

# An Experimental Investigation of the Effect of Governance on Expropriation by Managers

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Using a controlled laboratory experiment in a three-period investment setting, we examine the deterrence effect of internal governance on manager's *intention to expropriate* (IER). We distinguish between managers who survive till the third period (SM) and those who go bankrupt after the first period (NSM). Our examination of their IERs shows that SMs strategically exhibit lower IERs in the first (and second) period to build reputation but expropriate in the last period whereas NSMs expropriate in the first period. We interpret the lower IERs of SMs in the first two periods as a strategic choice of managers with different time preferences. We also find that internal governance level chosen by the investor has no effect on SMs and NSMs, indicating the lack of deterrence effect of internal governance. The actual expropriation, which combines the intention to expropriate with the detection effect of governance, decreases with the level of internal governance. An important policy implication of this finding is that effective governance systems should allow for deferred contingent compensation that extends beyond the manager's tenure.

*Key words*: Internal Governance, Expropriation, Experimental Economics

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## 1. Introduction

Proponents of the free market system have argued that a free capital market can safeguard investors and constrain managerial expropriation because investors can instantly move capital away from under-performing firms. However, the failures of large corporations such as Enron, financial institutions such as Lehman Brothers and the large audit firm of Arthur Andersen in the last decade have shown the need for strong internal governance systems to complement the market. Further, these failures not only adversely affect investors in those firms but the economy as a whole. This realization has prompted regulators, acting

in public interest, to regulate the design of governance mechanisms within firms to prevent expropriation by managers. A case in point is the passage of the Sarbanes-Oxley Act of 2002 that seeks to strengthen the internal governance mechanism in listed firms by requiring audit committees that are comprised solely of independent directors; holds CEOs and CFOs directly responsible for the effectiveness of internal control and veracity of financial statements; and forbids auditors from offering several non-audit services that might impair their independence in auditing. These governance systems are meant to strengthen the oversight of managerial decisions and actions so that managers are deterred from expropriating invested resources. The effectiveness of internal governance depends critically on whether most managers strategically determine their expropriation based on its wealth effects or have different psychic costs and/or other-regarding preferences which drive their actions irrespective of the wealth effects. Even if they respond strategically, internal governance's overall effect combines both its effect on the intention of managers to expropriate (deterrence effect) and its effectiveness in detecting and correcting such expropriation.

Managers can expropriate investor wealth in several ways: (i) perquisite consumption; (ii) reducing productive effort and shirking; (iii) empire building that gives them more luxury and social recognition and (iv) engaging in related party transactions that could, for example transfer assets from the publicly listed firm to a privately owned firm (Leuz et al. 2003). Such expropriation is partly restrained by the capital market wherein investors seek highest risk-adjusted returns by moving capital away from under-performing firms (Holmstrom and Kaplan 2001, Denis and McConnell 2003).<sup>1</sup> Supplementing the capital-market-based external governance, investors deploy internal governance by electing independent boards that exercise oversight on managers' actions and engage (through the audit committee of the board) external auditors who verify financial statements, assess internal control systems and provide opinions on them (Klein 2002a,b, Becker et al. 1998). In

<sup>1</sup> However, control over the movement of capital could be compromised by greenmail, poison pills and other anti-takeover mechanisms leading to entrenched managers (Eckbo 1990, Kosnik 1987, Shleifer and Vishny 1986, Dann and De Angelo 1983, Cochran et al. 1985, Knoeber 1986, Lambert et al. 1985, Malatesta and Walking 1988, Ryngaert 1988, Sundaramurthy 2000).

the face of failures of market-based governance experienced in the last decade, internal governance has gained increasing recognition as the primary means of restraining expropriations by managers and in turn, has prompted regulators to lay down the minimum level of internal governance in firms. Therefore, the effect of internal governance, either chosen by investors or regulated externally, on managers' intention to expropriate have become important research questions.

We use a controlled laboratory setting to experimentally examine two issues. First, we examine whether managers' actions could be best explained as strategic or innate behavioral response to expropriation opportunities. Second, we examine the deterrence effect of internal governance (IG) on manager's intention to expropriate. Our use of experimental setting is motivated by the following considerations. First, managers' intention to expropriate cannot be observed and recorded for empirical analysis. Second, archival studies are limited in their ability to manipulate governance variables in a controlled manner and in isolating contexts in which their effects could be investigated. For example, we are able in an experimental setting to introduce a monitoring system that detects and corrects expropriations but does not explicitly penalize the manager for expropriations. By avoiding explicit penalty, we can assess the effect of capital market on the manager's intention to expropriate. In a real life setting, it is inefficient to have a monitoring system without such an explicit penalty. Therefore, in real life situations, any expropriations that the manager carries out are hidden except in some special cases where further legal investigation might reveal it partly. This near-absence of empirical data on expropriations has limited the ability of empirical studies to examine expropriating behavior in a corporate setting.

Theoretically, if there are no behavioral differences between managers and they exhibit unbounded rationality, there are only two possible mutually exclusive equilibria. Under these assumptions, managers can determine the expected costs of expropriation perfectly and if the benefits of expropriating in any period exceed the expected costs, all managers expropriate as much as possible. The investors rationally anticipate this behavior and

reduce their investments to zero in that period. Alternately, if the costs of expropriation are more than the benefits, no manager will expropriate and anticipating this, investors will be fully invested in the firms. There will be no reason for investors to move capital from one firm to the other. However, a relaxation of either one of the above two assumptions could lead to equilibria in which expropriating and non-expropriating managers co-exist. We could relax the homogeneity assumption and allow for managers who might not be alike in their psychic costs of expropriation or in their social preferences towards investors, i.e. settings where there are inherent behavioral differences between managers. Alternatively, managers may differ in their bounded rationality or discount rate for future payoffs. In this case we could classify them as being either myopic or patient, where the myopic (patient) managers strategically evaluate the benefits of current expropriation to be higher (lower) than the expected future costs. In all of these settings, it is possible to have an equilibrium in which managers who expropriate co-exist with those who do not. For our experiment we assume that managers could respond differently, because of either strategic or behavioral differences.

Our experiment runs over three periods with a number of sub-periods within each period. We find that the level of IG does not influence managers who become bankrupt by losing all capital from investors at the end of the first period (denoted as non-surviving managers, NSM). We find that the surviving managers (SM) reduce their second period expropriation compared to period one, but expropriate significantly more in the last (third) period, suggesting that their relative non-expropriation in the first and second periods is driven by strategic considerations, i.e. investors choose internal governance levels juxtaposed upon differential time preference.<sup>2</sup> We also find that the intended expropriation rate (IER) is not affected by the internal governance level chosen by investors for both SMs and NSMs. This is consistent with the lack of deterrence effect from higher internal governance level.

<sup>2</sup> Note that in our experimental design there is no role for actual differences in time preference to affect behavior, since earnings are realized at the same time for all participants. However time preference captures the conceptually equivalent preference regarding uncertain payoffs over future periods in our experiment.

However, testing with a fixed IG level shows that for both SMs and NSMs, the IER is lower in the fixed non-zero IG level than in the zero-IG level. This result shows that when regulators exogenously choose the internal governance levels, it has a deterrence effect on managers.

These findings have policy implications in distinguishing between those aspects of IG that deserve greater emphasis from those that do not. For example, screening out managers based on their inherent potential for expropriating behavior might not be effective *per se* because the expropriation is driven by strategic considerations. Instead, governance mechanisms should focus on detecting expropriations with higher probability and possibly attaching penalties for detected expropriations. Regulators and investors should also recognize that mandating strong IG might or might not have the intended deterrence effect on the intention to expropriate. Another implication is that CEOs near retirement will have a strong incentive to engage in expropriating behavior in the absence of a longer term benefit from the firm. This suggests that governance should allow for deferred contingent compensation that extends beyond retirement.

Next, we briefly review related work in Section 2. Section 3 describes the experiment and its design, followed by the results in Section 4. The last section concludes the paper. The experiment instructions are provided in the e-companion to this paper.

## 2. Related Work

Review of prior empirical literature suggests that managerial expropriation can be controlled partly by the market for corporate control and partly by internal governance, which includes monitoring of managers' actions, choices and reports through corporate board structure and by external and internal auditing. The market for corporate control constrains managerial expropriations because investors can impose costs on managers who are under-performing either by taking over the firm and changing the management (Martin and McConnell 1991, Grossman and Hart 1988, Dahya and Powell 1998) or by

moving their investment elsewhere.<sup>3</sup> Regarding the role of internal governance, prior studies provide evidence that an effective board can limit managerial perquisites and private control benefits (Mace 1978, Hermalin 2005, Callen and Falk 1993, Kosnik 1987). Existing literature on boards document that independent boards mitigate real earnings management (Osma 2008) and monitor managers' actions, decisions and reporting through external and internal auditors. Audit committee, a committee comprising of board members, chooses the firm's external auditor and determines engagement terms and conditions (Rezaee and Turner 2006, Turley and Zaman 2007). Empirical evidence shows that independent, diligent and expert boards demand higher audit effort (Carcello et al. 2002). The board also oversees internal auditors (Davidson et al. 2005, Sweeney and Vallario 2002, Harrington 2003) and could improve monitoring of management actions through the internal audit function.

Although they provide valuable insights, these empirical studies are hampered by problems of endogeneity and omitted variables. For example, empirical analysis cannot unambiguously differentiate between the following two hypotheses: (i) stronger internal governance reduces managerial expropriation; or (ii) firms with low managerial expropriation choose strong internal governance structures. It is possible that managerial behavior might be the determinant rather than consequence of governance (See Linck et al. (2008) for an examination of board structure determinants). On the other hand, in an experimental setting, we can vary the treatments and determine the direction of the relationship. Prior experimental literature is rare in this area but has been used in related areas. In an experimental study of managerial choice between short term gains and long term cash flows when capital market pressure and disclosure frequency are varied, Bhojraj and Libby (2005) provide insights into the determinants of managerial myopia. Experimental investigations have been carried out on auditor independence in fact and appearance (Dopuch et al. 2003),

<sup>3</sup>In this context note that anti-takeover laws and firm-level provisions such as poison pills, golden parachutes, blank checks and greenmail enable managers to expropriate resources by restricting the market for corporate control (Bebchuk et al. 2004, 2002, Barnhart et al. 2000, Borokhovich et al. 1997, Mahoney and Mahoney 1993, Pound 1987).

auditor retention and rotation (Dopuch et al. 2001), effects of low balling on audit quality (Dopuch and King 1996), effect of different liability regimes on the demand for audit services (Dopuch and King 1992) and the impact of non-audit services on auditor independence (Dopuch et al. 1991). In an earlier experiment, Dopuch et al. (1989) examine how auditing could reduce moral hazard in a context with a buyer and a seller. Most of these experimental studies are one period studies that do not allow for competition among managers and investors in a multi-period context, since they focused on topics that did not necessarily require such a framework.

The investment game was first studied experimentally by Berg et al. (1995), in order to examine the degree of trust and reciprocity between two subjects, who can be interpreted as an investor and a manager. Numerous studies have subsequently used Berg et al. (1995) trust game to study the role of trust and trustworthiness in different contexts (see Güth et al. 1997, Ortmann et al. 2000, Gneezy et al. 2000, Buchan et al. 2008, among others). While these studies used a one-shot interaction between a matched pair of subjects, Cochard et al. (2004) allowed repeated interaction between matched pair of subjects in order to study the evolution of trust in the context of a repeated investment game. In our study we are interested in how internal (through costly monitoring) and external (through potential bankruptcy) governance influence the degree of managerial expropriation of returns generated through investment. Accordingly, we modify the basic investment game in two important ways. One, we incorporate the presence of a costly internal governance process allowing investors to detect with some probability managerial expropriation of returns. Second, we introduce a multi-period investment process which allows for the movement of capital by investors across managers in different periods and thereby allows the build-up of managerial reputation.

### **3. Experiment Design**

All participants were drawn randomly on a voluntary basis from graduate and undergraduate business students. The participants were compensated for their earnings at the end of

each session in cash. Each session lasted for approximately 3 hours and subjects earned the equivalent of US \$25 on average (including a fixed payment for participating) per session. Each participant in a treatment is assigned one of two equally likely roles, Manager or Investor, that remains the same over the course of the treatment. Each treatment consists of three periods and each period consists of multiple sub-periods. Operationally  $\tau$  denotes periods and  $t$  denotes sub-periods within each period ( $\tau$ ).

At the beginning of the first period, each investor is randomly matched with a manager, where a manager could be thought of as a “firm” owned by the investor. Each investor is provided with a one-time initial endowment ( $\omega_0$ ). In every sub-period ( $t$ ), an investor decides on the level of investment ( $I_t$ ) with a manager, an amount less than or equal to the total available amount. The investment yields a return  $\alpha$ , where  $\alpha \in [a, b]$  is a random normal variable characterized by

$$\alpha_t(\varepsilon_t) = \mu_\alpha + \varepsilon_t; \text{ where } \varepsilon_t \sim N(0, \sigma_\alpha^2) \text{ and } \mu_\alpha \in (0, 1) \quad (1)$$

where,  $\mu_\alpha$  and  $\sigma_\alpha$  reflect the expected return and its standard deviation for any given level of investment respectively. For an investment  $I_t$ , we define Actual Cash Flow (ACF) as

$$ACF_t(I_t, \varepsilon_t) = (1 + \alpha_t)I_t \quad (2)$$

Though the distribution of the returns is common knowledge, the ACF is privately observed by the manager. Subsequently, the manager reports a amount defined as Reported Cash Flow (RCF) to the investor ( $RCF \leq ACF$ ), where the difference between the ACF and RCF denotes the level of expropriation by the manager. Any non-invested amount with the investor is assumed to give zero returns<sup>4</sup>. Manager’s total payoff ( $\phi_t$ ) is given by:

$$\phi_t = \beta \cdot RCF_t + (ACF_t - RCF_t) \quad (3)$$

The first term in equation (3) is the direct compensation paid out of the reported cash flow, where  $\beta$  denotes the share of the reported earnings paid out as manager’s compensation<sup>5</sup>

<sup>4</sup> The investor has the option of investing partly in a risk free asset with a return  $r_t$  and partly with the firm with an expected return  $r_t + \mu_\alpha$ . Assuming  $r_t = 0$  does not affect the nature of the problem.

<sup>5</sup> In the experiment we use two values of  $\beta$ , 0.05 and 0.15. The value of  $\beta$  used in a particular session was known to all subjects.



and the second term is the expropriated amount. The investor's payoff ( $\nu_t$ ) from investment is given by

$$\nu_t = (1 - \beta)RCF_t \quad (4)$$

The total amount ( $\psi_t$ ) available to the investor to invest at the beginning of sub-period  $t$ , is given by

$$\psi_t = (\psi_{t-1} - I_{t-1}) + (1 - \beta)RCF_{t-1}; \text{ where } \psi_0 = \omega_0 \text{ and } I_t \leq \psi_t \forall t$$

During any sub-periods within a period, investors can invest their total cash holdings partially or fully, but they are not allowed to switch managers. Starting from period two ( $\tau = 2$ ) each investor is allowed to switch managers (firms), but only at the beginning of every period ( $\tau$ ). Prior to their decision on choice of manager at the beginning of periods 2 and 3, investors can observe the previous periods' reported returns from all managers. This is similar to investors having access to published financial reports of all firms before choosing a firm and the amount of investment.

### 3.1. First Period

The first period ( $\tau = 1$ ) consists of 6 investment sub-periods,  $t \in [1, 6]$ . Each investor is randomly matched with a manager and the matching remains in force for the duration of this period. At the beginning of the period, each investor is provided with an initial endowment ( $\omega_0$ ) of 3000 units of experimental currency units (ECU). The payoffs for investors and managers are determined as described earlier and at the beginning of each sub-period, the investor can partly or fully invest her total holdings with their manager.

### 3.2. Second Period

Second period ( $\tau = 2$ ) also consists of six sub-periods. At the beginning of this period, first period investments and returns for each manager (firm) are revealed to all investors. Investors can continue to invest with the same manager or switch their investment to another manager. This opens up the possibility of multiple investors choosing the same manager. It also opens up the possibility of a manager losing all investors. The manager

is said to be bankrupt if he/she does not attract any investor. A bankrupt manager (firm) does not participate in the rest of the treatment. Investors carry over to the second period their earnings from the end of the first period. The investment in a manager (firm) is the cumulative investment from all investors with that manager. The payoff for managers in each sub-period of the second period is determined in the same way as before. The payoff for investors is also determined as before, with the proviso that in case of multiple investors, the reported cash flows after paying off manager's compensation is shared in proportion to investment amounts.

### 3.3. Third Period

This period ( $\tau = 3$ ) is identical to the second period except that the number of sub-periods is deliberately kept uncertain in order to mitigate the "end game effect"<sup>6</sup> The participants are however aware that this is the last period. Therefore, the data from this period is only used to test for the expected presence of the "end game effect." However, the participants are fully compensated based on their earnings from all the three periods. The ECU's are converted to Hong Kong dollars at the end of the session and cash is paid out.

### 3.4. Internal Governance (IG)

**3.4.1. Variable Internal Governance Treatment** In this treatment, before every sub-period in each one of the three periods, investors make two decisions: the amount of investment and the level of internal governance. Internal governance is operationalized

<sup>6</sup> Even though the number of sub-periods in the third period is kept uncertain, the subjects will have expectations about the end of the game. This leads to the possibility of a backward induction equilibrium, i.e. one that would entail full expropriation by managers at every stage of the game and hence, no investment to begin with. But evidence from our current experiment and previous experiments on games involving backward induction, e.g. alternating offers bargaining games (Binmore et al. 2002, Johnson et al. 2002, Ochs and Roth 1989), centipede game (McKelvey and Palfrey 1992) and guessing games (Nagel 1995, Stahl 1996, Ho et al. 1998, Nagel 1998) consistently show players' decisions systematically violating backward induction based perfect equilibrium outcomes. This has been attributed to 'limited cognition' or 'bounded rationality' on the part of agents (Camerer et al. 1993, Stahl 1996, Spiegel et al. 1994). Another class of bargaining game experiments where the outcome is different from the one dictated by backward induction are the ultimatum (Güth et al. 1982) and trust (Berg et al. 1995) games, but here social preferences (Fehr and Schmidt 1999, Köszegi and Rabin 2006, McKelvey and Palfrey 1995) and not 'limited cognition' have been commonly identified as the reason behind the deviations from perfect equilibrium. Unlike this experiment, all the experiments cited above involved complete information games. In our set-up agents have incomplete information as investors choose managers after every period which leads to potential changes in their pairing during the course of the game. This imposes an additional cognitive challenge to the subject's ability to deduce the backward induction outcome.

by the probability that computer's monitoring process discovers the ACF. In firms with multiple investors, each investor submits his or her preferred level of internal governance. One of those submitted levels is chosen with a probability proportional to the ratio of her investment to the total investment in the firm. The chosen level of internal governance (but not its result) is revealed to manager before he chooses to report the amount, RCF. Once manager chooses RCF, the monitoring process generates Audit Revealed Cash Flow (ARCF) that is equal to RCF if audit fails and equal to ACF if it succeeds. In other words, internal governance is either effective and prevents expropriation fully or is ineffective and allows the full amount of intended expropriation<sup>7</sup>.

Investor's choice of governance level is denoted by  $\kappa \in [0, 1] = \text{Prob}[\text{ARCF} = \text{ACF}]$ . Choice of higher levels of governance entails higher costs resulting from more extensive monitoring. The internal governance cost function is denoted by  $C(\kappa)$ , where  $C(0) = 0$  and the marginal cost is positive and increasing, i.e.,  $C'(\kappa) > 0$  and  $C''(\kappa) > 0$ . Internal governance cost is modeled as a deadweight loss that is deducted from ACF before earnings are realized. Investor observes both ARCF and RCF. When they are equal, the investor is unable to deduce whether the manager did not intend to expropriate or whether he has expropriated but the governance system has not detected it. In case where manager's expropriation gets revealed because  $\text{ARCF} > \text{RCF}$ , he is penalized by being paid as a proportion of RCF<sup>8</sup> and is required to "restate" his earnings to ARCF. Expressions for the expected values of ARCF and expected payoffs to manager ( $E(\phi_t)$ ) and investor ( $E(\nu_t)$ ) follow.

$$E(\text{ARCF}_t) = \kappa_t \text{ACF} + (1 - \kappa_t) \text{RCF} \quad (5)$$

$$\begin{aligned} E(\phi_t) &= \kappa_t (\beta \cdot \text{RCF}_t) + (1 - \kappa_t) [(\beta \cdot \text{RCF}_t) + (\text{ACF}_t - C(\kappa_t) - \text{RCF}_t)] \\ &= \beta \cdot \text{RCF}_t + (1 - \kappa_t) (\text{ACF}_t - C(\kappa_t) - \text{RCF}_t) \end{aligned} \quad (6)$$

<sup>7</sup> In real world, a monitoring mechanism is likely to be one whose output is the amount of expropriation with an added noise component whose precision increases with the level of the mechanism. Theoretically the audit mechanism we use is an equivalent of such a monitoring mechanism.

<sup>8</sup> The amount of penalty is the expropriated amount plus reduced pay because  $\text{RCF} < \text{ACF}$ .

$$\begin{aligned}
E(\nu_t) &= \kappa_t (ACF_t - \beta.RCF_t - C(\kappa_t)) + (1 - \kappa_t)(1 - \beta)RCF_t \\
&= (1 - \beta)RCF_t + \kappa_t (ACF_t - C(\kappa_t) - RCF_t)
\end{aligned} \tag{7}$$

In the above expressions,  $E(\cdot)$  denotes the expected value.

**3.4.2. Fixed Internal Governance Treatment** This treatment is identical to the variable internal governance treatment, except that the investor does not exercise any choice over the internal governance level. The level of internal governance is exogenously *fixed* at 0.5 (i.e.,  $\kappa = 0.5$ ) throughout the treatment. Everything else, including the process through which ACF, RCF and ARCF gets generated, is the same as in the variable internal governance treatment.

Table 1 provides the details for the independent cohorts per treatment and number of subjects per cohort.

Treatment	Number of Subjects per Cohort				Total
	Cohort 1	Cohort 2	Cohort 3	Cohort 4	
No Internal Governance	40	32	–	–	72
Fixed Internal Governance	32	32	–	–	64
Variable Internal Governance	40	32	32	32	136

## 4. Results

Table 2 provides a summary of the definitions for the variables used in our design and analysis. Table 3 provides the data averaged over sub-periods within each period for the following variables of interest: intended and actual expropriation by managers; investment rate and internal governance levels chosen by investors; and managers' and investors' payoffs from different treatments and managerial bankruptcy rate, in three categories: (i) No Internal Governance (IG level fixed at 0), (ii) Fixed Internal Governance (IG level fixed at

**Table 2 Definition of Variables.**

Cash Flow Variables	Definition
ACF	Actual Cash Flow (net of audit cost)
RCF	Cash flow reported by managers
ARCF	Cash flow revealed to the investors through the internal governance process
BEGCASH	Investors total cash balance at the beginning of a sub-period
Internal Governance Variables	Definition
IG	Internal Governance
No IG	Treatment where there is no internal governance, i.e. exogenously fixed at 0
Fixed IG	Treatment where internal governance level is exogenously fixed at 0.5
Variable IG	Treatment where internal governance level is chosen by investors
DFixed	Indicator variable for Fixed IG treatment
DVar	Indicator variable for Variable IG treatment
Igovlev	Level of internal governance
Investor Variables	Definition
Irate	Ratio of amount invested over the total amount available for investment
Invearn	Ratio of investor earnings on ACF
Manager Variables	Definition
IER	Intended Expropriation Rate = $(ACF-RCF)/ACF$
AER	Actual Expropriation Rate = $(ACF-ARCF)/ACF$
SM	Surviving Managers, identified as those who do not go bankrupt during any period and therefore continue to manage their firm in period 3
NSM	Managers who go bankrupt at the end of period 1
DSM	Indicator variable that takes a value of 1 if the manager is SM, 0 if the manager is NSM
Manearn	Ratio of manager earnings on ACF
Other Variables	Definition
DBeta	Indicator variable for high managerial compensation where, $\beta(high) = 0.15$ and $\beta(low) = 0.05$
BKrate	Bankruptcy rate for managers
DSecondpd	Indicator variable for the second period ( $\tau = 2$ )
DThirdpd	Indicator variable for the third period ( $\tau = 3$ )

0.5) and (iii) Variable Internal Governance (IG level chosen by investors).

In the first period, both expropriating and non-expropriating managers co-exist. Each investor is randomly matched with a manager at the beginning of the first period and continues with that manager during all the six sub-periods in the first period. At the end of the first period, the performance of all managers are revealed to each investor when they get the opportunity and information to switch investments among different managers. The returns for expropriating managers are likely to be lower and such managers are also likely to be exposed, *ceteris paribus*. Investors are therefore likely to move their investments

**Table 3** Aggregate Mean Data for All Treatments.

	No IG (n=536)			Fixed IG (n=480)			Variable IG (n=964)		
	Period 1	Period 2	Period 3	Period 1	Period 2	Period 3	Period 1	Period 2	Period 3
Igovlev	0	0	0	0.5	0.5	0.5	0.62	0.49	0.72
Irate	0.33	0.56	0.49	0.51	0.6	0.52	0.62	0.66	0.69
IER	0.22	0.05	0.18	0.18	0.145	0.28	0.2	0.14	0.18
AER	0.22	0.05	0.18	0.08	0.05	0.12	0.09	0.09	0.11
Invearn	0.71	0.88	0.72	0.76	0.84	0.79	0.72	0.79	0.79
Manearn	0.29	0.13	0.26	0.10	0.09	0.14	0.137	0.151	0.127
BKrate	na	0.64	0.75	na	0.65	0.78	na	0.56	0.66

IG denotes internal governance. Refer to Table 2 for definition of all variables.

away from expropriating managers to non-expropriating managers. As a result, in the second period only those managers who did not excessively expropriate in the first period survive. Therefore, internal governance level (Igovlev) needed to control expropriation falls in the second period compared to first, as can be seen from the Variable IG treatment data in Table 3. For similar reasons, investment rate (Irate) increases in the second period compared to the first for all treatments. From Table 3 we also observe that the internal governance level for variable IG rises considerably in the third period. This is a consequence of investors rationally expecting expropriation by managers in the absence of the threat of investors switching their investment.

The intended expropriation rate (IER) consistently declines in the second period compared to the first for all treatments. Also, from the Variable IG treatment we observe that this decline in IER in the second period is accompanied by a decline in internal governance level. This is attributable to the screening out of excessively expropriating managers in the first period. The actual expropriation rate, however, declines with internal governance. This is mostly driven by the mechanical effect of a higher likelihood of detection of expropriation at higher levels of internal governance. The third period shows an increase in intended expropriation for all treatments, providing an early indication that the manager's

intention to expropriate in our experimental setting is driven by strategic considerations.

The managers who survived the first period and expropriated less than others in the second period are likely to continue in the third period. In the next section, we compare these surviving managers with non-surviving managers who went bankrupt at the end of the first period.

#### 4.1. Regression Analysis: Managerial Expropriation

Within the group of managers, differences in expropriating behavior could be driven either by innate behavioral differences or by strategic considerations. Differences in expropriating behavior for either reason would be reflected in a significantly lower first period IER for SMs, i.e. those who survive to the third period compared to the IER for NSMs who go bankrupt at the end of the first period. In order to examine this, we use an indicator variable (DSM) that takes the value of one if the manager is SM and zero if the manager is NSM. We delete from the analysis those few managers who survive the first period but go bankrupt at the end of the second period because it is unclear whether these managers were expropriators who survived the first period by chance or non-expropriating managers who went bankrupt in the second period by chance. By deleting this set of managers, we have a less noisy classification between SMs and NSMs. We investigate whether SMs have significantly different expropriation rates (IER and AER) compared to NSMs.

Regression 1 in Table 4, which uses the first period data from all three treatments, shows that DSM has a significantly negative coefficient, implying that SM's do indeed have significantly lower IER than the NSM's. This result holds whether investors have access to internal governance (Variable IG) or there is no internal governance (No IG), as can be observed from the regressions 2 and 3. However, difference in internal governance levels (Igovlev) are not significantly associated with IER, irrespective of whether we look at the combined data from all treatments (regression 1) or specifically at the Variable IG treatment where investors can choose the level of internal governance (Regression 2). The signs for the coefficients of Actual Cash Flow (ACF) and managerial compensation factor

**Table 4** Intended (& Actual) Expropriation Rate (SM vis-a-vis NSM)

Model	IER			AER
	(1)	(2)	(3)	(4)
Treatment	All	Variable IG	No IG	All
Sample	Full Period 1	Full Period 1	Full Period 1	Full Period 1
Constant	0.333*** (0.021)	0.404*** (0.046)	0.355*** (0.030)	0.290*** (0.017)
ACF	-2.30 <sup>a</sup> *** (0.717 <sup>a</sup> )	-2.78 <sup>a</sup> *** (1.01 <sup>a</sup> )	-1.93 <sup>a</sup> (1.74 <sup>a</sup> )	-0.588 <sup>a</sup> (0.588 <sup>a</sup> )
Igovlev	-0.039 (0.033)	-0.075 (0.060)	–	-0.222*** (0.027)
DBeta	-0.059*** (0.022)	-0.128*** (0.034)	-0.043 (0.034)	-0.046** (0.018)
DSM	-0.170*** (0.021)	-0.157*** (0.030)	-0.235*** (0.039)	-0.136*** (0.017)
Obs	659	350	172	659
Adj $R^2$	0.146	0.127	0.224	0.197
F stat	28.07***	13.67***	17.46***	41.47***

, \*\*, \*\*\* denotes  $p < 0.1$ ,  $p < 0.05$ ,  $p < 0.01$  respectively. <sup>a</sup> denotes  $\times 10^{-5}$ . IG denotes internal governance. Number inside parenthesis denotes standard error. Refer to Table 2 for definition of variables.

(DBeta is one when compensation factor,  $\beta$ , is high and zero when low) in both regressions 1 and 2 are negative as expected. They imply that when managerial compensation is high, either due to high ACF or due to high  $\beta$ , there is less incentive for managers to expropriate. Regression 3 has similar results but the ACF and DBeta coefficients are not significant. The results for actual expropriation (AER) by managers, i.e. regression 4 in Table 4, are exactly similar to that of IER, except that Igovlev has a significant negative impact on AER. This is to be expected, since a high internal governance level is mechanically designed to detect expropriation with more efficacy and thereby reduce actual expropriation, irrespective of the intended level of expropriation.

From Table 4 we find that SMs have significantly lower expropriation levels than NSMs. This raises the issue of whether SM's lower IER choice in period one is innately behavioral



**Table 5 Intended Expropriation Rate (SM)**

Model	IER		
	(5)	(6)	(7)
Treatment	No IG	Variable IG	All
Sample	SM Periods 1-3	SM Periods 1-3	SM Periods 1-3
Constant	0.078*** (0.018)	0.145*** (0.038)	0.108*** (0.020)
ACF	-1.86 <sup>b</sup> (2.09 <sup>b</sup> )	-1.51 <sup>b</sup> (1.39 <sup>b</sup> )	3.95 <sup>b</sup> (0.804 <sup>b</sup> )
IGovlev	–	0.004 (0.050)	0.028 (0.028)
DBeta	0.001 (0.023)	0.009 (0.035)	0.006 (0.024)
DSecondpd	-0.032 (0.025)	-0.053* (0.029)	-0.067*** (0.021)
DThirddpd	0.119*** (0.037)	0.067* (0.042)	0.073*** (0.029)
Obs	158	355	628
Adj $R^2$	0.082	0.014	0.037
F stat	4.53***	2.02*	5.85***

\*, \*\*, \*\*\* denotes  $p < 0.1$ ,  $p < 0.05$ ,  $p < 0.01$  respectively. <sup>b</sup> denotes  $\times 10^{-6}$ .

Number inside parenthesis denotes standard error. Refer to Table 2 for definition of variables.

or they are dictated by strategic considerations of attracting more capital over a longer period. If the low IER choice is innately behavioral, due to higher psychic costs of expropriation or greater other-regarding preferences, we would expect such behavior to carry through to the third period. However, if the lower IER choice is dictated more by strategic considerations, then we would expect a substantial increase in IER in the third period, since in the last period there is no further incentive for managers to work towards attracting future investments.<sup>9</sup>

Table 5 gives results of regressions for SMs that include indicator variables for the second

<sup>9</sup> Note though that the investors still have the ability to discipline managers by reducing investment in response to perceived expropriation.

and third periods. Regression 5 gives the results in the case of no-IG; regression 6 in the case of variable IG and regression 7 includes all cases. In all these three regressions, it is seen that the third period indicator (DThirdpd) shows a positive and significant coefficient. In effect, the non-expropriating managers who survived till the third period by expropriating less in the first two periods change their expropriation behavior and expropriate significantly more in the third period. This is consistent with strategic behavior whereby the restraint on expropriation during the first two periods is driven primarily by a desire to continue attracting more capital from investors but when this incentive is removed in the third period, the expropriation is significantly higher. This evidence is inconsistent with innately non-expropriating behavior which would have lead to low expropriation in the third period irrespective of external incentives.

#### **4.2. Regression Analysis: Effect of Internal Governance on IER**

We saw earlier from regressions 1 and 2 in Table 4 that in a pooled sample of all managers, the level of internal governance does not exhibit an association with the choice of IER. Regressions 8 and 9 in Table 6 show no evidence of any significant effect of Igovlev on IER in the variable IG case for SM and NSM respectively. Regressions 10 and 11 use the pooled No-IG and Fixed-IG sample and uses DFixed as an indicator variable for the fixed IG case where the internal governance level is fixed at 0.5. In this case, the higher internal governance level (DFixed) has negative and significant coefficients, indicating a deterrence effect. In cases where investors can alter the governance levels, there is no deterrence effect but exogenously fixing a high internal governance level seems to have a deterrence effect. Moreover, the presence or absence of deterrence effect does not depend on whether the manager is SM or NSM. Overall, these results indicate that an external regulation might be more effective in reducing expropriation than higher governance levels chosen by investors (or the board on their behalf).

### **5. Conclusion**

We use a controlled three-period investment game setting to observe the intention by managers to expropriate the returns from investment in the presence of internal governance

**Table 6** Effect of Internal Governance on Intended Expropriation Rate

Model	IER			
	(8)	(9)	(10)	(11)
Treatment	Variable IG	Variable IG	No & Fixed IG	No & Fixed IG
Sample	SM Period 1	NSM Period 1	SM Period 1	NSM Period 1
Constant	0.024 (0.066)	0.479*** (0.059)	0.090*** (0.015)	0.356*** (0.034)
ACF	0.465 <sup>b</sup> (11.6 <sup>b</sup> )	-0.509 <sup>b</sup> *** (0.147 <sup>b</sup> )	-5.16 <sup>b</sup> (5.17 <sup>b</sup> )	-19.4 <sup>b</sup> (16.3 <sup>b</sup> )
Igovlev	0.078 (0.083)	-0.089 (0.083)	–	–
DBeta	0.047 (0.054)	-0.185*** (0.042)	-0.30 (0.020)	-0.044 (0.046)
DFixed	–	–	-0.068*** (0.018)	-0.120*** (0.045)
Obs	126	224	94	215
Adj $R^2$	-0.015	0.098	0.188	0.054
F stat	0.35	9.09***	8.18***	5.12***

\*, \*\*, \*\*\* denotes  $p < 0.1$ ,  $p < 0.05$ ,  $p < 0.01$  respectively. <sup>b</sup> denotes  $\times 10^{-6}$ . Number inside parenthesis denotes standard error. Refer to Table 2 for definition of variables.

and market control, in order to experimentally examine two things. First, whether managers' decisions are determined by strategic reaction or innate behavioral responses in the presence of expropriation opportunities. Second, the impact of internal governance (IG) on manager's intention to expropriate. We find that managers who survive bankruptcy in the first two periods by expropriating less than those who do not survive bankruptcy at the end of the first period, nevertheless expropriate significantly in the last period. This suggests that their decisions regarding expropriation are driven primarily by strategic considerations rather than being inherently behavioral. We also find that the level of internal governance chosen by the investors has little effect on the intended expropriation rate but an externally imposed internal governance level has a deterrence effect. Importantly, this relationship is similar for both the surviving and non-surviving managers.

Our findings also have two important policy implications. First, given that in this kind of

setting managerial action is driven primarily by strategic considerations, executives with a short horizon (i.e. nearing retirement) will have strong incentive to engage in expropriating behavior in the absence of longer term benefit from the firm. This suggests that governance should allow for deferred contingent compensation that extends beyond retirement in order to better align the incentives of executives and shareholders. Second, external regulation of governance seems to have more effective deterrence effect than the internal governance chosen by the investors of the firm when the external governance - the ability of investors to disinvest from any manager - is kept constant throughout the experiment.

Although our study does not provide evidence in support of innately behavioral explanation in the context of deterring expropriation, it does not rule out such an explanation. A conceptual contribution of the study is that it helps in drawing boundaries on situations where behavioral explanation is necessary and where it is not necessary.

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## Experiment Instructions (Variable IG Treatment)

This is an experiment in decision-making funded by a research grant. During the experiment you will be called upon to make some decisions. Your earnings will be determined by the rules of the experiment, your decisions and the decisions of the other participants. During the experiment you will be awarded points which are in the nature of Experimental Currency Units (ECU). At the end of the experiment your ECU's will be converted to HK\$ and you will be paid in cash what you earn.

The experiment consists of a game with multiple *periods* and each period has several identical *sub-periods*. You will be assigned either the role of an **Investor** or a **Manager** in the game. To begin with (in Period 1), each *Investor* is matched with a *Manager* at random by the program. From Period 2 onwards, each investor SELECTS their manager. In case a manager *is not selected* by any investor, she is **declared bankrupt** and **can no longer participate** in the game. In each sub-period the investor and the manager have to make certain decisions (*See Figures EC.1 and EC.2 for a screen shot of the Investor's and Manager's main window respectively.*)

Figure EC.1 Screenshot of Investor Main Window

The screenshot shows the 'Investment Window (You are founder investor)' with the following data:

- User ID: 1, Group ID: A, Round: 1, Period / # Periods: 2 / 2, Initial Endowment: 200000
- No. of Investors: 1, Has Founder Investor: Y, Period Investment Earning: 59918, Cumulative Earning: 205918
- Poison Pill Option (Yes/No/NA): AVAILABLE
- Audit level: VAR\_AUDIT, Level: ---
- Amount to invest: ---, Max Investment: 205918
- Reported Cash Flow of last period: 50373, Audit Revealed Cash Flow of last period: 67165

Message: [Tue Jul 25 17:24:56 CST 2006]: Please select audit level for the company.

Period	Investment	Audit Level	Reported Cash Flow	Audit Revealed Ca...	Investment Earning	Cumulative Earning
1	54000	0.41	50373	67165	59918	205918
2	---	---	---	---	---	---

Figure EC.2 Screenshot of Manager Main Window

Period	Investment	Audit Level	Actual Cash Flow	Reported Cash Flow	Audit Revealed Ca...	Earning
1	54000	0.41	67165.0	50373	67165	7021
2	70012	0.69	89349.0	---	---	---

## EC.1. Decisions

### EC.1.1. Investment Decision

Investors are given some ECU's to begin with. At the beginning of period one they decide on how much of it to invest with the manager. The rest they get to keep as cash in hand. Investments generate a return (termed actual cash flow or ACF), where in general higher the investment level, higher the ACF, where Actual Returns (ACF) =  $\alpha \cdot \text{Investment} \pm \text{Uncertainty Factor On Returns}$ , where  $\alpha$  is average return on investment and will be revealed to you before each game<sup>10</sup>.

The investor makes earnings at the end of each sub-period which gets added to their cash in hand. In the next sub-period, the investor decides on how much of their total cash balances to allocate towards investment, where like before the uninvested part is cash in hand.

### EC.1.2. Internal Governance Decision (Variable IG Treatment)

Investors have to also make an *Internal Governance* decision<sup>11</sup>. It involves CHOOSING an *audit* level, where the investors use audit in order to know the actual return (ACF). The audit level determines the PROBABILITY with which the investor will be able to KNOW the actual return (ACF) on their investment. The audit level can be anywhere between

<sup>10</sup>  $\alpha$  was 1.15 in some treatments and 1.30 in others.

<sup>11</sup> In the experiment, internal governance, defined as the probability that expropriation is reduced to zero, is denoted as "Audit."

and including 0 and 1.

If the audit process is SUCCESSFUL then the RETURN REVEALED to the investor is equal to the actual return (ACF), while if the audit process FAILS then the the RETURN REVEALED to the investor is equal to the manager's reported return (RCF). The PROBABILITY of SUCCESS of the audit process is directly equal to the AUDIT LEVEL chosen by the investor.<sup>12</sup> The return revealed by the audit process is termed as audit reported cash flow (ARCF). Once the audit process is over, the investor observes both ARCF and RCF. (See Figure EC.3 for a screen shot of the Investor's audit and investment decision).

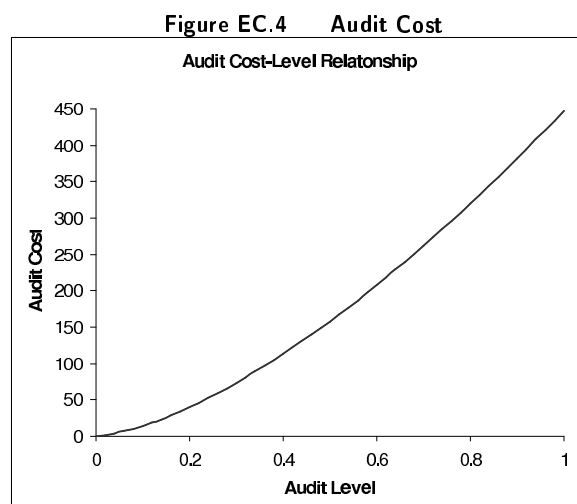
**EC.1.2.1. Internal Governance Decision with Multiple Investors** If a manager is selected by more than one investor, then each investor chooses an audit level and investment like before. However, the investor who chooses a relatively high level of investment compared to other investors in the group will have a higher likelihood of their audit level being actually selected. If an investor's chosen audit level is not selected then that investor is given the opportunity to choose a different investment level.

Figure EC.3 Screenshot of Audit and Investment Decision

The screenshot shows a software interface for making an audit and investment decision. It features two horizontal sliders. The first slider, labeled 'Audit level', ranges from 0.0 to 1.0, with a current selection at 0.5. The second slider, labeled 'Investment Amount', ranges from 0.0 to 2300, with a current selection at 1150. Below the sliders is a button labeled 'Submit Audit and Investment Level'. A text box contains a remark: 'Remark: If your chosen audit level is selected, the amount chosen by you here will be your investment level. Otherwise, you will have the option to change your investment level in the next step.' At the bottom, a 'Confirmation' section asks 'Do you want to submit the chosen audit level and investment amount?' with 'Yes' and 'No' buttons.

<sup>12</sup> We went through some examples of the audit process with the subjects.

**EC.1.2.2. Internal Governance Cost** Choosing audit is COSTLY. Higher the chosen audit level higher the cost, where the audit costs increases steeply (and not proportionally) with increases in audit level (as can be seen from Figure EC.4).



The program provides you with an in built audit cost calculator. The audit costs gets deducted from the actual returns (ACF) before earnings are realized for the investor and manager.

### EC.1.3. Reporting Decision

Once investment is made, MANAGERS observe the actual cash flow (ACF) and the audit level. They then CHOOSE what to report to the investor as the return (termed reported cash flow or RCF). The investors do not observe the actual return (ACF). The reported return (RCF) CHOSEN by the Manager can be EQUAL to or LESS than the ACTUAL RETURN (ACF). (See Figure EC.5 for a screen shot of Manager's reporting decision).

## EC.2. Manager Selection

At the beginning of Period 2 and all subsequent periods investors have to select a manager. They can either RETAIN the one they are currently matched with or CHOOSE a NEW one. Once a period is completed, all investors receive information about the performance of all managers in that period. Investors are then expected to use that information in

Figure EC.5 Screenshot of Manager's Reporting Decision

order to select their manager for the next round (See Figure EC.6 for a screen shot of the information that investors receive about all managers and the manager selection process).

Figure EC.6 Screenshot of Manager Selection Decision

Group ID	Available	Round	Poison Pill	Total Investment	Audit Cost	Reported Cash Flow	Audit Reveal Cash Flow	Investors % Earning
A	Yes	1	NA	2280	552	2496	3374	101.49%
B	Yes	1	NA	2010	546	981	981	15.22%
C	Yes	1	NA	1800	517	2161	2161	68.5%
D	Yes	1	NA	1290	437	1202	1909	99.22%

### EC.3. Earnings

The manager's share of the returns is determined by the fraction  $\beta$ . This will be revealed to you before the game<sup>13</sup>. The earnings for the investor and manager depends on the results of the audit process and are calculated in the following way<sup>14</sup>:

1. If  $ARCF = ACF$

<sup>13</sup>  $\beta$  took the values of 0.05 or 0.15.

<sup>14</sup> Note audit costs (if any) were deducted from the actual returns before earnings were realized for the investor and manager. Also for each of the two cases described below, we went through some actual numerical examples with subjects.

- Manager Earnings =  $\beta$  ARCF
- Investor Earnings =  $(1 - \beta)$  ARCF =  $(1 - \beta)$  ACF

2. If  $\text{ARCF} < \text{ACF}$

- Manager Earnings =  $\beta$  ARCF + (ACF - ARCF)
- Investor Earnings =  $(1 - \beta)$  ARCF

### **EC.3.1. Multiple Investor Case**

In case there are multiple investors matched with the same Manager then the total investor earnings is first determined as described before. Then all the investors SHARE the investor earnings in PROPORTION to their SHARE OF INVESTMENT with respect to total investments in the firm.

### **EC.4. Experiment Preliminaries**

We will now take you through the steps to load the program to begin the experiment. Once the program is loaded you will play a practice game to familiarize yourself with the decisions during the experiment. Your earnings during the practice games will not count towards your actual earnings!

ANY QUESTIONS?