EFFECT OF INTERNAL AND MARKET-BASED GOVERNANCE ON MANAGERIAL INTENTION TO EXPROPRIATE AND INVESTOR CONFIDENCE: AN EXPERIMENTAL INVESTIGATION

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ABSTRACT. We use a controlled laboratory setting to experimentally examine the role of internal and market-based-governance in restraining opportunistic managerial expropriation and thereby increasing investor confidence. Managerial expropriation is broadly defined to include consumption of private control benefits and non-pecuniary compensation that transfer wealth from investors to managers and result in a reduction of income. Internal governance includes board-based governance systems and other verification-monitoring systems such as internal and external auditing that constrain managerial expropriation. Market-based governance is the disciplining of managerial actions through capital market mechanisms. Market-based governance works through the market for corporate control and movement of capital away from under-performing firms. Such market-based mechanisms could be weakened when managers are entrenched. The results of the experiment reveal that the market converges to equilibrium even in the absence of internal governance. However, internal governance reduces managerial consumption, attracts more capital and thereby increases the overall welfare, after accounting for the cost of such governance. Further, we show that entrenchment of management results in a demand for more internal governance and lower net inflow of capital. The effect of entrenchment on managerial consumption is mixed.

KEYWORDS: GOVERNANCE, INVESTOR CONFIDENCE, EXPERIMENTAL ECONOMICS

1. INTRODUCTION

Failures of governance systems at large corporations such as Enron, Tyco and World-Com, large auditors such as Arthur Andersen and more recent failures in financial infrastructure have focused the attention of, regulators, executives, investors and researchers on the roles played by both institutional governance systems and competitive markets in limiting managerial expropriation of resources at the expense of investors and society at large. Managers can expropriate investor wealth by (i) reducing effort that provides them with more leisure, (ii) perquisite consumption and empire building that gives them more luxury and social recognition, and (iii) consumption of private control benefits that gives them power and ability to control resources of the corporation with little or no accountability. Such expropriation deprives investors of the difference between achievable and realized performance. In a study spanning 31 countries, Leuz et al. (2003) argue that managers engage in consumption of private control benefits such as related party transactions, empire building and other "hidden" transactions that effectively transfer wealth from investors to managers[1]

In practice, both market and institutional mechanisms discipline managers and limit their consumption of benefits (Denis and McConnell, 2003). Market mechanisms work if investors can move capital between firms at will with negligible transaction costs. Rational investors seek highest risk-adjusted returns for their investments by moving capital away from firms whose managers expropriate resources. This competition for capital induces managers to act in the interest of investors to preserve their firms and jobs. Extensive literature on corporate control document the governance role played by capital markets in limiting managerial consumption (for a review, see Holmstrom and Kaplan (2001)). Consistent with Denis and McConnell (2003), we refer to market-driven governance mechanism as external governance. However, market for corporate control

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[1]Another way in which managers transfer wealth from investors to themselves is by earnings management, a notion that is supported by extensive empirical literature (Healy and Wahlen, 1999; Bruns Jr. and Merchant, 1990; Burgstahler and Dichev, 1997; Burgstahler and Eames, 2003; Christie and Zimmerman, 1994; Dechow et al., 1996; DuCharme et al., 2004; Richardson, 2000). Expropriation through earnings management takes place by misleading investors about performance in a way that helps managers increase their own compensation and other benefits. In addressing expropriation, this study does not explicitly deal with any particular mechanism of expropriation (in particular through misreporting) at the conceptual level, though for reasons explained later (see footnote 11) it exclusively uses under-reporting as an expropriatory device.

could be compromised by mechanisms that restrict transfer of control such as greenmail, golden parachutes, poison pills and anti-takeover mechanisms leading to entrenchment of managers (Eckbo, 1990; Kosnik, 1987; Schleifer and Vishny, 1986; Dann and De Angelo, 1983; Cochran et al., 1985; Knoeber, 1986; Lambert et al., 1985; Malatesta and Walkling, 1988; Ryngaert, 1988; Sundaramurthy, 2000). Entrenched managers are likely to expropriate more resources than managers whose jobs are contingent on performance. For example, poison pills have been shown to increase earnings management, decrease value-relevance of earnings (Srinidhi and Sen, 2007b) and increase managers' compensation (Srinidhi and Sen, 2007a; Bebchuk et al., 2002). Potential failure or weakening of corporate control induces investors to bolster internal governance mechanisms that include board structuring, auditing and ownership structure (Denis and McConnell, 2003). Several studies have examined the effectiveness of internal governance mechanisms such as board independence and audit committee structure (Klein, 2002a; Klein, 2002b; Becker et al., 1998), auditor independence (Klein, 2002a; Klein, 2002b; Becker et al., 1998), and audit effort (Srinidhi and Sen, 2007b) on earnings management. In summary, these studies provide evidence that both external and internal governance mechanisms restrain expropriating behavior. However, managers weaken internal governance by increasing their influence on boards and creating economic bonds with auditors and weaken external governance by adopting anti-takeover provisions (Gompers et al., 2003; Srinidhi and Sen, 2007b).

The existence of these two mechanisms to limit expropriation and managers' incentive to weaken them calls for a systematic study of the interplay between them in restricting expropriating behavior. In particular, at issue are the following questions: (i) how effective is internal governance in limiting managerial expropriation? (ii) When the investors can choose costly internal governance mechanisms, what factors affect their choice? In particular, how does the effectiveness of market mechanism affect the choice of internal governance? (iii) Do the two governance mechanisms exhibit substitutive or complementary effects on managerial expropriation?

In this paper, we use a controlled laboratory setting to experimentally examine the above issues. Our use of an experimental setting is motivated by two primary considerations. First, empirical studies are limited in their ability to vary governance variables in a controlled manner and in isolating the contexts under which their effects could be investigated. A controlled experiment in a laboratory setting involving human participants

overcomes these limitations by creating settings in which the experimenter can vary the incentives and choice sets of participants. The experimenter can also introduce specific variations in treatment variables, document the decisions made by the participants and evaluate results under different regimes[2]. Second, few empirical studies have addressed managerial expropriation in situations of weak internal governance. A plausible reason for this near-absence of empirical analysis is that data on private consumption is by definition not accessible to investors or researchers. Only experimental or analytical examination can help regulators and policy makers in devising policies to constrain such expropriation. By its very nature, analytical formulations make a number of assumptions that cannot be validated in practice. Even in the presence of analytical analysis, an experimental investigation will offer a richer set of insights into the phenomenon.

Our experiment is conducted in a multi-period setting. In every period, managers (also called "firms") privately become aware of a potential (pre-expropriation) return which they could fully or partly expropriate and report a lower residual post-expropriation amount. The difference between the two amounts is expropriated by the manager and proxies for real-life actions that include perquisite consumption, private benefits of control, empire building and increased compensation. Only the residual amount is available to investors for future investments (or for ultimate consumption by them). In most cases, investors choose both the amount of investment and the firms in which they invest it. In addition, they also choose a level of monitoring, i.e., internal governance. In the experiment, internal governance is denoted as audit[3]. Such governance is costly and is modeled as a dead-weight loss to the investor. In addition, we have a manager-chosen treatment (denoted as poison pill) that constrains the investor from switching his/her investment to another manager. Tantamount to a restriction on free movement of capital between firms, the poison pill simulates loss of external governance. Using treatments in which internal governance level is set exogenously, we study how effectively internal governance limits managerial expropriation, helps attract investments and affects investment return. We examine these effects both with and without poison pill treatment. Using treatments

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[2]The one potential drawback of an experimental approach being that it does not completely capture the richness of real settings.

[3]Audit in this context includes all the actions that an investor can take to reduce expropriation. For example, it includes internal and external financial and operations audits, choosing the auditor through the audit committee and structuring the board. In the experiment, this internal governance function is operationalized as the probability that managerial expropriation is avoided.

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in which internal governance levels are chosen by investors, we examine whether external and internal governance exhibit substitutive or complementary effects on managerial expropriation. We also examine the joint effects of the two governance mechanisms on expropriation and investor return.

Even in the absence of internal governance, we find that external governance can sustain the market, albeit with low levels of investment. Consistent with our expectations, we find that higher levels of internal governance result in less managerial expropriation and higher levels of investment. We also find that investment returns are higher when internal governance is stronger. These results hold with or without poison pills. The expropriation is higher for all levels of internal governance when poison pill is present, i.e., when external governance is weak. Our results from treatments that allow investors a choice in internal governance levels show that investors choose higher levels of internal governance in the presence of poison pills but choose lower internal governance if the poison pill option is available to the manager but not used. While first part of the result supports substitutive relationship between internal and external governance, second part shows that investors trust managers who voluntarily refuse using anti-takeover mechanisms. Consistent with our expectation, internal governance level is higher when higher amounts are invested and lower if compensation for the managers is high (signifying lower expropriation incentive for manager). Investments are predictably lower in firms with poison pills. Interestingly, expropriation is not affected by poison pills. In effect, when the external governance is weak, investors choose a higher level of internal governance to substitute and the effect of increased internal governance on expropriation effectively cancels out the effect of decreased external governance.

Our findings contribute to literature in two important ways. First, unlike prior empirical studies which are limited to using indirect measures of expropriation, our experimental analysis uses direct measures. Therefore, our study validates prior empirical finding of a negative association between internal governance and managerial expropriation. Second, our analysis shows a substitutive relationship between internal and external governance - a result that has been conjectured by earlier empirical and analytical studies. By exogenously controlling experimental parameters and finding similar results, we show that prior empirical findings are not driven by endogeneity.

The rest of the paper is organized as follows. In the next section, we provide a brief review of related work. The third section describes the experiment and its design. In

the fourth section, we present our hypotheses. The results and their discussion is given in section five. The last section concludes the paper. Finally, figures, tables and the experiment instructions are provided in appendices at the end.

2. Review Of Related Empirical Literature

2.1. Managerial expropriation through consumption of private control benefits.

Managerial expropriation, defined as any managerial consumption that is detrimental to investor interest but beneficial to the manager, has been examined in different contexts in accounting and corporate governance literatures. Prior studies have studied managerial expropriation through consumption of private control benefits (Dyck and Zingales, 2004), perquisite consumption (Hersch and McDougall, 1992; Revsine, 1991), empire building (Baldenius, 2003; Gaspar et al., 2005; Hope and Thomas, 2008; Morck et al., 1990; Zwiebel, 1996) and selection of negative net-present-value projects that are beneficial to managers but reduce the value of the firm to the investors (Jensen, 1986). They provide evidence that managers not only consume private control benefits but try to protect those benefits by reducing disclosures and increasing information risk for investors (Leuz et al., 2008; Leuz et al., 2003). Prior studies also provide evidence of empire building by making acquisitions that are not in investors' interest (Gaspar et al., 2005; Morck et al., 1990). The free cash flow hypothesis of Jensen (1986) argues that managers take up negative NPV projects (includes perquisites, empire building etc.) when they have the resources to do so and are not obligated by investors to pay dividends or service debt.

Accounting literature has focused on expropriation through one particular mechanism, namely earnings management. There are two ways in which earnings could be managed. First, managers could skimp on long-term-value-increasing activities such as maintenance, advertising and research and development. The resulting short-term reduction in discretionary cash outflows allows managers to use cash for increased compensation or perquisite consumption or increased private control benefits. This kind of expropriation is referred to as real earnings management. Alternatively, managers could use discretion given by GAAP to opportunistically misreport performance and boost their own welfare at the expense of investors. This kind of expropriation is referred to as accounting earnings management. Managers' objective in either accounting or real earnings management is the expropriation of resources that leaves investors worse off while they benefit at investors' expense. Only the mechanisms are different.

Several recent studies have examined real earnings management (See Xu et al. (2007) for a review) that includes changing discretionary expenditures such as research and development (Bushee, 1998; Baber et al., 1991; Dechow and Sloan, 1991), altering production, inventory and sales levels (Roychowdhury, 2006; Dhaliwal et al., 1994), selling long-term assets (Bartov, 1993) and altering financing activities (Hand, 1989; Pincus and Rajgopal, 2002). Accounting earnings management has been studied extensively[4] in contexts where manager's compensation is determined by bonus or other accounting-related measures (Healy, 1985; Healy, 1999; Gul et al., 2003; Hunt, 1985; Reitenga and Tearney, 2003), seeking public financing (Teoh et al., 1998; DuCharme et al., 2004; Dechow et al., 1996), meeting or beating earnings benchmarks such as previous year's earnings or analyst forecasts (Burgstahler and Dichev, 1997; Burgstahler and Eames, 2003; Bartov and Cohen, 2006), responding to regulation such as import relief (Jones, 1991). Different motivations for accounting earnings management are categorized in (Healy and Wahlen, 1999).

Our study does not deal explicitly with misreporting of realized earnings. Our focus is on the amount of expropriation, not on the mechanism employed to carry out the expropriation. The primary purpose of governance is the reduction of managerial expropriation. One way in which governance can reduce managerial expropriation is by effectively reducing the incentives and discretion of managers to misreport earnings. To that extent, external financial auditing is indeed a governance mechanism intended to mitigate the expropriation of investor's wealth by managers, but it is one part of the internal governance structure that includes the board structure, the audit committee composition, selection of auditors and the performance of internal audit function, among others.

2.2. **Internal governance and managerial expropriation.** Monitoring of managers' actions, choices and reports in a firm through corporate board structure and by external and internal auditing constitutes internal governance. Prior studies also provide evidence that an effective board can limit managerial perquisites and private control benefits (Mace, 1978; Hermalin, 2005; Callen and Falk, 1993; Kosnik, 1987). Prior literature on boards document that board size, independent directors on boards and audit committees affect accounting earnings management (Dechow et al., 1996; Klein, 2002b; Nikos, 2000; Farber,

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[4]The literature on accounting earnings management is very extensive. The studies mentioned here constitute a small sample of the whole literature and we make no claim of providing a comprehensive list of studies in this area.

2005; Ahmed et al., 2006; Ching et al., 2006; Jaggi and Tsui, 2007) and real earnings management (Osma, 2008).

Effective boards monitor managers' actions, decisions and reporting through external and internal auditors. Audit committee, a committee 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 board independence, diligence and expertise influence audit effort (Carcello et al., 2002). The board also interacts with internal auditors (Davidson et al., 2005; Sweeney and Vallario, 2002; Harrington, 2003) and could improve monitoring of management actions through the internal audit function.

External auditing reduces uninformative accruals and the resulting information risk faced by investors in the presence of information asymmetry between them and managers[5]. Accruals are partly determined by the discretion of managers in choosing accounting methods and estimates about the future[6]. Auditors independently assess accruals, examine the design of internal control procedures, and evaluate managers' compliance with them. In this, they are also assisted by internal auditors. Further, auditors could credibly threaten costly qualification forcing managers to be more restrained in their actions and disciplined in their reporting. Therefore, the effectiveness of the audit function (both internal and external) measures the strength of internal governance exercised through the board.

2.3. **External governance and managerial expropriation.** The market for corporate control constrains managerial expropriations because of the ability of investors to take over the firm when managers are underperforming (Martin and McConnell, 1991; Grossman and Hart, 1988; Dahya and Powell, 1998). Prior studies provide evidence that antitakeover laws and firm-level provisions such as poison pills, golden parachutes, blank checks and greenmail restrict the market for corporate control and allow managers to

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[5]Prior literature (Francis et al., 2004; Francis et al., 2005; Ecker et al., 2006; Easley and O'Hara, 2004) has shown that lower quality earnings represents a systematic information risk that cannot be diversified away by investors and therefore results in increased costs of debt and equity for the reporting firm. The usefulness of auditing derives therefore from a reduction in the agency cost and the resulting decrease in the cost of capital of the firm.

[6]For example, managers estimate the useful life of each asset, the amount of doubtful debts, the amount of future warranty expenses, the obsolescence of inventory, loan loss reserves, etc. They also choose the method of depreciating assets, the method of accounting for inventory and a variety of other accounting methods.

expropriate resources (Bebchuk et al., 2004; Bebchuk et al., 2002; Barnhart et al., 2000; Borokhovich et al., 1997; Mahoney and Mahoney, 1993; Pound, 1987). Several of these studies have also examined the effect of anti-takeover provisions on the wealth and the governance of the firm (De Angelo and Rice, 1983; Pound, 1987; Harris, 1990; Comment and Schwert, 1995; Datta and Iskandar-Datta, 1996; Borokhovich et al., 1997; Sundaramurthy, 2000). Some of these studies such as Comment and Schwert (1995) present the view that firm-level anti-takeover provisions could help current investors by increasing the bargaining power of managers in takeover negotiations. However, evidence seems to be overwhelmingly supports increased managerial expropriation and reduced investor wealth in the presence of anti-takeover provisions. In effect, this literature supports using managerial entrenchment - inability of investors to change the managers - as a way of compromising external governance.

2.4. **Experimental Literature.** Review of prior empirical literature above provides evidence that managerial expropriation can be controlled partly by the market for corporate control and partly by internal monitoring of managers' actions and choices through internal and external audit functions. Most of this empirical work, however, is hampered by endogeneity and omitted variables. For example, empirical analysis cannot unambiguously differentiate between two hypotheses: (i) stronger internal governance reduces managerial expropriation; or (ii) firms with low managerial expropriation have 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 like ours, we can vary the treatments and determine the direction of the relationship easier.

Prior experimental literature is rare in this area but it has been used in related areas. In an experimental study of managerial choice between short term gains and long term cash flows in a situation where 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), 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 multi-agent context. Our experiment also differs from these experimental studies in the build-up of managerial reputation and capital movement across managers in different periods that could result in bankruptcy. More importantly, we address the issue of internal and external governance in our experiment that is not the subject of study in these experiments.

3. Experimental Design

3.1. **Environment.** Consider n investors, each with an initial endowment ω_0 matched with a manager. The investor decides on the level of investment $(I_t)^7$ in every period t, with a manager. The investment yields a (potential pre-expropriation) return α, where $\alpha \in [a, b]$ is a random variable having a density function $f(\alpha)$ with an expected value $\mu_\alpha > 0$ and standard deviation σ_α. The realization of α is privately revealed to the manager. The manager expropriates an amount and reports a return $\tilde{\alpha} \leq \alpha$ to the investor. Without loss of generality, any non-invested amount with the investor is assumed to give zero returns. The net cash flow (ν_t) to each investor during period t is given by

$$\nu_t = (1 - \beta)\tilde{\alpha}_t I_t; \ \ 1 \leq t \leq T \tag{3.1}$$

In the above expression, β denotes the share of manager's compensation paid out of the reported earnings[8]. "T" denotes the finite time horizon. The total amount available to the investor to invest at the end of period t, ψ_t is given by

$$\psi_t = \psi_{t-1} + (1 - \beta)\tilde{\alpha}_t I_t; \ \ \text{where } \psi_0 = \omega_0 \text{ and } I_t \leq \psi_{t-1} \ \forall t \text{ s.t. } 0 \leq t \leq T$$

Manager's total payoff in period t, denoted by ϕ_t consists of two parts. The compensation is $\beta\tilde{\alpha}_t I_t$, while the "perquisite," i.e., the expropriated amount is $(\alpha_t - \tilde{\alpha}_t)I_t$. We can write

$$\phi_t = \beta\tilde{\alpha}_t I_t + (\alpha_t - \tilde{\alpha}_t)I_t \tag{3.2}$$

Initially, each investor is matched with a manager randomly. Operationally we denote periods $\tau = 1, 2, 3$ and sub-periods t within each τ. Investor is allowed to switch firms at the beginning of every period τ. At the beginning of each period τ (other than the

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[7]At any time, the investor cannot invest an amount higher than the total amount available to her. Throughout this paper, the investor is referred to as "she" and the manager is referred to as "he" purely for convenience.

[8]For the purpose of this exposition, cash flow and earnings are used interchangeably.

first), each investor has to choose a firm to invest in, and the level of investment. Every investor observes the previous reported returns from all managers at the beginning of the period before making these choices. This is similar to investors having access to published financial reports of all firms, before choosing a firm and the amount of investment.

3.2. **Design.** All subjects were drawn randomly on a voluntary basis from both graduate and undergraduate student populations in City University of Hong Kong. We ran multiple sessions, with each session consisting of 3-4 treatments. In each treatment, there are three periods. Within each period, there are a number of sub-periods. The subjects were compensated for their earnings at the end of each session in cash. Each session lasted for approximately 3 hours and subjects earned around HK\$ 200[9] on average (including show-up payment) per session.

Each subject is assigned one of two roles: Managers and Investors. The internal governance (auditing) task is performed in the experiment by the computer. All experiments consist of three periods. We first describe the design for the control treatment that excludes both internal governance and poison pills. In effect, in the control treatment only external market-driven governance exists. Each treatment consists of three periods with each period consisting of multiple sub-periods. At the beginning of the first period, half the subjects are randomly assigned as managers and the other half are assigned as investors for the rest of the treatment.

3.2.1. *First Period.* The first period ($\tau = 1$) consists of 6 investment sub-periods, $t = 1, 2, \ldots 6$. 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 (ω_0) of 3000 units of experimental currency units (ECU). The return from investment follows a normal distribution given by

$$\alpha_t(\varepsilon_t) = \mu_\alpha + \varepsilon_t; \text{ where } \varepsilon_t \sim N(0, \sigma_\alpha^2) \text{ and } \mu_\alpha \in (0, 1) \tag{3.3}$$

In the above expression, as defined before 't' denotes each sub-period within the period. μ_α (used as a treatment variable[10]) and σ_α (fixed for all treatments) reflect the expected return and its variability for any given level of investment respectively. For an investment

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[9]Note, 1 US\$ $\approx$ 7.8 HK\$.

[10]In the experiments, we use two values of μ_α, 0.15 for some treatments and 0.30 for others.

I_t , we define Actual Cash Flow (ACF) as

$$ACF_t(I_t, \varepsilon_t) = (1 + \alpha_t)I_t \tag{3.4}$$

Though the distribution of the returns is common knowledge, the realized ACF is privately observed by the manager. After observing ACF, the manager chooses to expropriate a part of ACF and report the post-expropriation residual amount to the investor. In this, he is guided, among other things, by his ability to attract and retain future investments, probability that all investors choose other managers and leave his firm bankrupt, and the direct compensation that he gets based on the reported cash flow, where the amount reported to the investor is defined as Reported Cash Flow (RCF) such that $RCF_t \leq ACF_t$[11]. Manager's payoff is given by modifying (3.2) as follows:

$$\phi_t = \beta RCF_t + (ACF_t - RCF_t) \tag{3.5}$$

The first term in (3.5) is the direct compensation paid out of the reported cash flow and the second term is the expropriated amount which primarily consists of perquisites, private control benefits and empire-building. The investor's payoff is given by

$$\nu_t = (1 - \beta)RCF_t \tag{3.6}$$

At the beginning of any period, the investor can invest any amount out of her total holdings. During the subsequent sub-periods within the period, investor can invest out of her total cash holdings partially or fully, but they are not allowed to switch managers during the period. Choosing the firm to invest in can only be done at the beginning of each period.

3.2.2. *Second Period.* Second period ($\tau = 2$) also consists of six investment sub-periods, $t = 1, 2, \ldots 6$. At the beginning of this period, first period investments and returns for each firm are revealed to each investor. In other words, firm performances of the

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[11]As described earlier, the difference between ACF and RCF is consumed by managers in the form of private control benefits or other means. The actual mechanics of expropriation could be to inflate reported income and get greater incentive compensation. Our main interest here is the amount of expropriation, not the mechanics of doing it. Specifically, we do not allow for over-reporting in this setting, since over-reporting introduces other complexities, especially with regards to investors perceived and actual earnings, that potentially reduces experimenter control and noise in the data. In this context, we did run a pilot with a mix of students and faculty that allowed for over-reporting. But we got an adverse reaction regarding complexity of the design during the subsequent debriefing.

first period become public at the beginning of second period. Investors can choose to continue with the same firm or switch their investment to another firm. This opens up the possibility of multiple investors matched with a manager. On the flip side, it also opens up the possibility of a manager losing all investors and going bankrupt. A bankrupt manager/firm does not participate in the rest of the experiment. Investors carry over their earnings from the end of the first period.They can choose to invest any amount up to the aggregate of initial endowment and subsequent earnings during the first period. In any firm, if there are multiple investors, the investment amounts are revealed to each other. Payoff for managers in each sub-period of the second period is determined in the same way as in the previous period. The investment in a firm is the cumulative investment from all investors investing in that firm. The payoff for investors is also similar to period 1, 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.

3.2.3. *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[12] The participants are however aware that this is the last period and hence the role of market-based governance will be severely weakened. Therefore, the data from this period is not reliable and is ignored except to test for the expected presence of the "end

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[12]Even though the number of sub-periods in the third period is kept uncertain, yet the subjects will have expectations about the ending of the game. This leads to the possibility of a backward induction type 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 other 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; Kőszegi and Rabin, 2006; McKelvey and Palfrey, 1995) and not 'limited cognition' have been commonly identified as the reason behind the deviations from perfect equilibrium. Finally, note that all the experiments cited above involved complete information games. In our set-up agents have incomplete information as investors choose managers after very period which leads to potential for 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 in our set-up.

game effect." However, the participants are fully compensated in accordance with 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.

3.2.4. *Internal Governance.* For this treatment we modify the design as follows. Before every sub-period in each one of the three periods, investors make two decisions: the amount of investment and the level of governance. The governance is operationalized by an audit performed by computer. The level of governance is a number between 0 and 1 that specifies the probability that computer's audit process identifies the expropriated amount. In firms with multiple investors, each investor submits a level of governance one of which will be chosen with a probability that is proportional to the ratio of her investment to the total investment in the firm. The chosen level of governance (but not its result) is revealed to manager before he chooses expropriation. Once manager chooses RCF, the audit process generates an Audit Revealed Cash Flow (ARCF). ARCF is equal to RCF in case audit fails and is equal to ACF in case audit succeeds. In other words, internal governance is either effective and finds the whole amount of expropriation or is ineffective and finds nothing. The probability with which internal governance is effective is the investor's chosen audit level[13].

Investor's choice of governance level is denoted by the probability ($\kappa \in [0,1]$) with which ARCF = ACF. Choice of higher levels of governance entails higher costs because of more extensive monitoring costs. The internal governance cost function is denoted by C(κ), where $C(0) = 0$ and the marginal cost is positive and increasing, i.e., $C'(\kappa) > 0$ and $C''(\kappa) > 0$. Audit cost is modeled as a deadweight loss that is paid out before ACF is realized. Investor observes both ARCF and RCF. When they are equal, the investor is unable to distinguish between the possibility of an expropriation that went unchecked because of governance failure and that of no expropriation. In case where manager's expropriation comes to light, the manager is assessed a penalty equal to the amount of expropriation and is also paid as a proportion of RCF. Expressions for the expected values

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[13]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.

of ARCF and expected payoffs to manager and investor follow.

$$E(ARCF_t) = \kappa_t ACF + (1 - \kappa_t)RCF \tag{3.7}$$

$$E(\phi_t) = \kappa_{(}\beta.RCF_t) + (1 - \kappa_t)\left[(\beta.RCF_t) + (ACF_t - RCF_t)\right]$$
$$= \beta.RCF_t + (1 - \kappa_t)(ACF_t - RCF_t) \tag{3.8}$$

$$E(\nu_t) = \kappa_t (ACF_t - \beta.RCF_t - C(\kappa_t)) + (1 - \kappa_t)(1 - \beta)RCF_t$$
$$= (1 - \beta)RCF_t + \kappa_t (ACF_t - RCF_t) \tag{3.9}$$

where in the above expressions, $E(.)$ denotes expected value. Further,

$$ACF_t(I_t, \varepsilon_t) = (1 + \alpha_t)I_t - C(\kappa_t) \tag{3.10}$$

3.2.5. *External Governance.* In the above treatments, investors could freely shift their investments from one firm to another at the beginning of each period τ. This signifies a free market for capital flow and corporate control - an effective external governance mechanism. In some treatments, we introduce an instrument (defined as "poison pill") that restricts an investor from withdrawing or switching her investment from a firm. Managers are allowed to adopt poison pills in the second period. Adoption of poison pill is observable to all investors before they choose their second period investments. Once introduced, poison pill continues in the firm for periods $\tau = 2$ and 3. If an investor chooses a firm with poison pill, she cannot leave that manager for the rest of the experiment.

4. Hypotheses

4.1. **Statements of hypotheses.** Our first set of hypotheses are concerned with the effect of internal governance or the lack of it on managerial consumption, investment rate and investment returns both in the absence and presence of poison pills. These are treatments in which the internal governance levels are chosen exogenously. First, we have an exploratory hypothesis on whether the market is sustained with only external governance in the absence of any form of internal governance. Second, based on the arguments presented in earlier sections and consistent with the prior empirical literature, we expect that whatever be the level of external governance, internal governance reduces managerial consumption. Third, increased levels of internal governance result in greater investor confidence. We expect this increased confidence to increase the investment rate defined as the proportion of invested amount to what could potentially be invested. Therefore we hypothesize a positive relationship between internal governance level and investment rate.

Even though the investment rate increases with the internal governance level, it is not clear whether reduced expropriation and increased investment rate are adequate to overcome the cost of such governance. However, if the cost of governance is reasonably low, we expect increased returns to improved governance. We state these hypotheses below:

Hypothesis H1.0: (Exploratory Hypothesis) The market will sustain itself even when audit is unavailable, i.e. at zero audit level[14].

Hypothesis H1.1: Managerial expropriation is negatively related to internal governance both in the presence and absence of poison pills.

Hypothesis H1.2: Investment rate is positively related to internal governance both in the presence and absence of poison pills.

Hypothesis H1.3: Investment returns are positively related to the internal governance both in the presence and absence of poison pills.

Our second set of hypotheses deal with treatments in which internal governance levels are chosen by investors endogenously. Our exploratory hypothesis here is about the impact of investor confidence on investment rate (IRATE) and audit level (AudLev).

We use previous period investor returns as a proxy for investor confidence, where we define IRET as the return on invested amount (in contrast to overall return ORET, the return on investible amount defined earlier). Before making AudLev and IRATE decisions at the beginning of each sub-period, investors observe IRET from the previous sub-period. A higher (lower) IRET is reassuring (not reassuring) to investors because it signals a lower (higher) likelihood of excessive expropriation. Therefore, we model IRETLAG, the previous sub-period's investment return as the proxy for investor confidence at the time they make the AudLev and IRATE decisions. Another issue regarding investor confidence and it's effect on investment and audit level is related to the timing of the two choices. Investors make both testing internal governance (AudLev) and investment rate (IRATE) decisions at the beginning of each sub-period t. They could make these decisions simultaneously or in one of two sequences, namely IRATE after AudLev or AudLev after IRATE[15]. Testing the effect of investor confidence requires setting up a descriptive model of how investors make these decisions. In order to set up such a descriptive model, we carry out the following analysis.

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[14]This was tested for the no poison pill case.

[15]Operationally, screens for AudLev choice and IRATE choice appear in that order but this does not constrain investors from making either one of the decisions first or making both decisions simultaneously.

If both investment and audit levels are chosen simultaneously by the investor then we would expect a positive relationship between investment and IRETLAG (i.e. the proxy for investor confidence), while audit level would be negatively related. This follows from the reasoning that if IRETLAG measures investor confidence, a higher level of confidence would make investors choose a lower level of (costly) internal governance and a higher rate of investment. If they decide on AudLev first and then decide on IRATE based on AudLev, we expect a negative relation between AudLev and IRETLAG in the first decision of the sequence and a positive relation between AudLev and IRATE in the second. On the other hand, if they decide on IRATE first and then decide on AudLev, we expect a positive relation between IRATE and IRETLAG in the first decision of the sequence and a positive relation between IRATE and AudLev in the second. Our analysis of these possibilities (presented in the results section) is consistent with investors deciding first on IRATE and then AudLev. This assumption forms the basis of our exploratory hypothesis regarding investor confidence.

Moving to the rest of the hypotheses, we expect higher internal governance levels to be chosen in the presence of poison pills (based on substitution hypothesis) - which weaken external governance. We expect both internal and external governance to improve the confidence of investors. Therefore, we expect the investment rate to be positively associated with the internal governance level and negatively associated with poison pill adoptions. We expect the internal governance rate to be chosen at a level where the marginal cost to investor of managerial expropriation is equal to the marginal cost of additional auditing. Therefore, at this level, the marginal cost of expropriation is still positive and we expect a negative relationship between the chosen internal governance level and expropriation. The relationship between expropriation and external governance is a result of two opposing effects. First, when poison pills are adopted (weak external governance), we expect a direct increase in the expropriation level. However, poison pill adoption also triggers the choice of higher internal governance levels by investors and we expect this to decrease the expropriation level. The net effect of these two relationships is difficult to predict. Therefore, we do not have any directional expectation of a relation between poison pill adoption and expropriation rate. Finally, the manager has less incentive to expropriate if the direct compensation is high. Therefore we expect a negative relation between the compensation rate (β) and IER. We state these expectations formally as hypotheses below.

Hypothesis H2.0: (Exploratory Hypothesis) Investment rate is positively associated with one sub-period lag values of investment returns, while audit level is positively associated with investment rate.

Hypothesis H2.1: Intended managerial expropriation is negatively related to the selected internal governance level.

Hypothesis H2.2: The relationship between intended managerial expropriation and poison pill adoption could be positive or negative when the internal governance is chosen by investors.

Hypothesis H2.3: Intended managerial expropriation is negatively related to direct compensation rate.

Hypothesis H2.4: The selected internal governance level is higher when poison pill is adopted.

Hypothesis H2.5: The investment rate is negatively associated with poison pill adoption.

4.2. **Notation and Models.** The variable definition and notations are summarized in Table 1.

<div align="center">Insert Table 1 here</div>

Hypotheses 1.1 - 1.3 are tested using the following regression models when poison pill is not adopted:

$$y = \delta_{10} + \delta_{11}DLow + \delta_{12}DVar + \delta_{13}DHigh + \epsilon_1 \tag{4.1}$$

In the above regressions, dependent variable y is IRATE or ORET or IER. We define intended expropriation rate IER as the ratio of the intended expropriation, (ACF-RCF) over ACF. The actual expropriation drops to zero when internal governance detects expropriation and is therefore mechanically affected by governance decisions of investors. Intended expropriation rate therefore better reflects manager's response to governance than actual expropriation. IRATE is the rate of investment defined as the ratio of amount invested over the total amount available for investment and reflects investor's confidence in the firm. RET is the ratio of investor's incremental net cash inflow (profit) over the amount available for investment at the beginning of the period. The independent variables DLow, DVar and DHigh are indicator variables for low, variable and high internal governance levels respectively. The intercept gives the effect of no internal governance.

Hypotheses 1.1 - 1.3 are tested using the following regression models when poison pill is adopted:

$$y = \delta_{20} + \delta_{22}DVar + \delta_{23}DHigh + \epsilon_2 \qquad (4.2)$$

These regressions are similar to equation (4.1) except that the case with no internal governance - the case with neither internal nor external governance - is not tested because it is not likely to yield meaningful results. In equation (4.2), the intercept gives the effect of low governance level and the other coefficients give incremental effects of variable and high levels over low levels of internal governance.

Hypothesis 2.0 and Hypotheses 2.1 - 2.5 are tested using the following models.

$$IRATE = \delta_{30} + \delta_{34}BegCash + \delta_{35}IRETLAG + \delta_{36}DPPT + \delta_{37}DPPC$$
$$+ \delta_{38}DBeta + \delta_{310}DAlpha + \delta_{311}DTHIRDPD + \epsilon_3 \qquad (4.3a)$$

$$AudLev = \delta_{40} + \delta_{42}IRATE + \delta_{44}BegCash + \delta_{45}IRETLAG + \delta_{46}DPPT$$
$$+ \delta_{47}DPPC + \delta_{48}DBeta + \delta_{49}DGamma + \delta_{411}DTHIRDPD + \epsilon_4 \qquad (4.3b)$$

and

$$IER = \delta_{50} + \delta_{51}AudLev + \delta_{53}ACF + \delta_{56}DPPT + \delta_{57}DPPC$$
$$+ \delta_{58}DBeta + \delta_{511}DTHIRDPD + \epsilon_5 \qquad (4.4)$$

As mentioned earlier, our analysis of the timing possibilities (presented in the results section) regarding the choice of audit level and investment rate is consistent with investors deciding first on IRATE and then AudLev. The equations presented above reflect this sequence of decisions by investors.

In equation (4.3b), the internal governance level chosen by investors is the dependent variable. The primary treatment variable is DPPC for Hypotheses 2.4. DPPC is an indicator variable for poison pill adoption. External governance is compromised in firms with poison pills. A positive coefficient for DPPC indicates that investors choose a higher audit or internal governance level in firms that adopt poison pills. If more of available cash is invested investors demand more assurance and therefore, we expect a positive coefficient for IRATE. Likewise, if more cash is available to invest, investors have a greater incentive to invest but require more assurance and therefore, we expect a positive coefficient for BegCash. Interestingly, if poison pill option is available but is not used by manager, it signals manager's lack of interest in expropriating. If so, we expect a positive sign for the

coefficient of DPPT. DGamma reflects the cost of internal governance and we expect it to negatively affect AudLev.

In equation (4.3a), investment rate is the dependent variable. Our primary interest is in investigating how internal and external governance affects IRATE. Internal governance increases the confidence level of investors. On the other hand, adoption of poison pill compromises external governance and therefore, reduces investor confidence. We expect DPPC to have a negative coefficient, in accordance with Hypothesis 2.5. We expect investors with large funds to invest a smaller proportion of their funds compared to investors with low investment funds. We therefore expect a negative coefficient for BegCash. Investors have greater confidence in firms that have the option of poison pills but choose not to, and therefore are likely to increase their investment rate in these firms. Therefore we expect a positive coefficient for DPPT. By the same rationale, higher returns increase incentive to invest and so, we expect a positive coefficient for DAlpha.

In equation (4.4), the intended expropriation rate, IER is the dependent variable. Our primary interest (Hypotheses 2.1 and 2.2) is investigating the effect of internal and external governance on IER. We expect a negative sign for AudLev but the effect of external governance is not clear. When poison pills are adopted, we expect AudLev to go up and thereby counteract potential increased expropriation. In effect, we do not have a directional hypothesis for DPPC. If ACF is high, less expropriation is likely to lead to higher direct compensation and therefore, we expect a negative sign on ACF. By the same logic, we expect a negative sign for the coefficient of DBeta.

We expect the third period to have weaker governance effects because there is an expectation that the experiment will end. Expropriations are expected to increase in the third period and therefore, we expect investors to increase the level of internal governance. Therefore we have included DTHIRDPD - an indicator variable for the last period in the analysis.

5. Results

5.1. **Data.** We collected data from four sessions with a total of fifteen treatments. The details of sessions, treatments and number of participants in each session are given in Table 2. From these sessions, we collected data in each sub-period on the actual, reported and audit-revealed cash flows, investor payoffs, managers' direct compensations and indirect

consumption in the form of expropriations, internal governance level decisions and poison pill adoptions.

Insert Table 2 here

5.2. **Descriptive Results.** We compare the resulting *decisions* - expropriation by managers and investment rate and internal governance level by investors - as well as resulting *consequences* - managers' and investors' payoffs from different treatments, in four categories: (i) No Internal Governance (treatments where audit control was not available), (ii) Low Internal Governance (treatments where audit level was fixed at 0.5), (iii) High Internal Governance (treatments where audit level was fixed at 0.75), and (iv) Variable Internal Governance (treatments where investors had full audit control). The data is averaged over sub-periods within each period and is compiled separately for treatments without and with the availability of poison pill. Panels A and B of Table 3 give the aggregate data from all treatments without and with the availability of poison pill respectively, averaged for each period[16].

Insert Table 3 here

Panel A results without poison pill availability show that Investment rate, IRATE increases with internal governance in all three periods (comparing the high audit case with low audit case and low audit case with no audit case), suggesting that even in the presence of external governance, internal governance increases investor confidence. Investor's return increases with internal governance only in the first period. Investor's return in the second and third periods are affected by a number of factors including the cost of instituting internal governance and the extent to which investors are able to identify expropriating managers in the first period and withdraw capital from those firms in the second period.

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[16]In the table, IRATE refers to ratio of investment to cash holdings (BegCash), AudLev is the audit level choice, AudCost is the ratio of audit cost to ACF, InvEarn is the ratio of period investor earnings to ACF, IER is the ratio of manager's intended expropriation to ACF, AER is the ratio of actual expropriation to ACF, ManEarn is the ratio of manager period earnings to ACF and BNKP Rate is the rate of managerial bankruptcy. All other variables have the same terminology as defined earlier. The new additions are with respect to poison pill. Period two data is now split between those manager-investor interactions where the manager did not choose the poison pill (PPN) and where he did (PPY). PP Rate refers to the rate of poison pill adoption by managers in round two, the only period where the choice was available.

In the first period, investors do not yet have the choice of switching investments among different firms and therefore the disciplining effect of external governance would not be fully effective. It therefore stands to reason that in the first period, the benefits of internal governance far outweigh its costs and therefore, there is a monotonic increase in investor return with the level of internal governance. The intended expropriation rate in the second period does not seem to depend on the level of internal governance. At first blush, this might appear surprising. However, this could be driven by screening of expropriating managers (penalty imposed by the market) in the first period. In the second period, only those managers who did not excessively expropriate in the first period survive and the internal governance needed to control expropriation falls. The actual expropriation rate, however, declines with internal governance. This could of course, be due to the mechanical effect of a higher likelihood of detection of expropriation at higher levels of internal governance. Manager's earnings rate, defined as the proportion of ACF that managers get as compensation or expropriation, decreases with internal governance as expected. Bankruptcy rates for firms are not affected much by internal governance because this is essentially a market phenomenon and is associated with external governance.

The results in Panel B when poison pill is available for managers are similar to the results in Panel A. In Panel B, firms that chose poison pill attract less capital (compare IRATEs in period 2 between PPN and PPY), return less to investors and go bankrupt (at the beginning of the second period after they announce the poison pill choice) more often than those that did not. Investors choose higher internal governance level for poison pill firms when they have a choice.

We graphically depict variables of interest from Table 3 in figures and discuss them in greater detail below.

5.2.1. *Intended Expropriation Rate.* Figures 1.1 and 1.2 summarize the Intended Expropriation Rate (IER) by managers in each period without and with poison pill availability respectively. The case without poison pill represents the case with strong external governance. The case with poison pill availability allows the managers to choose poison pill if they want to. Manager can refuse the poison pill option and face the possibility of investors leaving the firm. By such a choice the manager signals his confidence in providing attractive returns by low or no expropriation. On the other hand, managers could choose poison pill and entrench themselves, effectively weakening external governance. At this

stage, the descriptive statistics in Panel B of Table 3 and in Figure 1.2 shows an average of these two cases.

<div align="center">Insert Figures 1.1 and 1.2 here</div>

In the first period, the highest intended expropriation is in the case of no internal governance in Figure 1.1 and in the case of low internal governance in Figure 1.2 suggesting that for a given level of external governance, internal governance can reduce expropriation. Further, in the first period, in both figures, it is apparent that as internal governance increases, expropriation falls. In Figure 1.1, external governance strongly penalizes managers who expropriate in the first period and likely drives them to early bankruptcy. The intended expropriation rate falls significantly in the second period compared to the first, so much so that the case with no internal governance shows the most significant improvement. More importantly, the internal governance levels do not markedly affect intended expropriation in the second period because of the strong effect of external governance. Figure 1.2 shows that the effect of internal governance on expropriation continues to be very significant in the second period when external governance is weakened. Figure 1.2 also shows IER in period 2 decomposed into cases where managers refuse or choose poison pill. Consistent with our expectation, the expropriation is considerably lower when managers refuse poison pill compared to when they adopt it. More tellingly, the effect of internal governance on expropriation is very high when poison pill is chosen and but is quite mild when poison pill is refused. This result suggests that when external governance is weak, managerial expropriation is very sensitive to internal governance.

The third period shows an increase in expropriation - a result of end-of-game effect. Yet, it also shows that managers who were not expropriating in the first two periods increase their expropriation when the ability of both internal and external governance to punish them in a future period is removed. This supports the view that managerial behavior in the experiment is driven by strategy, not inherent ethical reasoning.

5.2.2. *Mean Investment Rate.* Figures 2.1 and 2.2 give the investment rate decisions by investors without and with the availability of poison pills respectively. At the beginning of every sub-period, investors allocate their investible amount between a risk-free zero-return saving and a risky investment in the firm. The risk in the firm consists of both the inherent uncertainty accompanying ACF as well as the risk of expropriation by the manager. A higher investment rate signifies a relatively greater allocation of investible amount to the

firm. This necessarily depends on investor's confidence that manager will not expropriate a large part of return. The previous history of manager in providing returns and the extent of monitoring in the form of internal governance determine investor confidence and therefore the rate of investment. Consistent with our expectation, Figure 2.1 shows a positive relation between internal governance and investment rate in every period. Figure 2.2 presents a more ambiguous result. Positive relation between investment rate and internal governance is apparent in the first period and in the no-poison-pill case in period 2. When poison pill is present, the relationship does not hold, suggesting that internal governance might not increase investor confidence.

Insert Figures 2.1 and 2.2 here

5.2.3. *Manager's Earnings.* Figures 3.1 and 3.2 give manager's earnings averaged over all managers and sub-periods in cases without and with poison pills respectively. Managers' earnings include both the direct compensation and actual expropriation. As one would expect, the results are very similar to intended expropriation results depicted in Figures 1.1 and 1.2. Managerial earnings are reduced by internal governance in all cases. Further, it falls dramatically in the case of no or low internal governance levels from the first to the second periods. However, this is a joint effect. By definition, internal governance reduces actual expropriation, for a given level of intended expropriation. We also know from Figures 1.1 and 1.2 that internal governance reduces intended expropriation. Together, these two effects reinforce each other in reducing manager's earnings when internal governance levels are high.

Insert Figures 3.1 and 3.2 here

5.2.4. *Investor Returns.* Figures 4.1 and 4.2 give mean realized investor returns in cases without and with poison pill availability respectively. In the first period, a clear monotonic relation between investor returns and internal governance is apparent. In the case of weak external governance, Figure 4.2 shows this effect clearly in the first two periods. The third period results are driven by end-game effect. These figures suggest two effects. First, when external governance is weak or before external governance can penalize expropriating managers (first round in the no-poison-pill case), internal governance is positively related to investor returns. It is therefore in investor's interest to improve internal governance

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and reduce managerial expropriations even when internal governance is costly. The second effect suggested by the figures is that in the presence of strong external governance, it is not clear whether internal governance adds value to investors.

Insert Figures 4.1 and 4.2 here

5.2.5. *Mean Bankruptcy Rate.* Figures 5.1 and 5.2 provide the mean bankruptcy rates without and with poison pill availability respectively. Withdrawing capital and bankrupting firms (and managers) is the way that external governance works to discipline their expropriating behavior. We look at the interaction between poison pill choice by managers and their likelihood of going bankrupt, i.e. investors' proclivity to avoid managers with poison pill. Consistent with our expectation, we find that managers who choose poison pill are more likely to be avoided by investors and hence, declared bankrupt.

Insert Figures 5.1 and 5.2 here

5.3. **Regression Results.**

5.3.1. *Test of Hypotheses H0 and H1.* Panels A and B of Table 4 provide the results for regressions in equation (4.1) without and with poison pill availability respectively. When poison pill is available, we have only the low, high and variable internal governance treatments since it is not meaningful to consider a treatment with neither internal nor external governance. We drop the dummy variable for low audit (DLOW) from the regressions for the poison pill available treatments.

Insert Table 4 here

Even without any internal governance, the investment rate is positive and significant (intercept = .4478) which shows that investors continue to invest even in the absence of internal governance. ORET is also positive and significant which provides evidence that the threat of capital withdrawal can restrain managerial expropriation to an amount that still leaves investor with positive expected returns. In effect, this result shows that investment is sustained even without any internal governance when external governance is effective. This result supports Hypothesis H0.

The intended expropriation rate decreases as internal governance level increases from no audit to high audit. When investors have a choice, they choose a level of audit that is

between the high and the low values and correspondingly, the intended expropriation rate is also higher than in the high-audit case but lower than the low-audit case. The differences between high and low audit cases are all statistically significant both without and with poison pill availability[17]. These results support Hypothesis H1.1. Likewise, investment rate and returns to investors increase significantly as internal governance levels increase both when poison pill is available or not. These results are supportive of Hypotheses H1.2 and H1.3.

5.3.2. *Test of Hypotheses H2.*

Determination of the Model: As mentioned earlier, the first part of this analysis deals with the determination of the decision-making sequence of investors in their choice of IRATE and AudLev. Table 5 gives the results of 3SLS simultaneous estimates[18] of relationships in the first two columns. The results of sequential OLS estimates with AudLev as a function of IRETLAG and IRATE as a function of AudLev and IRETLAG are given in columns (3) and (4). Columns (5) and (6) give the results of sequential OLS estimates with IRATE as a function of IRETLAG and AudLev as a function of IRATE and IRETLAG.

Insert Table 5 here

If investors' decision-making was indeed simultaneous, IRETLAG should be positively related to IRATE and negatively to AudLev. However, from Column (1), AudLev is positively related to IRETLAG which suggests that investors' decision making is not simultaneous. If investors decided first on AudLev and then on IRATE, we expect a negative relationship between IRETLAG and AudLev in the first part of the sequence and a positive relation between IRATE and AudLev in the second part. However, from Column (3), there is a positive relationship between AudLev and IRETLAG that is inconsistent with this proposition. Finally, if investors decided first on IRATE and then on AudLev, we

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[17]The variable audit level could be close to low or high audit levels and therefore, it is not meaningful to test for statistical significance of differences involving variable audit level. Even so, for both IRATE and ORET we obtain statistically significant difference between variable audit level and low and high audit level respectively in all cases.

[18]The two stage simultaneous estimation gives good estimators of coefficients if the error terms in the two simultaneous equations are independent of each other and not correlated with any independent variable. In our estimation, it is not clear that this assumption holds. 3SLS corrects for this potential bias. We have also carried out 2SLS and the results are similar. We also drop DBeta to avoid singularity in 3SLS and in both the sequential decision models in Table 5 to be consistent.

expect a positive relation between IRATE and IRETLAG and a positive relation between IRATE and AudLev. Results in Columns (5) and (6) of Table 5 are consistent with this proposition. In effect out of the three possibilities of decision-making sequence, only one gives consistent results. Therefore, for testing of Hypothesis 2, we use the sequential OLS estimates where IRATE is determined first by investors and AudLev is determined as a function of IRATE and IRETLAG. This explains the model presented in equations (4.3a) and (4.3b).

Using Sequential Decision Model - IRATE to AudLev to test Hypothesis 2: Table 6 gives the results of regressions to test Hypotheses 2.4 - 2.3. These hypotheses are tested using only treatments in which investors had the choice of internal governance levels (AudLev). The first two columns give the results of investor decisions, namely AudLev and IRATE. The third column gives the results of managers' intended expropriations (IER). AudLev reflects the internal governance level selected by investors. Consistent with our expectations, it is positively related to IRATE. In other words, if investors choose to invest a larger part of the investible amount (BegCash), they would like to reassure themselves by choosing a higher level of monitoring (higher AudLev). The internal governance level is negatively related to the investible amount itself after controlling for IRATE. The association with IRETLAG is insignificant that is consistent with investors first choosing IRATE and then choosing AudLev based on the amount they invest. Importantly, the relationship with DPPC is positive. If poison pill is adopted by the firm, the external governance is weaker and under this condition, investors substitute for the weak external governance by choosing a higher level of internal governance. This is supportive of Hypothesis H2.4. Not surprisingly, there is a negative association with the cost of internal governance DGamma.

Insert Table 6 here

The second column gives the results for IRATE. It is significantly positively related to IRETLAG, the previous sub-period's investor return. Investors whose confidence in the firm is bolstered by a higher return in the previous sub-period tend to invest a greater proportion of their investible amount in the firm. Adoption of poison pill per se does not significantly affect the investment rate. Hypothesis 2.5 is not supported by these results.

The third column provides the results for IER, the intended expropriation rate of managers. A strong negative association with AudLev shows that managers intended expropriation is lower at higher levels of internal governance. This supports Hypothesis H2.1. Further, we find that it is not significantly related to the poison pill variables. External governance seems to constrain expropriation through capital withdrawal (IRATE and bankruptcy). If external governance is weakened by poison pill adoption, the internal governance is bolstered to an extent that the intended expropriation is not affected significantly.

6. CONCLUDING REMARKS

There are several innovations in this study. First, we use an experimental approach to identify the effects of internal and external governance on managerial expropriation and investor behavior. This approach gives us an advantage over empirical studies where expropriation information is not available and the control variables cannot be controlled as needed. Second, we allow managers (firms) and investors to make repeated decisions over a number of periods to bring out the multi-period effects clearly. In particular, external governance that employs the ability of investors to move their investments from one firm to another or to a savings vehicle is essentially a multi-period phenomenon.

We find that in the presence of effective external governance, it is possible to sustain a positive level if investment interest even in the absence of internal governance mechanisms to control managerial expropriation. However, internal governance can increase investor confidence, boost investment amounts and increase investor returns above the minimum level without internal governance. Further, when external governance is weakened by anti-takeover provisions and other means of managerial entrenchment, internal governance becomes more important and substitutes for external governance. Effectively, managerial expropriation is curbed either by external or by internal governance acting as substitutes. Given that internal governance is costly, anti-takeover provisions increase the deadweight costs of governance and thereby decrease the overall returns compared to a situation when external governance is effective.

As in any experimental study, our settings have to be simple, understandable and brief. This places a limitation on the conduct of this experimental study and could limit the generalizability of its results. However, our results are complementary to those intuited

by empirical findings and therefore, we suspect that the effect of these limitations is not severe.

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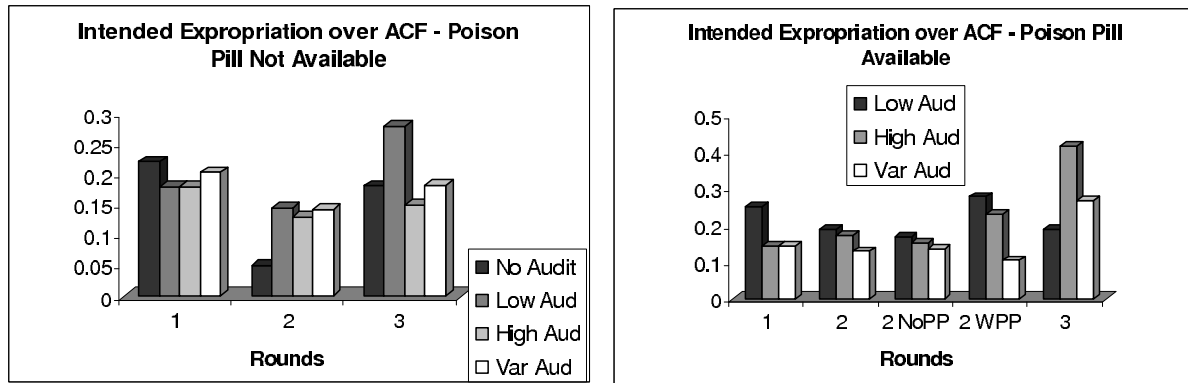
APPENDIX A. FIGURES AND TABLES

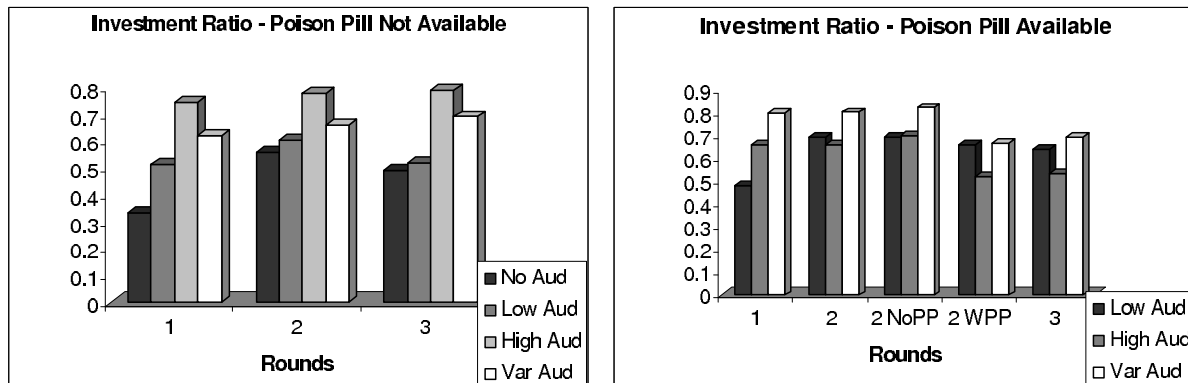FIGURE 1. Mean Managerial Intended Expropriation Rate
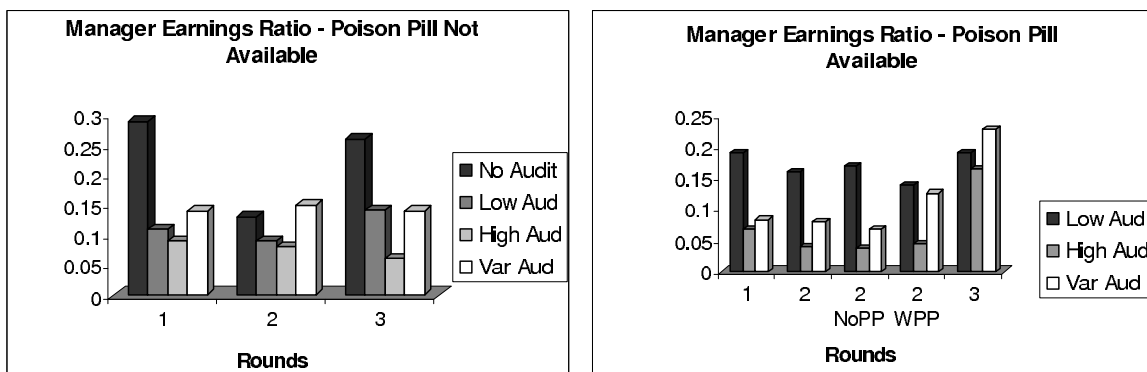

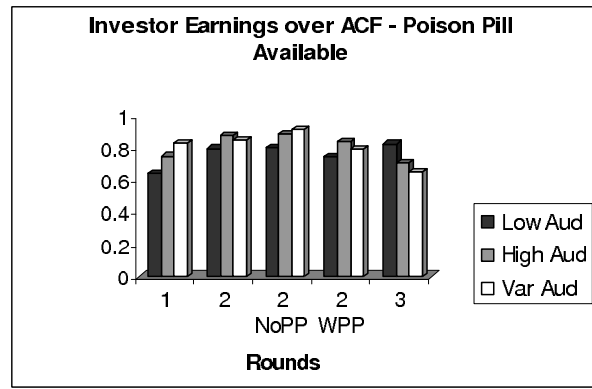FIGURE 2. Mean Investment Rate

FIGURE 3. Mean Manager Earnings Rate

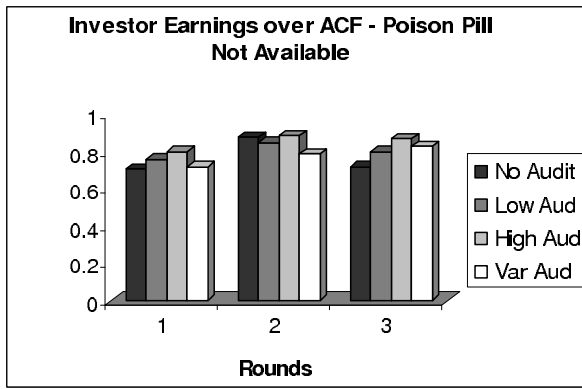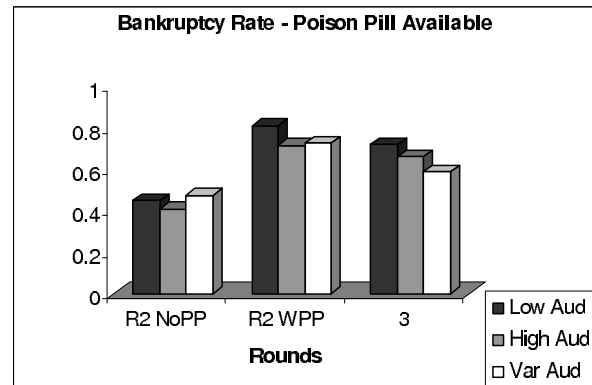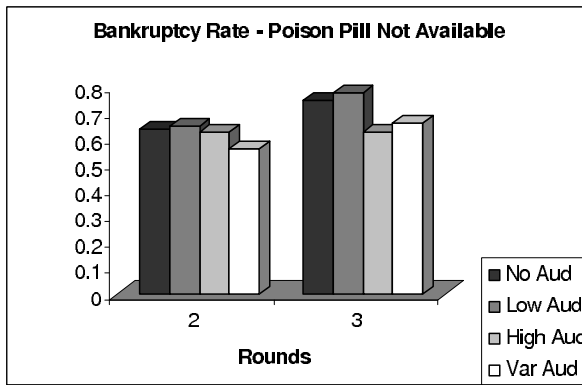FIGURE 4. Mean Investor Returns

FIGURE 5. Mean Bankruptcy Rate

TABLE 1. Notations and Definition of Variables

Notations

Parameter	Definition
v_t	Investor's payoff in sub-period t
ψ_t	Investor's total cash balance at end of sub-period t
ϕ_t	Manager's payoff in sub-period t
α_t	Pre-expropriation return on investment in sub-period t
β_t	Manager's compensation share paid out of the reported earnings in sub-period t
γ_t	Parameter determining cost of internal governance in sub-period t
κ_t	Internal governance level in sub-period t

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 (Audit)	Definition
DLOW	Indicator variable for treatments where the audit level is exogenously fixed at 0.5
DHIGH	Indicator variable for treatments where the audit level is exogenously fixed at 0.75
DVar	Indicator variable for treatments where audit level is chosen by investors
AudLev	Level of audit (either voluntarily chosen or exogenously given)
DGamma	Indicator variable for treatments with (relatively) high audit costs where, $\gamma\,(high) = 15$ and $\gamma\,(low) = 10$

External Governance Variables (Poison Pill)	Definition
PPY	Treatments where poison pill is available
PPN	Treatments where poison pill is not available
DPPT	Indicator variable for treatments where poison pill is available
DPPC	Indicator variable for the case when the option of choosing poison pill was exercised by the manager

Investment, Return & Compensation Variables	Definition
IRATE	ratio of amount invested over the total amount available for investment
ORET	ratio of investor's return on the overall amount available for investment (i.e., BEGCASH)
IRET	ratio of investor's return on invested amount
IRETLAG	one sub-period lag variable for IRET
DAalpha	Indicator variable for treatments with (relatively) high expected return on investment, where $\alpha\,(high) = 1.3$ and $\alpha\,(low) = 1.15$
DBeta	Indicator variable for high managerial compensation where, $\beta\,(high) = 0.15$ and $\beta\,(low) = 0.05$

Other Variables	Definition
IER	Intended Expropriation Rate = (ACF-RCF)/ACF
AER	Actual Expropriation Rate = (ACF-ARCF)/ACF
DTHIRDPD	Indicator variable for the third period ($\tau = 3$)

TABLE 2. Number of Subjects per Treatment

Experimental Sessions					
Treatment	Session 1	Session 2	Session 3	Session 4	Total
No Poison Pill					
No Internal Governance	40	32	na	na	72
Low Internal Governance (Low)	na	32	32	na	64
High Internal Governance (High)	na	na	32	na	32
Variable Internal Governance (Var)	40	32	32	32	136
Poison Pill					
Low Internal Governance (Low)	40	na	na	32	72
High Internal Governance (High)	na	32	na	32	64
Variable Internal Governance (Var)	na	na	32	32	64
Total	120	128	128	128	504

Subjects are equally divided between Managers and Investors

TABLE 3. Aggregate Data for all Treatments

Panel A: No Poison Pill Treatments												
	No Audit			Low Audit			High Audit			Var Audit		
	Pd1	Pd2	Pd3	Pd1	Pd2	Pd3	Pd1	Pd2	Pd3	Pd1	Pd2	Pd3
# Obs	536			480			256			964		
IRATE	0.33	0.56	0.49	0.51	0.6	0.52	0.745	0.78	0.79	0.62	0.66	0.69
AudLev	na	na	na	0.5	0.5	0.5	0.75	0.75	0.75	0.62	0.49	0.72
AudCost	0	0	0	0.15	0.05	0.07	0.11	0.05	0.05	0.19	0.07	0.06
InvEarn	0.71	0.88	0.72	0.76	0.85	0.80	0.80	0.89	0.87	0.72	0.79	0.83
IER	0.22	0.05	0.18	0.18	0.145	0.28	0.18	0.13	0.15	0.2	0.14	0.18
AER	0.22	0.05	0.18	0.08	0.05	0.12	0.05	0.04	0.02	0.09	0.09	0.11
ManEarn	0.29	0.13	0.26	0.11	0.09	0.14	0.09	0.08	0.06	0.14	0.15	0.14
BNKP Rate	na	0.64	0.75	na	0.65	0.78	na	0.625	0.625	na	0.56	0.66

Panel B: Poison Pill Treatments												
	Low Audit				High Audit				Var Audit			
	Pd1	Pd2		Pd3	Pd1	Pd2		Pd3	Pd1	Pd2		Pd3
		PPN	PPY			PPN	PPY			PPN	PPY	
# Obs	556				496				464			
IRATE	0.48	0.69	0.66	0.64	0.66	0.7	0.52	0.53	0.8	0.82	0.66	0.69
AudLev	0.5	0.5	0.5	0.5	0.75	0.75	0.75	0.75	0.695	0.56	0.72	0.58
AudCost	0.26	0.05	0.23	0.06	0.21	0.08	0.12	0.07	0.09	0.04	0.08	0.09
InvEarn	0.64	0.8	0.74	0.82	0.75	0.885	0.84	0.71	0.83	0.91	0.79	0.65
IER	0.25	0.17	0.28	0.19	0.14	0.15	0.23	0.42	0.14	0.14	0.11	0.27
AER	0.15	0.10	0.12	0.12	0.03	0.0	0.01	0.14	0.05	0.03	0.085	0.2
ManEarn	0.19	0.17	0.14	0.19	0.07	0.04	0.045	0.16	0.08	0.07	0.13	0.23
BNKP Rate	na	0.45	0.81	0.72	na	0.41	0.71	0.66	na	0.48	0.73	0.59
PP Rate	na	0.44		na	na	0.44		na	na	0.34		na

Note: Pd denotes period

TABLE 4. Regression Results for Internal Governance Regimes

	Panel A: No Poison Pill			Panel B: With Poison Pill		
	IRATE	ORET	IER	IRATE	ORET	IER
Constant	0.4478***	0.4318***	0.1709***	0.4748***	0.4546***	0.2330***
	(0.020362)	(0.018108)	(0.015795)	(0.020643)	(0.023909)	(0.016510)
DLow	0.1086***	0.1568***	-0.0007	-	-	-
	(0.022936)	(0.026621)	(0.023742)			
DHigh	0.3136***	0.4149***	-0.0079	0.1850***	0.2781***	-0.0797***
	(0.036709)	(0.032644)	(0.027746)	(0.026315)	(0.030479)	(0.023348)
DVar	0.2007**	0.2127***	0.014459	0.3244***	0.4468***	-0.0935***
	(0.025253)	(0.022457)	(0.019103)	(0.026315)	(0.030479)	(0.023109)
#Obs	1799	1799	1184	1008	1008	788

[1] *based on data from Period 1 and 2*

[2] *number inside parenthesis denotes std. error*

[3] **** denotes significance at 1% level*

[4] *** denotes significance at 5% but not 1% level*

[5] ** denotes significance at 10% but not 5% level*

TABLE 5. Regression Results for Simultaneous (3SLS) and Sequential Decision Making Estimation Models

	3SLS		SEQUENTIAL DECISIONS			
			AudLev → IRATE		IRATE → AudLev	
	AudLev	IRATE	AudLev	IRATE	AudLev	IRATE
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.346***	0.056	0.6636***	0.0869***	0.5794***	0.1737***
IRATE	-1.7748***	na	na	na	0.206***	na
AudLev	na	0.299***	na	0.2206***	na	na
BegCash	1.12^{1}	7.95^{2}***	-2.86^{2}	8.37^{2}***	-4.98^{2}**	9.54^{2}***
IRETLAG	0.6433***	0.272***	0.0628*	0.2842***	-0.0007	0.3185***
DPPT	-0.1186***	0.0381**	-0.1181***	0.0374*	-0.1165***	0.0354**
DPPC	0.0426	-0.0849*	0.1209**	-0.0733	0.1272**	-0.0404
DAlpha	na	0.1694***	na	0.1706***	na	0.1740***
DGamma	-0.5743***	na	-0.2954***	na	-0.262***	na
DTHIRDPD	0.0621	na	0.0563**	na	0.0696***	na
Observations	1290					

[1] *denotes* $\times 10^{-5}$

[2] *denotes* $\times 10^{-6}$

*** *denotes significance at 1% level*

** *denotes significance at 5% but not 1% level*

* *denotes significance at 10% but not 5% level*

TABLE 6. Regression Results for Variable Internal Governance Treatment

	IRATE	AudLev	IER
Constant	0.2026*** (0.030431)	0.5164*** (0.038021)	0.33825*** (0.040725)
AudLev	na	na	-0.25815*** (0.050909)
IRATE	na	0.2305*** (0.028977)	na
ACF	na	na	-2.36×10^{-6}*** (7.66×10^{-7})
BegCash	9.75×10^{-6}*** (2.27×10^{-6})	-4.43×10^{-6}* (2.37×10^{-6})	na
IRETLAG	0.2910*** (031232)	0.0391 (0.033483)	na
DPPT	-0.0082 (0.018982)	-0.1187*** (0.019696)	0.0362 (0.037628)
DPPC	-0.0325 (0.032471)	0.1321*** (0.051004)	-0.0747 (0.066408)
DBeta	-0.1272*** (0.021941)	-0.2185*** (0.026812)	-0.16765*** (0.048787)
DAlpha	0.2279*** (0.025046)	na	na
DGamma	na	-0.1257*** (0.026812)	na
DTHIRDPD	-0.0602 *** (0.021202)	0.0628*** (0.22066)	0.1166*** (0.036359)
#Obs	1290	1290	338

[1] *number inside parenthesis denotes std. error*

[2] **** denotes significance at 1% level*

[3] *** denotes significance at 5% but not 1% level*

[4] ** denotes significance at 10% but not 5% level*

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 will consist of 3-4[19] separate games. Each game will consist of multiple *periods* and each period will consist of several identical *sub-periods*. In each game you will be assigned either the role of an **Investor** or a **Manager**. 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 that game. She or he can still participate in subsequent games. In each sub-period the investor and the manager have to make certain decisions (*See Figures 6 and 7 for a screen shot of the Investor's and Manager's main window respectively.*)

Figure 6. Screenshot of Investor Main Window

B.1. **Decisions.**

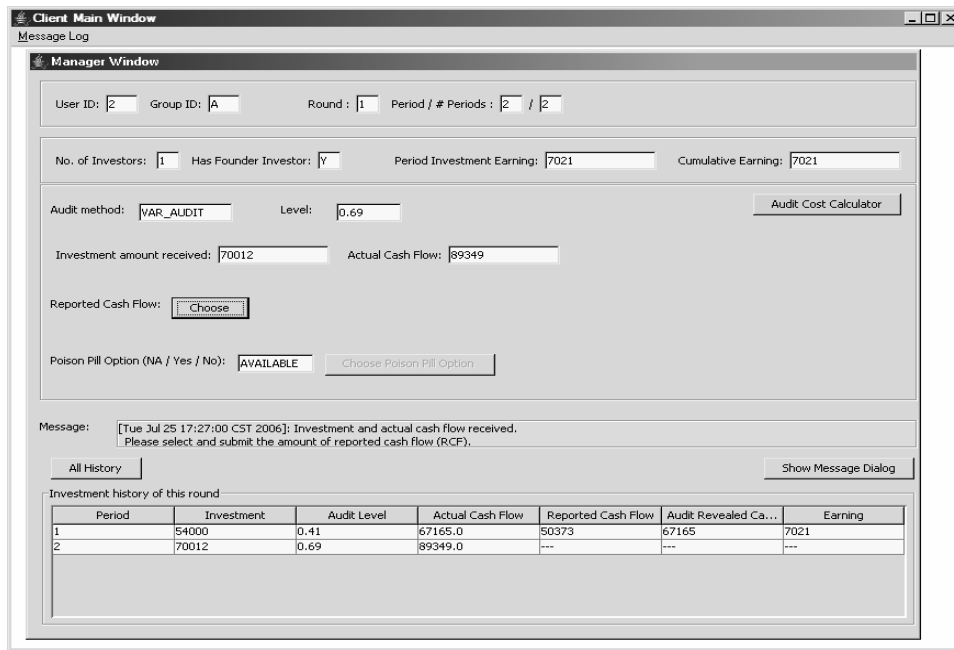[19]In one of the sessions we had three games (treatments) while in the rest we had four.

FIGURE 7. Screenshot of Manager Main Window

B.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) = α Investment ± Uncertainty Factor On Returns.

where, α is average return on investment and will be revealed to you before each game[20]. 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.

B.1.2. *Audit Decision.* Investors have to also make an *Audit Decision* in some games. The *Audit Decision* 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 on their investment. The audit level can be anywhere between 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

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[20]α was 1.15 in some treatments and 1.30 in others.

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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. The only return that the investor observes is the return revealed by the audit process (termed audit reported cash flow or ARCF). (*See Figure 9 for a screen shot of the Investor's audit and investment decision*).

AUDIT PROCESS EXAMPLE: Suppose the investment level made by an investor is 775 and the chosen audit level is equal to 0.6. Also suppose the actual return (ACF) generated by the investment is 1000. Suppose the manager after observing the audit level and the ACF, reports a return (RCF) equal to 1100. Then the audit process will result in either of the two following situations:

- With probability 0.6, the audit will be SUCCESSFUL. In that case the investor will observe the actual return (i.e. ARCF = ACF = 1000).
- With probability 0.4, the audit will FAIL. In that case the investor will observe the return reported by the manager (i.e. ARCF = RCF = 1100).

AUDIT 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 8).
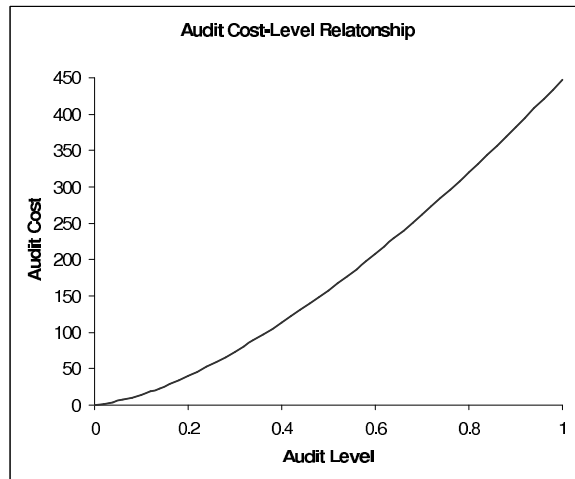

FIGURE 8. Audit Cost

The program provides you with an in built audit cost calculator. The audit costs gets deducted before the actual returns (ACF) is determined.

AUDIT DECISION WITH MULTIPLE INVESTORS: If a manager is selected by more than one investor, then the audit level is chosen in the following way:

- Each investor chooses an audit level and investment like before.
- 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 selected.
- If an investor's chosen audit level is not selected then that investor is given the opportunity to choose a different investment level.
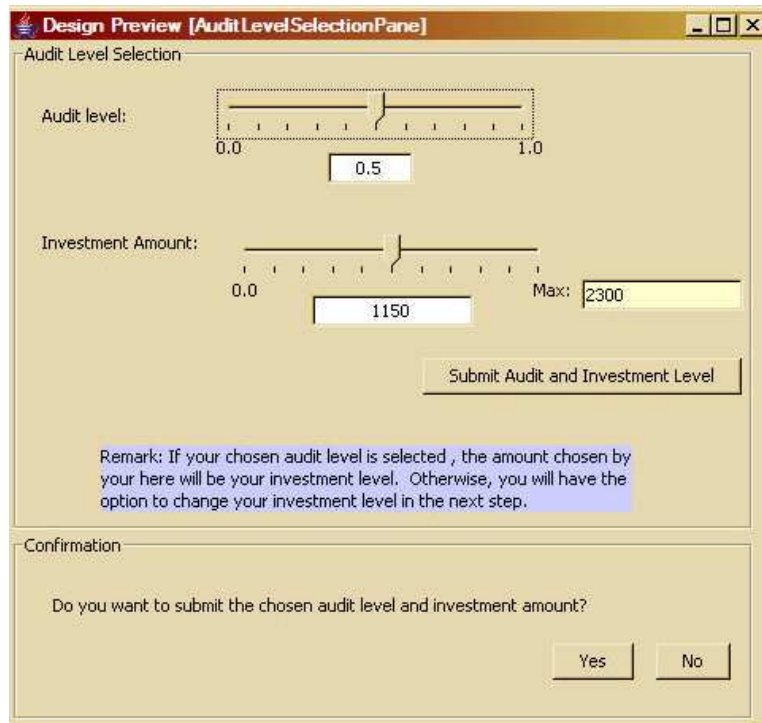

FIGURE 9. Screenshot of Audit and Investment Decision

B.2. **Reporting Decision.** Once investment is made, MANAGERS observe the actual return on investment (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 10 for a screen shot of Manager's reporting decision*).
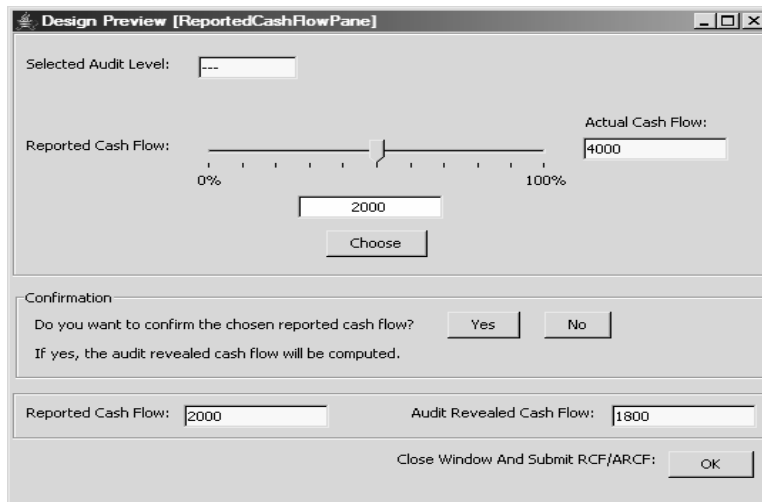
FIGURE 10. Screenshot of Manager's Reporting Decision

B.3. **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 round. Investors are then expected to use that information in order to select their manager for the next round (*See Figure 11 for a screen shot of Investor's manager selection decision*).
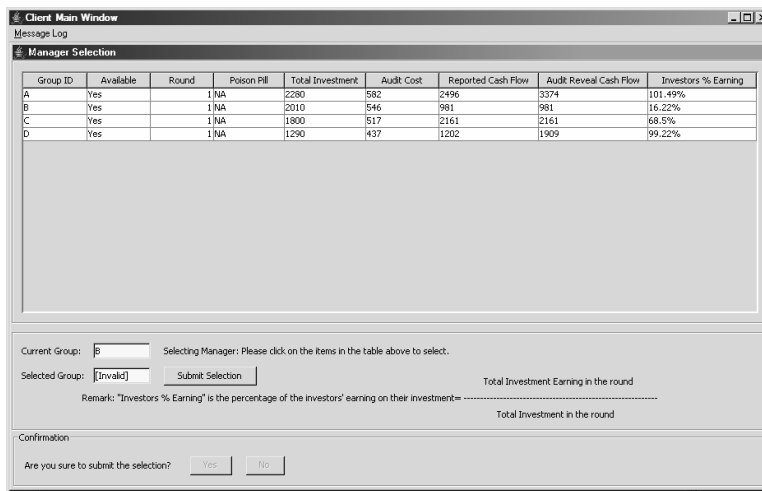

FIGURE 11. Screenshot of Manager Selection Decision

B.4. **Earnings.** The manager's share of the returns is determined by the fraction β. This is chosen by us and revealed to you before each game[21]. The earnings for the investor and

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[21]β took the values of 0.05 or 0.15.

manager depends on the results of the audit process and are calculated in the following way:

(1) If ARCF = ACF

- Manager Earnings = b. ARCF
- Investor Earnings = (1 - β) ARCF = (1 - β) ACF
- EXAMPLE: Suppose actual return (ACF) is 1000 and the Manager reports a return (RCF) equal to 500. Suppose the audit SUCCEEDS, then ARCF = ACF = 1000. Also suppose $\beta = 0.2$.
    - Manager Earnings = $0.2 \times 1000 = 200$
    - Investor Earnings = $1000 - 200 = 800$

(2) If ARCF < ACF

- Manager Earnings = β ARCF + (ACF - ARCF)
- Investor Earnings = (1 - β) ARCF
- EXAMPLE: Suppose like before actual return (ACF) is 1000, the manager reports a return (RCF) equal to 500 and $b = 0.2$. But now the audit FAILS, hence ARCF = RCF = 500.
    - Manager Earnings = $0.2 \times 500 + (1000 - 500) = 600$
    - Investor Earnings = 0.8×500 OR $1000 - 600 = 400$.

Remember, Manager Earnings + Investor Actual Earnings is ALWAYS EQUAL to ACF

B.5. **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.

B.6. **Poison Pill.** Some games have the availability of **Poison Pill**. In such games at the beginning of Period 2 each Manager has to decide whether to select this option or not. If this option is selected by a manager, then all investors who select that particular manager have to remain with him/her for all the subsequent rounds. Once a manager decides to choose the Poison Pill option, then that decision is binding for all subsequent rounds.

B.7. **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?