

Active agents, passive principals: does high-powered CEO compensation really improve incentives?*

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Abstract

In this paper we use agency theory to study the active role of the CEO in the formulation of corporate strategy. We allow the agent (CEO) to play a role in defining the parameters of the agency problem, in an incomplete contracting model in which the agent can be rewarded based only on financial performance. Contracts can be renegotiated depending on the proposed strategy. We argue that CEOs will have an incentive to propose difficult, ambitious strategies for change. The principal (the shareholders) can mitigate this by precommitting to pay high compensation regardless of the manager's chosen strategy, and will prefer to do so in times of change. In a less changeable environment, they will prefer to wait and see what strategy is chosen before setting compensation. In some circumstances, they will also prefer, if possible, to pre-commit never to pay high compensation. *JEL numbers: G30, G34, J33, D82. Keywords: agency theory, executive compensation, free-cash-flow theory, strategic complexity*

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“We have created a cult of leadership that far exceeds anything that existed decades ago... What we are getting now, very dangerously, is what I call a dramatic style of managing; the great merger, the great downsizing, the massive brilliant new strategy... So we get all these massive mergers, fire, brimstone and drama, because you can’t say to the stock analysts, ‘we’re getting our logistics all straightened out, we’re going to be much more efficient at throughput to the customer.’ They start to yawn” (Mintzberg, 2000).

1 Introduction

In this paper we study the role of a manager who runs a firm on behalf of shareholders, and who is rewarded according to a compensation plan designed to align his or her interests with theirs. Although nominally responsible to shareholders, in practice the CEO has the initiative in defining the framework in which the firm’s strategy is set and implemented, and therefore has an input into the design of his compensation package. We study the incentives a CEO might have to bias the firm’s strategic direction towards overambitious or “dramatic” strategies. Our basic argument is simple: such strategies are likely to require strong incentives, which in turn will imply high expected compensation. We develop this argument in the setting of an incomplete-contracting agency model.

Firms operate in uncertain environments, that require many of them to change or transform themselves.¹ If anything, this need for change has increased recently, and at the same time the role of the CEO in effecting

¹The ongoing revolution in information technology is one reason for this, opening up new possibilities for outsourcing and for communication between firms and their clients. One way to judge this is by the strategy literature, for example Jacobides and Hitt (2001) describe how mortgage lending, traditionally located within a single vertically-integrated mortgage bank, has become fragmented into many different specialist firms. At a general level, one can also cite examples of established firms that have reinvented themselves quite radically: in the US, IBM under the leadership of Lou Gerstner moved from hardware production to service provision and consultancy; in the UK, British Gas switched away from its role as a straight utility and towards general customer service provision such as electricity and vehicle breakdown services (in the process, splitting itself into two separate companies, Centrica and BG).

change has gained greater emphasis.² There has been the rise of the “hero-CEO” (Sonnenfeld, 1988, Senge and Kaeufer, 2000): the responsibility for corporate change is attributed to the individual leader rather than a team or the entire company, this individual is extremely highly paid, and he or she attains celebrity status beyond the business world and on a par with political leaders and star entertainers. These developments are not always viewed favorably, for instance research into the share-price effects of takeovers suggests that many kinds of takeovers generally do not add value (e.g. Jensen and Ruback, 1983, Shleifer and Vishny, 1988, Jarrell and Poulsen, 1989, Berger and Ofek, 1995, and Servaes, 1996).

One of the main points of this paper is to recognize that CEOs set or formulate strategy as well as implement it: they define the agency problem. In a standard moral hazard model, shareholders (the principal) hire a CEO (the agent) to perform a task that requires costly effort. The task is well-defined to both principal and agent as they both know the details of the problem the principal is delegating. There may be unknown parameters, but both players know the probability distributions of those parameters and the information structure describing who learns what when. A contract between both parties is signed at the outset, before any of the uncertainty is realized. This gives a somewhat *passive* role to the agent - he has no role in defining the problem he will have to “solve”. An example of such an agency relationship is given by Schama (1987). He describes an incentive system used in prisons in 17th century Holland, where social norms dictated that prisoners should be required to work even though sometimes a prisoner refused to do so. The hapless prisoner was chained to the handle of a pump in a room that slowly filled up with water flowing from a pipe. In equilibrium the incentive-compatibility constraint was satisfied and the agent exerted effort by turning the handle and surviving by continuously pumping the water out of the room. This example illustrates an agent whose role in the relationship is completely passive: the principal controls the relationship by designing the setting and an incentive system that determines the agent’s behaviour, and the agent merely reacts to those incentives.

In our view this standard framework does not accurately represent the relationship between shareholders and CEO. The top management of a publicly-

²HBR recently (December 2001) published its first-ever special issue, dedicated to “breakthrough leadership.”

owned company play an *active* role in their relationship with the shareholders and the board of directors. This limitation of the standard model has, of course, been recognized before, e.g. by Holmstrom and Milgrom (1987), and is clearly stated by Core and Guay (2000): “Implicit in the managerial ownership literature is a more general model of the agency relationship between the shareholders and the CEO, in which shareholders cannot specify which project the CEO chooses, but must instead delegate this choice to the CEO.” We model this active role for the CEO by splitting the agency problem into two processes: first, the manager searches for information, resulting in an evaluation of the task to be carried out (strategy formulation); secondly, he proposes a strategy to the board for their agreement and then carries out the agreed task (strategy implementation). The implementation stage (the second stage) is the one normally studied.³ Clearly, our model of strategic choice is still a simplification of reality since generally one cannot completely separate the formulation from the implementation stage. This argument is made in the strategy literature on the “crafting” or “emergent” view of corporate strategy (Mintzberg, 1987). What is crucial to our analysis is that these two tasks cannot be split and assigned to two different people.

A key aspect of our analysis is the fact that CEO compensation is generally adjusted in response to changing circumstances. Typically, compensation is reviewed annually, sometimes with additional changes in response to specific events. One can rationalize this by saying that contracts need to be revised in response to unanticipated circumstances, or in response to circumstances that were anticipated but not contractible. Our aim in this paper is to show that the scope for higher compensation is one of the motivations that a CEO might have to search for strategic change.

The managerial incentive problem resulting from the separation of ownership and control has long been recognised (e.g. Berle and Means, 1932, Marris, 1967, Baran and Sweezy, 1966) and is now one of the main theme of corporate finance research (free cash flow theory and the associated notion of private benefits of control are leading examples (Jensen, 1986)). Generally this research has viewed managerial compensation favourably, as a solution of the incentive problem. For example in their seminal paper, Jensen and Murphy (1990) argued that managers of large corporations typically had

³Although our analysis differs from most applications of agency theory, the techniques we use are standard. This is an application of existing methods to a specific setting.

small stakes in the financial success of their firms, on average receiving less than $\frac{1}{2}\%$ of any increase in shareholder value.⁴ Their conclusion suggested that compensation contracts should be used to provide a tighter link between performance and reward in order to solve the adverse incentive effects associated with the separation of ownership and management. New practices in executive compensation over the past decade have changed towards more high-powered incentives (Murphy, 1999, Conyon and Murphy, 2000). While the economics and finance research literature generally views high pay and incentives favourably, public debate is ambivalent and sometimes hostile. In part, it is clear that the divergence between the academic corporate finance research and the public debate is due to different perceptions of the sources of high pay: the corporate finance research generally views pay as the outcome of a contracting process that maximizes shareholder value (subject to incentive constraints), while the public debate does not assume that pay is set with this objective in mind.

In this paper we look for a middle ground between these views. We use standard agency theory techniques to challenge the view that compensation contracts are simply there to solve the managerial incentive problem. We show that sometimes compensation can become part of the problem, instead of just being the solution of the problem.

1.1 Outline of the model

To summarize the structure of our model, we consider a CEO who has some discretion over which strategic alternatives he might investigate. The compensation contract given to the CEO by the shareholders (or the board of directors) will be defined once the CEO presents the results of his strategy formulation exercise, and before he implements the new strategy. Then the CEO decides whether to actually implement the chosen strategy and put in the required effort. We use a standard incomplete contracting framework in which compensation is a function of firm value, and cannot be conditioned

⁴This is substantially raised by a small number of entrepreneurs with large equity stakes who remained as CEOs when their firms grew and obtained stock market listings. Subsequent researchers have challenged Jensen and Murphy's interpretation that 0.325% is a "small" amount (Hall and Liebman, 1998), but maintained the presumption that larger pay-performance sensitivity goes hand in hand with better alignment of interests.

on effort nor on the actual strategy implemented.⁵ We also assume that the manager has limited resources hence compensation must be non-negative.

What kinds of strategies will CEOs tend to develop? We assume that dramatic change will require massive effort from the CEO at the implementation stage, while business as usual requires much less. The difference between the two effort levels is proportionately much more than the difference in shareholder value (but in dollar terms, much less). Hence the CEO must not only be induced to put in the required effort to implement the strategy for change, but he also has to want to choose this difficult task over the much easier task of maintaining the status quo. Since implementation of a given strategy is non-contractible, the latter becomes the binding constraint (and since the former doesn't bind, his expected payoff exceeds his reservation wage), and the more demanding are the alternatives he finds to the status quo, the higher his surplus (Core and Guay, 2000, present empirical evidence that more unstable environments tend to be positively related to CEO pay-performance sensitivity) Hence by choosing a task whose success is highly dependent on his own performance, the CEO is able to extract higher surplus from his shareholders. We find that CEOs will prefer strategies for dramatic change.

One can also show that the CEO may prefer strategic opaqueness. By opaqueness we mean that the relationship between effort and performance is not understood as precisely by the shareholders (board) as by the manager. The CEO has superior information at the implementation stage. Suppose that the probability of success of a new strategy, given managerial effort, is known by the manager with more precision than by the shareholders. In this case, if they want to ensure that the CEO will choose this strategy over business as usual for several of the possible realizations of the mentioned probability of success, they will have to reward him sufficiently highly for him to be willing to adopt the new strategy for the lowest of those values. This way, he derives even higher surplus.

Putting all the pieces together we have a CEO who, given the nature of the job, must be given latitude to define the problem faced by the organization, including the possibility of dramatic change. If change is necessary, his compensation will need to be reset (upwards) to give stronger incentives,

⁵A detailed motivation of the form of contractual incompleteness, and discussion of this hypothesis, is given in the following section of the paper.

and will generally be higher than his cost of effort. This being the case, we find that CEOs will have an incentive to overdramatise, and their preferred strategies for change will generally not coincide with those of the shareholders. This analysis corresponds to our base case, which we call “ex-post” contracting.

Anticipating this divergence, what could shareholders do? If they are concerned that the CEO’s incentives are not well aligned with their own, they could simply give him enough equity at the outset and the conflicts would disappear (if you are worried the CEO will distort strategy to extract higher pay, just give him the money now and the distortion will not happen). This scenario, which we call “ex-ante contracting” works, but is expensive: there is a trade-off to be made. We show that in very unstable environments, in which it is likely that change (and particularly, dramatic change) will be desirable, setting such an ex-ante contract might be optimal from the shareholders’ perspective. The drawback of this contracting policy for the shareholders is that it is also possible that strategies for change will turn out not be relevant, in which case they will be overpaying the CEO to carry out a simpler task such as business as usual. Therefore in less changeable environments, shareholders may prefer to wait, without influencing the CEO in his strategic choices (“ex-post” contracting).

One might ask: can’t shareholders just refuse to go along with this? Arguably they could commit in advance not to pay high salaries. It is not clear they can credibly commit, since ex-post they will regret it, but perhaps in some societies and at some times social norms provide a mechanism for limiting CEO pay. We therefore investigate this case also. This will work in dissuading the CEO from unnecessary dramatic change, but again there is a trade-off: it is equally effective in dissuading the CEO from desirable dramatic change. In a changeable, unstable environment, this kind of ceiling on CEO compensation is not desirable for shareholders.

1.2 Some related literature

We now comment on the relationship of this paper to some of the existing literature (more extensive discussion including further literature is also given throughout the main part of the paper). First, there is the multi-tasking version of the principal agent problem (Holmstrom and Milgrom, 1991). In the multi-tasking problem the agent has two tasks to which he can devote

effort, but the output of only one of those tasks is measurable. Making his incentives more high-powered relative to that output measure can be counterproductive as it may induce the agent to reduce effort spent on the other task. There is a similarity with our model in that incentives for one variable (effort, in our model) can distort another variable (strategy choice). However, in our model both variables contribute to the same measured output (firm value). In our model, the analysis is driven by the incomplete nature of the contracting, the sequencing of the agents' choices, and the opportunities for renegotiation of the contract, which are absent from the multi-tasking model.

Prendergast (2000) considers a setting where the agent may have discretion in deciding how to solve the problem. He starts by noting that the majority of empirical studies find a positive relationship between the risk of an agency problem and the strength of the agent's incentives, contrary to the predictions of the standard model. This empirical evidence is compatible with our analysis. He then points out that in reality agents can decide how to go about solving a problem, which is similar to our point that CEO's decide strategy as well as implementing it. He goes on to address different issues to the ones we address here, namely, he suggests that if a problem is uncertain, the principal may not know how to solve it, so he will let the agent decide that and motivate him with strong incentive pay, while if a problem is predictable the principal will know how to solve it and will directly monitor the agent's actions instead.

The standard agency model is about *lazy* agents, i.e. it is simply about inducing agents to exert effort. This may be appropriate for modelling some situations, but when we consider CEO's they do not seem to avoid challenging, demanding tasks. Quite the opposite, if anything they seem to be overactive. This is recognized by free cash flow theory (Jensen, 1986), which suggests that demanding environments can be beneficial for CEOs in terms of private benefits (empirical evidence for free cash flow theory is discussed in Blanchard, Lopez-de-Silanes and Shleifer, 1994, Kaplan and Zingales, 1997, and Lamont, 1997). However, free cash flow theory does not explicitly model private benefits: they are exogenous. We do not consider direct benefits of actions, but rather indirect benefits modelled via the effect of managerial activity on compensation. Hence, while free cash flow theory is rather broader than our analysis, our paper could be viewed as compatible with free cash flow theory and as offering a rationalization of how private

benefits arise. It is also compatible with the wealth of empirical evidence suggesting that mergers often add little or no value to shareholders (see the references given above).

Shleifer and Vishny (1989) argue that managers will have an incentive to entrench themselves by making investments that create specific human capital. They will favour projects that they alone can operate and cannot easily be transferred to another manager, much like a computer programmer who writes deliberately cryptic code that makes him or her indispensable and able to extract rents. In our paper, there is no specific human capital. Shleifer and Vishny's effects rely on the manager manipulating his position in the labour market, while the effects in our paper rely on manipulating the agency problem.

Of course, the role of the CEO is also debated in the strategy literature. Hambrick and Finkelstein (1987) and Finkelstein and Boyd (1998) discuss the role of CEO discretion in firm performance and its relationship with executive compensation. Like theirs, our analysis stresses "the idea - central to the managerial discretion concept - that strategic leadership, especially as embodied in the role of the CEO, is pivotal to the success or failure of a firm" (Finkelstein and Boyd (1998)). One difference is that we explicitly focus on the incentives for managers to create complex environments with the resulting high compensation. Also, we associate complex environments with compensation above the reservation wage, while Finkelstein and Boyd (1998) regard high compensation as offsetting greater risk for management.

1.3 Structure of the paper

The paper is structured as follows. Section 2 starts the analysis with a simplified example that illustrates how CEOs may prefer different strategies to shareholders. We outline the basic assumptions, as well as the main trade-offs faced by the CEO, in order to illustrate the nature of the distortion in the CEO's preferences. In Section 3 we present the model, and consider a more general framework for contracting, in which shareholders may try to prevent the CEO from distorting the strategic choices he makes for the company. An extension of the model (allowing precommitment by the shareholders to restrict renegotiation) is presented in section 4. Section 5 presents brief concluding remarks.

2 Why managers and shareholders have different preferences over strategy

We start our analysis with a simplified version of the model that illustrates how managers may prefer different strategies from shareholders. The full version of the analysis is not given until section 3 below, where we also model the strategy choice process in detail as well giving a more extensive treatment of the contracting process. However, the simple example in this section contains some of the key ideas in our analysis.

The timing of the full model has three stages: first, the manager formulates a strategy for the firm, as an alternative to the status quo; second, he brings this proposal to the board for agreement; third, the strategy is implemented and the payoffs are realized. In the simplified version of the model presented in this section, we do not describe the first stage (strategy formulation). We simply consider how the shareholders will react to a proposal for a new strategy. In the full version of the model, we analyse all three stages.

In this section, then, we see what happens when the CEO brings a proposal for a strategy to the shareholders, and how this affects his or her compensation. We will see that certain strategies lead to the CEO earning a higher surplus in equilibrium, which would lead to the CEO preferring those strategies. We argue that there are good reasons why the CEO will tend to prefer “dramatic” strategies.

2.1 Motivating example

To motivate our analysis, consider the following example. Suppose that a professor is given responsibility for a degree programme. He or she can choose to run the programme on a business-as-usual basis, i.e. attending the usual committee meetings, checking the lecturing performance of his or her colleagues, monitoring the performance of the programme office in regard to admissions and records, and taking an appropriate interest in student welfare. This is a moderately time consuming, but manageable task and the professor would be entitled to expect some measure of compensation in the form of a reduced teaching load or moderate salary supplement.

Now suppose the professor is tasked with restructuring the course, with

a freshly-thought out structure and syllabus that reflects current student demand and is fully up to date. The first observation we make is that engineering such a change is extremely demanding in terms of time and energy. Many proposed changes, however trivial, will meet with resistance from entrenched lecturers. Even colleagues who are enthusiastic about change will respond by making a wide variety of counter-proposals that makes coordination on an improved outcome difficult. So change from the status quo can be disproportionately costly and the professor, unless he obtains intrinsic satisfaction from the task, will not be keen to take on this job without substantial additional compensation (generally in universities, such extra compensation is unlikely!). Of course, firms may not be quite as resistant to change as some universities but we argue that the same broad feature applies.

The second observation we make is that it may be easy to spot whether the changes made by a colleague are profound or superficial, but it may be hard to prove that assessment in a way that is credible to an outsider. A professor may feel that the course director's "relaunched" programme is just a minor variant of the old one, but, if he were challenged on this view, it might be hard for him to convince a colleague in another department, a student, or the course director's lawyer. So it would be impossible to condition compensation on the successful implementation of a truly improved degree programme. We argue that in businesses generally, similar reasons are likely to make it impossible to condition pay directly on strategy. However in businesses, unlike universities, pay can be conditioned on share price.

To summarise the two key points of the example: first, change can require disproportionately high effort to implement, relative to the status quo. Second, writing a contract conditional on "satisfactory change" is likely to be impossible.

2.2 Basic assumptions

We will investigate situations where the manager has developed a strategy for how the firm might be run, as an alternative to the status quo ("business-as-usual"). He brings this strategy to the shareholders at a board meeting for their approval. For the purposes of this paper, we will make the simplifying assumption that the board's role is to act as representatives of the

shareholders in dealing with the CEO.⁶ From now on, we will use “board” and “shareholders” interchangeably.

We assume, in this section and throughout the paper, that the CEO is risk-neutral and cannot make monetary transfers to the shareholders. The assumption of risk neutrality is merely for simplicity, but the assumption that contractual payments to the manager can only be non-negative is an essential building block of our analysis. In reality, CEOs of large public companies rarely have contracts specifying that they must reimburse the shareholders in the case of poor performance. This feature of CEO compensation is sometimes criticized, but nevertheless it seems to be almost universal (unlike small private businesses, where the entrepreneur often pledges collateral to a bank or VC). In Tirole’s (2001) recent graduate textbook on corporate finance, *all* of the models make the same assumption as we do. Studying the economic rationale for this feature, if there is one, would be interesting but is not the subject of this paper.

We also assume, in this section and throughout the paper, that CEO compensation is a function of firm value only.⁷ One can achieve this with a suitable mixture of cash and stock options or shares. The main point is that compensation cannot be conditioned on anything else, specifically strategy choice or effort level. The assumption that effort level is not contractible is, of course, standard in the agency theory literature. We assume that the board is capable of understanding strategic issues, discussing proposals made by the manager, agreeing on a strategy for the firm, and setting suitable CEO compensation accordingly. However, we assume that strategy as such cannot be written into a contract. Compensation cannot be made contingent on concepts such as transforming the business, successful globalisation, or strengthening brand value. It can be made contingent on financial performance. We comment further on the incomplete contractibility assumption in the next subsection.

⁶In reality, the situation is more complex and we could equally well argue that the board’s interests are closely allied to the CEO’s, and may differ from the shareholders. This additional conflict of interest is an interesting topic for research but is not the subject of our paper. In any case, the board does have an important role in agreeing corporate strategy and setting CEO compensation, as in our paper.

⁷Since in our model there is only one period in which cash flows are realized, it is equivalent to interpret this as conditioning compensation on share price or shareholder value (present value of expected future cash flows).

We assume, in the simplified version of the model presented in this section of the paper, that the CEO compensation contract is chosen by the board at the same time the strategy is agreed. We call this *ex-post contracting*, and this assumption calls for several remarks. First, the traditional assumption in agency theory is that contracting is done at the outset of the model (ex-ante contracting). In the full version of the model derived in the next section, we consider both ex-post and ex-ante contracting and show that in some circumstances, ex-post contracting is preferable, while in others, ex-ante contracting is preferable.⁸ Second, the reason we make this assumption is that we believe it captures an important feature of CEO remuneration. Typically compensation is reset every year. Strategic circumstances change and compensation changes in response. Although our application of agency theory to managerial compensation is broader than the standard framework because we look at choice of strategy as well as implementation, it is still greatly oversimplified relative to reality where strategies evolve continuously (and CEO compensation needs to be reset periodically).⁹ In a multiperiod setting, one might conjecture that the effects we study in this paper would become even more pronounced.

2.3 Incomplete contractibility

Some further discussion of the assumption of incomplete contractibility may be useful. This has become a standard framework as a result of many papers in the past decade that have studied contracting where some variables are observable by both parties, but not contractible. Aghion and Bolton (1992), Hart (1995), and Hart and Moore (1998) are leading examples. In general, non-contractibility can arise because it would be too expensive or too complex to make contracts fully conditional, or because it would be difficult for a third party to verify fulfilment of the conditional clauses in the contract (since contracts depend on third parties such as courts or private arbitrators

⁸Ex post contracting can be preferable because of contractual incompleteness. Clearly, with sufficient contractibility, there could not be strict preference for ex-post contracting since an ex-ante contract could replicate any ex-post contract.

⁹In one of the seminal articles in the strategy literature, Mintzberg (1987) argued that strategy formulation and implementation could not be separated into two separate processes, but instead evolved together. This is known as the “crafting” or “emergent” model of strategy.

for enforcement). For example, Hart (1995) and Hart and Moore (1998) assume that investment is not contractible. They argue that even if third parties were able to verify monetary expenditures on investment, they would be unable to tell if the funds were applied properly to the right kinds of projects. This is similar to our assumption that strategy is non-contractible.

In our motivating example above, we explained why it is likely to be impossible to write a compensation contract conditional on “successful introduction of a truly innovative curriculum” in a university. Below, we will consider a variety of corporate strategies, of which one the simplest is the introduction of a comprehensive cost-cutting programme. In fact, cost-cutting is an excellent example to illustrate our point about non-contractibility because at first sight, it might seem that costs can be verified easily from the company accounts. However, this would be a crude way of monitoring the successful implementation of a genuinely shareholder-value increasing rationalisation plan. It could likely be quite easy for the manager to slash costs with a poorly executed programme of cutbacks that would actually damage shareholder value in the longer term (through employee morale, quality control problems, disruption of supplier relationships, etc). Just because a strategy has implications for an easily quantifiable variable, it does not mean that controlling that variable will actually verify implementation of the strategy.

Holmström and Milgrom (1991) give a good illustration of this kind of problem. A teacher in South Carolina was found to have boosted her class exam performance, and hence her own performance rating, by passing the children answers to the statewide geography test. Another egregious example is given in the *Financial Times* of 4 February 1994: the recently appointed chairman of Audi discovered that the previous year’s sales figures had been “bolstered by an old trick. Audi France officials confirmed yesterday that ‘several tens of thousands’ of cars had been parked with French distributors [and hence recorded as sales], only to be shipped back to Germany last year. Since many of them lacked airbags and ABS braking systems - regarded as essentials in the Germany quality car market - selling them was no easy task.” This shows why even apparently “hard” data such as company accounts may not be of much help in writing conditional contracts.

2.4 Business as usual

We will assume that business-as-usual is always available as an option. We label this strategy B . To start with, suppose that the CEO has no other available strategy to propose to the board. They must therefore set a suitable incentive contract for the CEO to implement business-as-usual.

Because the time structure of our model will turn out to be quite rich and complex, we keep the basic structure of the agency problem as simple as possible. It requires effort e_B to give a probability π_B of success, in which case the firm is worth V . Otherwise (no effort, or sufficient effort but bad luck) the firm is worth nothing. We assume the manager's reservation utility is 0.

We consider contracts with payment m_B in case of success and 0 otherwise (recall that contractual payments must be non-negative). Incentive compatibility requires

$$m_B\pi_B - e_B \geq 0 \tag{1}$$

and the solution is

$$m_B = \frac{e_B}{\pi_B} \tag{2}$$

so long as $V \geq m_B$.

2.5 A strategy for change

Now suppose the CEO makes a proposal to the board for a new strategy. This strategy is an alternative to business-as-usual, which remains an option (but is now an inferior option). In line with our discussion above, we assume that the proposed change requires much more effort to implement than business as usual. It will increase shareholder value, but proportionately by much less. However since the value of the firm is huge compared to the monetary equivalent of the manager's effort, the change will still be desirable. It is worth the CEO working twice as hard in order to increase expected firm value by 5%. For concreteness, suppose the change is a comprehensive cost-cutting plan, which we label strategy C .

We assume that when the manager comes to the board meeting with his blueprint for a strategy for change, they are capable of understanding the

plan, verifying that it makes sense, and agreeing to proceed with implementation. However, they cannot write a contract with the manager in which reward depends directly on implementation of the strategy. We discussed above the reasons why this may be impossible.

To induce the manager to implement the agreed strategy C , the board will require a higher bonus payment in the event of success. We denote this payment m_{BC} to reinforce the message that B remains as an option and the manager must be induced not only to put in effort, but to really choose C over B . If the payment is inadequate, he may pretend to implement C , but actually stick to B . C requires effort e_C to give a probability π_C of success (firm worth V). With probability $1 - \pi_C$, or if the manager does not put in the required effort, the firm is worth nothing. We assume that $e_C > e_B$, $\pi_C > \pi_B$ and $\frac{e_C}{e_B} > \frac{\pi_C}{\pi_B}$. There are two incentive compatibility conditions:

$$m_{BC}\pi_C - e_C \geq 0 \quad (3)$$

$$m_{BC}\pi_C - e_C \geq m_{BC}\pi_B - e_B \quad (4)$$

It follows immediately from our assumptions on $\frac{e_C}{e_B}$ versus $\frac{\pi_C}{\pi_B}$ that the latter inequality is the binding one. Thus the solution is

$$m_{BC} = \frac{e_C - e_B}{\pi_C - \pi_B} \quad (5)$$

so long as the shareholders are willing to pay that much, i.e. $(V - m_{BC})\pi_C \geq (V - m_B)\pi_B$. This can be expressed as $V(\pi_C - \pi_B)^2 + e_B(\pi_C - \pi_B) - \pi_C(e_C - e_B) \geq 0$, which defines a region R_C in the space of exogenous parameters where the shareholders agree to implement C . Clearly if the effort is too high, or the chance of success too low, then the change to C will be prohibitively expensive to implement, e.g. as $\pi_C \rightarrow \pi_B$, and the shareholders will stick with B .

2.6 What kinds of change should the CEO prefer?

From the above, it is immediate that the manager will be “overcompensated” relative to his reservation wage when the programme of change is agreed. This is just a restatement of the fact that the latter of the two IC constraints is the binding one. Clearly, it is a natural outcome when the manager never

reimburses shareholders in the case of poor performance. Then managerial compensation becomes a “one way street” where stronger incentives imply high pay on average. The manager’s expected payoff is

$$U_C^M = \pi_C \left(\frac{e_C - e_B}{\pi_C - \pi_B} \right) - e_C = \frac{\pi_B e_C - \pi_C e_B}{\pi_C - \pi_B} \quad (6)$$

Perversely, so long as he remains within the region R_C , the manager prefers strategies with a lower chance of success and a higher effort level:

Proposition 1 *So long as $V(\pi_C - \pi_B)^2 + e_B(\pi_C - \pi_B) - \pi_C(e_C - e_B) \geq 0$, the CEO’s preferences are increasing in effort and decreasing in the chance of success:*

$$\frac{\partial U_C^M}{\partial \pi_C} = \pi_B \frac{e_B - e_C}{(\pi_C - \pi_B)^2} < 0 \quad (7)$$

$$\frac{\partial U_C^M}{\partial e_C} = \frac{\pi_B}{\pi_C - \pi_B} > 0 \quad (8)$$

Proof. Immediate by differentiation of equation(6) ■

The result that the manager prefers strategies with higher effort can be contrasted with the assumption that, for a given strategy, he finds effort costly and will shirk unless properly incentivised. In fact, while agency theory is about lazy agents, generally CEO’s seem to work hard and seek out demanding tasks. Our analysis provides an explanation of why this might be true.

Assume, as seems natural, that diminishing returns apply to strategies. Then a “big” or “dramatic” strategy will have a worse ratio of effort to success rate. Again, this makes the CEO better off:

Proposition 2 *So long as $V(\pi_C - \pi_B)^2 + e_B(\pi_C - \pi_B) - \pi_C(e_C - e_B) \geq 0$, the CEO’s preferences are increasing in the ratio of effort to chance of success:*

$$\frac{\partial U_C^M}{\partial \rho} = \pi_B \frac{e_B - e_C}{(\pi_C - \pi_B)^2} < 0 \quad (9)$$

where $\rho = e/\pi$.

Proof. immediate by differentiation of equation (6) ■

2.7 Opaque strategies

We have shown that managers have an incentive to prefer dramatic strategies, in the sense of “big” strategies with much higher effort (and, assuming diminishing returns, a lower effort/success rate). When one considers major corporate restructurings, they are often characterised not only by large, costly change, but also by great uncertainty. A dramatic strategy may be a leap into the unknown.¹⁰

For the purposes of incentive contracting in our model, the key feature turns out to be not uncertainty *per se* about the parameters of the strategy, but asymmetric information about those parameters. By choosing a strategy that is dramatic and opaque, the manager may be able to create a situation where he has more information than the board about his incentive-compatibility constraints. We now show that, under certain conditions, this opaqueness can work to the CEO’s advantage. Consider a strategy O (“opaque”) that has this kind of asymmetric information. We model this by assuming that O requires effort e_O and, at the time the CEO initially starts to investigate the strategy, it has an expected chance of success of π_O . However, assume the CEO learns something about the chance of success before choosing the effort level, but after (ex-post) contracting (equivalently, one could assume the CEO receives this information just before the ex-post contracting stage). As a result of receiving this signal the CEO’s updated probability of success is $\tilde{\pi}_O$ with possible realisations $\pi_{O1}, \dots, \pi_{ON}$. Assume the numbering is such that these are in increasing order, with the probability of π_{Oi} given by q_i . Then $\pi_O = E\tilde{\pi}_O = \sum_i q_i \pi_{Oi}$. Also assume $\pi_{O1} > \pi_B$ and $\frac{e_O}{\pi_{O1}} > \frac{e_B}{\pi_B}$.

Consider ex-post contracting, with a payment of m_{OB} in the event of success and 0 otherwise. To induce the CEO to implement strategy O at all

¹⁰One can readily find examples of companies that have “bet the ranch” on transformation of this kind. In the 1980’s, IBM took a big gamble with the personal computer market by encouraging competitors to use its PC standard, and by allowing another company (Microsoft) to take control of the operating system software. In the 1990’s it transformed itself again, moving into contracts to provide information services as opposed to just manufacturing hardware. During the new economy bubble of 1998-2000 many companies sought to reinvent themselves using the internet.

realisations of $\tilde{\pi}_O$, incentive-compatibility requires that:

$$m_{OB}\pi_{O1} - e_O \geq 0 \quad (10)$$

$$m_{OB}\pi_{O1} - e_O \geq m_{OB}\pi_B - e_B \quad (11)$$

$$\Rightarrow m_{OB} = \frac{e_O - e_B}{\pi_{O1} - \pi_B} \quad (12)$$

(Clearly, in general shareholders might choose to pay less and induce the CEO to choose strategy O at realisations π_{O_i} or above, sticking to business-as-usual otherwise. This would require a payment of $\max\left\{\frac{e_O - e_B}{\pi_{O_i} - \pi_B}, m_B\right\}$. For it to be optimal for shareholders to induce effort at all realisations of $\tilde{\pi}_O$ requires:

$$\begin{aligned} \forall i = 1, \dots, N : \\ (V - m_{OB}) \sum_{j=1}^N q_{Oj}\pi_{Oj} \geq & \left(V - \max\left\{\frac{e_O - e_B}{\pi_{O_i} - \pi_B}, m_B\right\} \right) \times \\ & \times \left(\sum_{j=i}^N q_{Oj}\pi_{Oj} + \pi_B \sum_{j=1}^{i-1} q_{Oj} \right) \end{aligned} \quad (13)$$

Subject to this condition holding, the CEO prefers higher effort and lower π_{O1} , i.e. he prefers more asymmetry of information (the condition is not trivial to satisfy, and it is easy to see how to construct examples where the CEO is even made worse off by the private information). We interpret this as a more ambitious strategy in the sense of being opaque. A similar point has been made in the literature on procurement (see Lewis and Sappington, 1993, and the discussion that follows).

To summarise, it can be to the CEO's advantage to propose highly opaque strategies. In fact, so long as the board is convinced such a strategy is always worth implementing, the CEO is made better off by having private information about his incentive compatibility constraint.

The analysis so far is incomplete because we have derived the CEO's preferences over strategies, in a situation where strategies are presented to the board for approval and the compensation package is set at the same time. To use an analogy with basic consumer theory, effectively we have derived the CEO's utility function, but not his choice set (budget set). We have not said anything about how strategies are developed. We have also not explored how

the board thinks about compensation at the time the CEO is first hired, but before he comes along with a proposal for change. One possibility would be for the board to defer the whole question of compensation until the strategy is agreed. Equivalently, they could set compensation for business-as-usual and then just wait to see if a proposal for change comes along, in which case they could renegotiate. This corresponds to the situation we have just derived, and we shall describe the payment m_{BC} as an “ex-post” contract for that reason.

However, it could also be possible for the board, anticipating distortions in strategy choice, to set a contract at an earlier stage in order to influence strategy formulation and not just effort level. In the next section of the paper we provide the full specification of our model, and then investigate this issue.

3 Compensating the CEO to choose the right strategy as well as implement it

We now move on to describe our full model. We assume that a newly appointed CEO needs to spend some time developing corporate strategy, and that before his strategy for change is implemented it needs to be agreed with the board before he proceeds to implement it. The board also has to develop an appropriate compensation policy. From the analysis in the previous section, one can see that if compensation is set in a myopic way and the reward for success is simply adjusted upwards when the manager proposes a strategy for change, there will be an incentive for the manager to distort his strategy choice towards high-paying strategies that are not necessarily those with the highest shareholder value.

To anticipate this problem and correct the CEO’s incentives, it is natural to consider setting compensation policy at an earlier stage. One approach would be just to commit to pay a very high bonus at the outset. This might, in some states of the world, turn out to represent overcompensation ex-post, but it would save the manager from trying to obtain a generous package by manipulating the corporate strategy. Alternatively, another approach would be to simply accept some distortion to the strategy choice and set compensation ex-post at the time a strategic change is agreed.

We investigate a broad class of possible compensation procedures and show that one of these two approaches is optimal, depending on the circumstances.¹¹

3.1 Strategy choice: setting the agenda

Before a strategy is implemented, the CEO presents his proposals to the board. We model the proposal as being partly the result of the CEO's choices, and partly the result of chance influences he cannot control. The reason for this is simple: if the CEO has no role in choosing strategy, then the problem disappears. We are back to the simple one-shot agency model. On the other hand if the CEO simply chooses his proposed strategy from a set of options that is known to the board, then they always know what strategy is optimal - although this can still be modelled as an agency problem, it is a pretty trivial one. The economically interesting case is when the board cannot tell for sure which strategy is optimal, because then it makes sense for the CEO to have a role in developing the strategy.

To motivate our model, consider the following story. Suppose that when the CEO starts work on his first day on the job, he finds several letters on his desk. Each of these contains an idea for a possible strategy for change for the firm: it could be a note from a colleague, a newspaper cutting, an internal company document, a consultant's report, etc. After spending some time considering these preliminary ideas, the CEO selects one to investigate fully and work up into a credible strategic plan for change (our analysis could be extended to the case where more than one idea is progressed in this way, but it is important that they cannot *all* be chosen). This process requires time and is not guaranteed to lead to an agreed strategy for change. It may be that the chosen strategy turns out not to be workable for the organisation after all, in which case we are back to the status quo. But, if it does succeed, it leads to a fully worked-out plan that can be presented to the board in order to convince them of the desirability of this strategic change. Once agreed, the strategy can be implemented but this does not mean it will necessarily succeed. It could fail either because of external circumstances, or if the CEO does not put in the required effort.

¹¹In section 4, we consider an extension to a broader class of compensation schemes, allowing some forms of precommitment not to renegotiate.

The idea behind our model is that a leader’s role is to set priorities. In an environment with enormous information overload, the leader is the one who picks out a key issue and uses it to set the agenda for the organisation.¹² Again, our model can be illustrated by giving an academic context. Suppose a university appoints a new president (dean, vice-chancellor, etc.). The president can either plan to sit out his term of office without making any major strategic changes, or he may decide to push for a significant change. The change could be a re-orientation of priorities towards boosting the undergraduate programme, a major expansion into e-learning, or a merger with another university. Once he or she has committed to pushing for one of these, the president must start a long and gruelling process of consulting with key stakeholders, getting feedback, working out the details, and gradually reaching the stage where the strategy could become officially-sanctioned policy. There are pitfalls along the way and it is possible that the strategy could turn out to be impossible, for example the faculty might reject the reform of the undergraduate programme, the alumni might be suspicious of the e-learning project, or the possible merger partners might turn out to be unsuitable.¹³ Even after agreement with major stakeholders, the strategy may or may not succeed at the implementation stage.

3.2 Modelling strategy formulation

In line with the preceding discussion, we assume the manager receives K ideas for strategies, chooses one, and then finds out whether or not it is applicable. These ideas are not observable by the shareholders. An idea for a strategy is drawn from a distribution \tilde{S}_i , $i = 1, \dots, K$. We assume the \tilde{S}_i are i.i.d. and, to keep things simple(r), we also assume that $K = 2$ and

¹²“in every successful transformation effort that I have seen, the guiding coalition develop a picture of the future that is relatively easy to communicate and appeals to customers, stockholders and employees. A vision always goes beyond the numbers that are typically found in five-year plans. A vision says something that helps clarify the direction in which an organization needs to move...A useful rule of thumb: if you can’t communicate the vision to someone in five minutes or less, and get a reaction that signifies both understanding and interest, you are not yet done...” (Kotter, 1995).

¹³As before we must qualify the applicability of our academic example by stating that while the process of leadership and strategic change may be similar to those in business, the financial rewards in academia are probably not sufficient to allow that part of our analysis to apply.

that there are only two possible realizations for \tilde{S}_i which we denote C and D . The reader may wish to think of them as “Change” and “Dramatic change” respectively. Throughout we assume, as in the previous section of the paper, that the *status quo* option B remains available and is characterised by effort e_B and probability π_B of success, in which case the firm is worth V . Otherwise (no effort, or sufficient effort but bad luck) the firm is worth nothing. We continue to assume that $V \geq m_B$ where $m_B = \frac{e_B}{\pi_B}$ (as defined in Section 2 above)

C is characterized by:

α_C : the probability that C is the realization of \tilde{S}_i (this realisation is private information)

p_C : the probability that C is workable if investigated (as discussed in the preceding subsection)

If it is workable and is then chosen, then:

e_C is the effort required and

π_C is the probability of success (firm has value V).

As in our example from the previous section, if the strategy is implemented and the effort put in is lower than e_C , or with probability $1 - \pi_C$ even if effort e_C is put in, the firm is worth nothing. Given the above parameters for strategy C , one can then compute the ex-post compensation in the event of success, m_{BC} and the resulting CEO expected wealth (conditional on strategy C being implemented), U_C^M as defined in the example of section 2 above:

$$m_{BC} = \frac{e_C - e_B}{\pi_C - \pi_B} \quad (14)$$

$$U_C^M = \frac{\pi_B e_C - \pi_C e_B}{\pi_C - \pi_B} \quad (15)$$

Although we will also discuss the case where CEO compensation is set before the strategy is selected, it will be convenient to refer to m_{BC} and U_C^M using this definition. We assume that the exogenous parameters e_C and π_C fall within the region R_C defined above, i.e. where the shareholders are willing to pay m_{BC} to implement C : $(V - m_{BC})\pi_C \geq (V - m_B)\pi_B$.

Likewise for strategy D we have $\alpha_D = 1 - \alpha_C$, p_D , e_D , π_D , m_{BD} and U_D^M and we assume e_D and π_D lie within R_D .

So, at the time the CEO decides which strategy to pursue, there are three possible outcomes. Turning to our letters-on-the-desk analogy from

subsection 3.1, the two envelopes could both contain C , they could contain one of each, or they could both contain D . The three outcomes are:

$$\begin{aligned} CC, & \text{ with probability } \alpha_C^2 \\ CD, & \text{ with probability } 2\alpha_C\alpha_D \\ DD, & \text{ with probability } \alpha_D^2 \end{aligned}$$

In the second case, there is potential for the manager to make a choice of which strategy to formulate and this may or may not be in the shareholders' interests. Distortion of the strategy choice means that the manager would choose D while, in first-best, the shareholders would prefer C , or vice versa. In the first and third cases, the manager has no discretion. Thus, the outcome of the process is influenced both by the manager and by random factors.

We need to complete the description by saying something about the values of the above parameters. As previously stated in our example in section 2, we suppose that C - "change" - requires higher effort than the status quo, and has a higher chance of success, but that proportionately the effort increases by more than the chance of success ($e_C > e_B$, $\pi_C > \pi_B$ and $\frac{e_C}{e_B} > \frac{\pi_C}{\pi_B}$). Our interpretation is that D - "dramatic change" - represents a larger and more radical restructuring than C . It will certainly require higher managerial effort, so $e_D > e_C$. We also suppose that there are diminishing returns to change, so that $\frac{e_D}{e_C} > \frac{\pi_D}{\pi_C}$. For the purposes of our analysis, we do not actually need to require that $\pi_D > \pi_C$ (although it seems a more natural case) but we do assume $\pi_D > \pi_B$.

For simplicity we shall assume from now on that $p_C = p_D = p$. We have also derived the analysis for the general case, but we have not included this in the current draft of the paper, as it does not add much insight to the results.

3.3 Agreeing strategies with the board

The next stage is for the CEO to present his strategy to the board for their agreement. If he has a workable plan for change we assume that the board members are able to understand it, as well as observing the probability of success and the required effort level. The CEO can't "fake" it in front of the board. However this does not mean that contracts can be made conditional

on the strategy presented: for the reasons discussed above, we assume the strategy presented at the board meeting is not contractible. During this meeting the CEO's compensation may be set or reviewed. As we shall discuss below, it may be that the board has previously decided to set a compensation package and there may be no need to return to the issue at this meeting. But, in principle, the board could now review compensation in light of the new proposed strategy for change.

We can justify this assumption by returning to our academic example on program redesign from the previous section. It would be difficult to give a professor a salary that is conditional on the event "preparing an intellectually rigorous, comprehensive program redesign". But it would (we hope) be possible for the faculty board to judge whether the proposed redesign is genuinely intellectually rigorous and comprehensive.

Of course it follows from our assumptions on strategy formulation that the CEO may not have a workable strategy for change, in which case the firm simply continues with business as usual.

3.4 Setting CEO compensation once strategy is decided: ex-post contracting

To start with suppose that CEO compensation is not fixed at the time he is appointed. Instead the board waits until the CEO has presented his strategic plans, then they agree on the choice of strategy and set the compensation package. This corresponds to the timing we discussed in our example in the previous section of the paper; we call this "ex-post contracting."

Then, at the strategy formulation stage, the manager's expected payoff if he chooses D is as follows. With probability p the strategy will be workable and give him payoff U_D^M . With probability $1 - p$ it will not turn out to be workable, B is the only option, and he is offered payment m_B in the event of success which exactly offsets his disutility of effort - so his payoff is 0. Averaging over both cases, his expected payoff is pU_D^M and so the CEO will choose D if $U_C^M < U_D^M$.

Turning to the shareholders, their payoff conditional on D being presented is $(V - m_{BD})\pi_D$, and their expected payoff averaging over the possible

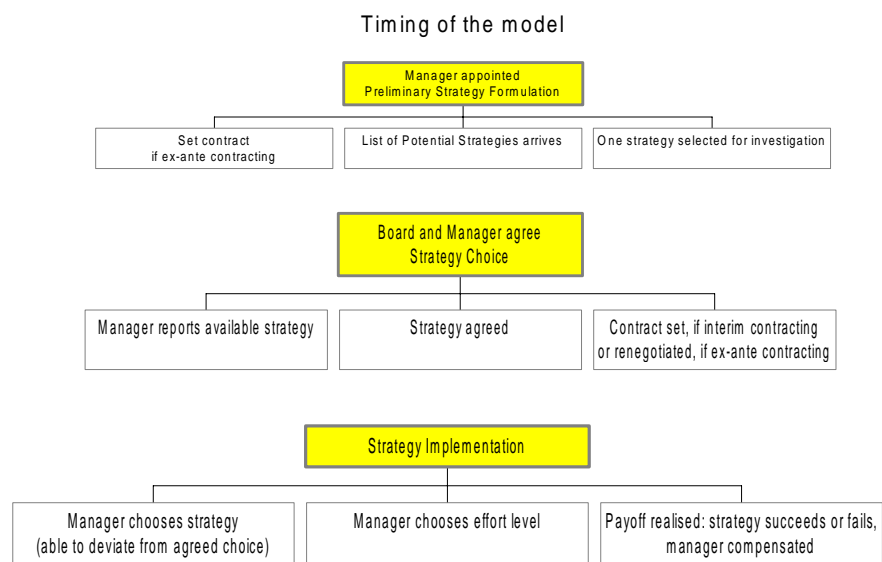


Figure 1: Timing of the model

strategies is:

$$\begin{aligned} & \alpha_C^2 [p(V - m_{BC})\pi_C + (1 - p)(V - m_B)\pi_B] + \\ & (1 - \alpha_C^2) [p(V - m_{BD})\pi_D + (1 - p)(V - m_B)\pi_B] \end{aligned} \quad (16)$$

On the other hand if the manager were to choose C instead, their expected payoff would be:

$$\begin{aligned} & (1 - \alpha_D^2) [p(V - m_{BC})\pi_C + (1 - p)(V - m_B)\pi_B] + \\ & \alpha_D^2 [p(V - m_{BD})\pi_D + (1 - p)(V - m_B)\pi_B] \end{aligned} \quad (17)$$

In other words, if $(V - m_{BC})\pi_C > (V - m_{BD})\pi_D$, the shareholders would prefer the manager to focus on C .

We restrict attention to the case where the shareholders would prefer C , and the managers would prefer D . The shareholders cannot achieve their preferred strategy with ex-post contracting when the CEO has a choice, so we now consider how they could use contracting at an earlier stage to induce the CEO to pick C in preference to D .

3.5 Setting compensation to influence strategy formulation: ex-ante contracting

We have seen that with ex-post contracting, the CEO's strategy choice may be distorted because he has an incentive to seek for hard strategies with an unfavourable effort/success ratio, which drive up the required compensation. Anticipating this problem, the shareholders may seek to derive a better alignment between their interests and the CEO's by designing a better compensation package at an earlier stage. Clearly, one way of ensuring better alignment of interests is just to give the CEO a large enough equity share at the outset - if he gets 99% of the equity, this difficulty will probably be eliminated. But giving the CEO a large amount of equity, share options, or an equivalently generous bonus is very costly.¹⁴

¹⁴Another way to handle the problem would be to precommit never to pay a very high bonus. This also has its drawbacks, since sometimes the only strategy for change may be one that requires high compensation. In any case, such pre-commitment may not be credible. We explore this case in the extensions section of the paper.

In this section, we explore how shareholders can use this kind of device to correct the CEO's incentives. We assume they are able to set the compensation contract ex-ante, before the CEO has started to formulate strategy. In line with our discussion above, we assume that such contracts cannot contain clauses with descriptions of the possible strategies that might later be presented at the board meeting. We assume:

1. The contract consists of a specified payment in the event the firm is worth V .
2. This contract can be renegotiated at the board meeting when strategy is discussed, if mutually agreeable.
3. Both in the initial negotiation and in the event of renegotiation, all the surplus goes to the principal. In other words we maximize the principal's payoff subject to constraints for the agent. This is a standard assumption (Salanié 1997).

Note that Assumption 1. contains the assumption that menus of contracts are ruled out. We consider that menus of contracts would be implausible for our application to CEO compensation. Note also that we have assumed here that agents cannot pre-commit not to renegotiate, an assumption that is discussed and relaxed in the section 4 below.

As will be seen below, effectively ex-ante contracting with renegotiation puts a lower bound (through assumptions 1,2 and 3) to the ex-post compensation levels m_B , m_{BC} , and m_{BD} . To begin our analysis, we suppose that ex-ante contracting results, in the end, in compensation levels m_B^* , m_{BC}^* , and m_{BD}^* (in the event of success and firm value V). Although the set of possible histories is richer, it is clear that the contract could not distinguish between events such as: (i) the manager initially had a choice between C and D , but chose to investigate D , versus (ii) the manager initially had no choice, and D was the only option for change. Thus, the most that one could hope for is three final different payments m_B^* , m_{BC}^* , and m_{BD}^* . Even then, not all combinations of three positive real numbers are achievable.

It is important to note that ex-post contracting can be viewed as a special case of ex-ante contracting. It corresponds to choosing a low payment initially (at most $m^* = m_B$) and then renegotiating upwards as desired.

From now on, we shall refer to ex-ante contracting of this form with

$$\begin{aligned} m_B^* &= m_B \\ m_{BC}^* &= m_{BC} \\ m_{BD}^* &= m_{BD} \end{aligned}$$

as “ex-post contracting.”

Proposition 3 *Under the above assumptions, ex-ante contracting results in a floor m^* such that*

$$\begin{aligned} m_B^* &= \max\{m^*, m_B\} \\ m_{BC}^* &= \max\{m^*, m_{BC}\} \\ m_{BD}^* &= \max\{m^*, m_{BD}\} \end{aligned}$$

Proof. We show that $m_B^* = \max\{m^*, m_B\}$; a similar argument holds for the other two cases BC and BD . Let the ex-ante contract specify a payment m^* in the event the firm succeeds and is worth V . First note that, if renegotiation occurs, it will occur upwards only, otherwise the CEO will reject the proposal (Assumption 2). Hence $m_B^* \geq m^*$. Next, note that the renegotiated payment cannot exceed the ex-post contracting level, otherwise the board could offer less and get the same behaviour from the CEO (Assumption 3).

Suppose first that $m^* > m_B$, then it is clear we cannot have renegotiation and $m_B^* = m^*$.

Next suppose that $m^* < m_B$, then it is clear (from the derivation of m_B) that renegotiation is mutually beneficial and will lead to a contractual payment $m_B^* = m_B$. ■

To proceed to the analysis of optimal ex-ante contracting, note that the standard procedure for solving an agency problem requires us to list all the possible actions of the agent, for each action to compute the cheapest way for the principal to induce the action, then to compute the principal’s payoff that results. Finally the principal must compare his payoff across actions and pick the optimal one. For this model the action space of the agent is a little complex because the CEO needs to decide:

- whether to choose C or D , if there is a choice, at the strategy formulation stage;

- whether to choose B or the alternative, if there is one, at the strategy choice stage;
- whether to put in the required effort for the chosen strategy at the implementation stage.

However, we can simplify matters by eliminating actions where there is ever a possibility (in case B , BC , or BD) that the CEO does not put in effort.

Proposition 4 *Under an optimal contract, the CEO always puts in the required effort for the chosen strategy*

Proof. Suppose the contrary. Consider first the possibility that in case B is the only available option, the CEO does not put in the required effort e_B (implying $m_B^* < m_B$). By our assumption that $V > m_B$, this is suboptimal because the shareholders would prefer to pay m_B and induce effort. The cases BC and BD are similar given our assumptions that the parameters lie within R_C and R_D . ■

Given this we can specify the relevant actions by describing the choices of strategy at the formulation stage and at the implementation stage (i.e. ignoring all actions without sufficient effort). We can list the actions as follows:

- A1: (D, C_{BC}, D_{BD})
- A2: (D, B_{BC}, D_{BD})
- A3: (D, C_{BC}, B_{BD})
- A4: (D, B_{BC}, B_{BD})
- A5: (C, C_{BC}, D_{BD})
- A6: (C, B_{BC}, D_{BD})
- A7: (C, C_{BC}, B_{BD})
- A8: (C, B_{BC}, B_{BD}) .

To explain the notation, take the first action on the list, (D, C_{BC}, D_{BD}) , which represents the outcome of ex-post contracting. The first symbol, D , means that when the manager has a choice between C and D at the strategy formulation stage, he picks D . The second symbol, C_{BC} , means that when the CEO presents strategy C to the board as an alternative to B , they pick C (to avoid lengthy circumlocutions, we do not distinguish between the board picking the strategy at the implementation stage and the CEO picking the strategy. Obviously, since the manager can always cheat if wants to, the

board knows which strategy he is going to pick so we may as well assume they both pick the same one.) Note that even if he picks D in preference to C at the strategy formulation stage when he has the choice, there will sometimes (probability α_C^2) be occasions when C is the only option. The third symbol, D_{BD} , means that when the manager presents option D to the board as an alternative to B , they pick D .

We can next rule out actions A2 to A4 and A6 to A8 as suboptimal, because renegotiation would always take place to implement the change strategy (C or D) rather than the status quo B , by our assumptions on the exogenous parameters lying within the regions R_C and R_D . The argument is similar to the previous proposition. (But in the extensions section of the paper, where we consider a form of pre-commitment to limit renegotiation, these cases do come back into consideration). That leaves action A5 (which corresponds to the manager choosing to investigate C rather than the more dramatic D) in addition to A1.

Proposition 5 *The cheapest way to implement action A1 is ex-post contracting*

Proof. Ex-post contracting gives action A1 in return for contractual payments in the event of firm value V , as follows:

$$\begin{aligned} m_B^* &= m_B \\ m_{BC}^* &= m_{BC} \\ m_{BD}^* &= m_{BD} \end{aligned}$$

If any these payments are reduced, the manager will not be willing to work to implement the specified strategy B , C , or D , therefore this is the cheapest way to induce the action A1. ■

Proposition 6 *The cheapest way to induce action A5 is ex-ante contracting with $m^* \in [m_{BC}, m_{BD}]$ given by*

$$m^* = \frac{\pi_D \left(\frac{e_D - e_B}{\pi_D - \pi_B} \right) - (e_D - e_C)}{\pi_C} \quad (18)$$

Proof. To induce this action, we obviously cannot drop m_B^* below m_B , m_{BC}^* below m_{BC} , or m_{BD}^* below m_{BD} , otherwise the CEO will not be willing to work to implement the chosen strategy. We have to increase one or more of the contractual payments above the ex-post level by setting $m^* > m_B$, to see if this will induce the agent to take action A5 and if so, find the smallest m^* that does this. The question is whether it is optimal to have $m^* \in (m_B, m_{BC}]$, $m^* \in (m_{BC}, m_{BD}]$, or $m^* > m_{BD}$.

In the event the CEO has a choice between C and D at the strategy formulation stage, his expected payoff if he picks C is:

$$p(\pi_C m_{BC}^* - e_C) + (1-p)(\pi_B m_B^* - e_B)$$

and if he picks D it is:

$$p(\pi_D m_{BD}^* - e_D) + (1-p)(\pi_B m_B^* - e_B).$$

By the hypothesis that ex-post contracting induces choice of D (action A1), it follows immediately that $m^* \in (m_B, m_{BC}]$ will not induce choice of C (action A5) because increasing m^* towards m_{BC} just increases both payoffs by the same constant. Next consider $m^* > m_{BC}$. If $m^* \in (m_{BC}, m_{BD}]$, the CEO will be just willing to pick C if

$$(\pi_C m_{BC}^* - e_C) = (\pi_D m_{BD}^* - e_D)$$

By hypothesis $m_{BC}^* = m^*$ and $m_{BD}^* = m_{BD}$, so substituting for $m_{BD} = \frac{e_D - e_B}{\pi_D - \pi_B}$ we have

$$m^* = \frac{\pi_D \left(\frac{e_D - e_B}{\pi_D - \pi_B} \right) - (e_D - e_C)}{\pi_C}$$

One can verify that m^* defined by this formula does not exceed m_{BD} , as a consequence of our assumption that $\frac{e_D}{e_C} > \frac{\pi_D}{\pi_C}$ (or equivalently $m_{BC} < m_{BD}$). ■

We can now complete the solution of the problem by examining the shareholders' preferences. The shareholders will prefer to induce choice of C (action A5) using ex-ante contracting with m^* as just derived, instead of accepting using ex-post contracting to induce choice of D (action A1) if:

$$\begin{aligned}
& \alpha_D^2 [p(V - m_{BD})\pi_D + (1-p)(V - m^*)\pi_B] \\
& + (1 - \alpha_D^2) [p(V - m^*)\pi_C + (1-p)(V - m^*)\pi_B] \\
\geq & (1 - \alpha_C^2) [p(V - m_{BD})\pi_D + (1-p)(V - m_B)\pi_B] \\
& \alpha_C^2 [p(V - m_{BC})\pi_C + (1-p)(V - m_B)\pi_B] \tag{19}
\end{aligned}$$

or, equivalently:

Proposition 7 *The shareholders will use ex-ante contracting with a guaranteed minimum m^* (paid in the event of success) to induce the CEO to prefer strategy C rather than D if*

$$\begin{aligned}
2p\alpha_C\alpha_D\pi_C(V - m^*) \geq & 2p\alpha_C\alpha_D\pi_D(V - m_{BD}) + \\
& (1-p)\pi_B(m^* - m_B) + p\alpha_C^2\pi_C(m^* - m_{BC}) \tag{20}
\end{aligned}$$

This ex-ante contracted payment m^ will be renegotiated upwards in case the CEO has no choice over available strategies and presents D to the shareholders. If the inequality is reversed, they will prefer es-post contracting.*

This expression has a simple intuitive explanation. The term on the left-hand side represents the shareholders' payoff when the CEO chooses C over D , and the first term on the right hand side is the payoff when he makes the opposite choice. But if the shareholders use ex-ante contracting to make the CEO switch from D to C (when he has a choice), this has the drawback that they will have to overpay (relative to the ex-post levels) for implementing strategies B and C . The second term on the RHS represents the extra cost from overpaying for strategy B , while the third term represents the extra cost for overpaying for strategy C .

Clearly, if p is big then ex-ante contracting is helpful to the shareholders, because one of its drawbacks is the overpayment in case strategic change is not required (B). Also, if C is generally less likely than D ($\alpha_C < \alpha_D$) ex-ante contracting is also more favourable to the shareholders because overpayment when C is actually the only option (the third term on the RHS) is less important relative to the improved shareholder value from the CEO selecting C over D when he has a choice (LHS and first term on RHS). One can interpret both of these cases (bigger p and $\alpha_C < \alpha_D$) as corresponding to a

more unstable, changeable business environment. So the conclusion would be that in such a changeable environment, one might wish to give the CEO an apparently overgenerous package of incentives at the outset. Although sometimes overgenerous relative to the immediate task at hand, it would improve his incentives for strategic decision making.

4 Extension: Setting a ceiling on compensation

In this section we consider the case where the shareholders may be able to make pre-commitments about the ex-post renegotiation of the CEO's compensation contract, specifically when they set an upper limit to compensation

We mentioned earlier the issue of committing never to renegotiate. The issue of pre-commitment not to renegotiate is open to debate. Clearly, companies and CEO's often do renegotiate compensation. The typical arrangement consists of an annual salary combined with a stock option grant, so each year the salary is renegotiated and the CEO also adds more options to an existing portfolio. Hence, initially it may seem natural to assume that such pre-commitment is impossible. There is also a theoretical problem, that it is hard to see how such a commitment could be enforced (perhaps by a third party, but then, the design of the contract with this third party would have to be complex and might violate the spirit of our prior assumptions on contractibility between CEO and board - and it would certainly be unrealistic).

However, perhaps social norms or individual ethics could be used as a pre-commitment device. For example, in Sweden it would probably be possible for a company to pre-commit never to pay the CEO over US \$1bn (as was paid to Roberto Goizueta of Coca-Cola over a ten-year period). Even within the US, there was a period about 25 years ago when such a payment might have been impossible. Thus pre-commitment may be possible at the social level. At the level of the individual company, it may be possible to make pre-commitments by appointing individuals who are known to be strongly opposed to high compensation to the board or to the remuneration committee. Having large block shareholders with this view might also have the same effect. For that reason, we believe it is worthwhile to at least

explore the case where pre-commitment is possible. We therefore add the following assumptions:

4.* We consider the possibility of pre-committing not to engage in certain types of renegotiation.

5.* The only pre-commitment of that type we consider reasonable is setting an upper bound on the level of compensation.

Note that the last assumption rules out pre-commitment of the sort where the board commit never to offer a payment in a set A , and the set A can have an arbitrary shape such as a subset of the real line that is not connected, the set of rational numbers, etc...

Assumptions 4* and 5* allow the shareholders to put an upper bound on the CEO bonus payment. A (binding) upper bound would prevent the CEO choosing ever implementing D . Clearly this will not allow implementation of action A5, because A5 requires $m_{BD}^* \geq m_{BD}$ (refer to page 30 for the numbered list of actions). The same argument rules out the use of pre-commitment to implement A1 and also A2 and A6. Of the remaining strategies, A3 can clearly not be implemented at all (why would the manager choose D over C at the formulation stage, only to reject it in favour of B at the implementation stage, even though he prefers C to B ?). A4 and A8 are easy to implement, but uninteresting - the shareholders committing to business-as-usual forever by binding themselves never to pay more than m_B .

The interesting case is A7. With pre-commitment the shareholders can correct the manager's preference for D by committing themselves never to pay enough compensation to make the CEO willing to implement the strategy. Recall that A7 is described by: (C, C_{BC}, B_{BD}) . It therefore requires $m_B^* \geq m_B$, and $m_{BC}^* \geq m_{BC}$ but certainly not $m_{BD}^* \geq m_{BD}$. So the cheapest way to implement it is to cut m_{BD}^* below m_{BD} . It makes no difference what value m_{BD}^* takes in the interval $[m_B, m_{BD})$ since the CEO will never implement D anyway. The expected payoff for the shareholders is then:

$$\alpha_D^2 [\pi_B (V - m_B)] + (1 - \alpha_D^2) [p\pi_C (V - m_{BC}) + (1 - p) \pi_B (V - m_B)] \quad (21)$$

We can compare this expected payoff to what shareholders would obtain in case the contracting process involved ex-ante contracting without pre-commitment, and also in case we had an ex-post contracting policy. From these comparisons we reach the following results.

Proposition 8 *The shareholders will prefer ex-ante contracting with a ceiling on compensation (inducing the CEO to choose action A7) to ex-ante contracting with unrestricted renegotiation (inducing the CEO to pick action A5) if:*

$$\begin{aligned} & p\alpha_D^2 [\pi_B (V - m_B) - \pi_D (V - m_{BD})] + \\ & \pi_B (1 - p) (m^* - m_B) + (1 - \alpha_D^2) p\pi_C (m^* - m_{BC}) \\ \geq & 0 \end{aligned} \tag{22}$$

with m^* as defined in proposition 4.

Proof. Direct from comparison of the shareholders' expected payoff with ex-ante contracting with a ceiling (equation (21)) and without an upper bound (LHS of inequality (19)). ■

Proposition 9 *The shareholders would prefer the ex-ante contract with a ceiling to ex-post contracting if:*

$$\begin{aligned} & p\alpha_D^2 [(V - m_B) \pi_B - (V - m_{BD}) \pi_D] \\ & + 2p\alpha_C\alpha_D [(V - m_{BC}) \pi_C - (V - m_{BD}) \pi_D] \\ \geq & 0 \end{aligned} \tag{23}$$

Proof. Direct from comparison of the shareholders' expected payoff with ex-ante contracting with a ceiling (equation (21)) to their expected payoff with ex-post contracting (equation (16)). ■

If both conditions (22) and (23) are satisfied, and if the pre-commitment not to violate the ceiling is credible, the shareholders would prefer to completely rule out the possibility of the manager formulating strategy D . The advantage of this type of contracting is that it can induce the manager to pick strategy C (when given a choice between C and D) without making strategy C and strategy B more expensive to implement when compared to the ex-post contracting solution (unlike what happens with ex-ante contracting without a ceiling). The drawback of designing such a contracting device with a non-renegotiable ceiling, is that the CEO will not develop strategy D (which is, by assumption, superior to the status quo) when this is the only option available to him.

From the above inequalities (22 and 23), we can see that setting an upper bound would be optimal if it is unlikely that the strategy for dramatic

change, D , is the only one available (probability α_D^2) and if the probability of it being feasible when available (p) is also low. We can interpret this case, $\alpha_D \ll \alpha_C$ and small p , as a very stable environment: a low chance of any change being required, especially dramatic change. In this case the ceiling on compensation is a cheap way to correct the manager's preference for dramatic change. If this is not the case, then it will be preferable to set either an ex-ante contract without a ceiling, or an ex-post contract.

5 Conclusion

Our results are simple to summarise. In this paper we analysed how managerial rent-seeking may distort strategy choice in favour of overambitious change. We showed that, in our model:

- In a highly changeable environment (change is more likely to be required) the shareholders should offer the CEO a high-powered incentive package at the outset in order to improve his incentives for strategy making, even if sometimes this results in excessive (with hindsight) payment at the implementation stage. This will correct his incentives away from excessively drastic restructuring and towards the kind of change that is preferred by shareholders.
- Another way of achieving this is to pre-commit never to pay the very high compensation package required to implement dramatic change. It may be difficult to make this precommitment, but if it is possible, then it will be preferred if dramatic change is not likely to be only the change option facing the CEO.
- Finally, in some situations it may be optimal for the shareholders simply to accept some strategic distortion and to negotiate compensation to the required level after the strategy has been selected. This will occur when change is not very likely or when shareholders do not have strong preferences among the possible change options.

Our model, of course, has some very special features. However, there are some general insights which we believe to have practical applicability:

- The key to our analysis is that very different strategic situations are likely to require very different compensation packages for senior management: in particular, different level of effective equity participation (i.e. overall pay-performance sensitivity). Obviously, CEO's cannot be expected to ignore this dependency in their strategy formulation. Shareholders need to be aware of the biases this could cause and to plan compensation policy accordingly.
- Shareholders and outside board members should think about the strategies they have not been shown, as well as the strategies they have been shown. Pay needs to be set not just in the context of the plans that the firm and the CEO are actually in the process of carrying out, but in the context of activities that are not being carried out, but might have been.
- This may explain why there is such a big difference between the compensation of CEO's (and a small group of very senior managers), and compensation for other managers throughout the firm. In our model, pay reflects the CEO's strategic discretion.

The biggest weakness of our analysis, in our view, is that although we have modified the standard framework to give the CEO a more active role, and to give him influence over the design of his own compensation package, we have still retained the traditional “moral hazard” assumption (see the discussion on this point in the introduction to Salanié, 1997) that the principal's expected utility is maximised subject to a collection of incentive-compatibility and participation constraints for the agent, albeit in a model with a more complicated collection of constraints than in the standard analysis. As Salanié points out, this is a strong assumption in modelling any agency relationship since one might expect the bargaining relationship between the parties to be more complex than this, and to evolve over time as the agency problem unfolds. We believe that CEO's do, in fact, have even more discretion over their own compensation than is modelled here, although this is subject to a number of constraints such as the threat of takeover, the adverse consequences of poor relationships with shareholders, influence of external board members, etc. Further modelling of these issues is an interesting area for future research.

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