The Consequences of Managerial Short-termism on the Firm : Theory and Empirics

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Abstract

We investigate the impact of managerial short-termism on corporate actions. Following Landier and Thesmar (2009), we try to reconcile the behavioral and the contract-theoretic approaches to corporate decisions. Using a simple dynamic moral hazard model with sequential projects, we find that short-termism does not only increase the likelihood of project termination and reduce the rent obtained by the Investor, but it also leads to a socially inefficient outcome: When the probability of success is close to 1, continuation would always be optimal from the Principal's perspective, but it may not be feasible if the manager's discount factor is not high enough. We then try to examine empirical evidence about managerial short-termism. Using data from the World Management Survey and conditioning on relationship of a firm's ownership structure and the strength of its managerial incentives scheme, Propensity Score Matching estimates reveal that companies run by short-termist executives exhibit lower output and output growth, lower investment expenditures, lower managerial compensation and a higher likelihood of firm shutdown.[1]

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1 Introduction

A significant proportion of the variation in investment choices, financial policies and organizational strategies undertaken by firms has been left unexplained, even after controlling for industry-level and firm-level characteristics. This large variation hints at the importance of those who make these investment and financing decisions, the managers, in accounting for the variety of corporate actions. Unlike the standard neoclassical approach which neglects managers' importance because the profit-maximizing action should be unique as managers are perfect substitutes for one another (after controlling for firm-specific and sector-specific effects), managers' personalities and characteristics actually do matter for corporate governance.

Using a panel data matching firms with their CEO's and CFO's and dropping observations where individuals don't move across firms in order to capture the managers' impact on corporate actions, Bertrand and Schoar (2003) find that CEO and CFO fixed effects are an important determinant of corporate decisions. In addition, they find that differences in managers' practices are not only always related to differences in performance at the firm level, but can also be attributed to differences in personal characteristics.

Furthering this line of research, Malmendier and Tate (2005) proposed managerial overconfidence as a possible explanation for the differences in corporate investment decisions, arguing that overconfident CEO's invest too much relative to a Pareto efficient situation. This is intuitively due to the tension arising from the difference in beliefs about the firm's value : Unlike capital markets, overconfident managers think that the investment they undertake is always a good one and overinvest relative to a rational individual. The authors exploit the date at which managers exercise their option to identify overconfident/optimistic individuals and notice that overconfident CEO overinvest and that their investment is much more sensitive to cash-flow. Indeed, these managers believe that their project is undervalued by external financiers and are thus reluctant to dilute their shares : This behavioral trait is consistent with another result of their paper, i.e. that this high sensitivity of investment is much more pronounced in equity-dependent firms, which is not surprising given that public firms rely more on external finances.

This emphasis on a behavioral bias (overconfidence) to explain managerial performance, seems to be consistent with the data, according to a study by Kaplan et al. (2009). The authors find that CEO overconfidence and resoluteness[2] are positively correlated with higher performance indicators. In a similar spirit, Graham, Harvey and Puri (2013) focus on financial policies and executive compensation and find that managers' time preferences matter in executive compensation[3] : Executives with a focus on the short-term prefer to be proportionately more paid in salary relative to bonuses or stock-options. This strand of the literature suggests that behavioral traits and individual characteristics such as optimism/overconfidence or time preferences might account for the variability of corporate actions.

Even though different behavioral characteristics could explain part of the variability in corporate decisions, an extensive survey of more than 400 executives, initiated by Graham, Harvey and Rajgopal in 2005 tends to suggest an alternative explanation. According to their findings, CFO's are almost always willing not to invest in a long-run project with positive net present value so as to manage their current (short-term) earnings and not fall below an earnings target. This short-termist behavior may be due to several reasons, all related to incentives :

Financial executives believe that failing to meet the benchmark would ruin their credibility with firms' owners and equity analysts and make the stock price more volatile. The last two decades were indeed characterized by a considerable change in the compensation structure of managers, who often hold a significant proportion of the company they run in the form of stock-options, in order to align their incentives with shareholders' interests. This was not the case before, and solving this incentives issue gave rise to another one : CEO's and CFO's are often willing to manipulate earnings in order to increase the share price and their own wealth.

In addition to that, as highlighted by the authors, top managers often fear that failing to meet analysts' benchmark result in a higher volatility of the stock prices. Market participants would indeed question the firm's underperformance and would think that it conveys bad prospects about the future : It thus makes stock prices more volatile, which is not desirable because managers prefer to smooth earnings

[2]Resoluteness is a form of optimistic behavior where individuals are completely unresponsive to informative signals.

[3]Managers' answers to survey questions help estimate subjective discount rates that measure a focus on the short-term.

across periods.

Furthermore, career concerns also do play a role in earnings management : It helps build a reputation with equity analysts, as smooth earnings do (in making analysts' predictions much easier). All these reasons motivate top executives to manipulate earnings, often at the expense of long-run projects with net positive value.

From this perspective, the study undertaken by Bergstresser and Phillippon (2006) who notice a higher propensity to manipulate earnings in firms whose managers' compensation is tied to their company's performance[4] is consistent with a focus on short-term outcomes.

This result, together with Graham, Harvey and Rajgopal's analysis, suggest that earnings' manipulation is likely to be more prevalent in public, equity-dependent firms, thus explaining the variation in management practices by different incentive schemes. Indeed, market pressure, the presence of dispersed owners and the resulting moral hazard issue may lead to incentives' schemes that do not insulate CEO's compensation to their firms' earnings.

This is indeed the case : A propensity score matching estimation by Asker, Farre-Mensa and Ljungqvist (2014) showed that these investment distortions are much more important in publicly-traded firms, which, by definition, rely much more on equity financing that private firms. Using as identification strategy the fact that privately held firms are subject to fewer short-termist pressures, they estimate that on average, public firms are four times less responsive to investment opportunities, confirming the idea that listed firms, with a more dispersed ownership, are subject to higher moral hazard problems and must, to a much greater extent, focus on managing current earnings in order to dissipate shareholders' concerns as a result.

However, we are convinced that we should not oppose the behavioral approach and the incentive (contract-theoretic) approach on corporate decisions. There is strong evidence that both approaches are complementary to each other and may help us explain more thoroughly the observed variability of management practices and corporate actions.

[4] Indeed, they estimate that the value of financial accruals (to define) is much higher in firms with powerful incentives.

In particular, behavior can be impacted by incentives. Bertrand and Mullainathan (2003) pointed out that when they do not suffer from market and/or owners' pressures, managers seem to prefer enjoying a "quiet life", to use the expression coined by the authors who hint at a reduction of plants creation and destruction in firms that are insulated from takeovers[5]. This can be explained as follows : Difficult investment decisions, such as opening up or shutting down a plant are costly in terms of relationships between managers and their employees, who are often pressured to meet early deadlines. Such corporate actions are also costly from a cognitive perspective, requiring a lot of effort that the manager may not consider as worthy enough. This shows how the threat of a takeover, i.e a discipline device, manages to affect managers' behavior.

Furthering this line of research that tries to link behavioral finance and contract theory, Landier and Thesmar (2009) studied the behavior of optimistic entrepreneurs. In their framework, optimistic entrepreneurs overestimate the quality of their project and always believe that it is a good one. They always choose to overinvest because of this behavioral bias, and it is not Pareto efficient. If they updated their beliefs after observing a signal correlated with the quality of their project, they would have chosen a safer strategy in some cases. They find that the difference in beliefs between the overconfident entrepreneur and the risk-neutral investor makes contingent control optimal, so as to coerce the entrepreneur to choose the best strategy. This is a situation analogous to Aghion and Bolton (1992) for whom it was optimal to allocate control rights in one state of the world because of incomplete contracts implying that there were some agency issues that could not be resolved ex-ante.

While Landier and Thesmar (2009) focused on optimism, complementing and furthering the analysis of Malmendier et al. (2005), our objective is study the impact of another behavior that managers may have : short-termism. Managerial short-termism per se is not inconsistent with the quiet life hypothesis described in Bertrand et al. (2003) : Indeed, a manager is reluctant to engage in a cognitively difficult

[5]Bertrand and Mullainathan manage to eliminate the endogeneity issue of corporate actions, by using the arguably (say why) exogenous variation in anti-takeover laws in order to disentangle managerial practices from other firm-specific attributes that otherwise affect a firm's performance.They eventually find that a weakening of managerial incentives is also associated to a rise in wages as well as a drop in investment.

activity that requires to pressure employees, engage in legal actions and would prefer to focus on activities that are not costly from his personal perspective, i.e "business as usual".

Their results about the quiet life hypothesis fit well our idea of studying executives with an exclusive focus on the short-term. Indeed, we argue that, regardless of risk-aversion or pessimism issues, investing a long-term project is difficult, costly and can in addition have negative consequences on the well-being at the firm-level. On the other hand, pursuing "business as usual", even though less profitable from a shareholder's perspective, may be preferable from the manager's perspective, for the reasons highlighted above.

2 A model for Managerial short-termism

2.1 Assumptions

Our approach is strongly inspired by Landier and Thesmar's approach of relating behavior with incentives as well as the baseline dynamic moral hazard model of Tirole (2005). Our model depicts a manager seeking funds in order to invest in two sequential projects with net expected positive value. Unlike Landier et al. (2009) who have an approach focusing on adverse selection issues arising from the existence of an irrational type of entrepreneur, we focus on moral hazard. We use a very simple dynamic moral hazard model so as to highlight features of the optimal contract for impatient managers (with a high discount factor) and its consequences in terms of firm value, growth rates and executive compensation schemes, among other things. We depart from their approach in the following : The short-termist does not choose the long-term project because he doesn't believe it is worthless per se, but because he has a focus on short-term outcomes that he finds more rewarding (future consumption is heavily discounted). We focus on time preferences to describe why a manager would choose an inefficient action, namely shirking, and the role of compensation schemes to induce optimal action. We consider a variant of a Fixed Investment model with sequential projects :

Project quality. The quality of the project chosen by the Agent (manager) is not directly observable by the Principal (investor). A project may be good or bad,

depending on the effort exerted by the manager. The manager may choose to exert effort $e \in \{0, 1\}$. If it exerts high effort, he suffers from a disutility of ψ but the project is more likely to be good. Indeed, under high effort, a project is likely to be a good one with probability p whereas the probability of ending with a good project is $p - \Delta p = 0$ if the manager misbehaves (chooses to shirk and exerts $e = 0$).
A good project will give to the investor a return of R^+, whereas a bad project will yield a payoff of $R^- = 0$. If the first project is a bad one, we allow for the possibility of partial liquidation (downsizing) of the subsequent project, by a factor $d \in \{0, 1\}$.

Timing. At $t = 0$, the manager seeks funds I from an investor in order to invest in two *independent* and sequential projects : the first project pays off at $t = 1$, whereas the second project pays off at $t = 2$. As highlighted above, the payoffs of each project are effort-dependent. The manager and the investor write a contract specifying potential cash transfers to the manager that take place either at $t = 1$ or at $t = 2$ or during both periods, as well as a downsizing policy if the first project is a lemon. Then funds I are invested so as to start the project. The manager then chooses whether to exert effort or not for the first project.

At $t = 1$, the first project pays off and gives a return of $R \in \{0, R^+\}$. Contingent on the first period outcome, the manager receives his promised compensation and chooses whether to exert effort or not for the second project.
Given a realization of $R^- = 0$, the manager will also apply the downsizing rule enacted in the contract and set $d \in [0, 1]$.

At $t = 2$, if the project has not been entirely liquidated, a payoff of $Rd \in \{0, R^+\}$ materializes depending on the effort level chosen by the manager and the liquidation rule.

Preferences and Utility. The investor and the manager do not share identical time preferences.
Investors value consumption equally in both periods, with a utility of $u_I = c_1 + c_2$, whereas managers do discount consumption between the two periods. Their utility is of the form $u_M = c_1 + \delta c_2$ for $\delta \in [0, 1]$.

Managers. Contingent on the project outcome, the manager receives a money transfer of u at $t = 1$. Let u^+ denote the money transfer at $t = 1$ when the first project is a good one whereas u^- denotes the executive's compensation if the project outcome was $R^- = 0$. The manager is protected by limited liability and may not suffer from negative money transfers.

At $t = 2$, the manager receives history-contingent payoffs[6]. We can write the managers' continuation utilities at $t = 1$, under high effort, as :

$$w^+ = pu^{++} + (1-p)\,u^{+-} - \psi$$

$$w^- = pu^{-+} + (1-p)\,u^{--} - \psi$$

The value w^+ (respectively w^-) represents the manager's net expected future compensation at $t = 2$ if the first project was a good one (resp. a bad one). Replacing p by $p - \Delta p = 0$ gives the continuation utilities under low effort[7].

Using this form for continuation utilities, we can write the manager's expected utility at $t = 0$ under high effort as :

$$U_0 = p\left[u^+ + \delta w^+\right] + (1-p)\left[u^- + \delta w^-\right] - \psi$$

High effort will thus be chosen whenever :

$$p\left[u^+ + \delta w^+\right] + (1-p)\left[u^- + \delta w^-\right] - \psi \geq \left[u^- + \delta w^-\right]$$

$$\Leftrightarrow u^+ + \delta w^+ - \left(u^- + \delta w^-\right) \geq \frac{\psi}{p} \quad (1)$$

It turns out that this condition is identical to the Inter-temporal Incentive Compatibility Constraint, as we will see below when solving for the optimal contracts.

Investors. By similar logic, we can write investors' continuation payoffs at $t = 1$ under managerial effort, contingent on the first project outcome [8] as :

$$\Pi^+ = p\left(R^+ - u^{++}\right) - (1-p)\left(u^{+-}\right) = \left(pR^+ + \psi\right) - w^+$$

$$\Pi^- = p\left(R^+d - u^{-+}\right) - (1-p)\left(u^{--}\right) = \left(pR^+d + \psi\right) - w^-$$

[6]This means that the outcome of the first project affects the executive compensation in the second period.

[7]Computation of these utilities $w^{\cdot}_{e=0}$ is straightforward and will be used later.

[8]Again, we will denote the continuation profit under low effort as $\Pi^{\cdot}_{e=0}$. This will be useful later.

Using these formulas for continuation payoffs at $t = 1$, we can write the Investor's expected profit at $t = 0$ as :

$$\Pi_0 = p\left[R^+ + \Pi^+ - u^+\right] + (1-p)\left[\Pi^- - u^-\right]$$

Any investor will finance the project whenever $\Pi_0 > I$. This is the investors' Participation Constraint (2).

Moral Hazard. We assume that shirking is inefficient from a social perspective, namely :

$$pR^+\psi \geq (p - \Delta p)\, R^+ + (1 - p + \Delta p)\, R^- = 0$$

$$\Leftrightarrow R^+ \geq \frac{\psi}{p} \quad (3)$$

Condition (3) is implied by our assumption suggesting that the total expected payoff under high effort is higher than under low effort. It moreover suggests that differences in payoffs between a good project (which occurs only if the manager behaves) and a bad project (which always occurs if the manager shirks) is higher than the private benefit that can be captured by the misbehaving executive. There is thus a deadweight loss from shirking.

However, shirking is efficient from the Agent's perspective if he is not rewarded to exert effort. The manager exerts effort whenever Condition (1) is satisfied. If it holds, we know for sure that the manager will exert effort for the first project, but we may not be guaranteed that he will exert effort at $t = 1$ for the second project. When the manager exerts effort, he immediately suffers from the associated disutility while he obtains potential rewards only at $t = 2$. In other words, the impatient manager will choose to behave whenever the following two conditions hold :

$$\delta\left[p\left(u^{++}\right) + (1-p)\left(u^{+-}\right)\right] - \psi \geq \delta u^{+-}$$

$$\Rightarrow u^{++} - u^{+-} \geq \frac{\psi}{\delta p} \quad (4)$$

and

$$\delta\left[p\left(u^{-+}\right) + (1-p)\left(u^{--}\right)\right] - \psi d \geq \delta u^{--}$$

$$\Rightarrow u^{-+} - u^{--} \geq \frac{\psi d}{\delta p} \quad (5)$$

Conditions (4) and Conditions (5) are the two second-period moral hazard constraints and must hold if the Principal wants the Agent to behave and exert effort for the second project. These two constraints suggest that it will not be possible to have a pure short-term compensation in equilibrium[9].

Using the model introduced above, we are going now to study the consequences of managerial impatience on project financing and project continuation.

2.2 A patient manager, $\delta = 1$

We will first focus on the baseline case $\delta = 1$ and reproduce the main results and features of the optimal contract. The optimal contract maximizes the Principal's profits net of transfers subject to the Agent's inter-temporal and last-period Incentive Compatibility Constraints (1), (4), (5), and limited liability constraints, i.e :

$$\max_{u^+,u^-,u^{++},u^{+-},u^{-+},u^{--},d} p\left[R^+ + \Pi^+ - u^+\right] + (1-p)\left[\Pi^- - u^-\right]$$

subject to :

$$\begin{cases} u^+ + \delta w^+ \geq u^- + \delta w^- + \dfrac{\psi}{p} \\ u^{++} \geq u^{+-} + \dfrac{\psi}{\delta p} \\ u^{-+} \geq u^{--} + \dfrac{\psi d}{\delta p} \end{cases}$$

This problem is similar to an expenditure minimization problem. We want to minimize the cost that must be borne in order to give enough incentives to the manager. Because this relaxes all moral hazard constraints, it would be optimal to set $u^- = u^{+-} = u^{--} = 0$. The intuition is that bad projects always arise if the manager shirks and setting money transfers to the minimum (transfers cannot be negative) possible reduces the cost to be borne by the Principal. If transfers were allowed to be negative, then it would be optimal to set negative transfers in case of project failure so as to punish the manager from shirking[10].

[9] The intuition comes from backward induction : Imagine that there is a optimal contract that gives all the transfers $\{u^+, u^-, u^{++}, u^{+-}, u^{-+}, u^{--}\}$ in period 1 to the manager. At $t = 1$, these transfers are already in the hands of the executive : Regardless of the previous agreement, it is rational for the manager to shirk since $\psi > 0$ and effort choices are not observable. Knowing that it is rational to do so, the investor will not propose such a contract since it will not induce effort for the second project and is not optimal.

[10] In Laffont and Martimort (2002)'s dynamic moral hazard problem, the first order condition to the profit maximization shows that transfers follows a *martingale property* which states that the expected value of future continuation utilities for the second project is equal to the utility obtained contingent on the first project outcome.

In other words, managers are punished through project downsizing in the second period for having shirked in the first period. In the limited liability framework, the threat of downsizing or liquidation is the only mechanism through which second period compensation may be linked to past outcomes[11].

Because $\delta = 1$, the time preferences of the Principal and the Agent are the same and the timing of compensation does not matter, contingent on satisfying conditions (1), (4) and (5). The proposition below summarizes our argument :

Proposition 1. *Contingent on the contract not being purely short-term, the time-structure of CEO compensation is irrelevant. The following contracts are both optimal :*

$$\begin{cases} u^{-} = u^{+-} = u^{--} = 0 \\ u^{+} = 0 \\ u^{++} = \dfrac{1+pd}{p^2}\psi \\ u^{-+} = \dfrac{\psi d}{p} \end{cases} \quad \text{and} \quad \begin{cases} u^{-} = u^{+-} = u^{--} = 0 \\ u^{+} = (1 - p(1-d))\dfrac{\psi}{p} \\ u^{++} = \dfrac{\psi}{p} \\ u^{-+} = \dfrac{\psi d}{p} \end{cases}$$

Proof. The first contract is a pure long-term compensation contract while the second involves a mix of sort and long term pay. Both contracts minimize the expected cost of providing proper incentives to the executive and cost the same. Indeed :

$$p\frac{\psi}{p}(1 - p(1-d) + p) = p\frac{\psi}{p}(1 + pd)$$

The optimality of these contracts is detailed in Appendix A.1. However, note that these results just arise from minimizing the expenditure of giving proper incentives to behave and make the moral hazard constraint bind in equilibrium. □

Using either optimal contract, we can rewrite the investor's expected profit as :

$$\Pi_0^* = (1 + p + (1-p)d)\left[pR^+\right] - \psi\left[1 - p(1-d) + p + (1-p)d\right]$$

$$= (1 + p + (1-p)d)\left[pR^+\right] - \psi\left[1 + d\right]$$

[11] Because monetary transfers are bounded below by 0, it may not always be possible to reach the first-best outcome.

The investor will choose to finance the manager whenever the Participation Constraint holds, i.e :

$$(1 + p + (1 - p)\, d) \left[pR^{+}\right] - \psi\,[1 + d] \geq I \quad (2')$$

Before focusing on impatient managers, let's first describe what the downsizing policy would be in equilibrium. Because the Principal's expected profit (utility) function is linear in d, the optimal downsizing policy will be described by a *cutoff rule* that sets either $d = 0$ or $d = 1$ depending on whether the derivative of the profit function with respect to d is negative or positive. Total liquidation after first-project failure is chosen whenever :

$$(1 - p) \left[pR^{+}\right] \leq \psi \qquad (6)$$

When (6) and (2) both hold, the optimal contract will set $d = 0$ and the profit for the investor will be :

$$(1 + p) \left[pR^{+}\right] - \psi - I \geq 0$$

2.3 Managerial impatience, $\delta < 1$

We now assume throughout our analysis that Condition (6) does not hold, namely that continuation after failure is always optimal whenever the Agent is as patient as the Principal, and thus project financing in both periods is feasible and optimal when $\delta = 1$.

2.3.1 Sub-optimality of long-term pay

After having introduced the basic results from the baseline case in which the Agent is as patient as the Principal, we focus now on the situation of an impatient manager, who discounts future rewards by a factor of $\delta < 1$. We first show that, unlike the situation where managers and investors' time preferences were aligned, it is no longer optimal to induce effort through a long-term compensation. Part of the compensation must be short-term. We then study the relationship between the discount factor, project financing, downsizing rules and shirking.

The intuition about the suboptimality of a pure-long term compensation when $\delta < 1$ is straightforward. The decision to shirk for the second project is independent of the first project outcome[12]. But the decision to shirk in the first period does depend on the agent's continuation utility and thus on his expected second-period compensation plan. Because of the manager's impatience relative to the principal, rewarding the manager at $t = 2$ for an effort level chosen at $t = 0$ and that potentially pays off at $t = 1$ costs $\frac{1}{\delta} > 1$ more than if the manager had been given that money at $t = 1$ for the same action. More formally, setting $u^+ = 0$ is no longer weakly optimal. Indeed, we will consider a contract that minimizes the investor's next expenditure contingent on inducing the manager to behave and to be paid only in the long-run, i.e at $t = 2$. We will see that it is Pareto-dominated by a mix of short and long-term compensation. This so-called "optimal[13] contract" would set :

$$\begin{cases} u^- = u^{+-} = u^{--} = 0 \\ u^+ = 0 \\ u^{++} = \dfrac{1 + dp}{p^2} \dfrac{\psi}{\delta} \\ u^{-+} = \dfrac{\psi d}{\delta p} \end{cases}$$

The derivation of this compensation plan is provided in Appendix A.1, but is identical than the previous long-term contract when $\delta = 1$ (trivial case). The expected cost of the contract is :

$$p \left[u^+ + p u^{++} + (1 - p) u^{-+} \right] = p\psi \left[\frac{1 + d}{\delta} \right] \qquad (7)$$

Now consider a contract that is also incentive compatible but pays off in both period such that both second-period incentive constraints bind (which is not the case for a pure-long term compensation plan). This mix of short-term and long-term incentives

[12]One could say that the optimal contract exhibits "memory" but we have just "shown" that the investor's profit function is linear in d, inducing a cutoff rule setting either $d = 0$ or $d = 1$ at the optimum. If $d = 0$, then the project is entirely liquidated and the manager's decision is any way irrelevant. Moreover, if $d = 1$, then the last-period incentive constraint of the manager is the same in every history of the game, and the manager's decision will still not depend on the first project outcome.

[13]It is an abuse of language but the adjective "optimal" is used in quotes to suggest that this contract minimizes the Principal's cost of inducing proper behavior subject to being long-term only.

is optimal and sets :

$$\begin{cases} u^{-} = u^{+-} = u^{--} = 0 \\ u^{+} = \dfrac{\psi}{p}\left(1 - p\left(1-d\right)\right) \\ u^{++} = \dfrac{\psi}{\delta p} \\ u^{-+} = \dfrac{\psi d}{\delta p} \end{cases}$$

Again, the expected cost is :

$$\psi\left[1 - p\left(1-d\right) + \frac{p + \left(1-p\right)d}{\delta}\right] \qquad (8)$$

Comparing conditions (7) and (8) will help us show that when the agent is more impatient than the principal, it is optimal to pay the agent as soon as possible. It leads us to the following proposition :

Proposition 2. *When $\delta < 1$, it is not optimal to delay payment. A mix of short-term and long-term incentives is optimal.*

Proof. To formally highlight why some transfers must occur at $t = 1$, we compare conditions (7) and (8) and show that it is possible for the investor to reduce her expected expenditure by switching from a long-term contract to a mixed contract. Indeed, subtracting the cost of a pure long-term contract from the cost of the mixed contract gives :

$$\frac{\psi}{\delta}\left(\frac{1+dp}{p}\right) - \frac{\psi}{p}\left(1 - \left(1-d\right)p + \frac{p}{\delta}\right)$$

$$\frac{\psi}{p}\left[\frac{1+dp}{\delta} - 1 + \left(1-d\right)p - \frac{p}{\delta}\right]$$

$$\frac{\psi}{p}\left[\frac{\left(1-\delta\right)}{\delta}\left[1 - \left(1-d\right)p\right]\right] \geq 0$$

This is always positive. Hence, a mix of short and long-term incentives will always be less costly than a pure long-term contract when $\delta < 1$. □

2.3.2 Project Downsizing

After having highlighted some features of the optimal contract and the importance of short-term compensation, we focus now on how managerial impatience (short-termism) affects the likelihood of termination, shirking as well project financing in the first place. The investor will choose to liquidate the project after failure whenever :

$$\frac{\partial\ \mathbb{E}\left(\Pi_0 \mid \delta\right)}{\partial d} \leq 0$$

$$\frac{\partial\left([pR^{+}]\left(1+p+(1-p)\,d\right)-\psi\left[1-p\,(1-d)+\frac{p+(1-p)\,d}{\delta}\right]\right)}{\partial\, d}\leq 0$$

$$\Leftrightarrow p\left[R^{+}\left(1-p\right)-\psi\right]\geq\frac{\psi\left(1-p\right)}{\delta}$$

Continuation after failure is always chosen if and only if :

$$\Leftrightarrow \delta\geq\delta^{d}=\frac{(1-p)\,\psi}{p\left[R^{+}\left(1-p\right)-\psi\right]}$$

Continuation after failure will thus never be feasible if :

$$\frac{\psi}{p}\geq(1-p)\,R^{+}$$

Notice that δ^{d} has a vertical asymptote in the plan (p,δ). Indeed, whenever $p\geq p^{*}=\frac{R^{+}-\psi}{R^{+}}$, $\delta^{d}<0$[14] The derivative of δ^{d} with respect to p is :

$$\frac{\partial\left[\delta^{d}\right]}{\partial p}=\frac{\psi\left[\psi+(1-p)\left(\psi-(1-p)\,R^{+}\right)\right]}{\left[R^{+}\left(1-p\right)-\psi\right]^{2}}\lesseqgtr 0 \qquad (9)$$

From the numerator in the expression above, we notice that there is a $p^{'}\in[0;\frac{R^{+}-\psi}{R^{+}}]$ such that for $p\leq p^{'}$, the derivative is negative and for $p\in[p^{'},p^{*}]$, the derivative is positive.[15]. The derivative of δ^{d} with respect to p may thus be either positive or negative. It suggests that there are two opposing forces.

Indeed, hen p is high, although abandoning the second project after failure of the first one involves large losses, it is also a tool used to punish the manager for shirking, since a failure often indicates that the Agent has misbehaved. Indeed, $p-\Delta p=0$ and success is perfectly correlated with effort. We call this effect the *"incentives effect"* : As p goes up, project failure reveals more precisely that the manager has shirked and the threat of downsizing is more likely to work[16]. We call the other effect the *"quality effect"*. This effect is very intuitive. As p goes up, it is more profitable to continue if the manager behaves because of lot of potential profits would be forgone if the project is discontinued. For some values of p, the incentive effect dominates. Indeed :

[14] This will suggest later that managerial impatience can lead to inefficient situations.

[15] We can solve for the quadratic equation in the numerator to obtain $p^{'}=\frac{2R^{+}-\psi-\sqrt{(\psi+2R^{+})^{2}-4R^{2+}}}{2R^{+}}$

[16] Project liquidation in the second period is a threat to induce proper behavior in the first period through the inter-temporal moral hazard constraint.

- $\forall\ p \in [0, p^{'}]$, $\frac{\partial\, \delta^{d}}{\partial p} \leq 0$: The *quality effect* dominates. As p goes up, the opportunity cost of discontinuing the project increases and continuation becomes more profitable.

- $\forall\ p \in [p^{'}, p^{*}]$, the *incentives effect* dominates. Indeed, when p is sufficiently high, it is easier to distinguish behavior from shirking and that is why $\frac{\partial\, \delta^{d}}{\partial p} \geq 0$: The set of δ such that it is optimal to continue after failure shrinks because it is made easier to punish the manager for misbehavior.

- $\forall\ p \in [p^{*}, 1]$, the value of p is so high that there are considerable forgone profits if the project is discontinued, so that $\delta^{d} < 0$ and it is always optimal to continue after failure. But, it is made easier to find out whether the Agent has exerted effort. The *incentives effect* still dominates and $\frac{\partial\, \delta^{d}}{\partial p} \geq 0$ as a result, but continuation is always optimal provided that $\delta > 0$. Indeed $\lim_{p \mapsto 1} \delta^{d} = 0$.

However, even if continuation is optimal for high probabilities of success, it may not be feasible if δ is low enough because it may break the investor's Individual Rationality constraint. That is why impatience can adversely affect investment and lead to socially inefficient outcomes.

2.3.3 Project Financing

We turn now to project financing. The project will be financed in the first place if and only if the expected profit from the sequential projects is higher than the initial investment I:

$$(p + (1-p)\, d + 1) \left[pR^{+}\right] - \psi \left[1 - p\,(1-d) + \frac{p + (1-p)\, d}{\delta}\right] \geq I$$

$$\Leftrightarrow \delta \geq \delta^{I} = \frac{\psi\, [p + (1-p)\, d]}{[p + (1-p)\, d + 1]\, (pR^{+}) - \psi\, (1 - p\,(1-d)) - I}$$

If $\delta < \delta^{I}$, the project will not be financed by the investor, because it is not profitable for her to do so : It is too costly to pay the impatient manager in the second period and this cost makes the project unsustainable from the Principal's perspective, as it breaks her individual rationality constraint. Indeed, the first period's compensation does not depend on the manager's impatience, while the second does.

This last point suggests that it may be possible to finance the project with the threat of downsizing. To see that, we first compute the values of δ^{I} depending on whether $d = 0$ and $d = 1$. Let δ^0 and δ^1 respectively be the cutoff values under which project financing with liquidation after failure and project financing with continuation after failure is feasible. We set $I = 0$ for convenience and obtain :

$$\delta^0 = \frac{\psi}{(1+p)\,R^+ - \dfrac{\psi}{p}\,(1-p)} \qquad \text{and} \qquad \delta^1 = \frac{\psi}{2pR^+ - \psi}$$

It is immediate that both values for δ^I are always positive and less than 1 (because of Assumption (3)), suggesting that project financing is always possible if the manager is sufficiently patient[17]. We also notice that regardless of the values for ψ or p, it is always more sustainable to finance a manager with downsizing after failure than without, that is : $\delta^0 \leq \delta^1$. The proof of this result is provided in Appendix A.2.

This confirms our previous analysis according to which managerial impatience is harmful because it allows otherwise profitable projects to be discontinued due to high cost of providing incentives to a short-termist executive. We can immediately notice that δ^1 is decreasing in p. The derivative of δ^0 respect to p is:

$$\frac{\partial\left[\delta^0\right]}{\partial p} = \frac{-\psi\left[R^+ + \dfrac{\psi}{p^2}\right]}{\left[\left(R^+ - \dfrac{\psi}{p}\right) + p\left(R^+ + \dfrac{\psi}{p}\right)\right]^2} \leq 0 \qquad (10)$$

Both derivatives are negative, which means that as p goes up, it becomes easier to sustain continuation after failure or even investment in the first place. Indeed, when p is high, effort is almost synonymous with a good outcome and it would be very profitable to invest if $\delta = 1$, which compensates the high pay required by the impatient manager to behave. Notice that, by definition, δ^0 and δ^1 are cut-offs such that it may or may not be feasible to finance the project, i.e whether the Principal's Participation Constraint holds or not. This has nothing to do with incentives, unlike δ^d. For the latter, d is a tool through which the investor threatens and punishes the executive for misbehavior. The project financing decision is irrelevant for that. In other words, there is no "incentives effect" and that is why both derivatives of δ^0 and δ^1 with respect to p are negative : As p goes up, it is more profitable to finance projects and the set of δ such that it the case expands.

[17]This property also arises from the fact that $I = 0$. For a sufficiently high investment cost I, any investor would be deterred from financing the project.

2.3.4 Short-termism and Efficiency

We have started to highlight the damaging consequences of managerial impatience on project financing and downsizing decisions at the optimum. When p is high enough, the cutoff values δ^d and δ^0 tell us that a lot of profitable opportunities are forgone because of the manager's impatience[18].

Moreover, if δ is too low, namely $\delta < \delta^0$, the project will not even be launched because it would take more than the value of the *inter-temporal rent* the investor would have gained to finance the manager in the second period, while it may be optimal to continue both projects for $p \geq p^*$[19], which leads to an inefficient outcome. Therefore, there is a social loss from managerial impatience that prevents project financing (if $\delta \leq \delta^0$ or $\delta \leq \delta^1$) whereas the cutoff $\delta^d \leq 0$ indicates that continuation is always optimal.

Our reasoning is summarized below :

Proposition 3. *For* $p \leq p^*$*, whenever it is optimal to continue after failure, the investor's Participation Constraint is always satisfied in equilibrium if the investor's decision is to set* $d = 1$ *in the optimal contract. For* $p \geq p^*$*, there is an inefficiency due to short-termism. The second project cannot be financed* ($\delta \leq \delta^1$) *but it is optimal from the investor's perspective to continue after failure* ($\delta \geq \delta^d$).

Proof. Calculation details in Appendix A.3. We just prove the first part of the proposition. The second part comes from our previous reasoning.

We want to see under which conditions $\delta^d \geq \delta^1$ is true. Knowing that $\delta^1 \geq \delta^0$, showing that $\delta^d \geq \delta^1$ $\forall p \in [0, p^*]$ is always true would prove our proposition. After some calculations, we show that this is true whenever:

$$(1-p)\left[pR^+ - \psi\right] + \psi p \geq 0$$

This always holds because of Assumption (3).

□

[18]The expected overall cost that the Principal must bear so that the Agent does not shirk (Condition (8)) is always higher than if the time preferences of the manager and the investor were aligned.

[19]since $\forall \delta > 0$, $\delta > \delta^d$.

We have proved that there is a social loss due to managerial impatience for p high enough. Let's focus on $p \leq p^*$ now. For such values of p, δ^d represents the lower bound under which it won't be optimal to finance the project and continue. In particular, if $\delta \leq \delta^d$, the manager will not be paid at all if the first project turned out to be a lemon. However, if $\delta \in \left[\delta^1, \delta^d\right]$, it does not mean that it is always optimal to let the manager continue in the second period if the first period project has succeeded. The Principal might in some cases be better off letting the manager shirk regardless of the first project outcome, because of the cost of giving incentives to a relatively impatient manager at date 2. This is what we are going to investigate now.

Under high effort, the expected value of the second project at the end of the first period is $\Pi_{|t=1,e=1} = p\Pi^+ + (1-p)\,\Pi^-$. Under low effort though, the expected continuation profit is $\Pi_{|t=1,e=0} = p\Pi^+_{e=0} + (1-p)\,\Pi^-_{e=0}$, which is obviously less than the former. We have already discussed the expression for continuation profits under high effort.

When the manager shirks, the investor's expected profits are :

$$\Pi^+_{e=0} = -w^+_{e=0}$$

and

$$\Pi^-_{e=0} = -w^-_{e=0}$$

Expected wages under shirking are defined accordingly[20]. Shirking is socially efficient whenever:

$$\Pi_{|t=1,e=0} \geq \Pi_{|t=1,e=1} \qquad (11)$$

Comparing $\Pi_{t=1|e=0}$ and $\Pi_{t=1,e=1}$ help us find that shirking is efficient from the Investor's perspective if the manager is too impatient (because of the costs of providing incentives at $t = 2$). More precisely, Condition (11) holds if and only if :

$$\delta \leq \delta^{\Pi} = \frac{\psi}{pR^+}$$

This cutoff δ^{Π} is always less than 1 thanks to Assumption (3) and is higher than δ^0 and δ^1[21]but less than δ^d [22] for $p \leq p^*$. This means that whenever shirking is not optimal from the Investor's perspective, it is at least possible to finance the first project and liquidate the second project if the first one turned out to be a lemon.

[20]The continuation wages after shirking respectively are $w^+_{e=0} = u^{+-}$ and $w^-_{e=0} = u^{--}$.

[21]Because of Assumption (3), i.e $pR^+ \geq \psi$.

[22]This result seems obvious, but details are provided in Appendix A.4.

Besides, when it is optimal to continue after first-period failure, it is also optimal to induce effort.

Notice that δ^{Π} is decreasing in p, indicating that the range of values of δ such that Condition (11) is satisfied widens as the probability of success of the project goes down, consistent with the idea that the opportunity cost of giving up on the second project goes up when the project quality (probability of success) rises ("quality effect").

Comparing δ^{Π} and δ^{1} indicates that there actually exist values of δ for which it is feasible to invest in the two sequential projects, but always optimal the discontinue the second one, regardless of the outcome of the first one. We will summarize our results below.

2.3.5 Results : Summary

Recall that we always have : $\delta^{\Pi} \geq \delta^{1} \geq \delta^{0}$ (with δ^{d} being either superior of inferior to all three cutoffs depending on whether $p < p^{*}$ or not). Moreover, we know that $\delta^{0} \geq 0$ since $R^{+} \geq \frac{\psi}{p}$ by Assumption (3).

Recall that δ^{d} has a vertical asymptote at $p^{*} = \frac{R^{+}-\psi}{R^{+}}$ in the (p, δ)-plan. The expression for the cutoff δ^{d} also reveals that whenever $p \geq p^{*}$, $\delta^{d} \leq 0$. In other words, for p sufficiently high, it is always optimal to continue after first project failure, for any value of $\delta \geq 0$, but it may not be feasible to do so because a low value of δ may prevent from financing the project in the first place, which leads to the inefficiency we introduced above.

Depending on the value of δ, a pure short-term compensation may be feasible and optimal, while long-term compensation will never be optimal. The following proposition summarizes our main results, that were detailed above :

Proposition 4. *Let's consider the previous optimal compensation plan described in Section 2.3.1 with expected cost* (8). *Depending on the values of δ and p, the following scenarios arise:*

- *When $p \leq p^{*}$, there is no inefficiency region since δ^{d} is the upper bound under which the second project would be discontinued, should the first project be a failure. That is,*

- *If* $\delta \geq \delta^d$*, the manager will be compensated in both periods and both projects will be undertaken. The manager and investor expected utilities and profits are described using expressions from Section 2.3.1 .*
- *If* $\delta < \delta^0$*, the managerial focus on short-term is so high that project financing is not feasible and both Principal and Agent's net rents are zero.*
- *If* $\delta \leq \delta^\Pi$*, only the first project will be financed and the manager will obtain* pu^+*, with* u^+ *determined such that the Agent's inter-temporal Incentive Constraint binds, i.e* $u^+ = \frac{\psi}{p}$*. At* $t = 0$*, it is optimal for the investor not to propose anything in the second period to the executive.*
- *If* $\delta \in \left[\delta^\Pi, \delta^d\right]$*, then the optimal contract will include a covenant setting* $d = 0$ *if the first project turns out to be a lemon.*

* *However, if* $p \geq p^*$*,* $\delta^d \leq 0$*. This leads to an inefficient situation because it is always optimal to continue after failure but not always feasible. Indeed :*
  - *If* $\delta \leq \delta^1$*, the fact that* $\delta^d << \delta^1$ *indicates that while it is optimal to continue after failure (because p is close to 1 so that the opportunity cost of discontinuation is also high), the impatience of the manager makes compensation so costly that it prevents the investor from financing the second project.*
  - $\delta \geq \delta^\Pi$ *is the necessary and sufficient condition such that both projects get financed in the second period and the manager receives compensation in case of success. Otherwise, the optimal contract would only pay* $u^+ = \frac{\psi}{p}$ *to the manager with probability p, instead of the optimal compensation contract introduced in Section 2.3.1 .*

Therefore, if the Agent is not patient enough ($\delta \leq \delta^\Pi$*), he will only be compensated in the first period, and the firm will be liquidated, whatever the first project outcome. Moreover, when p is high enough (greater than* p^**), managerial impatience is such that it does lead only to an inefficient situation where continuation is optimal but not feasible.*

For high values of p, $\delta^d << \delta^\Pi$ *suggests that it is optimal to continue after failure from the Investor's perspective, but at the same time preferable to discontinue the second project regardless of the first project outcome, because of the high cost of managerial compensation when the executive is impatient.*

Overall, while managerial short-termism may prevent project financing and investment in the first place[23], it is also detrimental to project continuation. Furthermore, as the cost of managerial compensation can break the profitability of investment at $t = 0$, managers may be compensated only in the first period (if the second project is always discontinued), so managerial impatience is also detrimental to CEO compensation. There is eventually a deadweight loss from short-termism : Projects that are optimal to launch *even if the manager had shirked* are not financed because paying the executive in the future is too costly.

The issue is whether these predictions are consistent with empirical evidence. That is what we are going to study now.

3 Empirical Analysis

3.1 Data

We now try to link our previous findings to the empirical evidence. We first need to obtain information about the managers' time preferences. In order to find them, we rely on the World Management Survey[24], which is the only publicly available dataset containing evidence about executives' preference for short-term vs the long-term. As stated on their website, the objective of the World Management Survey's is to collect "data to be used by researchers worldwide in digging deeper into the black box of productivity across industries and countries". This project has been initiated by Nicholas Bloom and John Van Reenen who aimed to explain how managerial practices could explain the differences in productivity of firms that may be almost identical otherwise.

We will use the first database they have collected, which has been introduced and used in Bloom and Van Reenen (2007). They interviewed senior executives in French, German, British and American companies between 1994 and 2004 and questioned managers about their management practices. The authors have tried to obtain answers that are as accurate as possible through asking open-ended questions and without telling managers that there are actually being interviewed. Furthermore, managers were scored by two interviewers who did not communicate with each other

[23] when $\delta < \delta^0$.

[24] http://worldmanagementsurvey.org/

during the grading process.

The data available on management practices is divided into four categories : operations (about the introduction and the motivation for manufacturing techniques and improvements), monitoring (about the managers' performance in their firm), targets[25] (about managers' targets and whether they have met them) and incentives (about their firm's incentives scheme and rewards for performance). Bloom and Van Reenen's *management practice* variable is then constructed by averaging, for each observation (manager-firm), the scores in the four above categories (which contain 18 variables). Drawing on their dataset, we will just focus on one particular practice, which is *time horizon*.

3.1.1 Data Description : World Management Survey

All management practices are scored from 1 to 5 in the WMS, and a higher score reflects a higher managerial ability. Scores are attributed depending on managers' answers to open questions. The managers in our sample of 732 firms were asked, between 1994 and 2004, several times, questions such as *"Do the staff ever suggest process improvements ?"* or *"What factors led to the adoption of these lean (modern) management practices ?"*. For each firm, the WMS records the average for each question over the period 1994-2004. For our variable of interest, "Target Time Horizon", managers were asked three questions :

1. *"What kind of time scale are you looking at with your targets ?"*
2. *"How are long-term goals linked to short-term goals?"*
3. *"Could you meet all your sort-run goals but miss your long-run goals ?"*

A low score reflects a managerial focus on the short-run while a high score (close to 5) will suggest that the manager is focused on long-term objectives.

We call "impatient" managers who scored less than 2 to these three questions (on average). In our sample of 732 firms, 193 firms (managers) are considered as impatient while 539 are deemed to be "patient" individuals. A first look at summary statistics (Tables 1 and 2) seems to suggest that, everything else equal, firms managed by

[25] We will focus on this area, since it contains our measure of short-termism.

impatient executives exhibit significantly lower output (sales), capital expenditures, employment expenditures, intermediate inputs (materials) expenditure, Tobin's Q, R&D spending, and return to capital. In addition to that, average wages as well as the rate of sales growth seem to be slightly lower in companies run by short-termist individuals, while the death probability[26] is significantly higher. Interestingly, firms run by impatient managers also have much lower scores in questions related to incentives[27] in their firms, which is consistent with our hypothesis according to which the strength of incentives is related to short-termism.

Table 1 : "Patient" Managers

Variable	Mean	Std. Dev.	Min.	Max.	N
Output (Sales)	11.835	1.392	8.738	15.73	539
Output Growth	0.077	0.108	-0.489	0.729	535
Employment Expenditures	6.703	1.285	4.21	10.883	539
Capital Expenditures	10.128	1.628	6.49	14.604	537
Materials Expenditures	10.995	1.621	4.600	16.292	523
Employment Growth	6.778	1.28	4.238	11.01	539
CEO Family Owner	0.113	0.317	0	1	532
CEO Founder & Owner	0.091	0.288	0	1	539
Firm Shutdown	0.004	0.061	0	1	539
Hours (Employees)	39.895	4.293	30	60	434
Hours (Managerial Personnel)	45.458	6.767	30	80	434
Average Wages	3.671	0.293	2.996	4.366	314
Tobin's Q	0.542	0.9	-2.303	3.186	295
R&D Spending	3.474	1.819	-0.979	7.367	179
Managers' Pay	6.289	0.655	4.872	8.041	226
Public Company	0.603	0.49	0	1	539
Return to Capital	18.752	13.033	-25	50	526
Years in Tenure	4.744	4.039	0.1	23	539
Incentives (Average Score)	0.153	0.656	-1.637	1.729	539

Table 2 : Impatient/Short-termist Managers

Variable	Mean	Std. Dev.	Min.	Max.	N
Output (Sales)	11.453	1.33	8.9	15.494	193
Output Growth	0.059	0.106	-0.267	0.489	192
Employment Expenditures	6.439	1.273	4.241	10.432	193
Capital Expenditures	9.632	1.656	5.641	14.268	193
Materials Expenditures	10.625	1.491	6.839	15.291	190
Employment Growth	6.465	1.28	4.363	10.868	193
CEO Family Owner	0.2	0.401	0	1	185
CEO Founder & Owner	0.145	0.353	0	1	193
Firm Shutdown	0.031	0.174	0	1	193
Hours (Employees)	39.319	4.419	30	55	127
Hours (Managerial Personnel)	43.52	7.112	30	65	126
Average Wages	3.584	0.294	2.999	4.605	134
Tobin's Q	0.26	0.808	-1.345	2.228	87
R&D Spending	2.849	1.588	-0.763	5.694	39
Managers' Pay	6.13	0.705	4.554	7.745	51
Public Company	0.487	0.501	0	1	193
Return to Capital	16.147	11.537	-15.806	50	186
Years in Tenure	5.26	5.096	0.1	34	193
Incentives (Average Score)	-0.448	0.689	-2.025	1.341	193

[26] A firm is considered as dead if it has shut down at the end of 2004 (or before), the last year in the WMS dataset.

[27] Please note that the average score for incentives has been centered and standardized.

This impact of incentives is particularly crucial : We argue throughout our analysis that there may be consequences of short-termism on key corporate decisions and outcomes, but we may be concerned that the observed differences between firms run by the two types of executives can be attributed to other factors too. However, as highlighted by the very significant differential in *incentives*, we will argue that the different scores on managerial practices (resulting in different choices and outcomes) can be attributed to weaker incentive schemes in firms managed by short-termist executives.

This means that conditional on controlling the impact of incentives on corporate actions (and thus outcomes), impatient managers and their firms are similar to their patient counterparts. In other words, if we want to consistently estimate the impact of short-termism, we have to understand why there are short-termist managers and what can affect their incentives. That is the reason why we will focus on the impact of ownership on incentives.

3.1.2 Identification Strategy : How does ownership affect incentives

Bertrand and Mullainathan (2003) hinted that when firms were insulated from the threat of takeovers, managers engage in less "cognitively difficult" and risky activies and choose to enjoy "a quiet life". If we interpret short-termism as the willingness to focus on actions that pay off immediately rather than more profitable decisions that pay off in the future (and are costly to undertake today), a parallel can be drawn between managerial short-termism and and the manager's desire for a "quiet life". Indeed, immediate rewards may rather be the result of actions that require less effort from the manager and are preferred by him because they do not require to wait for an uncertain outcome tomorrow. Therefore, we expect impatient (short-termist) executives to be found in firms that are relatively more protected from takeovers.

More importantly, we suggest that companies' ownership structures matter. In particular, if some structures of firm ownership protect the individuals who are running them from the threat of a hostile takeover, we conjecture that these individuals would be prone to engage in short-termist behavior. Consistent with Jensen (1988), the threat of a takeover is meant to benefit the shareholders of a firm. It is seen as a discipline device used to realign management's objectives with those of the company's owners. From this perspective, if there are ownership structures that protect relatively more against the threat of a takeover, incentives should be weaker for management and we should also find executives with a higher focus on short-term.

A first look at the distribution of impatient and impatient managers (Tables 1 and 2) in the data reveals that managers of publicly-traded companies score higher to the time horizon questions. This difference, albeit slow, is statistically significant and should not come at a surprise since information about public firms is available to market participants, and especially bidders. This facilitates takeovers and disciplines executives in acquired firms, letting them focus less on short-term goals and "enjoy their quiet life".

Moreover, we believe that firms who are managed by a member of a shareholder family (CEO family owned firm) or CEO-founded firms are also more likely to be protected from the threat of takeovers. If we view takeover threats as a way to discipline management and to realign managerial goals with owners' interests, there is less need for takeovers in CEO family owned firms or CEO-founded firms in the first place. Indeed, there is no need to realign preferences between the Principal and the Agent when the owner shares some proximity with the manager. In addition to that, a takeover is generally not worth considering in family firms especially because of the concentration of ownership. Our hypotheses are consistent with empirical evidence :

Shivdasani (1993) found that hostile takeover threats essentially play the role of a complementary mechanism to the board of directors. More precisely, he finds that directors in firms subject to hostile takeover threats have smaller ownership stakes, suggesting that there is more to gain in monitoring managers. In addition to that, his findings also point out that when blockholders are affiliated with management, there is a substantial decrease in the likelihood of a takeover attempt.

A further look at the data highlights indeed a sharp increase in the proportion of impatient managers in the subgroups comprised of CEO-family owned firms and CEO-founded and owned firms. While 23% of interviewed executives can be classified as "impatient" in our sample of 732 firms, this proportion rises up to 38,1 % in firms run by executives whose family is the largest shareholder, and to 36,3 % in CEO owned and founded firms.

Before embarking onto econometric analyses, we would like to investigate whether it is accurate to establish a relationship between short-termism and the desire for a *"quiet life"* in firms protected by takeovers. These firms are especially distinguishable from their longer executive tenure and lower working hours of managerial and non-managerial employees.

Looking at the duration of tenure reveals the close relationship between ownership and incentives. Consistent with Bertrand et al. (2003), we find longer managerial tenure in firms run by short-termist executives (Tables 1 and 2) and are coincident with observing a firm whose owners have a familiar relationship with the executive (Figure 1).

Figure 1 - Years in Tenure

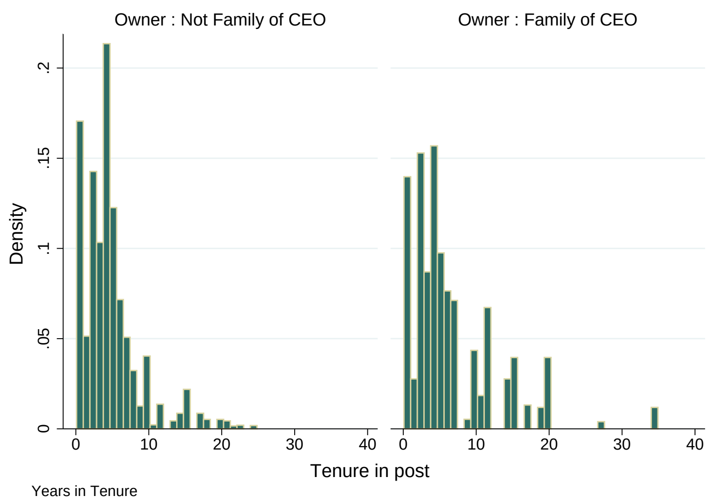


Figure 1 suggests indeed that executives stay longer on average in firms owned by the family of the manager, while Tables 1 and 2 displayed that impatient managers stay longer longer in tenure on average. This is also reassuring in comforting our suggestion that we can associate the desire for a "quiet life" with a focus on the short-term[28].

Besides, this relationship is confirmed after comparing working hours of managers and non-managerial personnel in firms run by patient and impatient managers.

[28]In Bertrand and Mullainathan (2003), firms that are insulated from takeovers have managers that stay longer in post.

While managerial personnel work on average 45 hours a week in firms run by "patient" individuals, they only work 43 hours a week in firms whose manager is classified as impatient[29]. This two hours decrease is also observed when looking at firms which are founded and owned by the current CEO or firms whose manager is a family member of the largest shareholder family.

3.2 Analysis and Results

First, we will estimate with standard least-squares methods in cross-sections and in panels the impact of short-termism on variables that are of interest to firms : Output, capital expenditure, R&D stock, Tobin's Q, employment, the probability of a firm shutdown and the return on capital among other things. This approach is very similar to Bloom and Van Reenen (2007).

Then, we will test our hypothesis according to which short-termism is much more likely to arise and occur in firms where the CEO belongs to the family of the owners/shareholders (see below for explanation). We will test this hypothesis with propensity score methods.

Let y_{ijt} be our dependent variable. Our dependent variables are : sales (as a proxy to output), but also return to capital, Tobin's Q[30], R&D spending and the probability of a firm shutdown. We are going to estimate the following production equation :

$$y_{it} = \alpha + \beta_1 T_i + \beta_{2j} k_{ijt} + \beta_{3j} n_{ijt} + \beta_{4j} m_{ijt} + \text{Controls} + \epsilon_{it}$$

In addition to subscripts i for firms and t for the year, the subscript j denotes the country in which the firm is headquartered. We actually allow for different share of inputs in the coefficients associated to capital k_{ijt}, labor n_{ijt} and intermediate inputs m_{ijt} across the four countries[31]. This is made possible by incorporating a set of indicators interacting a dummy for the country with capital, labor or materials expenditures, which is also performed in Bloom and Van Reenen (2007). T_i denotes our variable "time horizon" which corresponds to the average score of managers to the three questions above[32]. We add a set of controls including the degree of com-

[29] Evidence is presented in our Tables 1 and 2 above.

[30] Defined as the ratio of the sum of Market Value, Long Term Debt and Preference Shares on the sum of net fixed assets and stocks.

[31] France is the country of reference.

[32] This variable T_i is standardized and centered to zero.

petitiveness of the industry as well as the proportion of "educated" employees (i.e the share of employees with a College degree). All continuous variables are in logs.

We first try to estimate by within-group OLS the impact of short-termism on the outcome variables described above for the period 1994-2004. We control in our panel for industry specific effects, country fixed effects as well as year fixed effects and allow for clustered standard errors for each firm (i.e observation) to control for serial autocorrelation in the error term for each manager-firm interviewed. Table 3 displays our results :

Table 3

	(1) Sales	(2) Sales	(3) Return to Capital	(4) Tobin's Q	(5) R & D
Time Horizon	0.0210*	0.0224**	1.493**	0.0830	0.0116
	(2.48)	(2.74)	(3.13)	(1.44)	(0.15)
Employment Expenditures	0.500***	0.408***	0.946	-0.163	0.189
	(25.25)	(9.47)	(1.05)	(-1.67)	(1.52)
Capital Expenditures	0.122***	0.175***	-0.0785	-0.0154	0.381***
	(9.24)	(6.39)	(-0.10)	(-0.19)	(3.56)
Materials Expenditures	0.372***	0.362***	0.649	0.131*	0.342***
	(20.59)	(8.10)	(1.18)	(2.45)	(4.02)
% with degree	0.0187	0.0211	-0.757	0.253***	0.561***
	(1.56)	(1.78)	(-1.04)	(3.38)	(4.94)
N	5343	5343	5082	2631	1936

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In the first column, we restrict Cobb-Douglas Coefficients β_2, β_3 and β_4 to be the same across all four countries. All other columns allow for different coefficients. We always control for the "quality" of the labor force by including a variable accounting for the share of employees with a College degree and control for the degree of competitiveness of the industry. Alternative specifications including the share of personnel with a MBA or the number of hours worked in the company deliver similar results.

Firms whose managers have a longer time-horizon are associated with higher sales, a significant increase in the percentage return to capital as well as a higher Tobin's Q and higher R&D expenses. These results our consistent with our model above, since we expected investors to discontinue some projects because of the Agent's short-termism. An increase of 1 standard-deviation of the variable "time horizon" is associated to a rise of 2% of log output and an 1.4% increase of the return to capital and these results are statistically significant. Moreover, a 1 SD increase in T_i is associated with an increase of Tobin's Q of slightly more than 8% while the R&D expenditures go up by 1%. It is consistent with less investment in firms managed by short-termist individuals, as predicted by the model. However, these last results were not statistically significant.

When introducing the World Management Survey, Bloom and Van Reenen mentioned that there are potential measurement errors in the management practice scores, and found that 42% of the variation in managerial practices score is due to measurement error. They try to partially eliminate this issue by averaging the scores of each practice to compute their variable of interest, namely *"Management Practices"*. However, unlike the two authors, we are interested in the scores of a single practice, "time horizon". We tried to instrument these variables by variables related to ownership (in a analogous fashion to what we will try to perform when using propensity score matching.). However, although the coefficient associated to the variable "time horizon" significantly went up, it still was not statistically significant.

Another reason may be the panel dimension of our dataset. Indeed, we are controlling for country fixed effects, industry fixed effects, year fixed-effects and clustering standard errors for each firm, which may considerably increase the variance of our residual, and hence may negatively affect the significance of our results. In addition to that, recall that our data for T_i is averaged for each firm. That is why we also estimate the equation above by standard OLS in the cross-section (We consider the first and last years of our sample to perform these analyses). We also perform a between-group least squares analysis on our averaged data[33], and control in every case for country fixed-effects and industry fixed effects. In contrast to panel data estimation, our results are much more often statistically significant in the cross-section. In particular, we find that a one SD rise in "time-horizon" will lead to an increase in Tobin's Q of 10% to 14% compared to 8% previously, and an increase of 11% to 20% of R&D expenditures vs. 1% previously. However, we should be very cautious about point-estimates for time-horizon when the dependent variable is the log R&D expenditures since a lot of data is missing. Our estimates can be found in Appendix B.1.

We also try to see whether firms run by impatient individuals are more likely to shut down. Indeed, one of our previous theoretical predictions was that the cost of compensating an impatient manager may be so high that the owner is sometimes better off discontinuing the second project. We look at data in the last year of our sample, and estimate the probability of shutdown by Probit regression on the same independent variables as before as well as a set of controls for CEO's characteristics.

[33]We collapsed the original dataset for each firm and average the observations over time, so that between-group OLS estimation is consistent as there are no individual fixed effects.

Table 4 displays the results :

Table 4

	(1) Prob. Shutdown	(2) Prob. Shutdown
Time Horizon	-0.518	-0.568*
	(-1.87)	(-2.36)
CEO Seniority	0.549	0.282
	(1.51)	(1.11)
% with degree	0.721	
	(1.93)	
Firm age	-0.378	-0.259
	(-1.41)	(-1.32)
Public Company	0.636	0.314
	(1.19)	(0.76)
Lerner Index	-10.05	-3.318
	(-1.81)	(-0.81)
Employment Expenditures	1.163**	1.226***
	(3.07)	(3.31)
Capital Expenditures	-0.881*	-0.787**
	(-2.45)	(-2.74)
Materials Expenditure	-0.497*	-0.480**
	(-2.49)	(-2.85)
Years in Tenure		0.0164
		(0.68)
N	324	392

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The specification in the first column controls for the "quality" of the workforce, i.e the share of employees with an MBA or with a college degree, as well as the age of the firm, the profitability[34] of the firm and the seniority of the manager. The regression equation in the second column is similar to the first one, except that we don't account for the education level of employees, but account for how many years the manager has been in post.

We can notice that the coefficient associated to time horizon is negative and statistically significant at 10% and 5% significance levels, suggesting that firms whose managers have a shorter time-horizon are much more likely to shut down. These results were robust to other specifications.

3.2.1 The Relationship between Ownership and Time Horizon : Empirical Evidence

We have seen that time-horizon (and thus short-termism) is positively (negatively) associated with a high output, a high return to capital, high levels of Tobin's Q and R&D expenses, as well as a low probability of company shutdown. This is implicitly highlighting the relationship between time-horizon and incentives, since we expect

[34]The Lerner Index used in this dataset and described in Bloom et al. (2007) is Lerner = 1 - Profits/Sales.

owners to be more inclined to liquidate a badly run firm. However, some of our results were not statistically significant. In particular, we are concerned that there may be confounding factors affecting our variable "time-horizon". When we performed our within-group panel regressions above by instrumenting the time-horizon variable with variables on the ownership structures, our results were consistent with the "simple" least-squares analyses and the point estimates went up[35], but the variance of the coefficient β_1 did not go down. In other words, there was little gain from IV estimation compared to OLS in our situation.

We want to find an alternative method that enables us to isolate the impact of managerial impatience of key corporate variables. We argued previously that there may be a relationship between a firm's ownership structure and the short-termist behavior of its managers through weakened incentives. We especially hypothesized that CEO-family owned firms and founded firms were types of firm where short-termist behavior is more likely to flourish. Let's consider the model below :

$$T_i = \eta + X_i^{'}\gamma$$

Here, X_i denotes a set of variables accounting for the ownership structures. These variables are dummy variables indicating whether the firm is public or not, owned by the family of the manager or not, owned by Institutional investors, privately owned or owned by the founder and manager, among other things. Since the ownership structure did not change for any firm interviewed between 1994 and 2004, we run a least square estimation of the impact of the type of ownership on the time horizon. The results are available in Table 5 below :

Table 5

[35] In presence of an omitted variable bias or a measurement error, OLS estimates are always biased downward to zero. IV estimation will always give higher point estimates (in absolute value) and we may be concerned that this is just "artificial" and does not reflect the true impact of short-termism.

	(1) Time Horizon
CEO Family Owner	-0.263*
	(-2.17)
CEO Founder and Owner	-0.435**
	(-3.19)
Competitiveness Measure	0.338*
	(2.07)
Lerner Index	1.250
	(1.10)
Private Company	0.128
	(0.87)
Manager's Gender	0.453
	(1.69)
Manager's Seniority	0.170***
	(4.16)
N	725

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The set of controls include : The gender and seniority of the manager, a measure of the firm's competitiveness, a measure of the firm's rents (Lerner Index) as well as the share of employees with a degree. We account for country and industry fixed effects and heteroskedasticity

As revealed by Table 5 above, there is a strong and statistically significant negative relationship between being in a firm where the manager is member of the largest owning family and the executive's average score on the "time horizon" questions. Similar comments apply for being in a CEO-founded firm. Moreover, managers in public firms seem to score higher on these questions[36], as expected. We also interestingly observe that women are less short-termist on average than men, as well as older managers compared to younger ones, everything else equal. We will now use these ownership variables to control for the heterogeneity between firms run by patient and impatient managers through a propensity score matching method.

3.2.2 Propensity Score Matching

We are concerned that there may be confounding factors affecting outcome variables, which might have prevented us from measuring the true impact of managerial impatience (short-termism). Indeed, assignment to treatment is not random and it is definitely possible that firms run by patient and impatient managers differ in other aspects, leading to inconsistent estimates of the impact of short-termism on the variables of interest. Let T_i now be a dummy variable indicating whether the firm is run by an impatient manager ($T_i = 1$) or not ($T_i = 0$). Even though we can measure $\tau = \mathbb{E}(Y_i \mid T_i = 1) - \mathbb{E}(Y_i \mid T_i = 0)$, the average treatment effect of

[36]Although we cannot rule out the null hypothesis, i.e no impact of running a public firm.

"being short-termist", it does measure the impact of being a short-termist manager. Moreover, we cannot estimate $\mathbb{E}\left[\mathbb{E}\left(Y_i \mid T_i = 1\right) - \mathbb{E}\left(Y_i \mid T_i = 0\right) \mid T_i = 1\right]$, the average treatment effect on impatient managers (i.e the Average Effect on the Treated). We cannot measure this because assignment to treatment (being impatient or not) is not randomized and we cannot observe outcome values Y_i in both states of the world T_i for any observation i.

Nevertheless, we previously conjectured that the ownership structure of a firm may be related to the short-termism of its executives through the decreased likelihood of a takeover. If the ownership structure has an impact on managerial impatience, it suggests that conditioning on it, we can think that assignment to treatment is almost random. As in Dehejia and Wahba (1999), we perform *selection on observables*: Conditioning on ownership structures, firms run by patient or impatient managers are similar *ex-ante*, and the only source of variation would come from the executive's time horizon. That is :

$$\forall j \in \{0,1\} \quad , \mathbb{E}\left(Y_{ij} \mid X_i, T_i = 1\right) = \mathbb{E}\left(Y_{ij} \mid X_i, T_i = 0\right)$$

Thanks to this *selection on observables* assumption, we are now able to measure the effect on the treated as :

$$\tau_{T=1} = \mathbb{E}\left[\mathbb{E}\left(Y_i \mid X_i, T_i = 1\right) - \mathbb{E}\left(Y_i \mid X_i, T_i = 0\right) \mid T_i = 1\right]$$

However, as pointed out by Dehejia and Wahba, conditioning on the matrix of observables X_i can be made difficult depending on the number of covariates. That is why we follow their approach and condition on the propensity score. Rosenbaum and Rubin (1983) proved that whenever treatment assignment is ignorable given pre-treatment characteristics, it is also ignorable given any balancing[37] score, which is a scalar (dimension 1). They prove that the propensity score is a balancing score. Conditioning on the propensity score $p(X_i)$ rather than the high-dimensional matrix X_i will help us solve the curse of dimensionality issue as a result. Our procedure is as follows :

- In the first-step, we will estimate, for each firm, the propensity score[38] by

[37]A balancing score is a score that balances covariates across treatment and comparison units so that both groups are comparable ex-ante and estimation is made possible.

[38]Namely the likelihood of being assigned to the treatment group given pre-treatment characteristics.

probit regression of our dummy variable for impatience T_i[39] on the matrix of ownership variables X_i, by controlling for country fixed effects.

- In the second-step, we match each treated observation (impatient managers) to the comparison unit with the closest propensity score. For each matched pair, we take a difference in means $\mathbb{E}\left(Y_i \mid p\left(X_i\right), T_i = 1\right) - \mathbb{E}\left(Y_i \mid p\left(X_i\right), T_i = 0\right)$.

We prefer to use a nearest-neighbor matching approach because our number of observations is rather limited[40], and we prefer to reduce bias at the expense of a higher variance rather than the reverse.

3.2.3 Comparing Treatment and Comparison Groups

In the first-step, we estimate our propensity score by binary probit regression. However, we need to check whether there is overlap between treatment and comparison units after conditioning on the propensity score. The average propensity score for treated units is 0.31 while the average propensity score for comparison units is 0.24, as highlighted by Tables 6.1 and 6.2 below :

Table 6.1 : Propensity Score - Impatient Managers

Variable	Mean	Std. Dev.	Min.	Max.	N
Propensity Score	0.311	0.115	0.087	0.614	188

Table 6.2 : Propensity Score - Control Group

Variable	Mean	Std. Dev.	Min.	Max.	N
Propensity Score	0.244	0.107	0.076	0.629	530

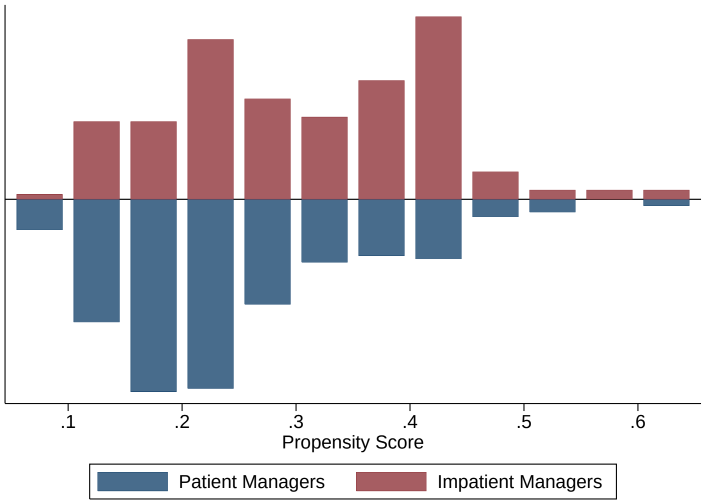
Moreover, we can see that upper and lower bounds are almost identical across subgroups, as is the variance. This suggests that there is overlap between the two subgroups and that consistent estimation of the average treatment effect on the treated is possible. Figure 2 below shows the distribution of propensity scores across treated and comparison units confirms that there is substantial overlap (common support) in propensity scores between the two groups[41].

[39]Recall that $T_i = 1$ if the managers scored less than 2 to the questions about targets time-horizon.

[40]Besides that, our ratio of treated to control units is $\frac{1}{3}$ which is rather very high compared to other studies using a Propensity Score Matching method

[41]In addition to that, Figures 3 and 4 in Appendix B.2 respectively display the existence of common support and the quality of the matches between the two groups.

Figure 2 - Distribution of the Propensity Scores across Treatment and Comparison Units



3.2.4 Average Treatment Effect on Impatient Managers

After having checked that there is common support and that the distribution of the propensity scores is similar across groups, we can proceed to the matching procedure. As explained above, we use a nearest-neighbor matching procedure as opposed to a caliper matching in order to have less biased point estimates. Our variables of interest are : Output, Capital Expenditures, Labor Expenditures, Materials Expenditures, Tobin's Q, Output (Sales) Growth, Firm Shutdown, Managers' Compensation, Average Hours Worked and Return to Capital. Each treatment unit is matched to the comparison unit with the closest propensity score and we take into account the fact that the propensity score is estimated. Tables 7 and 8 display our results :

Table 7

	(1) Output	(2) Tobin's Q	(3) Materials Exp.	(4) Capital Exp.	(5) Employment Exp.	(6) Output Growth
ATET						
Being Impatient	-0.309*	-0.578***	-0.310	-0.509**	-0.253	-0.0211
	(-1.98)	(-3.72)	(-1.80)	(-2.96)	(-1.75)	(-1.72)
N	718	373	700	716	718	713

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8

	(1) Prob. Shutdown	(2) Return to Capital	(3) Manager's Compensation	(4) Average Wages	(5) R&D
ATET					
Being Impatient	0.00979**	-1.668*	-0.0285	0.00375	-0.244*
	(2.73)	(-2.50)	(-0.73)	(0.26)	(-2.52)
N	6267	5930	2794	3356	2067

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

If there is more than one comparison unit with the same propensity score, the treatment observation is matched to the closest observations with the same propensity score and the differences in outcomes between treated and control groups is weighted by the number of observations used for the matching.

Our coefficients are almost always statistically significant at the 10% level[42]. Companies run by impatient managers exhibit much lower output, lower capital, labor and intermediate inputs expenditures, have a 2% lower sales growth per year and a 1.7% lower return to capital than other firms. R&D expenditures are also significantly lower in firms run by impatient managers.

In addition to that, the probability of firm shutdown goes up by almost 1% when the firm is run by a short-termist executives, while the Tobin's Q and managers' compensation (pay) is lower, even though the latter estimate is not statistically significant. All these results are consistent with our theoretical predictions. In line with Bertrand and Mullainathan (2003), we expected higher wages for employees in firms managed by short-termist managers, but the estimate is not statistically significant at all.

4 Conclusion

Our empirical analysis drew attention to the adverse effects of managerial short-termism : Firms run by impatient managers are characterized by lower output (sales), lower investment (expenditures), lower spending on inputs, lower growth and they are more likely to shut down and to be seen as less profitable (lower return to capital and lower Tobin's Q). This evidence is consistent with our theoretical predictions, according to which managerial impatience may not only prevent project continuation in the future, which can be interpreted as the growth of the firm and the return to investment, but project financing too, i.e less investment. We suggested that this short-termist behavior is somewhat related to the quiet life hypothesis in Bertrand and Mullainathan (2003) : When managers are not subject to market or owners' pressure, they prefer to avoid costly and difficult decisions and focus on actions that require less effort. Typically, earnings management is easier than investment into a long-term project.

However, these distortions induced by both managerial impatience and weakened

[42] 8 points estimates out of 10 are statistically significant at the 10% level and 6 out 10 at the 5% level.

incentives do not adversely only affect investment and financing decisions or managerial compensations, but may be detrimental to the economy as a whole. A recent working paper from Terry (2015) suggested that this focus on short-run management at the expense of long-run investment may cost 0,1 point of growth every year, and that firms that missed their earnings target are in average 146% less profitable than firms that did not. Besides that, he estimates the welfare loss due to short-termism to be around 0.5%, to put in perspective the welfare costs of business cycles, which are generally estimated to be between 0.1 and 1.8%. Studying the detrimental impact managerial short-termism may have is thus not only important from the shareholders' perspective, but it is also definitely relevant for policymakers.

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A Some Derivations

A.1 Optimal Contracts

Recall that the three incentive constraints are :

$$\Leftrightarrow u^{+} + \delta w^{+} - \left(u^{-} + \delta w^{-}\right) \geq \frac{\psi}{p} \quad (1)$$

$$u^{++} - u^{+-} \geq \frac{\psi}{\delta p} \quad (4)$$

$$u^{-+} - u^{--} \geq \frac{\psi d}{\delta p} \quad (5)$$

Looking at conditions (4) and (5), it is clear that setting $u^{+-} = u^{--} = 0$ will relax both second-period incentive constraints and it is weakly optimal to set the executive's compensation to 0 if the project fails. By similar logic, setting $u^{-} = 0$ relaxes the inter-temporal moral hazard constraint.

A contract is optimal whenever it minimizes the Principal's cost to providing "proper incentives" (exerting effort) to the Agent. Given that we have established that continuation utilities under failure should be zero, we have :

$$u^{-+} = \frac{\psi d}{\delta p}$$

When the manager is as patient as the investor, the cost of providing incentives to the manager is independent of the time period, as there is no discounting. In other words, the CEO compensation plan could be purely long-term, with $u^{+} = 0$. Indeed, future compensation enters in the first-period incentive compatibility constraint, so that the manager can be paid at $t = 2$ for an effort exerted at $t = 1$. Rewriting (1) so that we minimize the cost of the manager's compensation gives :

$$0 + \delta w^{+} - \delta p \frac{\psi d}{\delta p} = \frac{\psi}{p}$$

$$\Leftrightarrow \delta p u^{++} = \psi \left[\frac{1}{p} + d\right]$$

$$u^{++} = \frac{\psi}{\delta} \frac{1 + dp}{p^2}$$

However, when the manager is more impatient than the owner ($\delta \leq 1$), it is more

expensive to reward him at the last period. In particular, it would never be optimal to postpone payment. Indeed, for each dollar paid at $t = 1$ to induce effort at that period, it would cost $\frac{1}{\delta}$ dollar to induce the same effort at t=2. In particular, the Principal should pay consumption early whenever possible. This suggests that Condition (5) binds at the optimum. In other words :

$$u^{-+} = \frac{\psi d}{\delta p} \; u^{-+} = \frac{\psi d}{\delta p}$$

We can plug these values back into Condition (1) to obtain :

$$u^{+} = \frac{\psi}{p} - \delta \left[\frac{\psi p}{\delta p} - \frac{\psi p d}{\delta p} \right] = \psi \left(\frac{1 - (1-d)\, p}{p} \right)$$

The expected cost of the pure long-term contract is :

$$\psi \left[\frac{1+d}{\delta} \right]$$

The expected cost of the "mixed" contract is :

$$\frac{\psi}{p} \left[1 - (1-d)\, p + \frac{p + (1-p)\, d}{\delta} \right]$$

A.2 Cutoffs δ^0 and δ^1

Recall that :

$$\delta^0 = \frac{\psi}{(1+p)\, R^+ - \frac{\psi}{p}(1-p)} \qquad \text{and} \qquad \delta^1 = \frac{\psi}{2pR^+ - \psi}$$

δ^0 represents the cutoff under which the short-term focus of the manager is so high that it is not possible to launch either project. δ^1 is the cutoff under which the compensation of the manager is so high (because of impatience) that launching the second project will violate the Investor's participation constraint. We intuitively expect that whenever it is possible to launch the second project (the Participation Constraint), it is also possible to launch the first one. Indeed,

$$\delta^1 \geq \delta^0 \Leftrightarrow \frac{\psi}{2pR^+ - \psi} \geq \frac{\psi}{(1+p)\, R^+ - \frac{\psi}{p}(1-p)}$$

$$\Rightarrow 2pR^+ - \psi \geq (1+p)\, R^+ - \frac{\psi}{p}(1-p)$$

$$\frac{\psi}{p} - 2\psi \leq (1-p)\, R^+$$

$$0 \leq (1-p) \left[R^+ - \frac{\psi}{p} \right] + \psi$$

This always holds because of Assumption (3) (Inefficient Shirking).

A.3 Cutoffs δ^1 and δ^d

We want to compare the cutoffs δ^1 and δ^d to prove Proposition (3).

$$\delta^1 \leq \delta^d \Leftrightarrow \frac{(1-p)\,\psi}{p\left[R^+(1-p)-\psi\right]} \geq \frac{\psi}{2pR^+ - \psi}$$

$$\Leftrightarrow \left[2pR^+ - \psi\right](1-p) \geq p\left[R^+(1-p)-\psi\right]$$

$$\Leftrightarrow \psi\left[(1-p)-p\right] \leq pR^+(1-p)$$

$$\Leftrightarrow -\psi p \leq (1-p)\left[pR^+ - \psi\right]$$

which is always true.

A.4 Cutoffs δ^Π and δ^d

Because of our Assumption about inefficient shirking, we know that $\delta^\Pi \geq \delta^1$. Now, let's compare δ^Π and δ^d. That is, $\delta^d \geq \delta^\Pi$ whenever :

$$\frac{(1-p)\,\psi}{p\left[R^+(1-p)-\psi\right]} \geq \frac{\psi}{pR^+} \Leftrightarrow (1-p)\,R^+ \geq (1-p)\,R^+ - \psi$$

So whenever $\delta^d \geq 0$ (i.e $p \leq p^*$, we have $\delta^d \geq \delta^\Pi$. Obviously, when $p \geq p^*$, $\delta^\Pi > 0 > \delta^d$.

B Empirical Analysis

B.1 OLS in the Cross-section

Table 9 : Cross-Section - First Year

	(1) Return to Capital	(2) Tobin's Q	(3) R&D
Time Horizon	0.512	0.134*	0.178*
	(0.79)	(2.05)	(2.11)
Employment Exp.	-2.220	-0.670	0.248
	(-1.12)	(-1.38)	(1.57)
Capital Exp.	-0.0621	-1.264***	0.0934
	(-0.04)	(-3.68)	(0.73)
Materials Exp.	0.438	1.510***	0.439***
	(0.27)	(6.45)	(4.55)
% with degree	0.637	0.410***	0.682***
	(0.68)	(4.50)	(5.57)
N	537	214	184

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10 : Cross Section - Last Year

	(1) Capital Return	(2) Tobin's Q	(3) R&D
Time Horizon	1.632*	0.101	0.209*
	(2.54)	(1.42)	(2.26)
Employment Exp.	2.114	0.476	0.109
	(0.81)	(1.01)	(0.66)
Capital Exp.	-2.071	-0.286	0.133
	(-0.98)	(-0.86)	(1.05)
Materials Exp.	-0.0985	-0.173	0.506***
	(-0.05)	(-0.62)	(4.01)
% with degree	-0.208	0.341**	0.741***
	(-0.21)	(3.19)	(5.68)
N	632	137	205

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11 : Between OLS (Collapsed Data)

	(1) Return to Capital	(2) Tobin's Q	(3) R&D
Time Horizon	1.017*	0.143***	0.125
	(2.34)	(3.42)	(1.49)
Employment Exp.	-0.833	0.528	0.0743
	(-0.42)	(1.62)	(0.48)
Capital Exp.	-0.664	-0.458*	-0.438*
	(-0.47)	(-2.32)	(-2.05)
Materials Exp.	0.227	-0.0730	0.500***
	(0.19)	(-0.29)	(5.48)
% with degree	-0.608	0.335***	0.711***
	(-0.86)	(6.03)	(5.60)
N	694	377	195

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

B.2 Propensity Score - Treatment and Control Group Comparison

Figure 3 - Treatment and Control Units Before Matching

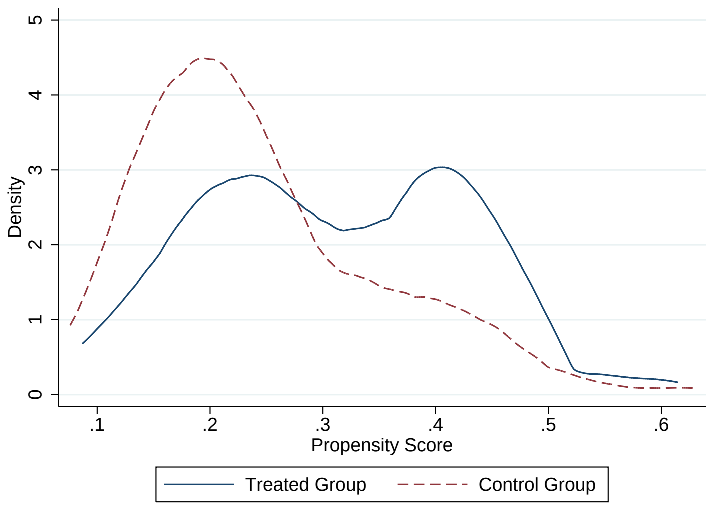
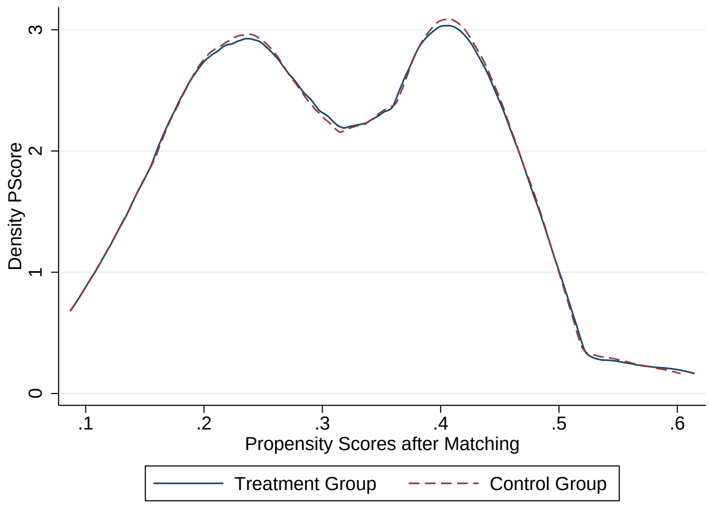


Figure 4 - Treatment and Control Units After Matching



Density PScore
0
1
2
3
.1
.2
.3
.4
.5
.6
Propensity Scores after Matching
Treatment Group
Control Group