) positively related to the short-term performance. In the model, higher growth options tilt the incentives vs. control trade-off towards the incentives side. It is then efficient to increase the extent of managerial discretion. As a result, investors' effective control powers are diminished. For that purpose, concentration has to be lower, given that the ability to commit the management to a certain pay-out policy is increasing in the blockholder equity stake. In presence of a positive cost of intervention, only a sufficiently large claim makes credible the threat of management removal by shareholders. By contrast, higher short-term earnings increase the efficient pay-out ratio and diminish the optimal degree of managerial discretion. Since the dividend pressure exerted by the blockholder must be higher, so must be the concentration.

Second, concentration is negatively related to the riskiness of the firm, as captured by short-term exogenous uncertainty. A low value of short-term earnings may result in financial constraints on investment. In turn, the financial constraint has a negative effect on managerial incentives, adding risk to her compensation and reducing effort. When this is the case, concentration has to decrease in order to restore an efficient balance between incentives and control. Third, concentration turns out to be negatively related to the probability of being financially constrained.

In summary: firms with more (less) valuable growth options should display lower (higher) degrees of equity concentration; firms which are more likely to be financially constrained should have lower concentration than comparable firms with less probability of financial constraints; for any firm, concentration increases as the expected volatility of short-term performance diminishes.

In parallel, I also show that straight debt does not implement the second best, in absence of a large shareholder. The result owes to the fact that debt does not enforce a state-contingent pay-off, in spite of conditional control rights. Although the framework is too stylised for a comprehensive analysis of debt, I also make a case for mixed capital structure: when the maximal equity stake of the blockholder is capped above, the second best is implemented by the combination of a concentrated equity claim with straight debt.

The *pay for luck* phenomenon.

In a study based on US corporations, Bertrand and Mullainathan (2000) provide empirical evidence of a systematic relationship between CEO's compensation and exogenous uncertainty (i.e. uncertainty beyond the control of economic agents). In other words, managerial compensation seems to respond to luck, a finding apparently inconsistent with the tenets of standard agency theory. They also find a negative correlation between pay for luck and measures of corporate governance, among them the presence of a large shareholder. The standard contracting approach posits that good governance mechanisms implement efficient incentive contracts which in turn rule out systematic forms of pay for luck. Conversely, loose governance increases the extent of managerial discretion, which in turn leaves the agents free to earn extra[3] rents - the so called *skimming* view. Bertrand and Mullainathan interpret pay for luck as *prima facie* evidence for the skimming view, therefore for inefficient levels of governance.

In our set-up, pay for luck together with looser governance, under certain conditions, emerges as an efficient arrangement, i.e. as a feature of the efficient incentive contract. Financial constraints in the form of limited cash flows available for reinvestment are the driving force behind the result. As the probability of financial constraints grows or, for given probability, the volatility of earnings gets large, it is efficient to implement a higher degree of managerial discretion,

[3]Extra in the sense of over and beyond the amount needed for efficient incentives.

which translates in a state-contingent rent for the manager, in the sense that private benefits increase with the value of short-term earnings. I show that pay for luck is positively related to the growth options and to the degree of financial constraints (and to the volatility of earnings), while it is negatively related to the short-term performance. At the same time, the reverse implications hold for the concentration of outside equity.

As a result, a lower level of equity ownership together with pay for luck may be jointly an equilibrium arrangement, due to tougher incentive problems. This result suggests that the findings by Bertrand and Mullainathan are not necessarily evidence of governance failures. Rather, they can simply reflect contracting conditions conducive to an efficient degree of pay for luck combined with looser governance (reduced blockholder stake).

There is a large literature that has dealt with the disciplinary role of the capital structure and the ownership concentration. As discussed above, the most related work is the one by Burkart, Gromb and Panunzi (1997). Other related papers are Jensen (1986), Stulz (1990) and Hart and Moore (1995), who all argue that debt, markedly short-term debt, minimize the inefficiencies related to project selection and solves the control problem generated by free cash flows. I challenge that view showing that debt fails to implement the efficient allocation of effective control powers at growth stage. In Zwiebel (1996), management chooses debt structure to promote entrenchment: dividends can be part of the pay-out policy when debt alone does not guarantee the minimal dynamic efficiency needed to avoid dismissal. A similar view is adopted by Fluck (1999) and Myers (2000), who explicitly focus on equity pay-out policy: dividends are voluntarily set by management to the minimum level that keeps them in control. I follow this approach, in that dividend pressure, as implemented by a precise ownership pattern, acts as a commitment technology for entrenched management.

The paper is organized as follows. The model is presented in Section 2 and the second best solution is derived in Section 3. Implementation with an equity claim only is discussed in Section 4. Section 5 briefly considers the role of debt and the case for mixed capital structure. Section 6 deals with the pay for luck phenomenon. The last Section summarizes the main empirical predictions. Longer mathematical proofs are in the Appendix.

2 The model.

The model is cast in a simple framework of symmetric information and risk neutrality. There are two types of agents, pennyless managers and outside equity-holders, in turn distinguished in large and small shareholders. There are three dates, $t = 0, 1, 2$. Risk-free interest rates are normalised to one in both periods. Subjective discount factors are assumed to be one.

2.1 Manager

At $t = 0$, the manager is in charge of investing in a positive NPV project, that delivers cash flows in the next periods. The existing technology requires the manager to make a costly firm-specific investment $e \in [0, 1]$ which affects long-term performance. As a crucial assumption, effort, once exerted, is assumed to be sunk inside the firm, in the sense that it becomes incorporated in the technology open to the firm even if management is removed. Effort is observable but non verifiable, so that no contract can be written contingent on it.

The ex-ante utility function of the manager is defined in terms of (non transferable) private benefits stemming from long-term performance[4]:

$$U(i_l, i_h) = \left[\frac{b(i_l) + b(i_h)}{2}\right] e - \frac{e^2}{2},$$

where i_j $(j = l, h)$ is the amount of short-term cash flow not distributed and reinvested in the venture. Private benefits are increasing and concave in the amount of retained earnings available for reinvestment, i.e. $b'(i) > 0$, $b''(i) < 0$.

This specification aims to capture the nature of management interests in presence of separation between ownership and control. In the tradition of Hart and Moore, managers' utility is proportional to the amount of resources directly under their control, while, at the same time, they enjoy a rent for which they can't be made pay for (as in Jensen, 1986). A novel feature regards the timing. While effort, intended as a metaphor for the human/specific capital profused in the venture, is exerted ex-ante in order to boost long-term profitability, benefits

[4] It is assumed that managers' monetary benefits at time 1 and 2 are fixed to a competitive constant wage normalized to zero. The presence of a large pool of managers offering their services at the competitive wage prevents the implementation of performance based rewards to improve on the outcome.

appears only in the long-run, conditional on successful performance, in turn related to the level of effort chosen.

2.2 Technology

At $t = 1$, stochastic short-term cash flows $\tilde{y}_1 = \{y_l, y_h;\ y_l < y_h;\ E(\tilde{y}_1) = y_1\}$ are realized with exogenous equal probability. Short-term performance is subject to a level of uncertainty beyond managerial control: however hard she can work, she cannot eliminate the riskiness due to macroeconomic or industry-specific uncertainty. Hence, she can be either lucky (y_h) or unlucky (y_l), independententy on her chosen course of action. Then, for each realization of $\tilde{y}_1$, one of two mutually exclusive states of the world is publicly realized. With probability $1-e$, where e equals the effort exerted ex-ante by the managerthere, is no continuation project available[5] and the venture ends.Otherwise, with probability e a long-term investment opportunity (continuation project or growth option) arises at the end of time 1.

Depending on the amount of resources injected in the firm at this stage (i), the net value delivered at $t = 2$ is $V_2(i) = y_2(i) - i \geq 0\ \forall i$. The technology available to the firm in the long-run, as a result of the effort profused by the manager, is governed by the continuous and concave function $y_2(\cdot)$. For given effort, ex-post NPV is maximised at $i = \hat{\imath}$ such that $y_2'(\hat{\imath}) - 1 = 0$. After the realization of state e, for $j = l, h$ the manager announces the payout/investment policy, i.e. a value i_j of retained earnings to be reinvested. The difference $d_j = y_j - i_j$ represents the payout to investors at time 1.

2.3 Shareholders

Equity-holders are interested in the security benefits from the project, i.e.

$$E_{\tilde{y}_1}\left[V\left(i(y_j)\right)|e(i(y_j))\right].$$

On the opposite angle of the separation between control and ownership, shareholders (ultimately the owners of the corporation) are endowed with costly interference powers. At time 1, when uncertainty is resolved and the the payout policy is announced, shareholders have the faculty to challenge the manager's decision. Specifically, each shareholder can overrule manager's payout decision,

[5] Otherwise, there is a liquidation value normalized to zero without loss of generality.

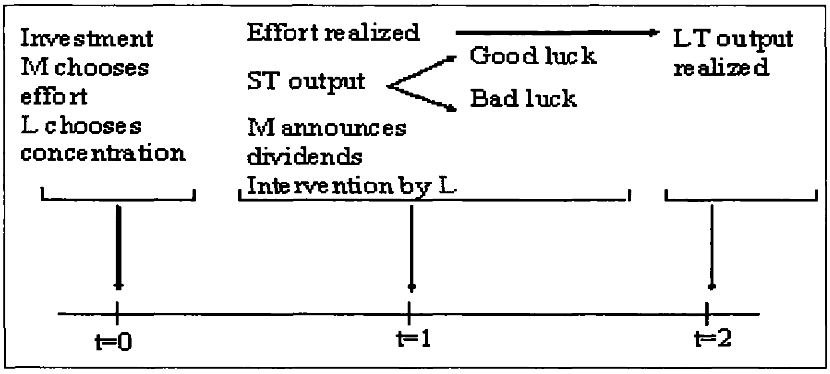

Figure 1: Time Line

and so require the ex-post efficient level of dividend, equal to $\hat{d}_j = y_j - \hat{\imath}$. This intervention power, a direct prerogative of being the owners of the firm, comes at an exogenous cost c, taken to reflect a number of factors such as the legal framework, the regulation of firms' disclosure policy, the development of financial markets, the transparency of the business, etc. Since the cost is entirely born by the challenger while the gains are shared proportionally to each shareholders' stake in the firm, free riding behavior by the small shareholders implies that only a relatively large blockholder has *effective* intervention powers, in the sense that her threat of intervention is credible, given her share of equity. Therefore, the other crucial decision at time 0, together with the effort decision by the manager, sees the large shareholder selecting her equity stake (α)in the firm. Finally, at time 2, the proceeds are realized and distributed.

The unfolding of events is represented in the time line in Figure 1.

This set-up creates a trade-off between incentives and control, much as in Burkart, Gromb and Panunzi (1997), while adding the multi-period element of payout policy. The relevant control variable becomes the level of payout or, symmetrically, the level of retained earnings. This additional feature enables us to link the efficient policy to firm-specific characteristics, like cash flows volatility and growth options.

Notice that, at the inception stage, the manager enjoys full control over the the operations and the intermediate cash flows, since it is the unique combination of these resources with her specific skills that makes the firm profitable. Underlying the model, there is the idea that the contribution to the growth of the firm on behalf of the management tends to materialize in the long-run, while the short-term is subject to less controllable fluctuations. Put differently, as the creation of value takes time to materialize, in the meanwhile uncertainty can affect the project both in positive and negative ways. Long-term performance remains only potential, to capture the unavoidable uncertainty intrinsic to any economic venture. For the sake of tractability, I assume that the original funding[6] is fully embodied in the process by time 1, so that any further investment must come from the short-term earnings. The basic problem is about the degree of managerial discretion over the cash accruing to the firm in the short-run. From an ex-ante perspective, the objective of long-run performance (proportional to e) makes it efficient to leave extended control over short-term cash flows to the manager. Insofar she retains control, the pay-out decision falls under her discretion. However ex-post, after effort is sunk, it is optimal to set limits to such discretion. As a result, an optimal ownership structure strikes an efficient balance between the respective powers of managers and investors.

A natural question is about what specific pattern of ownership structure and security/control rights implements the second best.

3 The Second Best solution.

It is assumed that the maximum value exceeds the cost of investment, such that the venture is economically viable. At time 0, the manager maximizes her expected utility over e for given α. The large shareholder maximises the value of her share in the firm by choosing α for given e and subject to the additional constraint of ex-post incentive compatibility of intervention (intervention vs. passivity)[7]. Under our modelling assumptions, I can write the problem as a

[6]The participation constraint of the shareholders is not modeled. Implicitly, I assume that the blockholder is never wealth constrained, so that for any stake and any amount of up-front capital she can always provide the necessary capital. It then suffices to assume that the project has positive NPV at the optimal concentration, for the participation constraint of the shareholders to have no relevance. Though this is justified by the focus of the paper on the interplay between firm fundamentals and ownership concentration, the explicit introduction of shareholders' participation constraint has important consequences that deserve separate analysis.

[7]This ex-post constraint supports the equilibrium threat that guarantees sub-game perfection of the equilibrium.

simple maximization program. The objective function is the expected value of the firm (shareholders' value), maximised subject to the ex-ante incentive constraint of the manager and the ex-post incentive constraint of the blockholder.

I initially solve the problem without the incentive constraint of the blockholder, in order to check later on if there is some value α that satisfies the relaxed program. Formally, the relaxed problem[8] is:

$$\max_{0\leq i(y_j)\leq y_j; j=l,h} E_{\tilde{y}_1}\left[V\left(i(y_j)\right)|e(i(y_j))\right] \equiv$$

$$\equiv \max_{0\leq i(y_j)\leq y_j; j=l,h} E_{\tilde{y}_1}\left[\tilde{y}_1\right] + E_{\tilde{y}_1}\left[\left(y_2(i(y_j)) - i(y_j)\right)|e(i(\tilde{y}_1))\right]$$

$$s.t. e(i(y_j)) \in \arg\max_e E_{\tilde{y}_1}\left[b(i(y_j))e - \frac{1}{2}e^2 \,|i(y_j)\right]$$

Due to the binomial distribution of $\tilde{y}_1$ and the separability of effort and time 2 cash flows, I can rewrite it simply as:

$$\max_{i_h, i_l} \frac{1}{2}\textstyle\sum_{j=h,l}\left[y_j + e(i_l, i_h)\left(y_2(i_j) - i_j\right)\right] =$$

$$= \max_{i_h, i_l} y_1 + \frac{1}{2}e(i_l, i_h)\left[y_2(i_h) + y_2(i_l) - (i_l + i_h)\right]$$

$$s.t. e(i_h, i_l) \in \arg\max_e \frac{b(i_l) + b(i_h)}{2}e - \frac{1}{2}e^2 \Rightarrow e(i_h, i_l) = \frac{b(i_l) + b(i_h)}{2}$$

$$0 \leq i_l \leq y_l \;;\; 0 \leq i_h \leq y_h$$

The First order conditions are:

$$\begin{aligned}\frac{\partial V}{\partial i_l} &= b'(i_l)\left[y_2(i_h) + y_2(i_l) - (i_l + i_h)\right] + \left[b(i_l) + b(i_h)\right]\left[y_2'(i_l) - 1\right] \geq 0 \\ \frac{\partial V}{\partial i_h} &= b'(i_h)\left[y_2(i_h) + y_2(i_l) - (i_l + i_h)\right] + \left[b(i_l) + b(i_h)\right]\left[y_2'(i_h) - 1\right] \geq 0\end{aligned}$$

Since the gradient at $\hat{\imath} = (\hat{\imath}, \hat{\imath})$ is positive, any possible solution entails $\mathbf{i}^* = (i_l^*, i_h^*) \gg \hat{\imath} = (\hat{\imath}, \hat{\imath})$. The first term on the right hand sides, always positive,

[8] To rule out the trivial solution $e^* = 1$, it is assumed $e^{\max} = \frac{b(Y_l)+b(Y_l)}{2} < 1$.

represents the *value creation* effect of managerial incentives. The second term measures the *value destruction* effect: for $i_j > \hat{\imath}$, the expressions become more and more negative, as a result of overinvestment beyond the zero NPV rule. Basically, manager and investors's objectives are perfectly congruent, from *both* ex-ante and ex-post perspective, for $i_j < \hat{\imath}$. For larger values, an ex-post clash emerges. Notice, however, that the level of congruency of interests is not exogenous[9] but depends on the available technology ($y_2(i)$), the manager utility ($b(i)$), and the degree of intrinsic uncertainty ($\tilde{y}_1$).

Mathematically, there exists two[10] possible solutions to the program above, depending on parameters constellations. In the appendix I provide suitable conditions on the parameters such that the following proposition holds.

Proposition 1 *depending on parameters constellations, the second best is characterized as follows:*

Interior Solution (I). *When the gradient vanishes at an interior point,* $i_l^* = i_h^* = i^* > \hat{\imath}$ *and* $d_h^* = d_l^* + (y_h - y_l)$;

Constrained Solution (II).[11]. *When* $\hat{\imath} < y_l < i^*$*as obtained in (I), the solution attains at* $i_l^* = y_l < i^*, i^* < i_h^* < y_h$ *and* $d_l^* = 0, d_h^* < d_l^* + (y_h - y_l)$.

Proof. *See the Appendix.* ∎

The optimal level of investment is always higher than the ex-post efficient level. Over-investment is the natural result of the incentives vs. control trade-off, under non verifiability of investment. Still, the solution depends endogenously on firms fundamentals. As the value destruction effect ultimately becomes stronger[12], I obtain either an *interior* or a *constrained* solution, depending on the magnitude of short-term cash flows.

[9]For instance, in Burkart, Gromb and Panunzi (1997) it is captured by an exogenous parameter, independent on technology and uncertainty.

[10]Actually, when the gradient never vanishes at an interior point of the domain, a third type of solution attains, namely $i_l^* = y_l, i_h^* = y_h$ and $d_l^* = d_h^* = 0$. However, it is of scarce economic interest as there is no real ex-ante incentives vs. control trade-off: the value creation effect dominates everywhere. Though admittedly extreme, it may describe start-up firms, for which growth factors such as expenditures for R&D overshadow the extent of managerial moral hazard. In this case, it is efficient to reinvest all available cash flows so that nothing is ever paid out.

[11]Though qualitatively identical, I rule out the case $y_l < \hat{\imath}$ as less meaningful from an economic point of view.

[12]As the difference $i_j - \hat{\imath}$ grows larger.

There are two driving forces behind the state-insensitive investment policy and its symmetrical state-contingent dividend policy. On the one hand, the concavity of the continuation project over the two states of nature l and h calls for a state-invariant investment policy, $i_l^* = i_h^* = i^* > \hat{\imath}$. On the other hand, the concavity of managerial utility makes the manager risk-averse over the investment levels. Intuitively, the optimal solution is to provide full-insurance to the manager, insofar it is feasible to do so (solution (I) above). Under solution (I), risk-neutral shareholders efficiently bear all undiversifiable risk stemming from exogenous uncertainty, while rewarding the manager on the basis of her effort only. As a result, the pay-out policy acts as a shock absorber: all short-term income volatility translates into the pay-out levels. The ex-post inefficiency is proportional to the distance $i^* - \hat{\imath}$: the more (less) important the value creation compared to the value destruction effect, the larger (smaller) such distance is. Solution (II) emphasizes the importance of cash flows uncertainty on the optimal policy. It is best understood by comparison with the invariant investment rule obtained at solution (I). When cash flows volatility is large, insufficient low state resources constraints the respective reinvestment below its efficient value. In essence, large short-term volatility of earnings imposes a financial constraint on the optimal course of action. Furthermore, this financial constraint creates a distortion in the ex-ante provision of incentives, resulting in the optimal level of high state reinvestment to be set above i^*.

4 Implementation.

The analysis of Section 3 makes clear why ex-ante managerial control over firm's resources is ex-ante optimal. The optimum is characterized by a reinvestment vector $\mathbf{i}^* \equiv (i_l^*,\ i_h^*) \gg (\hat{\imath},\ \hat{\imath})$, and, symmetrically, a pay-out vector $\mathbf{d}^* \equiv (d_l^*,\ d_h^*) \ll (\hat{d}_l,\ \hat{d}_h)$. Once determined the ex-ante efficient level of investment, *only* the exceeding part of short-term income has to be paid out to the investors. The incentives to promote long-term value are proportional to retained earnings available for reinvestment. The vector $(i_l^*,\ i_h^*)$ determines the *non-contractible* value of effort $e^* \equiv e(i_l^*, i_h^*) = \frac{b(i_l^*)+b(i_h^*)}{2}$ and the rent of the manager conditional on successful performance. Hence the optimal solution is represented by the couple $(e^*, \mathbf{i}^*)$.

A time-consistency problem arises, due to shareholders' lack of commitment not to intervene. The manager decides her effort based on her beliefs upon the intervention power of outside investors at pay-out stage. Such beliefs must be consistent with the investment rule she chooses at time 1. But, once at pay-out stage, effort is sunk, and investors, if able to do so, would limit the resources under managerial control to $\hat{\imath} \ll \mathbf{i}^*$, expropriating the managerial rent. Any such attempt, if feasible, would be anticipated by the manager, who would in turn reduce her level of effort to $e(\hat{\imath}) = b(\hat{\imath}) < e^*$. Therefore, allocating ex-ante control to investors would reduce the intensity of the value creation effect and lead to a suboptimal outcome. Shareholders cannot commit to any investment policy larger than $\hat{\imath}$: any other promise they can make to the manager is not credible. For the same logic, allocating formal control to the manager while leaving *costless* intervention powers to investors leads to the same suboptimal outcome. As laid out in the discussion above, its straightforward implication is:

Corollary 1 *Setting the cost of investors intervention* $c = 0$ *does not implement the Second Best, indeed:*

$$E(V_{c=0}) = y_1 + e(\hat{\imath})(y_2(\hat{\imath}) - \hat{\imath}) < E(V^*) = y_1 + \tfrac{1}{2}e(i_h^*, i_l^*)\left[y_2(i_l^*) + y_2(i_h^*) - (i_l^* + i_h^*)\right]$$

The corollary simply reflects the nature of the *hold up* problem induced by the separation between ownership and control, and the lack of commitment thereof.

Maximization of value requires the manager to enjoy decisional powers over the use of internal resources. Because of this discretion, she engages in costly value creation activities, which in turn generate a rent. Since her contribution to long-term growth remains sunk inside the firm, this rent must be protected from investor interference, even though, ex-post, curbing managerial private benefits has a positive effect on the overall value. A positive cost of shareholders' intervention exactly safeguards managerial incentives by limiting excessive investors' interference. In essence, it confers *effective* status to the *formal* control allocated to the manager.

On the other hand, if the manager was left unconstrained because of loose investors control, ex-post she would inefficiently boost her rent expanding the reinvestment up to the maximum feasible value[13]. In this instance, the value

[13] Of course, the presence of an external discipliner would set un upper bound on the

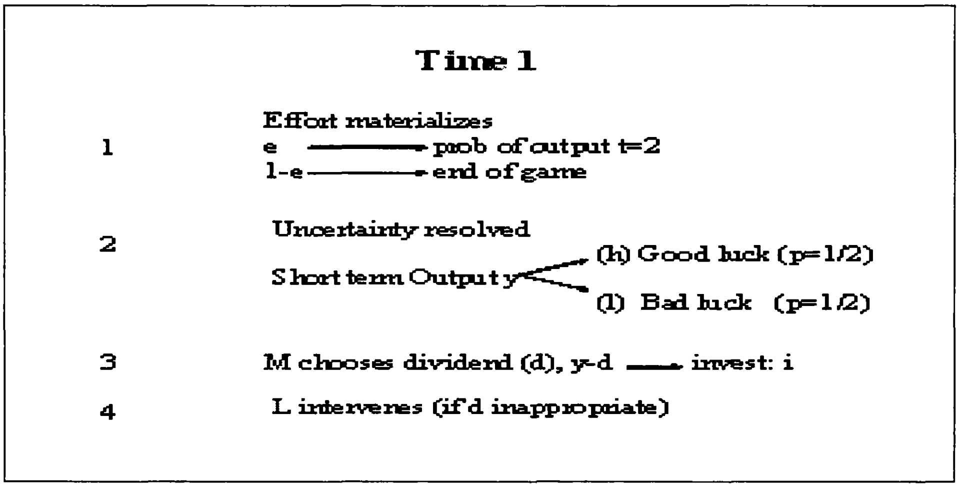

Figure 2: Events at time 1

destruction effect would dominate due to excessive investors' passivity. To avoid the extreme of total passivity, the cost of intervention must then be not too large, as stated in the following Assumption.

Assumption 1 *After the management has announced the pay-out policy and uncertainty is resolved, investors can challenge that choice at a given cost c such that, for any parameters constellation:* $0 < c < [y_2(\hat{\imath}) - \hat{\imath}] - [y_2(i_h^*) - i_h^*] = \Delta V_2$.

The assumption simply states that the cost of intervention is smaller than the minimum gain from intervention, thus ruling out the extreme case of stockholders total passivity. For the sake of clarity, Figure 2 summarizes the events taking place at time 1.

Overall, a mechanism of control-switch is needed to make (e^*, i^*) ex-post enforceable. Ex-ante the manager is allocated the control over short-term cash flows, while a credible threat of intervention from investors must trigger interference in case of *deviations* from the efficient pay-out policy. As a result, the optimal contract specifies not only a stream of payments (R_j) but also a pattern

maximum level of reinvestment. As the dynamic efficiency of the firm falls below a threshold, the conditions for a profitable hostile take-over could be satisfied. In this sense, the model I develop best fits a financial and institutional environment where the external threat is below the level that guarantees the maximization of value.

of control rights (CR_j[14]) that together support the sub-game perfection of the solution. On the basis of the results of Proposition 1, I can state the properties of the optimal contract.

Definition. *The optimal contract is a vector of income streams and a pattern of control rights such that:*

$R_1(y_l; e^*) = d_l^* \leq y_l$

$R_1(y_h; e^*) = d_h^* \leq y_h$

$R_2(y_l; e^*) = y_2(i_l^*)$

$R_2(y_h; e^*) = y_2(i_h^*)$

$$CR_l = \begin{cases} 1 \text{ for } & R_1(y_l; e^*) < d_l^* \\ 0 \text{ for } & R_1(y_l; e^*) \geq d_l^* \end{cases}; \quad CR_h = \begin{cases} 1 \text{ for } & R_1(y_h; e^*) < d_h^* \\ 0 \text{ for } & R_1(y_h; e^*) \geq d_h^* \end{cases}.$$

I can notice three main features of the optimal contract:

- state-contingent income streams at time 1, depending on the realization of $\tilde{y}_1$;
- conditional *and* state-contingent control rights at time 1;
- residual claim over time 2 value.

Such a contract shares features of real life financial contracts. Conditionality of control rights is normally associated with debt, where default is triggered when the contractually stated repayments are not met. State-contingency with respect to the realized cash flows is a typical feature of dividend payments on equity. The residuality of the claim is a typical feature of equity, as well.

I now turn to the implementation of the optimal contract. It is clear that the capital structure operates as a committing technology that fine tunes the effective control rights with the efficient pay-out rule. For our purposes, *equity* is a title to the ownership of the firm, proportional to the stake owned, which delivers unconditional formal control rights. However, the level of dividends remains a discretional choice of the management, as far as it retains control. Our analysis focuses on the optimal degree of concentration/dispersion of equity, in the hypothesis that large shareholders enjoy the same income rights of the small ones, even conditional on intervention.

[14]CR is an indicator function that takes value 0 when the manger is unchallenged and value 1 when shareholders intervene (i.e. when they are effectively in control).

Proposition 2 *Depending on parameter constellations, the Second Best (as determined by Proposition 1) is implemented by a unique equity concentration value:*

Interior Solution (I). $\alpha^* = \frac{c}{[y_2(\hat{\imath})-\hat{\imath}]-[y_2(i^*)-i^*]}$;

Constrained Solution (II). α_σ[15]$= \frac{c}{[y_2(\hat{\imath})-\hat{\imath}]-\left[y_2(i^*_{h,\sigma})-i^*_{h,\sigma}\right]} < \alpha^*$.

Proof. *See the Appendix.* ■

The ownership stake α, selected by the blockholder at time 0, guarantees the credibility of the threat of intervention in equilibrium. Its value is related to firm fundamentals and to the ex-post gains from intervention.

Under symmetric information, shareholders' intervention restores the ex-post zero-NPV level of reinvestment, $\hat{\imath}$, thus increasing also the pay-out up to $\hat{d}_j = d^*_j + (i^*_j - \hat{\imath})$. Assumption 1 precisely states that the cost of intervention is smaller than the total gains. The phenomenon of free-riding is obvious. While the cost is born privately, the gain form intervention is shared with the other passive investors. In essence, the blockholder's stake confers effective status to the formal control rights of outside equity-holders. The intervention constraint of a blockholder with a stake α of equity capital states that the her net payoff from intervention, proportional to α, is equal to her payoff in case of passivity. Hence, only an appropriately large equity stake allows the constraint to hold. Notice that the gain is increasing in the investment level i^*. Given that $i^*_h \geq i^*_l$, strictly so in the case of Solution (II), it follows that that the optimal ex-ante concentration must be computed with respect to the high state.

Formally, the value α needed to implement the desired solutions is implicitly determined by the following equation, where the left hand side is the pay-off upon intervention and restoration of the optimal investment rule:

$$\alpha\left[\hat{d}_h + y_2(\hat{\imath})\right] - c = \alpha\left[d^*_h + y_2(i^*_h)\right] \Leftrightarrow \alpha\left[y_2(\hat{\imath}) - \hat{\imath}\right] - c = \left[y_2(i^*_h) - i^*_h\right]$$

$$\Rightarrow \alpha^* \equiv \alpha(d^*_h) \equiv \alpha(i^*_h) = \frac{c}{\Delta V_2} < 1$$

As in Burkart, Gromb and Panunzi (1997), the value of the firm is non-monotonic in the concentration of equity, and attains its maximum for an interior concentration. Higher stakes have a negative impact on managerial incentives, while lower stakes lead to excessive shareholder passivity, in turn allowing

[15]The subscript sigma is a reminder of the effect of cash-flows uncertainty on the concentration.

the manager to appropriate resources in the pursuit of private benefits. Notice that intervention remains only potential, since the manager does not have incentives to deviate from the efficient pay-out policy. The threat of intervention exerted by a large shareholder translates into a dividend pressure that puts an efficient bound on the power conferred to the management at origination. In the same vein of Zwiebel (1996), Fluck (1999) and Myers (2000), management sets the dividends to the minimum level that allows her to retain control.

The equilibrium outside equity concentration is proportional to the pay-out pressure specified in the optimal contract. Firms with larger net benefits from managerial control should display lower concentration (higher managerial discretion) and the converse. The allocation of effective control rights, with a relatively large shareholder to overcome the free-riding problem, commit the parties to the optimal outcome. The intensity of the parties' effective control rights may be different between the high and low states[16]: indeed, at the Constrained Solution (II) intervention must be triggered in the high state and not in the low state, where the optimal investment rule satisfies $i_l^* = y_l$.

5 Debt vs. Equity.

In our framework, the combination of ex-ante incentives for potential growth and short-term uncertainty leads to a short-term claim whose payoff and control rights are both cash flow sensitive. The blockholder claim exhibits both features. What is crucial is the residuality of equity. Indeed, only a residual claim can satisfy the intervention vs. passivity constraint, in that its payoff is increasing in the amount of resources available for distribution. It is instructive to consider what would happen in the case when all shareholder are atomistic but short-term debt is a feasible contract. For our purposes, debt is a claim with a fixed, contractually stated pay-off (interest and face value) prior to any repayment to equity-holders. Its control rights are conditional to the event of default.

Corollary 2 *Absent a blockholder, debt alone does not implement the Second Best.*

Proof. *Let D the debt repayment due at time 1. For any value of short-term debt $D \geq d_l^*$, pay-out is no longer state-contingent: $d_l = d_h = D$. The expected*

[16] See the Appendix.

value becomes

$$y_1 + (1/4)\left[b(y_l - D) + b(y_h - D)\right]\left[y_2(y_l - D) - y_l + y_2(y_h - D) - y_h + 2D\right]$$

Since $i_h(D) = i_l(D) + (y_h - y_l)$; *then either* $i_h(D) \neq i_h^*$ *or* $i_l(D) \neq i_l^*$ *or both. Hence,* $\max_D E_{\tilde{y}_1}\left[V\left(i_j(D)\right)|e(i_j(D))\right] < E_{\tilde{y}_1}\left[V\left(i_j(\alpha^*)\right)|e(i_j(\alpha^*))\right]$. ■

A fixed debt-like claim is not flexible enough. A well known benefit of debt lays in its ability to force management to pay-out free cash flows, as enphasized by Jensen (1986). It is certainly the case in our model. However, debt repayments are contractually stated: they cannot be made state-contingent on the realization of short-term income. As a result, for any debt repayment due at pay-out stage, there will be inefficiencies that prevents the implementation of e^*. According to its level, debt acts either too soft or too tough on managerial incentives. Notice that *long-term debt*, due at time 2, is of limited utility in the model, as the intervention threat must be effective at time 1 and must internalize the effect of investment on the continuation project.

For the sake of clarity, consider the limit case of deterministic short-term cash flows y_1, which in turn implies a unique value d^* and i^*, at the interior solution. Now, debt can implement the optimal outcome, without any need for a blockholder. It suffices to set the short-term debt repayment to $D^* = d^*$ while leaving the claim on the residual value under the form of dispersed equity. However, as free riding prevents small shareholders from intervening, the manager can trigger renegotiation, reschedule (part of) the repayment to debtholders to time 2 and increase her rent at the expenses of shareholder value. It is apparent the other drawback of debt: it fails to fully internalize the continuation value.

A further comment is due. If debt-holders' intervention conditional on default is costly, for any level of debt the manager will repay an amount equal to face value minus the cost of intervention: then no investor will be willing to lend to the firm at all. Clearly, some further protection must be granted to the creditors to make debt feasible. A first possibility is to allow debt-holders to recoup the cost of intervention together with the face value[17], as assumed by Hart (2001). Otherwise, debt-holders can have the right to dispose of certain assets of the firm that serve as collateral. Third, debtholders as a group can enjoy a veto power at the pay-out stage. In essence, for debt to be an enforceable claim

[17] An equivalent option is tohave premium debt with face value $B = D + c$.

it must enjoy a preferential treatment with respect to equity, which is exactly what happens in real life legal systems.

Altough the model is too stylized for a comprehensive treatment of debt, once I assume that debt financing is feasible, I can make a case for mixed capital structure. Denote as I the upfront investment in the venture and W the maximum amount of funding that can be committed by a large shareholder. Furthermore, assume:

Assumption 2. $\alpha^* > W/I \geq \alpha^* (I - d_l^*)/I$.

Assumption 2 states that the large shareholder's funding is limited by a wealth constraint, perhaps because of the underdiversification arising from holding a large stake in the firm, or due to some form of credit markets imperfection. Now, a pure equity capital structure can no longer implement the optimum. The maximum feasible dividend pressure is too low to implement the dividend payments (d_l^*, d_h^*). Introducing short-term debt relaxes the constraint, by reducing the amount of cash available for dividend distribution.

Proposition 3 *Under Assumption 2, a mixed capital structure implements the second best. Short-term prior risk-free debt is set to a value* $D^* \in (0, d_l^*]$ *such that* $\alpha^*(I - D^*) < W$.

Proof. *The intervention vs. passivity constraint of the blockholder is unchanged by short-term debt:*

$$\alpha^* [y_2(\hat{\imath}) - \hat{\imath} - D] - c = \alpha^* [y_2(i_h^*) - i_h^* - D]$$

For any amount of equity funding, concentration is constant at the value determined by the difference in time 2 NPV $[y_2(\hat{\imath}) - \hat{\imath}] - [y_2(i_h^*) - i_h^*]$. *However, risk-free debt reduces the total amount of equity capital. Ultimately, given Assumption 2, there is a value* $D^* \in (0, d_l^*]$ *such that* $\alpha^*(I - D^*) = W$. ■

Basically, short-term debt cooperates with the large shareholder claim[18] in order to exert the efficient pay-out pressure. Actually, the leverage effect increases the expected return on equity, since $R_E(D; \alpha^*) \equiv \frac{y_1 - D + e^*[y_2(i^*) - i^*]}{I - D}$ is

[18] In this instance, the enforceability of the debt claim is guaranteed by the priority rule, even if intervention given default is costly and no further conditions are assumed. Indeed, the debt claim is protected by the blockholder threat. Defaulting on debt and reinvesting the unpaid cash decreases the large shareholder payoff under passivity. This event automatically triggers the block-holder intervention, that in turn restores the debt payment as by the priority rule. Hence, the manager has no incentives to (strategic) default.

increasing in D, short-term debt should be set at the maximum feasible value, i.e. $D^* = d_l^*$, in order to maximize the return on equity.

Therefore, as argued by Hart (2001) a mixed capital structure makes financing possible under circumstances when a pure equity capital structure does not make it feasible. Bearing in mind the results in Proposition 1, it is possible to state the following empirical prediction:

Leverage ratio is (weakly) negatively correlated with the volatility of short-term cash flows[19]*. Furthermore, leverage is (weakly) positively correlated with the amount of funding I.*

Empirical studies[20] provide evidence of a positive correlation between leverage ratios and the size of the firm. If the magnitude of I is taken as a proxy for the size of the firm, our result matches the empirical findings.

Another benefit of debt lays in its ability to curb private benefits in case of unexpected shocks on short-term cash flows. As an illustration, consider a ceteris paribus decrease in low state cash flows after effort is sunk. Under pure equity capital structure, the manager will simply decrease one-to one the dividend, as the blockholder intervention vs. passivity constraint is unaffected from such decision. Instead, under mixed capital structure, debt would constrain the manager to decrease the low state reinvestment value, which is exactly the ex-post efficient choice.

6 Financial constraints matter

Provided that the cost of intervention is never too large, the second best can be implemented whereby an appropriate pattern of equity ownership. The optimal concentration α^* defines the ex-ante efficient vector of investment $i^*$and pay-out d^*, respectively larger (smaller) than the corresponding ex-post efficient values.

However, the features of the second best solution depend critically on the degree of exogenous uncertainty. Indeed, insofar parameters constellations are such that $y_l > i^*$, the only effect of uncertainty regards the pay-out policy. The equilibrium α^* implicitly defines a state-contingent dividend pressure that forces the manager to pay-out all the cash in excess of the constant level of

[19]Ultimately, as volatility grows large and $d_l \rightarrow 0$, there is no role for short-term debt, as evident from Constrained Solution II.

[20]See, for instance, Rajan and Zingales (1995).

investment. Uncertainty translates entirely in the pay-out levels. As for the manager, she is given full insurance with respect to the two states of nature l and j. This is equivalent to maximal incentives for effort provision since the concavity of managerial utility makes her endogenously risk-averse with respect to the investment levels. In equilibrium she is not rewarded for luck, as agency theory predicts.

This is no longer the case as $y_l < i^*$, when the interior solution with full insurance is no longer feasible. Here exogenous uncertainty displays its full force by imposing a constraint on the self-financing of investment: as a result, the manager must bear some risk. As financial constraints bite, shareholders are left with the sole option of minimizing, given the technology and effort parameters, the extra risk added to managerial rent. The result is a higher value of equilibrium investment following good luck (y_h) than following bad luck (y_l), and higher than the value under the full insurance solution (I)[21]: $y_l = i_l^* < i^* < i_h^* < y_h$. As for the concentration, the equilibrium α^* is set to a lower α_σ which trades-off the value creation vs. the value destruction effect with respect to the h state only.

In equilibrium, manager's rent becomes state-contingent in short-term cash flows: the more cash is in the firm in the high state, because of sheer good luck, the more the manager invests. Therefore, the ultimate effect of financial constraints is to induce a systematic relationship between uncertainty beyond managerial control and compensation on the one hand and to decrease the equilibrium level of concentration (intervention threat) on the other hand. Still, it is ex-ante efficient to do so.

6.1 Pay for luck and equity ownership

The interpretation I provide in this section depends on the reader's willingness to consider private benefits as a legitimate form of managerial remuneration. I make an analogy between (increasing) private benefits and pay for luck, although what really matters for our purposes is that managerial discretion over the control of cash flows (hence her compensation) is state contingent, i.e increasing with short-term exogenous uncertainty.

[21] For this and the following result on concentration, refer to the proof of Proposition 1, solution (II), in the Appendix.

In this section I slightly modify the benchmark model, always under the conditions of Solution (II), namely $y_l < i^*$.

Let the probability of y_h equal to $p \in (0,1)$, i.e. $1-p$ is the exogenous probability of being financially constrained. Notice that now $E(\tilde{y}_1; p) = py_h + (1-p)\, y_l \gtrless E(\tilde{y}_1; 1/2)$ as $p \gtrless 1/2$. Hence, for any couple (i_l, i_h) the overall expected value for the firm is larger (smaller) as $p > 1/2$ $(<)$. I can now state the following proposition[22]:

Proposition 4 *At the financially constrained Solution (II) $i_l^*(p) = y_l$; state h investment and concentration satisfy, respectively:*

$i_h^*(p) \lesseqgtr i_h^*(1/2)$ *as* $p \gtrless 1/2$,

$\alpha_\sigma(p) \gtrless \alpha_\sigma(1/2)$ *as* $p \gtrless 1/2$

Furthermore, $i_h^*(p) \to i^*$ and $\alpha_\sigma(p) \to \alpha^*$, both from the left as $p \to 1$.

Proof. *See the Appendix.* ■

When financial constraints are binding, pay for luck is negatively related to the level of expected short-term performance and positively to the probability of being financially constrained. Intuitively, the less valuable is the growth option, compared to short-term profitability, the less discretion the manager is given, hence less pay for luck and higher concentration.

In the model, pay for luck and looser governance, as implemented by the internal discipliner of equity concentration, go *hand in hand.* Lower concentration is the equilibrium result of a constrained incentive problem, i.e. when there is no room for efficient risk-sharing. Bertrand and Mullainathan (2000), based on the tenets of agency theory, conclude that empirical evidence of pay for luck is a *prima facie* case for the validity of the skimming view as opposed to the contracting view. In a nutshell, the skimming view sees CEO's as agents without principals, left free, by the inadequacy of extant governance mechanisms, to appropriate resources irrespective of their effective contribution to the value of the firm. Their conclusion seems strenghtened by their finding of a negative correlation between pay for luck and measures of governance, including equity concentration. However, I show that, under certain conditions, the negative correlation between pay for luck and equity concentration is itself a feature of the equilibrium arrangement. This finding suggests the logical chain "failures

[22]Notation follows unambigously: $i_h(p)$ and $\alpha_\sigma(p)$ are investment and concentration levels in the high state given probability p; $i_h(1/2)$ and $\alpha_\sigma(1/2)$ the respective values for $p = 1/2$.

of governance mechanism imply excessive managerial discretion which implies pay for luck" is neither necessarily true nor necessarily supportive of the skimming view. Indeed, looser governance mechanisms may well be the equilibrium response to the characteristics of certain firms: in this sense "loose" stands for "best"! In the light of these findings, a more powerful test of the contracting vs. the skimming view should focus only on those industries for which the theory does rule out (any extent of) pay for luck, namely those that tend not to be financially constrained or exhibit very low cash flow uncertainty.

7 Other results

The model generates a number of results. Some of them have already been discussed. For example, *ceteris paribus*, firms with higher probability of constraints to self-financing (low p) or, for given probability, with tighter constraints (low y_l) have a lower degree of efficient concentration.

Now I turn to the benchmark model ($p = 1/2$), and consider the comparative statics with respect to the growth option and earning volatility.

Corollary 3. *(1) A parallel shift upward (downward) of the function* $y_2(i)$ *decreases (increases)* α^**:* $\frac{\partial \alpha^*}{\partial y_2} < 0$*; the same attains for* $b(i)$*:* $\frac{\partial \alpha^*}{\partial b} < 0$*. (2) A mean preserving spread in the distribution of the short-term cash flows (weakly) decreases the optimal concentration value.*

Proof. *(1) Solution (I). By simple inspection of the Foc at* $i_h^* = i_l^* = i^* \frac{\partial V}{\partial i_h}(i^*) \equiv \frac{\partial V}{\partial i_l}(i^*) = b'(i^*)\left[y_2(i^*) - i^*\right] + b(i^*)\left[y_2'(i^*) - 1\right] = 0$ *I see that* $\frac{\partial i^*}{\partial y_2} > 0$ *and* $\frac{\partial i^*}{\partial b} > 0$*. The result follows as* $\frac{\partial i^*}{\partial \alpha^*} = \frac{[(y_2(\hat{\imath})-\hat{\imath})-(y_2(i^*)-i^*)]^2}{y_2'(i^*)c} < 0$ *at the intervention constraint. The same reasoning applies for solution (II), where the relevant Foc is* $\frac{\partial V}{\partial i_h}(y_l, i_h^*) = 0$ *(eqn.2 in the Appendix).*

(2) It is just a restatement of Proposition 1. As $\sigma \equiv (1/2)(y_h - y_l)$ *grows large, ultimately I end up in the case of solution (II), namely where* $y_l = y_h - 2\sigma < i^*$*.* ■

Firms with higher growth options, where future profitability is strictly linked to managerial effort (human capital intensive), or, generally, where the expected time pattern of profits is upward sloping should have, *ceteris paribus*, lower levels of optimal concentration and higher managerial discretion. This case seems to be relevant for innovative or high-tech firms, as well as for mature firms in the aftermath of a corporate crisis, when most of the value is prospective and stemming from the ability of the newly appointed management.

Firms whose performance is, *ceteris paribus*, more subject to uncontrollable fluctuations should have more powerful managers, smaller blockholders and exhibit a higher correlation between investment and cash flows. It seems appropriate to include in this category firms operating in the oil and raw materials sectors, firms more open to foreign competition and, in general, firms with a core business focus, unable to reducing idyosincratic risk by pooling cash flows from different operating units.

Finally, notice that the model predicts the efficient pay-out ratio (d_j/y_j) to be higher for for firms with comparably lesser growth options. This result seems to suggest a larger strategic role for blockholders in firms with a relatively constant time pattern of profits (like widely diversified groups, conglomerates, utilities).

8 Conclusion

This piece of work investigates the role of internal discipliners in the form of optimal equity ownership for the purpose of committing the management to the pursuit of shareholder value in the presence of separation between ownership and control. The analysis builds on the model developed by Burkart, Gromb and Panunzi (1997), who show that a concentrated equity claim maximise the value of the firm. I extend the original set-up (i) by explicitly rooting the conflict of interest between managers and shareholders on the control of internally generated cash flows and (ii) by taking into account the role of earnings volatility and financial constraints at growth stage. As a result, I establish a number of results and empirical predictions that link investment policy and optimal equity concentration to firm characteristics.

First, the optimal financial contract exhibits state-contingency of both security and control rights. It can be uniquely implemented by an interior concentration value. This optimal concentration is negatively related to the growth options of the firm and positively related to the level of short-term cash flows. It is negatively related to the riskiness of the firm, as captured by the volatility of short-term cash flows. Importantly, optimal equity ownership is negatively related to the probability of the firm being financially constrained, in the sense that the level of desired investment exceeds internal resources. I also show that straight debt alone does not implement the second best, in absence of a large shareholder. Nonetheless, under certain conditions, a combination of a concentrated equity claim together with straight debt is the efficient solution.

Second, when financial constraints are binding, the optimal contract is shown to involve a positive correlation between cash flows exogenous randomness and managerial utility. I interpret this finding as an optimal endogenous level of pay for luck, a phenomenon analysed by Bertrand and Mullainathan (2000). Crucially, pay for luck is associated in equilibrium to a lower optimal degree of ownership concentration. Pay for luck is also negatively related to the level of short-term cash flows and positively to the probability of being financially constrained, while the reverse holds for concentration. In other words, pay for luck and looser governance, as implemented by the internal discipliner of equity concentration, emerge as the equilibrium result of a constrained incentive problem. This finding suggests that, under certain conditions, looser governance arrangements may be the equilibrium response to the characteristics of certain firms. Contrary to standard tenets of agency theory, in such cases loose governance can be an efficient equilibrium feature.

Looking forward, the predictions of the model appear worthy of empirical tests.

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Appendix.

Proof of Proposition 1.

First, in order to rule out the economically uninteresting corner solution $(i_l, i_h) = (y_l, y_h)$ I impose the following sufficient condition, that simply states that investing all resources in the h state is never optimal:

Condition (i) $\forall\ i_l \in (\hat{\imath}, y_l]$

$$\frac{\partial V}{\partial i_h}(i_l, y_h) = (1/2)b'(i_h)\left[y_2(y_h) + y_2(i_l) - y_h - i_l\right] + (1/2)[b(i_l) + b(y_h)]\left[y_2'(y_h) - 1\right] < 0.$$

The characterisation of the solution depends on parameters constellation. I show that there is either an interior solution or a constrained solution (with a corner solution for investment in the low), depending on the magnitude of y_l with respect to the parameters.

Interior Solution (I). A necessary condition for the gradient of the relaxed Program to vanish at an interior point (i_l, i_h) is that simultaneously $\begin{cases} y_2'(i_l) - 1 < 0 \\ y_2'(i_h) - 1 < 0 \end{cases} .\Rightarrow \begin{cases} i_l > \hat{\imath} \\ i_h > \hat{\imath} \end{cases}$. At this point, the First order conditions imply:

$$g(i_l) \equiv \frac{[y_2'(i_l) - 1]}{b'(i_l)} = -\frac{\{y_2(i_h) + y_2(i_l) - (i_l + i_h)\}}{b(i_l) + b(i_h)} = \frac{[y_2'(i_h) - 1]}{b'(i_h)} \equiv g(i_h)$$

Now compute the first derivative of $g(i)$. Over the relevant range $i > \hat{\imath}$, negativity of $[y_2'(i) - 1]$ together with concavity of $y_2(i)$ and $b(i)$ yields:

$$g'(i) = \frac{y_2''(i)b'(i) - [y_2'(i) - 1]\, b''(i)}{[b'(i)]^2} < 0.$$

It follows from the monotonicity of $g'(i)$ over the relevant domain, that there is only a unique value i^*that simultaneously satisfies the First order conditions, provided that $i^* < y_l$. To verify that $i_l = i^* = i_h$ is indeed a maximum, I need to study the sign of the Hessian determinant. The Second order derivatives are:

$$\frac{\partial^2 V}{\partial i_l^2} = (1/2)b''(i_l)[y_2(i_h) + y_2(i_l) - (i_l + i_h)] + b'(i_l)\left[y_2'(i_l) - 1\right] +$$

$$+(1/2)[b(i_l)+b(i_h)]y_2''(i_l)<0, \forall (i_l,i_h)>(\hat{\imath},\hat{\imath});$$

$$\frac{\partial^2 V}{\partial i_h^2} = 1/2)b''(i_h)[y_2(i_h)+y_2(i_l)-(i_l+i_h)]+b'(i_h)\left[y_2'(i_h)-1\right]+$$

$$+(1/2)[b(i_l)+b(i_h)]y_2''(i_h)<0, \forall (i_l,i_h)>(\hat{\imath},\hat{\imath});$$

$$\frac{\partial^2 V}{\partial i_l \partial i_h} = (1/2)\left\{b'(i_l)\left[y_2'(i_h)-1\right]+b'(i_h)\left[y_2'(i_l)-1\right]\right\}<0, \forall (i_l,i_h)>(\hat{\imath},\hat{\imath}).$$

At the stationary point $\mathbf{i}^*$ the Hessian determinant is positive:

$$\Delta(\mathbf{i}^*) = \left\{b''(i^*)\left[y_2(i^*)-i^*\right]+b'(i^*)\left[y_2'(i^*)-1\right]+b(i^*)y_2''(i^*)\right\}^2 + - \left\{b'(i^*)\left[y_2'(i^*)-1\right]\right\}^2>0.$$

It follows that $i_l = i^* = i_h$ is the unique interior solution.

Constrained Solution (II). Let $\hat{\imath} < y_l < i^*$. Now the First order conditions can no longer vanish simultaneously. Reminding that $\frac{\partial^2 V}{\partial i_l^2}<0$, at the point $i_l = y_l$, $i_l = i^*$ as obtained under the Interior Solution (I), I have that

$$\frac{\partial V}{\partial i_l}(y_l,i^*) = (1/2)b'(y_l)[y_2(y_l)+y_2(i^*)-(y_l+i^*)]+(1/2)[b(y_l)+b(i^*)]\left[y_2'(y_l)-1\right]>0.$$

Because of the negativity of the Second order derivatives, it is optimal to set $i_h^* > i^*$. The optimal i_h^* attains where the First order derivative wrt. i_h vanishes:

$$\frac{\partial V}{\partial i_h}(y_l,i_h^*) = (1/2)b'(i_h^*)[y_2(y_l)+y_2(i_h^*)-(y_l+i_h^*)]+[b(y_l)+b(i_h^*)]\left[y_2'(i_h^*)-1\right]=0$$

Because of Condition (i) above , $i_h^* < y_h$. Notice that at $(i_l,i_h)=(y_l,i_h^*)$, $\frac{\partial V}{\partial i_l}(y_l,i_h^*)>0$, since $g'(i)<0$.

Proof of Proposition 2.

For both cases of Proposition 1, the optimal ownership pattern implements the income and control rights defined in Section 3.

Interior Solution (I). In this case, the intervention constraint of the blockholder must be binding in both states of the world, so that the threat of intervention is credible in both states. Formally, the intervention vs. passivity constraint must satisfy the following equations, for each realization of $\tilde{y}_1$:

$$\textit{conditional on } y_l : \alpha\left[\hat{d}_l + y_2(i_l)\right] - c = \alpha\left[d_l^* + y_2(i_l^*)\right]$$

$$\textit{conditional on } y_h : \alpha\left[\hat{d}_h + y_2(i_h)\right] - c = \alpha\left[d_h^* + y_2(i_h^*)\right]$$

Since the optimal investment policy is state-insensitive, it follows that $\hat{d}_h - \hat{d}_l = y_h - y_l = d_h^* - d_l^*$, and the two equations collapse to the same one: $\alpha\left[y_2(\hat{\imath}) - \hat{\imath}\right] - c = \alpha\left[y_2(i^*) - i^*\right]$. Assumption 1 guarantees a well defined concentration value $\alpha^* = \frac{c}{[y_2(\hat{\imath})-\hat{\imath}]-[y_2(i^*)-i^*]} < 1$.

Constrained Solution (II). In this case, $i_l^* = y_l < i_h^*$, $d_l^* = 0$ and $d_h^* = y_h - i_h^* < (y_h - y_l)$. Since investment is no longer constant over states of the world, the gain from intervention is now larger in state h than in state l. The intervention constraint must be binding only in the high state, upon the realization of y_h, while no intervention must be triggered following the realization of y_l.The relevant constraints, conditional on the realised values y_l and y_h, become:

$$y_l : \left[\hat{d}_l + y_2(\hat{\imath})\right] - c < \alpha\left[y_2(y_l)\right] \Leftrightarrow \alpha\left[y_2(\hat{\imath}) - \hat{\imath}\right] - c < \alpha\left[y_2(y_l) - y_l\right] \quad \text{(eqn. ii)}$$

$$y_h : \alpha\left[\hat{d}_h + y_2(\hat{\imath})\right] - c = \alpha\left[d_h^* + y_2(i_h^*)\right] \Leftrightarrow \alpha\left[y_2(\hat{\imath}) - \hat{\imath}\right] - c = \alpha\left[y_2(i_h^*) - i_h^*\right] \quad \text{(eqn. iii)}$$

Now notice that $\left[y_2(i_h^*) - i_h^*\right] < \left[y_2(y_l) - y_l\right]$. Therefore eqn. (iii) determines the optimal $\alpha_\sigma = \frac{c}{[y_2(\hat{\imath})-\hat{\imath}]-\left[y_2(i_h^*)-i_h^*\right]} < \alpha^* < 1$ such that eqn. (ii) holds with strict inequality at α_σ.

Proof of Proposition 4.

The Foc of the new (relaxed) Program are:

$$\frac{\partial V}{\partial i_l} = (1-p)\left\{b'(i_l)\left[p\left(y_2(i_h) - i_l\right) + (1-p)\left(y_2(i_l) - i_l\right)\right] + \right.$$

$$+ \left[pb(i_l) + (1-p)b(i_h)\right]\left[(1-p)(y_2'(i_l) - 1)\right]\} \geq 0$$

$$\frac{\partial V}{\partial i_h} = p\left\{b'(i_h)\left[p\left(y_2(i_h) - i_l\right) + (1-p)\left(y_2(i_l) - i_l\right)\right] + \right.$$

$$+ \left[pb(i_l) + (1-p)b(i_h)\right]\left[p(y_2'(i_h) - 1)\right]\} \geq 0$$

As $y_l < i^*$, where i^* is the optimal investment under the Interior Solution (I), I obtain that $\frac{\partial V}{\partial i_l}(y_l, i_h) > 0$ for any $i_h > \hat{\imath}$. Following the same logic of Proposition 1, the value i_h at which $\frac{\partial V}{\partial i_h}(y_l, i_h^*) = 0$ is an $i_h^* > i^*$. Then the monotonicity of $g(i)$ over the relevant domain $(\hat{\imath}, y_h]$, as shown in the proof of Proposition 1, together with the trivial facts that, for any couple $(i_l, i_h) \gg (\hat{\imath}, \hat{\imath})$,

(a) $p\left(y_2(i_h) - i_l\right) + (1-p)\left(y_2(i_l) - i_l\right) \gtrless (1/2)\left(y_2(i_h) - i_l\right) + \left(y_2(i_l) - i_l\right)$ as $p \gtrless 1/2$ and

(b) $pb(i_l) + (1-p)b(i_h) \gtrless 1/2\left[b(i_l) + b(i_h)\right]$ as $p \gtrless 1/2$

deliver the result about $i_h(p)$. Once characterised $i_h(p)$, the last piece of Proposition 4 is straightforward, according to the logic in Proposition 3.