ORGANIZATIONAL INERTIA 
AND DYNAMIC INCENTIVES

by

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Why would an organization give to internal interest groups the incentives and power to block changes that might be beneficial to the overall organization? How will an organization choose to allocate rents and decision power? Why and in what sense does such an allocation generate inertia? The relatively simple principal-agent model presented in this paper is meant to address those questions in a formal way. We model the endogenous determination of the level of flexibility or inertia as a rational choice made by the organization. Our results are three-fold: first, the efficient organizational response to the presence of private information on the value of change will in general be to bias the decision rule towards the status quo; we then show that the payment scheme to the agent differs (an upfront payment versus a distribution of stock options) according to whether the information on the value of change is private to the principal or the agent; finally, we discuss the efficient distribution of authority in an organization and we show that the effective or real authority for recommending and/or implementing change need not always be profitably retained by the principal.

Keywords: Inertia, Flexibility, Principal-Agent, Dynamic Incentives
J.E.L. D23, D82, G30, J33.

RESUME

Pourquoi une organisation donnerait-elle à des groupes d'intérêt internes l'incitation et le pouvoir de bloquer des changements profitables pour l'ensemble ? Comment l'organisation allouera-t-elle les rentes et le pouvoir de décision ? Comment cette allocation générera-t-elle de l'inertie ? Le modèle principal-agent développé ici traite de ces questions d'une manière formelle ? Nous modélisons la détermination endogène du niveau de flexibilité ou d'inertie comme un choix rationnel visant la maximisation de l'intérêt du principal. Nos résultats sont les suivants : d'abord, la réponse efficace à l'existence d'une information privée sur la valeur du changement biaise en général la règle de décision en faveur du status quo ; nous montrons ensuite que le mode de rémunération de l'agent (paiement forfaitaire versus distribution d'options) diffère selon que l'information sur la valeur de changement est une information privée du principal ou de l'agent ; enfin, nous analysons la distribution de l'autorité au sein de l'organisation et nous montrons que l'autorité réelle de recommander ou d'initier un changement ne sera pas toujours assumée par le principal.

Mots-clés: Inertie, Flexibilité, Principal-Agent, Incitations dynamiques
J.E.L. D23, D82, G30, J33.
1. INTRODUCTION

Fighting inertia, favoring continuous change and building flexible companies or agile corporations have become popular buzzwords in the management literature. Inertia and flexibility are for all practical purposes antonyms in the literature on organizations. Without exception, flexibility has a positive tune: more flexibility is always better and more efficient. A report from Business International (1991) stresses the need for companies to be flexible given the important changes in the way competition operates and is likely to operate in the future: markets are becoming more and more ephemeral and volatile. On the basis of a large number of case studies, Business International claims that flexibility is indeed the all-inclusive concept integrating a whole set of recent management theories, and moreover that collaboration inside and outside the company is the way flexibility is achieved.1

Yet, if flexibility is so valuable, why is it the case that so many organizations (including, not the least, public bureaucracies) are seen as failing to meet the challenge of change? Some large and powerful companies have reacted too slowly to the need of change and either went bankrupt or were brought to the brink of bankruptcy and obsolescence before adapting. The political cost of changing obsolete socio-economic policies has been blamed for the growing burden of government welfare programs. Inertia is a pervasive problem that organizations face in spite of frequent calls for change and flexibility by shareholders, managers, workers and politicians. Why is inertia so prevalent?

There are few general and formal definitions of flexibility proposed in the literature. George Stigler (1939) pioneered the analysis of cost flexibility by stating that firms have in general to make a choice among different equipments or technologies giving rise to different cost configurations, for example a S-shaped average cost function and a W-shaped average cost function.

1The thesis of Business International is that the process of change towards flexibility and collaboration in a company is built in four different ways: first from a reliance on rules to guidance according to goals, second from motivation by product possibilities to motivation by market possibilities, third from hierarchy to network in which the corporate system is constantly recreated, and fourth from compliance based on an internal carrot and stick incentive system to alliances, both internally and externally, based on passing the carrot and the stick to the participants themselves, whether they are customers, employees, suppliers or partners. The latter path implies an internal reorganization based on the empowerment of employees, information sharing between employees and management, more and smaller goal-oriented units, more pressure to act simultaneously and more customer pressure.
cost function attaining a lower minimum level but rising steeply as production moves away from
the average cost minimizing production scale.\textsuperscript{2} A typical management literature deﬁnition of
`strategic' ﬂexibility is given by Harrigan (1985) as `rms' abilities to reposition themselves
in a market, change their game plans, or dismantle their current strategies when customers they
serve are no longer as attractive as they once were."\textsuperscript{3}

The analysis of inertia has both a long and a short history. It is present under different
names in many strands of the literature, in particular in economics, psychology and manage-
ment. It underlies the analysis of dynamic adjustment costs in investment theory [Lucas (1967a,
1967b), Rothchild (1971), Dixit (1992), Ito (1996)], of the rise and decline of nations [Olson
(1982)], of routines and procedures [Gabel and Sinclair-Desgagnés (1996)], of systematic cost
overruns and delays in large-scale, long term, advanced technology projects [Lewis (1986), Ar-
van and Lète (1990)], of the soft budget constraint syndrome [Dewatripont and Maskin (1995),
Dewatripont and Tirole (1996), Bai and Wang (1997)], of the efﬁciency of franchise bidding for
natural monopolies [Demsetz (1968), Posner (1972,1974), Stigler (1974), Williamson (1986)], of
the rational suppression of potentially valuable informations in organizations [Côté (1995),
Burkart, Gromb and Panunzi (1996), Friebel and Raith (1996), Faure-Grimaud (1996)], of fads,
customs, fashions and cultural change [Bikhchandani, Hirshleifer and Welch (1992), Moscarini,
Ottaviani and Smith (1997)], of the transmission of bad news in organizations [Levitt and Snyder
(1996)], of organizational ecology or the evolutionary theory of surviving organizations [Hannan
and Freeman (1984), Boone and van Witteloostuijn (1997)], of the relative (real option) value of
of organizational culture [Carillo and Gromb (1997)], of the value of incentive enhancing nar-
row diversiﬁcation strategies [Rotemberg and Saloner (1994)], of the constitutional restrictions
placed on politicians [Boyer and Laënt (1999)]. And this is just the tip of the iceberg of relevant
articles.

Rumelt (1995) claims that the most crucial problem facing the top level management of

\textsuperscript{2}More formal deﬁnitions of ﬂexibility were given by Marshak and Nelson (1962) and Jones and Ostroy (1984)
in decision theoretic contexts. Those deﬁnitions are reviewed and discussed in Boyer and Moreaux (1989).

\textsuperscript{3}In the language of Business International (1991), ﬂexible companies ::: must balance rigid structure and loose
network, clear strategy and opportunistic market response; ::: the capacity for fast response with `rm decisions
on when to use it, the ability to collaborate with the readiness to protect assets."
corporations, large and small, public and private, is not product-market strategy but indeed organizational change. If managers are to commit energy, careers, time, and attention to a program of change, there must be trust that the direction chosen will not be lightly altered. Here we touch the central paradox that change may require the promise of future inertia. In other words, today’s inertia may be the result of a commitment necessary to implement change at some earlier date. Another explanation for organizational sclerosis goes as follow. In order to prosper, an organization must provide incentives to its members and promise them future rents. As the organization grows older, these rents, which are disseminated across the organization, inhibit change. Members of the organization learn to use their power to protect their rents and the conflicts between interest groups will make it hard to reform the organization. A significant free-rider problem arises and sclerosis and inertia set in until the very survival of the organization and of the rents associated with it are in danger. Even then, the organization may be unable to orchestrate change. Olson (1982) uses such a framework to explain the rise and decline of nations.

We address in this paper some basic questions which the above story raises. The allocation of rents and power to initiate, bring or block change is in some way endogenously determined and does derive from the organizational design. But then, why would an organization give to interest groups within the organization the incentives and power to block changes that might be beneficial to the overall organization? How will an organization choose to allocate rents and decision power? Why and in what sense does such an allocation generate inertia? The relatively simple model presented in this paper is meant to address those questions in a formal way. We model the endogenous determination of the level of flexibility or inertia as a rational choice made by the organization.

We will show how the 'optimal' probability of change given the observation of a signal of the profitability of change, that is switching to an alternative project (with such a change implemented with probability 1 under full information) will optimally depend on the parameter

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4Rumelt argues that one source of inertia is dulled motivation with other sources being distorted perception, failed creative response, political deadlocks, and action disconnects. The cost of change, the loyalty of consumers, and the cross-subsidy comforts, a kind of soft budget constraint on some activities or divisions of the firm, may lead the firm to resist change.
structure of the problem at hand and in particular on the relative informational rents of the different participants. We present in section 2 the formal model and the analysis of the benchmark case where the signal is common knowledge. In Section 3, the signal is observed only by the principal while in Section 5, it is a private information of the agent. If only the agent observes the signal, he may have an incentive to misreport its value in order to favor the project in which his rent is larger. Similarly, if the principal is the only one observing the signal, she may want to misreport it in order to maximize her net benefits. The principal must select and commit (credibly) to a payment profile and a switching decision rule providing the necessary incentives.

The efficient organizational response to this self-interest behavior will in general be to bias the decision rule towards the status quo. We therefore confirm in a formal way Rumelt's (1995) assertion of the paradox that change may require the promise of future inertia and Dewatripont and Tirole's (1996) statement that ex ante efficiency may require a commitment to ex post ine...ciency. In addition, we compare in section 5 the results obtained from the analyses of the different frameworks and we discuss the efficient distribution of authority in an organization. If the signal about the alternative project can or should, for some technical or economic reasons, be observed only by either the agent or the principal, to whom should be given the responsibility of observing the signal and of recommending change? As we will see, the effective or real authority for recommending and/or implementing change need not always be retained by the principal. We provide further discussion and comments in the conclusion. The Appendix contains the detailed proofs of the propositions and corollaries.

2. THE MODEL

We use the most stylized and abstract representation of an organization: it is composed of a principal (the owner/manager/supervisor), who is the residual claimant, and an agent (the executive/worker/supervised). Our objective is to provide a simple model in order to illustrate and better understand the unavoidable arbitrage between incentives and elasticity in dynamic contexts of asymmetric information and to characterize the general features of an appropriate response to this challenge.5

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5In a different context, Boyer and Moreaux (1997) characterize the trade-off between commitment and elasticity. They consider a duopoly model of flexible manufacturing technology adoption in which asymmetric equilibria...
The basic structure of the model is as follows. An agent is asked to invest an unobservable, specific and sunk effort to increase the probability of success of an initial project. New information (a signal) is then generated about the profitability of an alternative project. The projects being mutually exclusive, the organization must decide whether or not to abandon the initial project in favor of the alternative one. If the organization decides to switch to the alternative project, the agent is again asked to invest an unobservable, specific and sunk level of effort to increase the probability of success of the alternative project. Finally, outcome for the selected project is observed and payments are made.

More flexibility to abandon the initial project to pursue the alternative project will in general be detrimental to the level of specific efforts that the agent will be willing to exert to increase the probability of success of the initial project: hence the fundamental trade-off between ex ante incentives and ex post flexibility. Moreover, the existence of informational rents will generate distortions in the choice between project 1 and project 2. The principal's problem is analyzed in three different informational settings: the generated signal may be observed by both the principal and the agent, by the principal only, or by the agent only. In each setting, the agent's efforts, both for the initial and the alternative projects, are unobservable by the principal. The agent receives rents in the organization because of moral hazard and limited liability. In order to induce the agent to provide the proper level of effort, the principal must reward the agent if the project undertaken is successful while limited liability prevents the principal from financing this reward through a penalty in case of failure (for instance by a bond posted by the agent).

The organization, represented by a principal and an agent, both risk neutral, must invest in an initial project. Later on, the organization will observe a signal \( \mu \) about the probability of success of an alternative project. Based on the observed value of \( \mu \), the organization may choose either to abandon the initial project 1 in favor of the alternative project 2 or pursue project 1 (the projects are mutually exclusive).

The timing of observations and decisions is as follows. First, the agent invests some unobservable level of effort \( e \) which may be low (\( \text{`low} \)) or high (\( \text{high} \)) in the initial project 1, at a cost \( V_1 \).
and $V^h_1$ respectively. This investment in effort determines the probability of success $p^h_1$ of that project, with $p^h_1 > p^l_1$. Effort is specific to the project and considered as sunk. Second, the signal $\mu$ is observed: it may be good or favorable (g) with probability $1/2$ and bad or unfavorable (b) with probability $(1 - 1/2)$. The organization must then decide whether to abandon the initial project in favor of the alternative one or to maintain the initial project (the status quo). If project 2 is selected, then the agent must again provide some unobservable level of effort $e^2$ which is either low (l) or high (h), at a cost of $V^l_2$ and $V^h_2$ respectively. The level of effort $e^2$ together with the value of the signal $\mu$ determine the probability of success of project 2. Finally, the state of nature, that is the outcome of the project chosen, is revealed and payments are made.

The outcomes of the projects are random. The expected level of net profits depends on the project pursued, on the level of effort invested by the agent and on the value of $\mu$. Let $R^e_1$ be the expected return from project 1 when effort $e$ has been invested and let $R^{e\mu}_2$ be the expected return of project 2 given $e$ and $\mu$. The probability of success of project 1 is given by $p^h_1 [p^l_1]$ if the agent's effort in project 1 is high [low]. The probability of success of project 2 depends on effort and on the value of the signal $\mu$. It is given by $p^{hg}_2$, $p^{`g}_2$, $p^{hb}_2$ or $p^{`b}_2$ depending on whether the agent's effort and the signal are (h; g), (l; g), (h; b) or (l; b).

We do not intend here to consider all the possible cases for this problem. We wish instead to limit our attention to cases where both the effort and the signal are meaningful. More precisely, we restrict our attention to vectors of exogenous parameters $[R^e_1, R^{e\mu}_2, 1/2, p^h_1, p^l_1, V^e_1, V^e_2]$ such that, when the signal $\mu$ is common knowledge, the principal always prefers to elicit a high level of effort for both project 1 and project 2 and a switch to project 2 occurs if and only if the signal is favorable, that is, if and only if $\mu = g$. This case will be our benchmark case characterized in Proposition 1 below. Therefore, we make the following assumptions:

A1-a: $p^h_1 > p^l_1 > 0;\ p^{bg}_2 > p^{`g}_2 > 0;\ p^{hb}_2 > p^{`b}_2 = 0;\ V^e_1 = V^e_2 = 0$

A2: $R^{h} i_1 \frac{A^1_{1i}}{1/2} > R^{l} i_1;\ R^{h\mu} i_2 > R^{l\mu} i_2$ for $\mu 2 fg; bg$

A3: $R^{bg} i_2 > R^{bg} i_2 > R^{h} i_1$

A4: $R^{h} i_1 \frac{A^1_{1i}}{1/2} > R^{hb} i_2 > p^{hb} i_2 > p^{hb} i_2$

An incentive system takes the general form of a payment profile $w$ specifying a payment
contingent on the project pursued (1 or 2), on whether it is a success s or a failure f, and on whether the announced value of µ is g or b:

\[ w = f w_1^s; w_1^f; w_2^g; w_2^f, w_b^g; w_b^f \]. Limited liability requires that \( w \geq 0 \). A switching rule, which specifies when project 1 will be abandoned in favor of project 2, is a pair \((r_g; r_b)\), where \( r_g [r_b] \) denotes the probability that project 2 is chosen when the value of µ observed or announced is g [b].

The effort level exerted by the agent is always a private information of the agent and therefore, in order to induce the high level of effort, the principal must offer a payment profile such that it is privately beneficial for the agent to provide that level of effort. To achieve this, the principal must create a wedge between the payment made in case of success and the payment made in case of failure such that the expected net payment received by the agent is weakly larger when \( e = h \). This, together with limited liability, generates rents for the agent. We assume that the agent's reservation utility level is 0. If project 2 is chosen when \( µ = g \), the wedge must satisfy

\[ p_2^g w_2^g + (1 - p_2^g) w_2^f + V_h^2 - V_h^2 = (p_2^g A_2^g) \]

or

\[ w_2^g - w_2^f \geq \frac{V_h^2}{p_2^g - p_2^f} \cdot A_2^g \]  

(1)

The limited liability assumption implies \( w_2^g \geq 0 \), and therefore \( w_2^g \leq A_2^g \). Hence, we obtain that the net payment received by the agent is no less than \( p_2^g A_2^g + w_2^f + V_h^2 \), \( p_2^g V_h^2 = p_2^g \cdot V_h^2 \), \( p_2^g V_h^2 = p_2^g \cdot V_h^2 \), and \( w_2^f > 0 \), and therefore exceeds the agent's reservation utility: the agent receives an effort-based informational rent.

Similarly, if project 2 is chosen when \( µ = b \) the wedge must satisfy

\[ w_2^b \geq w_2^f, \quad \frac{V_h^2}{p_2^b - p_2^f} \cdot A_2^b \]  

(2)

Again, the limited liability assumption implies \( w_2^b \geq 0 \), and therefore \( w_2^b \leq A_2^b \).

For project 1, the wedge \((w_1^s; w_1^f)\) necessary to induce a high level of effort must take into account the fact that the project may be abandoned in favor of project 2 after the effort cost has been sunk. From the switching rule \((r_g; r_b)\), this will occur with probability \( \frac{1}{2} + \frac{1}{2} r_b \). If there is such a switch, then the agent will obtain a rent of \( p_2^b A_2^b \cdot V_h^2 \) from the payment.
profile relevant for project 2. But given that \( \frac{1}{2} \) is independent of whether the effort put into project 1 is high or low, the value of the appropriate rent is added on both sides of the relevant incentive constraint for \( e_1 \); therefore, the effort inducing payment wedge for project 1 depends on the probability that a switch will occur but is independent of the rent itself accruing to the agent from the realization of project 2. Hence, this wedge must satisfy:

\[
\left[ \frac{1}{2} (1 - \gamma_g) + \frac{1}{2} (1 - \gamma_b) \right] V_{1h}^0 + w_f^1 \] 

that is

\[
(w_i^0, w_f^1) \cdot \frac{A_1}{V_{1h}^0} > \frac{A_1}{V_{1h}^0} \cdot V_{1h}^0 + w_f^1:
\] 

(3)

Ex ante, the agent receives from project 1 an expected payment

\[
p_i^0 \left[ \frac{1}{2} (1 - \gamma_g) + (1 - \frac{1}{2} (1 - \gamma_b)) \right] V_{1h}^0 + w_f^1 \]

equal to \( p_i^0 V_{1h}^0 + p_i^0 w_f^1 > 0 \) which is also the ex post rent from project 1 if the decision to pursue project 1 is taken.

We will consider three alternative information structures. In the first case (benchmark case), the signal \( \mu \) is jointly observable by the principal and the agent; in the second case, it is observable only by the principal and in the third case, it is observable only by the agent. When \( \mu \) is observable and contractible, the optimal organizational design will maximize the principal’s expected profits subject to the limited liability constraints and, if the principal wishes to elicit a high level of effort from the agent, the incentive constraints (1), (2) and (3).

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\(^6\)We do not model the process by which a ‘new’ project is discovered. One possible way to model this process in the first context is to suppose that effort can be extended either to raise the probability of success \( p_e(e_c) \) of the current project 1 or to raise the probability \( p_e(e_n) \) of discovering a new and better project. Designing efficient schemes for total effort provision \( e_c + e_n \) at cost \( A(e) \) and for allocating that effort between the two objectives is clearly a major concern of organizational design. See for example Sinclair-Desgagné and Gabel (1997) who claim that a properly designed auditing procedure could induce a higher effort level \( e_c \) and a higher effort level \( e_n \); the procedure would call for an audit of \( e_c \) if a new and better project is found with a payment made in case \( e_c \) is found to be high. Moreover, the value of \( e \) could depend on market structure as one can infer from Tirole (1988, chap. 4).
Proposition 1: When the signal $\mu$ is observed by both the principal and the agent, then the principal prefers, under $A_1$-a, $A_2$, $A_3$ and $A_4$, to induce a high level of effort both for project 1 and for project 2 and switching occurs if and only if $\mu = g$. We have $r_b = 0$, $r_g = 1$, $w_1^f = w_2^f = w_g^f = 0$, $w_1^b = \bar{A}_1 = 1$, $w_2^b = \bar{A}_2^b$, $w_2^g = \bar{A}_2^g$.

Note that from a social welfare point of view, a switch to the alternative project should occur ex post when $\mu = g$ (should not occur when $\mu = b$) if and only if the expected net total benefits from project 2, assuming that the agent exert a high level of effort in all cases, are larger (smaller) than the expected gross total benefits from the original project, that is, if and only if

$$\begin{align*}
R_1^h &< R_2^g_i \quad V_2^h \\
R_2^b_i &> V_2^h & \text{if } \mu = g \\
R_1^b &> R_1^h - P_1^h A_1 \quad V_2^h \\
R_2^b_i &> R_2^b_i - P_2^b A_2^b \quad V_2^h
\end{align*}$$

(4)

Under the assumptions of the model, the switching rule $r_b = 0$ and $r_g = 1$ is also the socially optimal rule. Indeed we have: $R_1^h < R_2^g_i \quad p_2^g \bar{A}_2 \quad R_2^g_i \quad V_2^h$ and $R_1^h > R_1^h - P_1^h A_1 \quad V_2^h \quad R_2^b_i \quad p_2^b \bar{A}_2^b \quad R_2^b_i \quad V_2^h$.

The above result holds also in the case where the signal is observed by both the principal and the agent but is not contractible. The principal, as the residual claimant, implements the optimal allocation with $r_b = 0$ and $r_g = 1$. The key is to notice that the principal has no incentive to misreport $\mu$. If $\mu = g$, we have $R_2^g_i \quad p_2^g \bar{A}_2 \quad R_1^h \quad R_2^b_i \quad p_1^h A_1 \quad V_2^h$, and thus the principal will prefer to recommend change. If $\mu = b$, the principal knows that if she recommends change, the agent will choose a low level of effort unless $(w_2^b \quad w_2^f) \quad \bar{A}_2^b$. Since by assumption $R_1^h \quad p_1^h A_1 \quad V_2^h \quad R_2^b_i \quad p_2^b \bar{A}_2^b$, it is not in her interest to recommend change.

We use the above as a benchmark for the following sections. We shall consider how the fact that $\mu$ becomes private information affects the rents in the organization and the switching rule. We will show that when the signal is private information of either the principal or the agent, switching to project 2 may not always occur when $\mu = g$. Moreover, we will show that, when the signal can be observed by either the principal or the agent but not both, the principal will sometimes be better observing the signal herself and sometimes be better letting the signal be observed by the agent (empowerment of the agent).
3. THE SIGNAL $\mu$ IS OBSERVABLE ONLY BY THE PRINCIPAL.

We consider now the case where the signal on the profitability of the alternative project is observed only by the principal. We assume that the principal cannot commit herself not to use opportunistically her private information on $\mu$. The principal’s problem is to select an incentive scheme and a credible switching rule so that the agent chooses the high level of effort expecting rationally that the principal will reveal truthfully the observed signal and apply the announced switching rule. The credibility of the switching rule will depend on the principal’s relative interests in revealing the signal she observes and, given the signal revealed, in letting the announced switching rule apply. The principal’s relative interests will themselves rest on the payment profile, that is, the structure of payments to be made to the agent in the different outcomes.

We are looking for a solution where the principal truthfully reveals her information about $\mu$. The principal can deviate from the full information solution by manipulating her message in two ways. First, she can pretend that the alternative project is bad when she observes $\mu = g$. This would be profitable, given the decision function of the agent believing the announcement of the principal, i.e.,

$$ (1 - \frac{1}{2}) \left[ R^h_1 i \ p^h_1 \ A^i_1 \right] + \frac{1}{2} \left[ R^{hg}_2 i \ p^{hg}_2 \ A^g_2 \right] < R^h_1 i \ p^h_1 \ A^i_1 \left( \frac{1}{2} \right) $$

that is, if and only if

$$ R^{hg}_2 i \ p^{hg}_2 A^g_2 < R^h_1 i \ p^h_1 A^i_1 \left( \frac{1}{2} \right) $$

From assumption A3, this never holds. The principal has no interest in claiming that a good project 2 is bad even if her announcement is taken as truthful by the agent. Second, she can pretend that the alternative project is good when she observes $\mu = b$. This would be profitable if and only if

$$ (1 - \frac{1}{2}) \left[ R^h_1 i \ p^h_1 \ A^i_1 \right] + \frac{1}{2} \left[ R^{hb}_2 i \ p^{hb}_2 \ A^b_2 \right] < (1 - \frac{1}{2}) \left[ R^{hb}_1 i \ p^{hb}_1 \ A^b_1 \right] + \frac{1}{2} \left[ R^{hg}_2 i \ p^{hg}_2 \ A^g_2 \right] $$

that is, if and only if

$$ R^{hb}_2 i \ p^{hb}_2 A^b_2 > R^h_1 i \ p^h_1 A^i_1 \left( \frac{1}{2} \right) \quad (5) $$
By assumption A4, we have \( R_{h}^{1} \geq p_{1h}^{A_{1}} > R_{h}^{2} \), where \( p_{2h}A_{2} \). Therefore, if \( A_{2} > A_{2} \), the above condition (5) never holds and the principal has no interest to misreport \( \mu \) whatever the value of \( \mu \) even if the agent believes the announcement.

However, if (5) holds, we must impose an incentive constraint on the principal. If \( A_{g} < A_{b} \), that is, if the cost of inducing a high level of effort is lower when the alternative project is good, then (5) may hold and hence we must impose an incentive compatibility constraint on the principal. We will assume that \( A_{g} < A_{b} \), that is

\[
A_{g} = p_{2g}^{h} > p_{2h}^{b} = p_{2}^{b} > 0: \quad p_{2}(e, \mu) \text{ is supermodular:}
\]

More generally, given a payment profile \( w \) and a switching rule \( (r_{g}, r_{b}) \), the following constraint states that it is not in the principal's best interest to pretend that project 2 (the signal \( \mu \)) is bad when it is indeed good:

\[
[(1 - \frac{1}{2}) (1 - r_{b}) + \frac{1}{2} (1 - r_{g})][R_{1}^{h} i^{3} p_{1}(w_{i}^{f}, w_{i}^{f}) + w_{i}^{f}]
\]

\[
+ (1 - \frac{1}{2}) (1 - r_{b}) p_{2}^{h}(w_{2}^{b} f_{2}^{b} + w_{2}^{b} f_{2}^{b}) + \frac{1}{2} \text{r}_{g} [R_{2}^{h} i^{3} p_{2}^{h}(w_{2}^{g} f_{2}^{g} + w_{2}^{g} f_{2}^{g}) + w_{2}^{g} f_{2}^{g}]
\]

\[
(1 - r_{b}) [R_{1}^{h} i^{3} p_{1}(w_{i}^{f}, w_{i}^{f}) + w_{i}^{f}]
\]

\[
+ (1 - \frac{1}{2}) (1 - r_{b}) p_{2}^{h}(w_{2}^{b} f_{2}^{b} + w_{2}^{b} f_{2}^{b}) + \frac{1}{2} \text{r}_{g} [R_{2}^{h} i^{3} p_{2}^{h}(w_{2}^{g} f_{2}^{g} + w_{2}^{g} f_{2}^{g}) + w_{2}^{g} f_{2}^{g}]
\]

The second term on each side being the same, the constraint can be rewritten as

\[
(r_{g} + r_{b}) [R_{1}^{h} i^{3} p_{1}(w_{i}^{f}, w_{i}^{f}) + w_{i}^{f}]
\]

\[
+ \text{r}_{g} [R_{2}^{h} i^{3} p_{2}^{h}(w_{2}^{g} f_{2}^{g} + w_{2}^{g} f_{2}^{g}) + w_{2}^{g} f_{2}^{g}]
\]

Similarly, it should not be in the principal's best interest to pretend that project 2 is good when it is bad, a condition which can be written as

\[
\text{r}_{g} [R_{2}^{h} i^{3} p_{2}^{h}(w_{2}^{g} f_{2}^{g} + w_{2}^{g} f_{2}^{g}) + w_{2}^{g} f_{2}^{g}]
\]

\[
+ (1 - \frac{1}{2}) (1 - r_{b}) [R_{1}^{h} i^{3} p_{1}(w_{i}^{f}, w_{i}^{f}) + w_{i}^{f}]
\]

\[
+ \text{r}_{b} [R_{2}^{h} i^{3} p_{2}^{h}(w_{2}^{b} f_{2}^{b} + w_{2}^{b} f_{2}^{b}) + w_{2}^{b} f_{2}^{b}]
\]

\[
+ (1 - \frac{1}{2}) (1 - r_{b}) [R_{1}^{h} i^{3} p_{1}(w_{i}^{f}, w_{i}^{f}) + w_{i}^{f}]
\]

\[
+ \text{r}_{g} [R_{2}^{h} i^{3} p_{2}^{h}(w_{2}^{g} f_{2}^{g} + w_{2}^{g} f_{2}^{g}) + w_{2}^{g} f_{2}^{g}]
\]

When the signal \( \mu \) is observable only by the principal, the principal's problem is therefore the
following:

\[
\max_{r_b,r_g,w} \left\{ (1_i \ 1/4 (1_i) r_b + 1/4 i \ r_g) R_i^h \ p_i^h (w_i^e \ w_i^f) + w_i^f \right\} \\
+ (1_i \ 1/4 r_b [ R_i^{h,b} i \ p_i^{h,b} (w_i^{f,b} \ w_i^{f,b}) + w_i^{f,b}] \\
+ 1/4 g [ R_i^{h,g} i \ p_i^{h,g} (w_i^{f,g} \ w_i^{f,g}) + w_i^{f,g}] \right\} \\
\text{subject to: the effort inducing conditions (1); (2); (3); and the principal's truth telling conditions (6); (7);}
\]

We obtain

**Proposition 2:** Under A1-a, A1-b, A2, A3 and A4, the solution to (8) entails:

1. constraint (6) is not binding,
2. \( w_i^f = 0, w_i^g = \frac{A_{1_i}}{1_i + \kappa_{1_i}}, w_i^{f,g} = \max f 0; (R_i^{h,b} i \ p_i^{h,b} A_i^g) i \ (R_i^h i \ p_i^h \frac{A_{1_i}}{1_i + \kappa_{1_i}}) g \ (w_i^{f,g} \ w_i^{g}) = A_i^g \)
3. \( r_b = 0; \)
4. and \( r_g \) solves:

\[
\max_{r_g \in [0,1]} \left\{ (1_i \ 1/4 g) (R_i^h i \ p_i^h \frac{A_{1_i}}{1_i + \kappa_{1_i}}) \\
+ 1/4 g R_i^{h,g} i \ p_i^{h,g} A_i^g \max f 0; (R_i^{h,b} i \ p_i^{h,b} A_i^g) i \ (R_i^h i \ p_i^h \frac{A_{1_i}}{1_i + \kappa_{1_i}}) g \right\} \\
\]

The value of \( R_i^{h,b} i \ p_i^{h,b} A_i^g \) measures the principal's expected benefits from pursuing project 2 if she pretends that project 2 (the signal \( \mu \)) is good when it is bad. If the agent is fooled, the principal will need to pay him an expected wage of only \( p_i^{h,b} A_i^g < p_i^{h,b} A_i^b = V_i^h \) in order to induce a high level of effort from the agent. Because \( \mu \) is not observable by the agent and because the principal could exploit opportunistically her information, extra agency costs must be incurred. In order to credibly convey that she will not engage in such behavior, the principal, when announcing \( \mu = g \), compensates the agent even if project 2 fails. The agency costs increase by

\[
1/4 g w_i^{f,g} = 1/4 g \max f 0; (R_i^{h,b} i \ p_i^{h,b} A_i^g) i \ (R_i^h i \ p_i^h \frac{A_{1_i}}{1_i + \kappa_{1_i}}) g \]

where the second element in the max f g function is indeed the principal's expected benefits of pretending that project 2 is good when it is bad. These extra agency costs are increasing and
convex in \( r_g \), thus generating a bias towards the status quo: in order to reduce the agency costs, the principal may choose \( r_g < 1 \) and therefore introduce a distortion (inertia) in the switching rule.

The principal's expected profit can be expressed as

\[
\psi (r_g; C) = (1 - \frac{1}{2} r_g) R_h^1 + \frac{1}{2} r_g R^h_{2} i \quad C
\]

(11)

where \( C \) is the payment to the agent. The isoprofit curves have slope

\[
\frac{dC}{dr_g} \mid (r_g, C) = f = \frac{1}{2} R^h_{2} i \quad R^h_{1} > 0
\]

From Proposition 2, we can write the expected labor cost, when the signal \( \mu \) is observed by the principal, as a function of the flexibility level as follows:

\[
C^P (r_g) = p^h_1 \tilde{A}_1 + \frac{1}{2} \epsilon_g p^h_2 \tilde{A}_2 + \frac{1}{2} \epsilon_g \max \left( 0 ; (R^{hb}_2 i \quad p^{hb}_2 \tilde{A}_2) \right) i \quad (R^h_1 i \quad p^h_1 \frac{\tilde{A}_1}{1_i} \frac{1}{i \epsilon_g}) g
\]

(12)

Let us define \( r_g^P \) as the value of \( r_g \) for which \( (R^{hb}_2 i \quad p^{hb}_2 \tilde{A}_2) = (R^h_1 i \quad p^h_1 \frac{\tilde{A}_1}{1_i} \frac{1}{i \epsilon_g}) \) if a solution in \([0; 1]\) exists, that is,

\[
r_g^P = \frac{1}{\frac{1}{2} i} \quad \frac{p^h_1 \tilde{A}_1}{R^h_1 i \quad (R^{hb}_2 i \quad p^{hb}_2 \tilde{A}_2)}
\]

The \( C^P (r_g) \) function is illustrated on Figure 1 together with the isoprofit curves of \( \psi (r_g; C) \) for the case \( 0 < r_g^P < 1 \). The difference between \( C^P (r_g) \) and its linear part \( p^h_1 \tilde{A}_1 + \frac{1}{2} \epsilon_g p^h_2 \tilde{A}_2 \) is the extra agency cost necessary to credibly convey that the principal will not misreport \( \mu \).

[Insert Figure 1 here]

The optimal level of flexibility is always in the interval \([r_g^P ; 1]\) since by assumption A3, the slope of the isoprofit curves is larger than the slope of the expected labor cost function to the left of \( r_g^P \). The optimum \( r_g^P \) may be either at the kink \( r_g^P \) (which may be at 0) of the expected labor cost curve, or at the tangency point between the convex portion of the labor cost curve and an isoprofit curve, or at the end point 1.

\[\text{We set } r_g^P = 0 \text{ when } R^{hb}_2 i \quad p^{hb}_2 \tilde{A}_2 > R^h_1 i \quad p^h_1 \tilde{A}_1 \text{ and } r_g^P = 1 \text{ when } R^{hb}_2 i \quad p^{hb}_2 \tilde{A}_2 < R^h_1 i \quad p^h_1 \tilde{A}_1.\]

\[\text{As shown above, the slope of the isoprofit curves is } \frac{1}{2} R^h_{2} i \quad R^h_{1}. \text{ The slope of the expected labor cost function to the left of } r_g^P \text{ is } \frac{1}{2} p^h_2 \tilde{A}_2. \text{ By A3, the latter is smaller.}\]
Corollary 1: The principal chooses to implement

\[ p^g_1 \mathcal{A}_1 \cdot \max (1_i - \frac{1}{2}[R^g_1 i (R^{bb}_2 i p^{bb}_2 \mathcal{A}^g_2) \times (R^{gb}_2 i p^{gb}_2 \mathcal{A}^g_2)] ; (1_i - \frac{1}{2}[R^g_2 i (R^{bb}_2 i p^{bb}_2 \mathcal{A}^g_2) \times (R^{gb}_2 i p^{gb}_2 \mathcal{A}^g_2)]) ; (1_i - \frac{1}{2}[R^g_2 i (R^{bb}_2 i p^{bb}_2 \mathcal{A}^g_2) \times (R^{gb}_2 i p^{gb}_2 \mathcal{A}^g_2)]) \] \] (13)

2 complete inertia, \( r^g_1 = 0 \), if and only if

\[ p^h_1 \mathcal{A}_1 \cdot (R^{hg}_2 i p^{hg}_2 \mathcal{A}^g_2) i (R^{hb}_2 i p^{hb}_2 \mathcal{A}^g_2) \] \] (14)

2 partial flexibility \( r^g_1 \) given by

\[ \frac{1}{2} \min \left( \frac{p^h_1 \mathcal{A}_1}{(R^{hg}_2 i p^{hg}_2 \mathcal{A}^g_2) i (R^{hb}_2 i p^{hb}_2 \mathcal{A}^g_2)} \right)^2 ; \max (0 ; \frac{p^h_1 \mathcal{A}_1}{(R^{hg}_2 i p^{hg}_2 \mathcal{A}^g_2) i (R^{hb}_2 i p^{hb}_2 \mathcal{A}^g_2)}) \] \] (15)

if and only if neither (13) nor (14) hold.\(^9\)

The optimal flexibility level is equal to 1 if the principal finds no value in misreporting the value of the signal \( \mu \) even if she could do it without cost (\( w^{fg}_2 = 0 \)). When she has to bear extra cost to make her announcement credible, she still chooses \( r^g_1 = 1 \) if the slope of the isoprofit curves is always larger than the slope of the expected labor cost function. If (14) holds, the best the principal can do is to never abandon project 1. The incentives for the principal to always pretend that project 2 is good are so strong that it becomes too costly for the principal to credibly convey that project 2 is good. Complete inertia is implemented in the organization.\(^10\)

The closer \( p^h_1 \mathcal{A}_1 \) is to \((R^{hg}_2 i p^{hg}_2 \mathcal{A}^g_2) i (R^{hb}_2 i p^{hb}_2 \mathcal{A}^g_2)\), the more the principal is tempted to misrepresent the value of the alternative project when the signal is bad and therefore the larger the level of inertia chosen and implemented by the principal will be. Thus:

\(^9\)By assumption A3, \((R^{hg}_2 i p^{hg}_2 \mathcal{A}^g_2) i (R^{hb}_2 i p^{hb}_2 \mathcal{A}^g_2) > R^g_1 i (R^{hb}_2 i p^{hb}_2 \mathcal{A}^g_2)\), where the right-hand side may be negative.

\(^10\)If one interprets the original project as a bold change from a previously pursued strategy, the complete inertia implemented if (14) holds may be understood as necessary to induce the optimal level of effort by the agent to raise the probability of success of this 'original' change in strategy: no more change will be made whatever the new information to be obtained in the future (\( \mu \)).
Corollary 2: The level of inertia in an organization (when the principal is the only one being informed of the value of the alternative project) is positively related to \(ph \cdot Vh \cdot \frac{p_{h_1}}{p_{i_1} \cdot p_{i}}\) and to \(p_{h_1} \cdot p_{h_2} \cdot A_{h_2} \cdot \frac{p_{h_2} \cdot p_{h_2} \cdot Vh}{p_{h_2} \cdot p_{h_2} \cdot Vh} \) and negatively related to the difference \(R_{h_2} \cdot R_{h_2}\). That is, the level of inertia increases with \(Vh, p_{h_1}, p_{h_2}, Vh,\) and \(R_{h_2}\); decreases with \(p_{h_1}, p_{h_2}, \) and \(R_{h_2}\); and increases with \(p_{h_2}\) if and only if \(p_{h_2} > p_{h_2}\).

The principal’s expected benefits of pretending that project 2 is good when it is bad increases with \(p_{h_1} \cdot Vh \) and with \(p_{h_2} \cdot Vh\). In order to give the principal the necessary credible incentive to report \(\mu\) truthfully, \(w_{fg}\) is increased: the principal must commit to pay a rent to the agent even when the alternative project turns out to be a failure. Since the wedge \(w_{fg} > 0\) is kept constant (equal to \(A_{h_2}\)) to induce the agent to provide a high level of effort, the payment \(w_{fg} > 0\) is similar to an upfront payment made to the agent when a switch to the alternative project is implemented. This is meant to signal to the agent that the project is indeed good and that a high level of effort is profitable.

4. THE SIGNAL \(\mu\) IS OBSERVABLE ONLY BY THE AGENT.

We consider now the case where the signal on the profitability of the alternative project is observed only by the agent. The agent could deviate from the full information solution by manipulating his message in two ways. First, he can pretend that the alternative project (the signal \(\mu\)) is bad when it is in fact good. This would be profitable for the agent, given the full information incentive scheme and switching rule, if and only if

\[
(1 \cdot \frac{\frac{p_{h_1} \cdot \frac{A_{h_1}}{1 - \frac{1}{2}}}{Vh} + \frac{\frac{\frac{p_{h_2} \cdot A_{h_2}}{1}}{Vh}}{Vh} < [\frac{p_{h_1} \cdot \frac{A_{h_1}}{1 - \frac{1}{2}}}{Vh}])
\]

that is, if and only if

\[
p_{h_2} \cdot A_{h_2} \cdot Vh < p_{h_1} \cdot \frac{A_{h_1}}{1 - \frac{1}{2}}
\]

Alternatively, he can pretend that the alternative project is good when \(\mu = \beta\) and perform no effort on the initial project. He benefits from doing so if and only if

\[
(1 \cdot \frac{\frac{p_{h_1} \cdot \frac{A_{h_1}}{1 - \frac{1}{2}}}{Vh} + \frac{\frac{\frac{p_{h_2} \cdot A_{h_2}}{1}}{Vh}}{Vh}) < (1 \cdot \frac{\frac{p_{h_1} \cdot \frac{A_{h_1}}{1 - \frac{1}{2}}}{Vh}}{Vh} + \frac{\frac{p_{h_2} \cdot A_{h_2}}{1}}{Vh} + \frac{\frac{p_{h_2} \cdot A_{h_2}}{1}}{Vh})
\]

15
that is, if and only if

\[(1_i \frac{1}{2} (p_h A_1 \frac{1}{2})_i V_1^h < (1_i \frac{1}{2} \max_{e_{2f} \cdot h} (p_g A_2^g))_i V_2^g) \]  

(17)

Under the assumptions behind proposition 1 (our benchmark), both (16) and (17) may be satisfied under the full information incentive scheme and switching rule: the rents obtained from pursuing a good project 2 may not be high enough to induce the agent to abandon project 1 when he has invested a high level of effort in it, while they may still be high enough that the agent might simply prefer to invest no effort in project 1 and always recommend change. However, if \( p(e, \mu) \) is supermodular (assumption A1-b), then \((p_{12b} A_1^g) i V_2^h = (p_{12b} A_2^g) i V_2^h < (p_{22b} A_2^g) i V_2^h = 0 \). Therefore \((p_{12b} A_2^g) i V_2^g = (p_{22b} A_2^g) i V_2^g = 0 \) by A1-a and the right hand side of (17) is negative: (17) is never satisfied under A1-b.

Let us consider the general case without A1-b. When the signal \( \mu \) is observable only by the agent, the principal must commit to a payment profile and a switching rule such that the agent will not misreport \( \mu \). Given a switching rule \((r_b, r_g)\), the agent will truthfully reveal \( \mu \) if only if the following two conditions are satisfied (recall that \( V_2^g \) is incurred before the signal is observed but that \( V_2^g \) is incurred only once the signal is observed and project 2 is pursued).

\[
\max_{e_{2f} \cdot h} [(1_i \frac{1}{2} (1_i r_b) + \frac{1}{2} (1_i r_g))] p_{12}^h (w_{1i}^h, w_{1i}^g) + w_{1i}^h V_1^g \]

\[
+ (1_i \frac{1}{2} r_b \max_{e_{2f} \cdot h} [p_{22}^g (w_{2i}^b, w_{2i}^g) + w_{2i}^b V_2^g]) \]

\[
+ \frac{1}{2} r_g \max_{e_{2f} \cdot h} [p_{22}^g (w_{2i}^b, w_{2i}^g) + w_{2i}^g V_2^g] \]

\[
\max_{e_{2f} \cdot h} [(1_i r_b)] p_{12}^h (w_{1i}^h, w_{1i}^g) + w_{1i}^h V_1^g \]

\[
+ (1_i \frac{1}{2} r_b \max_{e_{2f} \cdot h} [p_{22}^g (w_{2i}^b, w_{2i}^g) + w_{2i}^b V_2^g]) \]

\[
+ \frac{1}{2} r_b \max_{e_{2f} \cdot h} [p_{22}^g (w_{2i}^b, w_{2i}^g) + w_{2i}^b V_2^g] \]

(18)
max_{e^{2f};h^g} \left( \frac{1}{2}(1_i - r_b) + \frac{3}{4}1_i - r_g \right) [p_i^{h}(w_i^{f_1} + w_i^{f_1}) + V_i^{g}] \\
+ \frac{3}{4}1_i - r_b \max_{e^{2f};h^g} [p_i^{b}(w_i^{b_1} + w_i^{b_1}) + V_i^{g}] \\
+ \frac{3}{4}1_i - r_g \max_{e^{2f};h^g} [p_i^{g}(w_i^{g_1} + w_i^{g_1}) + V_i^{g}]

(19)

max_{e^{2f};h^g} \left( (1_i - r_g)(p_i^{h}(w_i^{f_1} + w_i^{f_1}) + V_i^{g}) \\
+ \frac{3}{4}1_i - r_b \max_{e^{2f};h^g} [p_i^{b}(w_i^{b_1} + w_i^{b_1}) + V_i^{g}] \\
+ \frac{3}{4}1_i - r_g \max_{e^{2f};h^g} [p_i^{g}(w_i^{g_1} + w_i^{g_1}) + V_i^{g}]

Condition (18) is necessary to guarantee that the agent will not always claim that $\mu = b$, thereby generating too much inertia. Condition (19) is necessary to guarantee that the agent will not always claim that $\mu = g$, thereby generating too much flexibility at the expense of too little effort invested in project 1.

When the signal $\mu$ is observable only by the agent, the principal's problem becomes:

max_{r_b,r_g,w} \left( (1_i - r_b) + \frac{3}{4}1_i - r_g \right) [p_i^{h}(w_i^{f_1} + w_i^{f_1}) + V_i^{g}] \\
+ \frac{3}{4}1_i - r_b \max_{e^{2f};h^g} [p_i^{b}(w_i^{b_1} + w_i^{b_1}) + V_i^{g}] \\
+ \frac{3}{4}1_i - r_g \max_{e^{2f};h^g} [p_i^{g}(w_i^{g_1} + w_i^{g_1}) + V_i^{g}]

subject to: the effort inducing conditions (1);(2);(3); and the agent's truth telling conditions (18);(19):

Under A1-a, A1-b, A2, A3 and A4, the solution to the principal's problem (20) can take three different forms. There are three different cases to consider depending on whether (18) and/or (19) are binding or not. These cases are presented and discussed in Propositions 3A, 3B and 3C below.
Proposition 3A: If \( p_1^{h} A_1^{h} < p_2^{h} A_2^{h} \) and \( V_2^{h} \), neither (18) nor (19) are binding. Hence, the principal can do as well as if the signal \( \mu \) were observable. We have \( w_f^1 = w_f^g = 0 \), \( w_s^1 = A_1^{1 - \frac{1}{2} r_g} \), \( w_s^g = A_2^{g} \), \( r_b = 0 \), \( r_g = 1 \).

Proposition 3A characterizes the case where the full information solution is attainable even if only the agent observes \( \mu \). The intuition is that the rent accruing to the agent when the alternative project is good (\( \mu = g \)) is high enough that he will not lie about \( \mu \). In this case, there are no agency costs associated with the fact that \( \mu \) is observable only by the agent.

Proposition 3B: If \( p_2^{h} A_2^{g} \) and \( V_2^{h} < p_1^{h} A_1^{1} < p_2^{h} A_2^{h} + p_1^{h} A_1^{1 - \frac{1}{2} r_g} \) and \( V_2^{h} \), then (18) is binding but (19) is not. We have \( w_f^1 = w_f^g = 0 \), \( w_f^1 = A_1^{1 - \frac{1}{2} r_g} \), \( w_s^g = p_2^{h} A_2^{g} = p_2^{h} A_2^{g} + V_2^{h} \), \( r_b = 0 \) and \( r_g \) solves:

\[
\max_{r_g} \left( 1 + \frac{1}{2} r_g \right) R_1^{h} + \frac{A_1}{1 - \frac{1}{2} r_g} \left( 0 ; p_1^{h} A_1^{1 - \frac{1}{2} r_g} \right) \left( p_2^{h} A_2^{g} + V_2^{h} \right)
\]

In this case, the agent may lie when the signal is \( g \). The organizational design must prevent the agent from claiming that the alternative project is bad when it is good. This is done by increasing the reward \( w_s^g \) if project 2 is undertaken and successful. From (18), the extra rent necessary to elicit truthful behavior from the agent is given by

\[
\frac{A_1}{1 - \frac{1}{2} r_g} \left( 0 ; p_1^{h} A_1^{1 - \frac{1}{2} r_g} \right) \left( p_2^{h} A_2^{g} + V_2^{h} \right)
\]

It is increasing and convex in \( r_g \) generating the bias towards the status quo. More precisely, we have:

\[
r_g^{\gamma} = \left\{ \begin{array}{ll}
\frac{A_1}{1 - \frac{1}{2} r_g} & \text{if } R_2^{h} V_2^{h} < R_1^{h} + p_1^{h} A_1^{1 - \frac{1}{2} r_g}, \\
1 & \text{otherwise.}
\end{array} \right.
\]

For inertia (\( r_g^{\gamma} < 1 \)) to appear, we must have \( R_2^{h} V_2^{h} < R_1^{h} + p_1^{h} A_1^{1 - \frac{1}{2} r_g} \), which is quite possible in this case.
Proposition 3C: If \( p^h_{2g} \cdot \bar{A}^g_2 + \frac{p^h_{1g} A^1_1}{p^h_{2g}} \cdot V_2^h < p^h_{1g} A^1_1 \), then both (18) and (19) may be binding. We have: \( w^f_i = w^f_g = 0, w^s_i = \max_{\frac{A^1_1}{p^h_{2g}}} \frac{A^1_1}{p^h_{1g}} - \frac{p^h_{2g} V^h_{1i}}{p^h_{2g} + \frac{p^h_{2g}}{p^h_{2g}}(1i \cdot r^g_g + (1i \cdot r^g_g)(1j \cdot p^h_{2g} p^h_{2g} p^h_{2g} p^h_{2g})}}{p^h_{1g}} \cdot V_2^h \), \( p^h_{2g} w^s_g = p^h_{1g} w^s_i + V_2^h \), \( r_b = 0 \) and \( r^g_g \) maximizes:

\[
(1i \cdot \frac{v^g}{\gamma^g}) (R^h_{1i} \cdot p^h_{1g} w^s_i + \frac{v^g}{\gamma^g} R^g_{2i} \cdot (p^h_{1g} w^s_i + V_2^h))
\]

\[
= (1i \cdot \frac{v^g}{\gamma^g}) R^h_{1i} + \frac{v^g}{\gamma^g} R^g_{2i} \cdot V_2^h \quad \gamma^g \quad p^h_{1g} \max_{\frac{A^1_1}{p^h_{2g}}} \frac{A^1_1}{p^h_{1g}} - \frac{p^h_{2g} V^h_{1i}}{p^h_{2g} + \frac{p^h_{2g}}{p^h_{2g}}(1i \cdot r^g_g + (1i \cdot r^g_g)(1j \cdot p^h_{2g} p^h_{2g} p^h_{2g} p^h_{2g})}}{p^h_{1g}} \cdot V_2^h
\]

In this case, the agent may lie both when the signal is \( g \) and when it is \( b \). The organizational design must now prevent the agent from exerting no effort in the initial project and always pretending that the alternative is good, and from exerting high effort in the initial project and always pretending that the alternative project is bad. The former is done by increasing the reward \( w^s_i \) if project 1 is pursued and successful and the latter is achieved by increasing \( w^s_g \). The extra rent necessary to elicit truthful behavior from the agent is now given by

\[
\frac{v^g}{\gamma^g} p^h_{2g} (w^s_g - \bar{A}^g_2)
\]

\[
= \frac{v^g}{\gamma^g} \max_{\frac{A^1_1}{p^h_{2g}}} \frac{A^1_1}{p^h_{1g}} - \frac{p^h_{2g} V^h_{1i}}{p^h_{2g} + \frac{p^h_{2g}}{p^h_{2g}}(1i \cdot r^g_g + (1i \cdot r^g_g)(1j \cdot p^h_{2g} p^h_{2g} p^h_{2g} p^h_{2g})}}{p^h_{1g}} \cdot V_2^h
\]

In this third case, the principal's problem is more complex to analyze. One can show that the above agency cost (24) is increasing but not necessarily convex in \( r^g_g \).

The optimal incentive system when the agent has the authority to recommend changes differently from the optimal incentive system when the principal is the one observing the signal \( \mu \). When the agent is the only one observing the signal on the quality of the alternative project, the incentive system must induce the agent to recommend abandoning the initial project and switching to the alternative one when the latter appears to be good, that is, when \( \mu = g \) and at the same time induce the agent to exert a high level of effort in project 1. In order to give the agent the necessary incentives to report truthfully the value of the signal \( \mu \), the payment \( w^s_g \) is increased above \( \bar{A}^g_2 \) (case 2 { Proposition 3B}): the agent gets a better deal when the alternative
project is a success and since \( w_{2}^{2} \) is also increased, the agent is overinduced to provide a high level of effort. The increase in \( w_{2}^{2} \) is similar to issuing, in addition to the provision of incentives for effort, stock options whose value rests on the success of project 2. However, these adjustments may imply that the agent has now an interest in reporting that project 2 is good when in fact it is bad. To make sure that constraint (19) is also satisfied, it may be necessary to increase both \( w_{1} \) and \( w_{2}^{2} \) (case 3 { Proposition 3C}): the agent is then properly induced to reveal the observed \( \mu \) (stock options are issued for both projects 1 and 2) and is overinduced to exert a high level of effort in project 1 and in project 2 if the latter is pursued. Hence, the optimal incentive intensity is stronger when the agent is responsible for observing the signal \( \mu \), that is, has the authority to recommend change.\(^{11}\)

5. ASSIGNING AUTHORITY

In this section, we raise the following question. If either the agent or the principal, but not both, can observe \( \mu \), to whom should be attributed the responsibility to observe \( \mu \) and to recommend or decide accordingly whether to abandon project 1 or not? Should the principal (the residual claimant) be allowed to exercise her authority to decide on change or should this authority be delegated to the agent? We already showed that if (5) does not hold, the principal will not lie about \( \mu \) and therefore incurs no extra agency cost by keeping the authority to observe \( \mu \) and to initiate change. Hence:

**Proposition 4:** If \( p_{\epsilon \mu}(\epsilon; \mu) < 0 \), the principal has no interest in misreporting the value of \( \mu \) and therefore should retain the responsibility to become informed and the power to recommend whether to switch or not to the alternative project.

If \( p_{\epsilon \mu}(\epsilon; \mu) \) is supermodular (assumption A1-b), retention of the authority by the principal or its delegation to the agent both present problems. The agent has vested interests in the pursuit of project 1 and there is no reason to believe that his interests coincide with that of the organization as a whole. On the other hand, the principal as residual claimant may behave opportunistically in order not to pay the rent promised to the agent were project 1 pursued and succeeded or in order to fool the agent in putting high effort in an alternative bad project. In

\(^{11}\)This is reminiscent of Milgrom and Roberts' (1992, chap. 12) discussion of the complementarities between discretion and incentives.
both cases, agency costs may have to be incurred to control opportunistic behavior.

**Proposition 5:** When \( p_{\mu} (\varepsilon; \mu) > 0 \), the principal finds it profitable to give the authority to the agent if and only if

\[
p_{2}^{h} \bar{A}_{2}^{g} i \ V_{2}^{h} > R_{1}^{h} i \ (R_{2}^{h} i \ p_{2}^{h} \bar{A}_{2}^{g}): \tag{25}
\]

We first establish that if condition (25) holds, then we are in the cases covered by Propositions 3A and 3B. Indeed, condition (25) together with A1-b and A4 imply that:

\[
p_{2}^{h} \bar{A}_{2}^{g} i \ V_{2}^{h} > R_{1}^{h} i \ (R_{2}^{h} i \ p_{2}^{h} \bar{A}_{2}^{g}) > p_{1}^{h} \frac{\bar{A}_{1}}{\sqrt{2}} \tag{26}
\]

which implies that constraint (19) is non-binding (from the proof of proposition 3B). Hence, from Propositions 3A and 3B, we can write the expected labor cost, when the signal \( \mu \) is observed by the agent, as a function of the flexibility level as follows:

\[
C^{A}(r_{g}) = p_{1}^{h} \bar{A}_{1} + \frac{\lambda_{g}}{\lambda_{g}} p_{2}^{h} \bar{A}_{2}^{g} + \frac{\lambda_{g}}{\lambda_{g}} \max 0; \ p_{1}^{h} \frac{\bar{A}_{1}}{\sqrt{2}} \ \frac{p_{2}^{h} \bar{A}_{2}^{g} i \ V_{2}^{h}}{\sqrt{2}} \tag{27}
\]

Similarly, we can rewrite the expected labor cost (12), when the signal \( \mu \) is observed by the principal, as follows:

\[
C^{P}(r_{g}) = p_{1}^{h} \bar{A}_{1} + \frac{\lambda_{g}}{\lambda_{g}} p_{2}^{h} \bar{A}_{2}^{g} + \frac{\lambda_{g}}{\lambda_{g}} \max 0; \ p_{1}^{h} \frac{\bar{A}_{1}}{\sqrt{2}} \ \frac{p_{2}^{h} \bar{A}_{2}^{g} i \ V_{2}^{h}}{\sqrt{2}} + (R_{2}^{h} i \ p_{2}^{h} \bar{A}_{2}^{g} i \ V_{2}^{h} i \ R_{1}^{h}) \tag{28}
\]

It follows immediately that the agency cost associated with giving the authority to the agent is not larger than the agency cost associated with giving the authority to the principal whenever condition (25) holds. Conversely, when (25) does not hold, giving the authority to the principal is preferable even when constraint (19) is not binding; it will a fortiori be the case if it is binding.

We can rewrite (25) as

\[
R_{1}^{h} i \ (R_{2}^{h} i \ p_{2}^{h} \bar{A}_{2}^{g} i \ V_{2}^{h}) < 0
\]

and therefore, the agent is more likely to be endowed with the responsibility of observing the signal \( \mu \) and with the real authority to recommend and initiate change, the smaller \( R_{1}^{h} \), the larger \( R_{2}^{h} \), and finally, if and only if \( p_{2}^{h} < p_{2}^{g} \), the smaller \( V_{2}^{h} \) and/or the larger (\( p_{2}^{h} \ i \ p_{2}^{g} \)).
Furthermore, since the optimal level of $r_g$ when the authority is assigned to the agent is not smaller than $r^P_g$ if (25) holds, the principal does strictly better in this case by giving the authority to the agent. One can verify that we have

$$\frac{\partial C^P(r_g)}{\partial r_g}, \frac{\partial C^A(r_g)}{\partial r_g}$$

whenever (25) holds.

Therefore,

**Corollary 3**: Whenever it is preferable to give the authority to the agent, then we have $r^P_g \cdot r^A_g$.

The result of Proposition 5 { for the case of Proposition 3B { is illustrated in Figure 2 where

the $C^A(r_g)$ function (27) is shown together with the $C^P(r_g)$ function (28) and the isopro`t curves of $\gamma(r_g; C)$. In Figure 2, we suppose that condition (25) is satis`ed and therefore, it is preferable to assign the authority to the agent.

[Insert Figure 2 here]

In a recent paper, Aghion and Tirole (1997) show that the allocation of formal authority in organizations, that is the allocation of "rights" to decide, may di®er signi®cantly from the allocation of real authority, that is the allocation of "effective control" on decisions. Aghion and Tirole consider di®erent ways to credibly increase the subordinate's or agent's real authority in a formally integrated structure with the supervisor or principal keeping the "legal" rights to decide: the work overload of supervisors, the design of lenient discipline rules for deviant behavior by the agent, the timing of background studies leading to an urgency of decision, the repeated interactions leading to the principal's reputation for non-intervention, an improved performance measurement and ¨nally the splitting of decision rights between multiple superiors.

6. CONCLUSION

Using a simple model, we showed that a principal may ¨nd pro¨table to limit her °exibility to initiate change, that is to generate some inertia, by giving the agents some power to block changes that she would like to undertake. We showed that inertia (bias towards the status quo) can be optimal from an ex ante point of view as a means to reduce informational rents.

Inertia in organization may take many forms or come from many sources. Although we ab-stracted from those speci¨c forms to concentrate on the fundamental dynamic trade-o® between
ex ante incentives and ex post flexibility, it is informative to consider those forms and sources. Let us briefly consider three settings, typical we think of more general situations. The three settings are examples of situations where only the agent observes the signal on the probability of success of the alternative project.

A first setting relates to the fact, quite common in organizations, that career possibilities, bonuses and promotions, are linked to the successful completion of projects, or at least of some significant portion of a project. If that is so, one may expect that better informed agents will tend to pursue a project even if they know that an alternative project now represents a more profitable opportunity for the firm. Abandoning the initial project in favor of the alternative project will be detrimental to the agent’s career. Hence, the firm’s flexibility level will be suboptimal, even more so if those incentives for in flexibility are not properly taken into account in the firm’s career evaluation process. It will in general be necessary to jointly determine the rewards accruing to the agent in the two mutually exclusive projects. It may even be necessary to value and reward a recommendation to abandon a project coming from those who were responsible to make it a success by providing the necessary efforts to achieve its successful completion.

A second setting pertains to the “political” cover-up of unfavorable information by agents. Such situations can occur because the efforts sunk by the agent in an initial position or project cannot be transferred to the alternative position or project. The new information, on the increased benefits associated with the alternative position or on the reduced benefits associated with the initial position, may be hidden or manipulated by the agent to make it appear less favorable to the alternative than it really is. It may again be necessary, from an organizational performance viewpoint, to value and reward the failure in making the initial position a success.

Finally, a third general context refers to the situations in which an independent appraisal concludes that a partially completed project should be abandoned because its completion will

12 In an interview with The Economist (1995.03.18), Livio DeSimone, Chairman and CEO of 3M, stressed that employees become less innovative if their job security is threatened and therefore, it is a policy of 3M to give such job security to its labor force. In order to avoid too much inertia, he has imposed tough innovation goals (30% of annual sales must come from products less than four years old; 10% from products introduced during the year) and very demanding organizational goals (marketing folks have direct contacts with scientists; R&D staff are directly involved in product strategy; cross-functional teams abound).
involve additional costs which cannot be recuperated from the total future benefts to be generated by the project. Systematically applying the textbook principle "bygones are bygones" may lead to reduced ex ante eforts to make the initial project protable. The principal may nd necessary, and protable, to commit ex ante to pursue such projects even if information, unfavorable to pursuing the project, is revealed to her.

Flexibility in an organization is a somewhat more subtle and more elusive concept than what one may infer from the existing economic and management literature on the subject. There are procedures in organizations which restrict and reduce the capacity or willingness to introduce and implement change. These procedures may be necessary to generate the optimal level of inertia. We showed that more ®exibility in adapting to changing conditions or new information, typically known or observed by either the agent or the principal but not both, may come at the expense of eforts exerted up front by the agent to make the organization more successful. There is a trade-o in this context between ex ante eforts and ex post ®exibility to adapt.

Tables 1 and 2 summarizes our results on the second-best switching rule and payment prole in the different contexts.

[Insert Tables 1 and 2 here]

We have shown that it will typically be the case that the agent's payment prole calls for an upfront compensation package when the principal retains the authority to initiate change but for a stock options package when the principal empowers the agent with that authority.

When the information structure can be made endogenous, the principal may sometimes be better o to become the informed party and to retain the authority to recommend change and sometimes be better o to let the agent become the informed party and be the initiator of change. There will be endogenous inertia in both cases as a way to reduce the agent's rents. The current popular discussion and arguments for ®exibility in production, human capital, ®nancial structure and contracts, and more generally in organizations, neglect the fundamental trade-o which we characterized here and which is likely to be present in many situations.
APPENDIX

Proof of Proposition 1: Clearly, when the signal µ is common knowledge and contractible, we
have w\textsuperscript{f} = w\textsuperscript{f,g} = w\textsuperscript{f,b} = 0. The principal has no reason to make positive any of those payments
in case of project failure. Also, from the latter part of A2, the principal always prefers to elicit
high e\textsuperscript{effort} in project 2 and so conditions (1), (2) and (3) will be binding. Hence, given some
arbitrary switching rule (r\textsubscript{g}; r\textsubscript{b}), the best the principal can do is given by the expected pro\textsuperscript{ts}:
\[
\frac{1}{2} \lambda (1, r\textsubscript{g}) + (1 i \frac{1}{2})(1 i r\textsubscript{b}) \max \eta R\textsubscript{1}^i \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)} + (1 i \frac{1}{2} r\textsubscript{d} R\textsubscript{2}^{hh} \frac{\tilde{A}_2}{(1 i \frac{1}{2} \lambda)} ; R\textsubscript{1}^g
\]
\[
+ \frac{1}{2} \rho \eta [R\textsubscript{2}^{hg} \frac{\hat{A}_g}{(1 i \frac{1}{2} \lambda)} + (1 i \frac{1}{2} r\textsubscript{d} R\textsubscript{2}^{hb} \frac{\hat{A}_b}{(1 i \frac{1}{2} \lambda)}]
\]
\[
< \frac{1}{2} \lambda (1, r\textsubscript{g}) + (1 i \frac{1}{2}(1 i r\textsubscript{b}) \{[R\textsubscript{1}^i \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)}] + \frac{1}{2} \rho \eta [R\textsubscript{2}^{hg} \frac{\hat{A}_g}{(1 i \frac{1}{2} \lambda)} + (1 i \frac{1}{2} r\textsubscript{d} R\textsubscript{2}^{hb} \frac{\hat{A}_b}{(1 i \frac{1}{2} \lambda)}]
\]
\[
\cdot [[(1 i \frac{1}{2}(1 i r\textsubscript{b}) \{[R\textsubscript{1}^i \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)}] + \frac{1}{2} \rho \eta [R\textsubscript{2}^{hg} \frac{\hat{A}_g}{(1 i \frac{1}{2} \lambda)} + (1 i \frac{1}{2} r\textsubscript{d} R\textsubscript{2}^{hb} \frac{\hat{A}_b}{(1 i \frac{1}{2} \lambda)}]
\]
\[
\cdot [[(1 i \frac{1}{2}) \{[R\textsubscript{1}^i \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)}] + \frac{1}{2} \rho \eta [R\textsubscript{2}^{hg} \frac{\hat{A}_g}{(1 i \frac{1}{2} \lambda)} + (1 i \frac{1}{2} r\textsubscript{d} R\textsubscript{2}^{hb} \frac{\hat{A}_b}{(1 i \frac{1}{2} \lambda)}]
\]
\[
\]

The \textsuperscript{rst} inequality follows from A2 and 1 i \frac{1}{2} \lambda > 1 i \frac{1}{2} \lambda (1 i r\textsubscript{g}) + (1 i \frac{1}{2}(1 i r\textsubscript{b}); the second
inequality follows from A4; the third inequality follows from A3. The expected pro\textsuperscript{ts} obtained
from any switching rule (r\textsubscript{g}; r\textsubscript{b}) and e\textsuperscript{ffort} levels (e\textsubscript{1}; e\textsubscript{2}) are therefore no greater than the pro\textsuperscript{ts}
obtained when r\textsubscript{g} = 1, r\textsubscript{b} = 0 and e\textsuperscript{ffort} levels (h; h) are elicited. QED

Proof of Proposition 2: Let us assume that constraint (6) is not binding (we will show that the
solution to (8) without imposing (6) satisfies (6)). Since increasing w\textsubscript{f} \textsuperscript{f} reduces the objective
function and tightens the constraints, it is optimal to let w\textsubscript{f} \textsuperscript{f} = 0. Since R\textsubscript{1}^i \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda), R\textsubscript{2}^{hh} \frac{\hat{A}_b}{(1 i \frac{1}{2} \lambda)} = w\textsubscript{f,b} \textsuperscript{b} \textsuperscript{b}, w\textsubscript{f,b} \textsuperscript{b}, w\textsubscript{f,b} \textsuperscript{b}, w\textsubscript{f,b} \textsuperscript{b} by A4, the objective function is decreasing with r\textsubscript{b} and reducing r\textsubscript{b} weakens
the constraints. It is therefore optimal to set r\textsubscript{b} = 0. It is clearly optimal to set the wages such
that constraints (1), (2) and (3) are binding. It follows that w\textsubscript{f} \textsuperscript{f} \textsuperscript{f} = \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)} and (w\textsubscript{f,b} \textsuperscript{b} \textsuperscript{b}, w\textsubscript{f,b} \textsuperscript{b}, w\textsubscript{f,b} \textsuperscript{b}, w\textsubscript{f,b} \textsuperscript{b} = \frac{\tilde{A}_2}{(1 i \frac{1}{2} \lambda)}.
Given this, (7) becomes
\[
R\textsubscript{2}^{hh} \frac{\hat{A}_b}{(1 i \frac{1}{2} \lambda)} = w\textsubscript{f} \textsuperscript{f,g} \textsuperscript{g} \textsuperscript{g} \textsuperscript{g} \textsuperscript{g}, R\textsubscript{1}^i \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)} = \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)} \textsuperscript{(29)}
\]
and thus
\[
w\textsubscript{f,g} \textsuperscript{g} \textsuperscript{g} \textsuperscript{g} \textsuperscript{g} = \\max \{0 ; (R\textsubscript{2}^{hh} \frac{\hat{A}_b}{(1 i \frac{1}{2} \lambda)} ) (R\textsubscript{1}^i \frac{\tilde{A}_1}{(1 i \frac{1}{2} \lambda)})\} ; (30)
\]

25
Using (30) together with the values and expressions derived above for $r_b$, $w^f_1$, $w^f_2$, and $w^s_2$, the principal’s problem (8) can be written as (9). In order to complete the proof, we need to show that constraint (6) is then satisfied. Constraint (6) can be rewritten as:

$$r_g[R^h_1 \cdot \frac{\tilde{A}_1}{\gamma g} - r_g[R^h_2 \cdot \frac{p^h_2 A_2}{i_2} i \cdot w^f_2].$$

If $w^f_2 = 0$, then (31) is satisfied from (31). If $w^f_2 > 0$, then (29) must be binding and therefore (31) becomes

$$r_g[R^h_2 \cdot p^h_2 A_2] - r_g[R^h_2 \cdot p^h_2 A_2].$$

If $(R^h_2 \cdot p^h_2 A_2) \cdot (R^h_2 \cdot p^h_2 A_2)$, condition (32) is satisfied for all $r_g [0, 1]$; if $(R^h_2 \cdot p^h_2 A_2) > (R^h_2 \cdot p^h_2 A_2)$, then (9) is maximized for $r_g = 0$ and therefore (32) is satisfied. Thus, (6) is satisfied. QED

Proof of Corollary 1: When $p^h_1 \tilde{A}_1 < (1_i \cdot \gamma h[R^h_1 \cdot (R^h_2 \cdot p^h_2 A_2)]$, incentive constraint (7) [or (29)] is not binding and therefore, the principal always reveal truthfully the value of the signal $\mu$ and no distortion from the common knowledge modification level $(r_g = 1)$ is necessary. When $(1_i \cdot \gamma h[R^h_1 \cdot (R^h_2 \cdot p^h_2 A_2)] < p^h_1 \tilde{A}_1$, the principal must bear extra agency costs $(w^f_2 > 0)$ to make her announcement of $\mu$ credible. The maximand of (8) can then be rewritten as

$$R^h_1 \cdot p^h_1 \cdot \frac{\tilde{A}_1}{\gamma g} + \gamma h (R^h_2 \cdot p^h_2 A_2) \cdot (R^h_2 \cdot p^h_2 A_2)$$

an expression which increases with $r_g$ when $p^h_1 \tilde{A}_1 < (1_i \cdot \gamma^2 h[(R^h_2 \cdot p^h_2 A_2) \cdot (R^h_2 \cdot p^h_2 A_2)]$. Hence, the maximum of (9) is obtained at $r_g = 1$.

When (14) holds, the principal’s profit (9) is a decreasing function of $r_g$.

When $p^h_1 \tilde{A}_1$ lies between the extreme values defined by (13) and (14), the optimum is either at

$$\frac{1}{2} \cdot 1 \cdot \frac{p^h_1 \tilde{A}_1}{(R^h_2 \cdot p^h_2 A_2) \cdot (R^h_2 \cdot p^h_2 A_2)} < 1;$$

the tangency point between the convex portion of the labor cost curve and an isoprofit curve, or at the kink.

Proof of Corollary 2: This corollary follows directly from (14) and (15).
Proof of Propositions 3A, 3B and 3C: If $p^{h_1}_{1} \cdot \hat{A}_{1}^{h} + V^{h}_{2}$ (case 1 { Proposition 3A}), the agent’s expected rent associated with switching to the good project 2 is at least as large as the expected payment\(^{13}\) from project 1 under the common knowledge switching rule ($r_{g}; r_{b}$) = (1; 0) and it is possible to implement the allocation as if $\mu$ were common knowledge: we can set $r_{g} = 1$, $w^{g}_{1} = p^{h}_{1} \cdot \hat{A}_{1}^{h}$ and $w^{g}_{2} = \hat{A}_{2}^{g}$, which is the optimal solution to (20) when constraints (18) and (19) are not binding. Let us check that indeed those constraints are not binding. Constraint (18) is satisfied by construction. Constraint (19) is also satisfied as we have

$$\text{max} f^{g}_{2} w^{g}_{2} i V^{h}_{2} : 0 g + \frac{\text{max}[f_{1} (1 i r_{g} (p^{h}_{1} i p^{b}_{1}) w^{g}_{1} i 0 g]}{(1 i \frac{1}{2} r_{g})} = 0 + \frac{V^{h}_{1}}{1 i \frac{1}{2}} < p^{h}_{1} \cdot \hat{A}_{1}^{h}$$

where the equality comes from (1) and A1-b and the inequality comes from (3). In this first case, the agent has no interest in misreporting the true value of $\mu$.

However, if $p^{h_{1}} \cdot \hat{A}_{2}^{g} i V^{h}_{2} < p^{h}_{1} \cdot \hat{A}_{1}^{h}$, the agent will have an incentive to pretend that project 2 is bad when $\mu = g$ in order to protect his rent which is larger when pursuing project 1. To induce the agent to truthfully reveal $\mu$, he must be subject to a positive probability of switching if he announces that $\mu = b$ and/or receive a larger payment if project 2 is pursued and successful: we must have either $r_{b} > 0$ or $w^{g}_{2} > \hat{A}_{2}^{g}$ or both. We now show that $r_{b} = 0$, which implies without loss of generality that $w^{b}_{2} = w^{f}_{2} = 0$.

Given some arbitrary switching rule ($r_{b}, r_{g}$), the level of expected pro\textsuperscript{−}t when $w^{g}_{1} = p^{h}_{1} \cdot \hat{A}_{1}^{h}$, is given by:

$$(1 i \frac{1}{2} r_{g} i (1 i \frac{1}{2} r_{b})[R^{b}_{1} i p^{h}_{1} \cdot \hat{A}_{1}^{h} + (1 i \frac{1}{2} r_{b} P^{b}_{2} w^{g}_{2} i (w^{f}_{2} i V^{h}_{2}) + (1 i \frac{1}{2} r_{b} P^{b}_{2} w^{g}_{2} i (w^{f}_{2} i V^{h}_{2})]) (33)$$

and constraint (18) can be rewritten as

$$r_{g} (p^{h}_{2} w^{g}_{2} i w^{f}_{2} i V^{h}_{2}) + w^{g}_{2} i V^{h}_{2}$$

which implies that

$$r_{g} (p^{h}_{2} w^{g}_{2} i w^{f}_{2} i V^{h}_{2}) + w^{g}_{2} i V^{h}_{2}$$

\(^{13}\)The cost of e\textsuperscript{effort} $V^{h}_{1}$ has been sunk by the time the switch is considered by the agent.
Substituting (34) into (33), we obtain that for every switching rule \((r_b, r_g)\) the principal's profits are no greater than:

\[
(1 i \gamma \epsilon_g) R_i^h \left[ p_i^h \bar{A}_1 + \gamma \epsilon_g \bar{A}_1 \right] i \ V_2^h \]

\[
(1 i \gamma \epsilon_g) R_i^h \left[ \bar{A}_1 \right] i \ V_2^h \]

Similarly, we can rewrite constraint (19) as follows:

\[
(1) \gamma \epsilon_r \left( R_i^h \left[ p_i^h \bar{A}_1 + \gamma \epsilon_g \bar{A}_1 \right] i \ (R_2^{b_i} \left[ \bar{A}_1 \right] i \ (p_2^{b_i} w_2^{b_i} + w_2^{f_i} + w_2^{b_i}) \right) : (35)
\]

When \(r_b = 0\), the principal's profit (33) reaches this upper bound (35) which by A4 is a decreasing function of \(r_b\). Hence the principal does better by setting \(r_b = 0\) and \(w_1^g = p_1^h \bar{A}_1 \). Hence, we can rewrite the constraint (18) as follows:

\[
\max_{e^f h} \left[ (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^f + w_1^f) \right] i \ V_1^e \right] + \gamma \epsilon_g \left[ p_1^e (w_1^g, w_2^g) + w_2^g \right] i \ V_2^e
\]

that is

\[
p_2^{b_i} (w_2^g + w_2^g) + w_2^g \ V_2^h, \ p_1^h (w_1^g, w_1^g) + w_1^g.
\]

Similarly, we can rewrite constraint (19) as follows:

\[
\max_{e^f h} \left[ (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^f + w_1^f) \right] i \ V_1^e \right]
\]

\[
= (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^f + w_1^f) \right] i \ V_1^e
\]

\[
\left[ (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^f + w_1^f) \right] i \ V_1^e \right] + \gamma \epsilon_r \left[ (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^g, w_2^g) + w_2^g \right] i \ V_2^e \right]
\]

that is, using \(1 i \gamma \epsilon_g = 1 i \gamma \epsilon_r, \)

\[
p_1^h (w_1^f + w_1^f) \ V_1^e + \gamma \epsilon_r \left[ (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^g, w_2^g) + w_2^g \right] i \ V_2^e \right]
\]

\[
(\max_{e^f h} \left[ (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^f + w_1^f) \right] i \ V_1^e \right] + \gamma \epsilon_r \left[ (1 i \gamma \epsilon_g) \left[ p_i^e (w_1^g, w_2^g) + w_2^g \right] i \ V_2^e \right]) i i
\]

\[
(1 i \gamma \epsilon_g) \ V_1^h.
\]
Hence constraint (18) and (19) can be combined as:

\[
p^h_{2g}(w^g_2 \mid w^f_2) + w^f_2 \mid V^h_2
\]
\[
= p^h_1(w^f_1 \mid w^f_1) + w^f_1,
\]
\[
\text{max}_{\mathbf{2g} : \mathbf{h}} \left[ p^h_{2g}(w^g_2 \mid w^f_2) + w^f_2 \mid V^h_2 \right]
\]
\[
\times + \left( \text{max}_{\mathbf{2g} : \mathbf{h}} \left[ \left( 1 \mid \mathbf{r} \right) \left[ p^h_1(w^f_1) \mid V^h_1 \right] \right] \right) \left( 1 \mid \mathbf{r} \right) g
\]

We must have: \( w^f_2 = 0 \) and \( w^f_1 = 0 \). If \( w^f_2 > 0 \), we could set \( w^f_2 = 0 \) and increase \( w^g_2 \) so that \( [p^h_{2g}(w^g_2 \mid w^f_2) + w^f_2 \mid V^h_2] \) remains constant. This will not hurt the principal and will weaken constraint (19). A similar argument applies for \( w^f_1 \). Hence, we can rewrite constraints (18) and (19) as follows:

\[
p^h_{2g}(w^g_2 \mid V^h_2), \quad p^h_1 w^f_1, \quad \text{maxf}_{p^h_{2g}(w^g_2 \mid V^h_2); 0g} + \text{maxf}_{p^h_1 w^f_1; 0g} \]

Two cases must be considered. On the one hand, if \( p^h_{2g} A^g_2 \mid V^h_2 \) or \( p^h_1 A^1_1 \mid 1 \mathbf{g} < p^h_{2g} \dot{A}^b_2 + p^h_1 \dot{A}^1_1 \mid P^b_2 \mid V^h_2 \) (case 2 { Proposition 3B }), constraint (18) must be binding: we must increase \( w^g_2 \) to prevent the agent from claiming that project 2 is bad when it is good. The solution consists in setting \( w^g_2 = \dot{A}^1_1 \mid \mathbf{g} \) and

\[
p^h_{2g} w^g_2 = p^h_1 w^f_1 + V^h_2 = p^h_1 \dot{A}^1_1 \mid \mathbf{g} + V^h_2 > p^h_{2g} A^g_2.
\]

Since \( p^h_1 \dot{A}^1_1 \mid \mathbf{g} + V^h_2 < p^h_{2g} \dot{A}^b_2 + p^h_1 \dot{A}^1_1 \mid P^b_2 \) and therefore \( p^h_{2g} w^g_2 < p^h_{2g} \dot{A}^b_2 + p^h_1 \dot{A}^1_1 \mid P^b_2 \), one can verify that (19) is not binding. Indeed, we have:

\[
\text{maxf}_{p^h_{2g}(w^g_2 \mid V^h_2); 0g} + \text{maxf}_{p^h_1 w^f_1; 0g} \]
\[
= p^h_{2g} \dot{A}^b_2 + p^h_1 \dot{A}^1_1 \mid P^b_2 \mid V^h_2; 0g + \text{maxf}_{p^h_1 w^f_1; 0g}
\]
\[
= p^h_{2g} \dot{A}^b_2 + p^h_1 \dot{A}^1_1 \mid \mathbf{g} = p^h_1 \dot{A}^1_1 \mid \mathbf{g} = p^h_1 \dot{A}^1_1.
\]

On the other hand, if \( p^h_{2g} \dot{A}^b_2 + p^h_1 \dot{A}^1_1 \mid P^b_2 \mid V^h_2 \) (case 3 { Proposition 3C }), there exist values of \( r \) such that both constraint (18) and constraint (19) are binding. From constraint
(18), we must set $p^b g w^g_2 = p^h_1 w^h_1 + V^h_2$ to prevent the agent from claiming that project 2 is bad when it is good. Substituting into constraint (19), we have:

$$p^h_1 w^h_1 + 4 p^b_2 \frac{p^h_1 w^h_1 + V^h_2}{p^b_2} + p^b_2 \frac{1}{(1 \cdot r_g) (p^h_1 / p^b_2) w^h_1}$$

that is

$$w^h_1, \quad \frac{1}{(p^b_2)} + \frac{1}{(p^b_2)} \frac{1}{(1 \cdot r_g) (p^h_1 / p^b_2) w^h_1}$$

To prevent the agent from claiming that project 2 is good when it is bad, we may have to increase the payment $w^h_1$. This is done by imposing an extra lower bound on the value of $w^h_1$ and therefore on the agency cost associated with giving the authority to the agent.

Finally, in the latter two cases, the principal's objective function becomes:

$$\begin{align*}
(1 \cdot r_g) [R^h_1 + \frac{1}{3} p^b_2 (w^h_1 + w^h_1) + \frac{1}{3} p^h_2 g (w^h_1 + w^h_1)] + (1 \cdot r_g) [R^b_2 + \frac{1}{2} p^b_2 (w^b_1 + w^b_1)] \\
+ \frac{1}{2} r_g [R^h_2 + \frac{1}{2} p^h_2 g (w^h_1 + w^h_1)] + \frac{1}{2} r_g [R^b_2 + \frac{1}{2} p^b_2 (w^b_1 + w^b_1)]
\end{align*}$$

$$= (1 \cdot r_g) (R^h_1 + \frac{1}{2} r_g (R^h_2 + V^h_2) w^h_1) + p^h_1 w^h_1: \quad \text{QED}$$

**Proof of Proposition 4:** Clear from the text. QED

**Proof of Proposition 5:** The proposition follows directly from Propositions 3A and 3C and from comparing $C^p (r_g)$ and $C^a (r_g)$ that is (27) and (28) in the case of Proposition 3B. QED

**Proof of Corollary 3:** Clear from the text. QED

30
References


FIGURE 1
The partial flexibility solution when the principal observes the signal

\[ C^P(r_g) \text{(12)} \]

\[ p^1_A^1 + r_g p^h g A^g \]

\[ \frac{1}{k_g} w^g \]

\[ \rho \]

\[ (r_g; C) = \rho \]

\[ \text{cost} \]

\[ r_g \]

\[ 0 \]
FIGURE 2
The allocation of authority to the agent

\[ C^p(r_g) \] (27)
\[ C^A(r_g) \] (28)
The switching rules $(r; g)$ in the different contexts:

<table>
<thead>
<tr>
<th>$r$</th>
<th>$g$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

(Note that $r_b = 0$ always)
<table>
<thead>
<tr>
<th>μ is observed by i!</th>
<th>P and A</th>
<th>P only</th>
<th>A only</th>
</tr>
</thead>
<tbody>
<tr>
<td>( w_{1} )</td>
<td>( \bar{A}_{1} \frac{1}{1 - \frac{1}{2}} )</td>
<td>( \bar{A}_{2} )</td>
<td>( \max \bar{A}_{1} \cdot \frac{1}{1 - \frac{1}{2}} )</td>
</tr>
<tr>
<td>( w_{2}^{f} )</td>
<td>0</td>
<td>( \max 0 ); ( R_{2}^{h} )</td>
<td>( \frac{1}{p_{2}} \frac{1}{p_{1}} (p_{1} + (1 - p_{1}))(p_{2} + (1 - p_{2}))(p_{1} + (1 - p_{1})) )</td>
</tr>
<tr>
<td>( w_{2}^{g} )</td>
<td>( \bar{A}_{2} )</td>
<td>( w_{2}^{f} + \bar{A}_{2} )</td>
<td>( \frac{1}{p_{2}} w_{2} + V_{2}^{h} )</td>
</tr>
</tbody>
</table>

(Note that \( w_{1}^{f} = 0 \) and \( r_{b} = 0 \) always, so we can set \( w_{2}^{i} = w_{2}^{g} = 0 \))