8-2009

An Analysis of Two Markets with Asymmetric Information

Stephen James Cotten
University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a dissertation written by Stephen James Cotten entitled "An Analysis of Two Markets with Asymmetric Information." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Economics.

Rudy Santore, Major Professor

We have read this dissertation and recommend its acceptance:

William Neilson, Christian Vossler, Phillip Daves

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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An Analysis of Two Markets with Asymmetric Information

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Stephen James Cotten
August 2009

DEDICATION

For providing a collegial environment where I could relax and discuss economic issues with my friends and colleagues, this dissertation is dedicated to Union Jacks. It would have taken a year less time without you.

ACKNOWLEDGEMENTS

Funding for this research was provided by a College of Business Professional Development Award, as well as the Department of Economics.

I would like to thank all who served on my dissertation committee for their guidance and insight. In particular, I would like to thank Rudy Santore for his late-night schedule that allowed me to discuss problems at 12:30AM, and Christian Vossler for his assistance in wrapping my mind around basic statistics – although those late nights drinking around the poker table probably undid much of his good. I would also like to thank Todd Cherry and Michael Price for constantly dealing with my questions, and Luke Jones for his research assistance. Special thanks go to my parents, Martin and Christy Cotten, and the rest of my family for their boundless support and encouragement.

Finally, I would like to thank members of the Economics Department as a whole for making my graduate school experience a collegial and friendly one. Our discussions and debates have enriched my understanding of economics and a great deal of other esoteric topics, and I appreciate them greatly.

ABSTRACT

In this dissertation, I examine the effect of statutory regimes on two common decisions made by market agents that are characterized by information asymmetries. For each decision, specifically, the decision to engage in accounting fraud by firm managers and the choice of contract to offer legal representation, a theoretical model is used to offer predictions which are then tested using laboratory experiments.

Chapter I examines the effects of Sarbanes-Oxley provisions pertaining to whistle-blower protections and reporting requirements on a managerial team's incentive to commit accounting fraud. Analysis predicts that whistle-blowing does not occur in equilibrium, but that the whistle-blower protections combined with the reporting requirements can reduce fraud, and are most likely to do so when managers are heterogeneous in their aversion to sanctions. Interestingly, amnesty provisions have no effect on the equilibrium level of fraud. In line with previous literature, equity compensation induces managerial effort, but also provides the incentive for management to fraudulently misreport the financial health of the firm.

Chapter II discusses the results of an experimental test of the theory and finds that whistle-blowing does occur in part due to coordination failures among members of the team. The out-of-equilibrium behavior from which whistle-blowing results renders the theoretical prediction that amnesty does not matter to be moot, and analysis shows that whistle-blowing decreases the amount of fraud that goes undetected by authorities, and that this effect is magnified by amnesty provisions. Otherwise, the experiments yield strong support for the theoretical predictions of the model.

Chapter III uses a theoretical model and experimental test to consider the possibility that contingent fees may improve the quality of legal services by allowing clients to screen low-quality

attorneys. The model suggests that caps on contingent fees may reduce the average quality of legal representation by allowing low-quality attorneys to remain in the market and decrease client welfare by allowing attorneys to earn rents. Experimental evidence provides support for these predictions, showing that client welfare and screening decrease as caps become more stringent, even if the caps are not do not prevent screening.

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CHAPTER I: MANAGERIAL TEAMS, WHISTLE-BLOWING, AND FRAUD

Introduction

Throughout the 1980s and 1990s corporations embraced the recommendations of agency theory by utilizing equity compensation to incentivize managers (Murphy 1999). However, the recent high-profile exposure of illegal accounting practices in numerous corporations, such as Enron and Worldcom, has led both researchers and policy-makers to acknowledge that fraud may be an unexpected consequence of these compensation schemes. It is now understood that at least one major roadblock to the practical application of agency theory to the corporate setting is that managers may manipulate a firm's stock price by misreporting the financial health of the firm. As explained by the AICPA, "Management may override controls to intentionally misstate the nature and timing of revenue or other transactions by (1) recording fictitious business events or transactions or changing the timing of legitimate transactions, particularly those recorded close to the end of an accounting period; (2) establishing or reversing reserves to manipulate results, including intentionally biasing assumptions and judgment used to estimate account balances; and (3) altering records and terms related to significant or unusual transactions." (American Institute of Certified Public Accountants 2005)

In response to recent accounting scandals, lawmakers passed the Sarbanes-Oxley Act of 2002. The Act attempts to reduce fraud by strengthening corporate governance and reporting requirements, and our analysis focuses on two of Sarbanes-Oxley's provisions. The first is the protection from retaliation given to whistle-blowing employees.[1,2] As discussed by Watnick (2006), "In attempting to

[1] 18 U.S.C. 1514A, "Civil action to protect against retaliation in fraud cases."; 18 U.S.C. 1513 (e), "Retaliating against a witness, victim, or an informant."

reform American business practices, Congress impressed into service corporate officers, directors, and other corporate employees, enlisting them as 'foot soldiers' in the fight against corporate fraud. Congress did so by requiring those who witness corporate fraud to report what they know about it and by offering commiserate protection from retaliation under the 'whistle-blower protection' provisions contained within Sarbanes-Oxley."

The second provision of interest is the requirement that management establish and affirm the adequacy of their financial reports.[3] Specifically, "the principal executive officer or officers and the principal financial officer or officers, or persons performing similar functions"[4] must certify that they are "responsible for establishing and maintaining internal controls"[5] and "have designed such internal controls to ensure that material information relating to the company and its consolidated subsidiaries is made known to such officers by others within those entities."[6] Management must ensure, with threat of criminal penalties for noncompliance, that "information contained in the periodic report fairly presents, in all material respects, the financial condition and results of operations of the issuer."[7]

In this paper, we consider the implications of supporting whistle-blowers (through employee protections) and requiring complicity in misreporting (through having managers sign off on financial reports) on the incentives of a managerial team to commit fraud. We construct and draw implications from a model in which a team of managers receives equity compensation to run a firm.[8] The team

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[2] See Watnick (2006) for a comprehensive review of the statutory language, legislative history, and regulations pursuant to the Act, as well as analysis of the effectiveness of the provisions and legal cases relating to the whistle-blower provisions.
[3] 15 U.S.C. 7262, "Management assessment of internal controls."
[4] 15 U.S.C. 7241, "Corporate responsibility for financial reports."
[5] Ibid
[6] Ibid
[7] 18 U.S.C. 1350, "Failure of corporate officers to certify financial reports."
[8] We use the same definition of *team* as found in Holmstrom (1982), namely, "A group of individuals who are organized so that their productive inputs are related."

provides productive effort, which increases the true value of the firm, and also reports the value to the market. The reported value, however, may be fraudulently inflated by one or more managers. It is assumed that all managers know whether fraud has taken place, and thus each manager is able to blow the whistle prior to sending the report to the market. Managers differ in their sensitivity to sanctions, implying that some managers are more inclined to report fraud than others. A manager who blows the whistle may be given complete or partial amnesty for his or her individual contribution. If no manager reports the fraud, there is a chance that the fraud will later be detected by authorities, in which case every manager is treated as being complicit and receives an identical sanction.

We find that, in equilibrium, only a fraction of the (heterogeneous) managers actively participate in the fraud, yet no manager blows the whistle. This is true despite the fact that the entire team faces a positive probability of sanction. The reason that no manager blows the whistle is that every member of the team holds stock in the firm and thus benefits if the fraud goes undetected. At the same time, those managers who actively commit fraud refrain from over-reporting at a level that would cause whistle-blowing by the managers who do not actively participate in the illegal behavior. As a result, rules that protect whistle-blowing and that effectively mandate complicity among the managerial team (by having management sign off on reports created by others) do keep fraud in check, but do not eradicate it entirely.

Our analysis also helps shed light on the notable absence of amnesty provisions for whistle-blowers in the Sarbanes-Oxley Act or, more generally, federal sentencing guidelines. Surprisingly, amnesty provisions are found to have no effect on the magnitude of fraud because those who are most inclined to blow the whistle do not actively participate in illegal over-reporting. These potential whistle-blowers would not receive sanctions even if they were to report the fraud.

Theoretical research exploring the effects of equity compensation on accounting fraud has mostly focused on single-agent models. Goldman and Slezak (2006) find that an increase in managerial equity compensation leads to greater incentives to commit fraud, while an increase in the probability of detection has an ambiguous effect because the owner may respond by increasing the pay-for-performance sensitivity. Andergassen (2008) examines whether stock-based or stock option-based compensation is optimal when managers may fraudulently inflate the value of the firm. Crocker and Slemrod (2007) derive the optimal compensation contract in a setting where the manager can generate an inflated earnings report. They show that a contract contingent on reported earnings cannot provide a manager with the incentive to both maximize profits and honestly report earnings. Bar-Gill and Bebchuk (2003) use a dynamic model that allows for both legal and illegal manipulation of the stock price. These authors find that increases in exercisable equity compensation lead to greater incentives to engage in fraudulent behavior, and that tightening controls on the ability of managers to liquidate decreases the incentive to commit fraud. Finally, Robison and Santore (2008) study an owner's incentive to invest in both *ex ante* monitoring, which decreases the likelihood that fraud is possible, and *ex post* monitoring, which increases the probability that fraud will be detected after the fact.

While the papers discussed above consider managerial fraud and allow for the possibility of detection, they do not allow for the possibility of whistle-blowing. Heyes and Kapur (2008) and Friebel and Guriev (2005) are two recent papers that formally model the decision to blow the whistle. Heyes and Kapur (2008) develop a model of whistle-blowing behavior in which agents may report environmental violations, although their results can be applied to other contexts. Unlike our model, in which whistle-blowers act to avoid being punished for the managerial team's actions, their model focuses on various motivations for whistle-blowers to act to prevent harm to others. These authors find

that the optimal enforcement policy is dictated in large part by the motivation of the potential whistle-blower.

Friebel and Guriev (2005) assume that *upper* management receives equity compensation and can artificially inflate earnings. In order to prevent lower management from blowing the whistle, upper management must give lower management additional compensation. Despite some similarities, their paper differs from ours in a few important aspects. First, our managers hold identical positions within the managerial team and each is able to actively participate in the fraud, while Friebel and Guriev have two levels of manager and only top management can actively commit fraud. Second, unlike Friebel and Guriev, we do not allow the team to manipulate the compensation packages in order to prevent whistle-blowing. Third, whistle-blowing in our model is motivated by the potential for team punishment when fraud is detected, which can occur even if no manager blows the whistle. In contrast, Friebel and Guriev assume that fraud is detected only if lower management blows the whistle.

There has also been a sizable array of empirical research on the impact of executive compensation on accounting malfeasance. Johnson, Ryan, and Tian (Forthcoming) compare a sample of firms under suspicion by the SEC of engaging in fraudulent behavior with a control sample of "innocent" firms. They find that the likelihood of fraud is correlated with unrestricted stockholdings and that unrestricted stockholdings comprise the largest share of managerial incentives at firms guilty of fraud. Peng and Roell (2006) find greater pay in the form of stock options increases the probability that a firm will be involved in securities litigation. Burns and Kedia (2006) use a sample of firms that restated earnings between 1995 and 2001 to look at the relationship between CEO compensation and misreporting, and they find that there is a significant and positive relationship between the sensitivity of a CEO's compensation package to a change in the stock price and the propensity to misreport earnings.

They also find that the magnitude of misreporting is larger in firms offering more equity-based compensation, and that options provide the strongest incentive to misreport because the risk of detection is lower than with other forms of compensation. In addition to the above field studies, Bruner, McKee, and Santore (2008) find experimental evidence that the amount of effort exerted and fraud committed are positively correlated with the level of equity compensation. [9]

The Model

A team of N risk-neutral managers is hired to provide effort to increase the value of the firm. The size of the team depends on the specifics of the firm and is taken as exogenous. The team is compensated with both salary and equity. The managers are assumed identical so each receives the same contract. Let s represent the total salary and α represent the total share of equity paid to the team. It follows that the salary and share of equity given to *each* manager are $\frac{s}{N}$ and $\frac{\alpha}{N}$, respectively. As we do not focus on the owner's problem or the optimal contract, we assume for simplicity that the contract exceeds the reservation utility of each manager in the team.

Each manager chooses an unobservable level of effort, e_i, which costs $C(e_i)$. The true value of the firm is determined by the combined effort of all managers, $E = \sum_{i=1}^{N} e_i$, and a stochastic component, μ, which is normally distributed with $E(\mu) = 0$ and variance σ^2. Specifically, the true value

[9] Other empirical research includes work by Bergstresser and Philippon (Forthcoming), who find that a greater share of a CEO's compensation derived from stock and option holdings is correlated with a greater propensity to engage in earnings management. Ke (2005) also finds that managers with exercisable stock options and unrestricted stock have a greater propensity for earnings manipulation. Cheng and Warfield (2003) find a significant positive relationship between stock-based compensation and an abnormal tendency to meet or barely exceed analysts' forecasts. Richardson, Tuna, and Wu (2003) also find that executives at restating firms have more equity-based compensation, but they do not distinguish between options and straight equity.

of the firm is $V(E, \mu) = v(E) + \mu$, where $v'(E) > 0$ and $v''(E) < 0$. Once the true value of the firm is determined, this value is learned by the managers, but no one else.

With the true value determined, the managers issue a report on the firm's value to the market, $V^R = V(E, \mu) - s + F$, where F is a non-negative fraudulent inflation of the true value. While the contracts paid to the managers are observable, both $V(E, \mu)$ and F are not. Each manager contributes to this report of the firm's value, and we will refer to each manager's decision as a choice of fraud, f^i. These choices are aggregated with the fraud of other managers, $F_{-i} = \sum_{j \neq i} f^j$ into total fraud, $F = \sum_{i=1}^{N} f^i$. One interpretation is that each manager is responsible for some section of the firm, and is able to report inflated earnings for that section. The reports are then aggregated to yield a reported value for the firm.

One or more managers may choose to report fraud to external authorities before the report is issued to the market; that is, a manager may blow the whistle. If whistle-blowing occurs, the ensuing investigation detects and prevents all fraudulent activity so that a truthful earnings report is released to the public. Below we describe the sanctions imposed on management in the event that the fraud is reported.

After the report is made, the managers sell their equity stakes at the market value.[10] Afterwards, the true value is learned by the market with certainty, causing damage to the firm, $D(F)$, commensurate with the difference between the reported value and true value. The market is assumed to anticipate a level of fraud, F^e, and adjusts the market value of the firm accordingly. In this case, the market value of the firm is $V^M = V^R - F^e - D(F^e)$.

[10] All managers must sell their equity stakes. If this were not the case, there would exist a classic adverse selection problem (Akerlof 1970); the mere fact that a manager sold his or her shares would signal that that fraud had occurred.

While the firm absorbs damage from the fraud with certainty, there is only a positive probability, ρ, that the deviation between the reported value and true value will be determined fraudulent.[11] Let $X()$ denote the convex sanction function that determines the punishment to the manager if the fraud is detected or reported, where $X^{'} > 0$, $X^{''} > 0$, and $X^{'}(0) = 0$. This sanction represents seizure of pay, jail time, reputation losses, etc., examples of which can be seen in several recent federal prosecutions.[12]

All managers receive disutility from being sanctioned, but some managers receive greater disutility than others. [13, 14, 15, 16] We assume that there are two types of manager and let $t = L, H$ denote a manager's type. A type L manager (referred to as a *low*) incurs disutility $\eta_L X()$ from being sanctioned while a type H manager (referred to as a *high*) incurs disutility $\eta_H X()$ from being sanctioned, where η_H and η_L are constants and $\eta_H > \eta_L$. There are $N_L \geq 1$ *lows* and $N_H \geq 1$ *highs* in the team, so that $N_L + N_H = N$.

In the case of a managerial team, where all members are working for a single entity and can be considered negligent if fraud occurs, team punishment is assumed. In the case where no manager blows the whistle (discussed below), we assume that manager sanctions are based on the average level of

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[11] One can interpret ρ as the probability that authorities have sufficient evidence to build a case against the managerial team.

[12] United States v. Kenneth L. Lay & Jeffrey K. Skilling (2004CR00025 – U.S. District Court – Southern District of Texas), and United States v. Bernard J. Ebbers (2002CR1144 – U.S. District Court – Southern District of New York) are examples.

[13] Schmidt (2005) provides a non-technical discussion of the merits of rewarding external whistle-blowing and of the impacts encouragement of whistle-blowing has on different types of managers.

[14] For example, a young manager may suffer greater future pay losses from establishing a criminal record early in his or her career than an older manager nearing retirement. Furthermore, as discussed by Cooter and Porat (2001), behavior that is inconsistent with social norms can lead to *nonlegal sanctions* that can vary across individuals.

[15] Mittendorf (2008) employs a principal-agent model where agents differ in their ethical characteristics, and finds that the existence of 'ethical' agents alters the behavior of those who are not 'ethical.' His model focuses on shirking by agents, and does not allow for the possibility that agents can commit fraud.

[16] Differences in risk-aversion would yield similar results, as risk-aversion is a measure of the disutility of the risk. We discuss other sources of heterogeneity later in the paper.

fraud, $\frac{F}{N}$.[17] This is consistent with the notion that, regardless of each manager's individual contribution to fraud, each member of the team is complicit and should be held accountable. Hence, if the managerial team is found to have committed fraud, the utility cost for a manager of type t is $\eta_t X\left(\frac{F}{N}\right)$.

A manager who blows the whistle is held responsible for his or her individual choice of (attempted) fraud, implying that a whistle-blower who did not attempt to commit fraud is not sanctioned. At the same time, when one or more managers blow the whistle, the other managers are punished based on the average level of fraud committed by those managers who did not blow the whistle. Formally, if N_W managers choose to blow the whistle and these managers were responsible for a combined level of fraud F_W, then the managers who did not blow the whistle are *each* held responsible for $\frac{F-F_W}{N-N_W}$ total fraud. Thus, a manager who does not commit fraud but also does not blow the whistle receives the same sanction as a manager who did commit fraud. This assumption is consistent with the view that managers have a fiduciary responsibility to report fraud, regardless of whether these managers actively participated in the fraud.

Consistent with statutes such as Sarbanes-Oxley, we allow for the possibility that, in exchange for revealing fraud, managers receive some degree of immunity from prosecution in addition to the protections from retaliation stated in the Act itself. Thus, managers are able to protect themselves from being punished for the actions of others if they find the risk to be too great. To model this partial immunity, we let θ represent the proportional reduction in penalty for the whistle-blower, where $0 \leq \theta \leq 1$. To summarize, the utility cost for manager i of type t who blows the whistle is $(1 -$

[17] One could punish each manager based on the entire amount of fraud with no qualitative change in results.

$\theta)\eta_t X(f_t^i)$, and the utility cost for manager i of type t when N_W another managers who committed a total of F_W of fraud blow the whistle is $\eta_t X\left(\frac{F-F_W}{N-N_W}\right)$.[18]

It follows from the above discussion that the expected utility for manager i of type t ultimately depends on i's choice of effort and fraud, the effort and fraud choices of other team members, and how many managers blow the whistle.

$$EU_i = \begin{cases} \frac{s}{N}+\frac{\alpha}{N}(V(E,\mu)-s-F^e-D(F^e))-C(e_i)-(1-\theta)\eta_t X(f_t^i)\,, if\ manager\ i\ blows\ the\ whistle \\ \frac{s}{N}+\frac{\alpha}{N}(V(E,\mu)-s-F^e-D(F^e))-C(e_i)-\eta_t X\left(\frac{F-F_W}{N-N_W}\right), if\ N_W\ other\ managers\ blow\ the\ whistle \\ \frac{s}{N}+\frac{\alpha}{N}(V(E,\mu)-s+F-F^e-D(F^e))-C(e_i)-\rho\eta_t X\left(\frac{F}{N}\right), if\ no\ one\ blows\ the\ whistle \end{cases} \quad (1$$

Team punishment provides an incentive to monitor and report on the behavior of other members of the team. If punishment were not applied to the entire team, a manager would never blow the whistle in equilibrium. Indeed, not blowing the whistle and not committing fraud dominates blowing the whistle since in the former case the manager may receive an inflated price for his or her equity holdings and has no chance of being sanctioned. When the choice of fraud is made individually but the entire team is punished, it is possible that total fraud could reach levels unacceptable to some managers. Faced with this possibility, with no mitigating instrument, *highs* may choose not to play the game, and an adverse selection problem would result. Here, whistle-blowing serves as a mitigating instrument.

To summarize, the timing of events are as follows:

<u>*Stage 1*</u>: Each manager simultaneously and individually chooses a level of effort.

[18] The main results are robust to different specifications of penalties when another manager blows the whistle. In particular, Lemma 1 continues to hold for a wide variety of circumstances since we cannot have an equilibrium in which fraud is committed and some manager blows the whistle.

Stage 2: The true value of the firm, $V(E, \mu) - s$, is realized and observed by all managers.

Stage 3: Each manager simultaneously and individually chooses a level of fraud.

Stage 4: Each manager observes the fraud chosen by the other managers and decides whether or not to engage in "whistle-blowing", revealing to authorities that fraud is about to occur.

Stage 5: Each manager sells his or her equity stake in the firm, regardless of whether or not whistle-blowing has occurred.

Stage 6: There is a positive probability, ρ, that any difference in reported and true values is determined to be fraudulent, in which case all managers are punished based on the total amount of fraud. (Note: If whistle-blowing has occurred then the reported value equals the true value, so no sanctions are applied.) Regardless of whether or not the difference between the reported and true value is proven fraudulent, the value of the firm is reduced by $D(F)$.

Results

In our analysis, we focus on a symmetric pure-strategy equilibrium in which all managers of the same type choose the same level of fraud. There is a multiplicity of equilibria, but the *total* amount of fraud is the same in each, so restricting our discussion to the symmetric equilibrium does not alter the qualitative nature of our results.

We begin by solving the game backwards and determining when it is optimal for a manager to blow the whistle. If a manager blows the whistle, he or she sells the stock at the true value and faces a possibly-reduced sanction for the fraud he or she committed. If a manager does not blow the whistle, he or she benefits from selling the stock at the artificially inflated price, but has a positive probability of facing a sanction based on the average amount of fraud. Comparing the payoffs given in equation 1, we

find that it is optimal for a manager of type $t \in L(low), H(high)$ to blow the whistle if, for a given level of total fraud, the following is satisfied for *any* manager in Stage 4:

$$\frac{\alpha}{N}F - \rho\eta_t X\left(\frac{F}{N}\right) \leq -\eta_t(1-\theta)X\left(f_t^i\right), \quad t = L, H \tag{2}$$

If (2) holds with equality, the manager is indifferent between blowing the whistle and not. In such circumstances, we assume that the manager does *not* blow the whistle.

Lemma 1: *Whistle-blowing does not occur in equilibrium.*[19]

If the total level of fraud is such that it is optimal for a manager to blow the whistle, any manager who committed positive fraud receives negative net benefits. Thus, it can never be an equilibrium for managers to commit fraud if doing so will cause some manager to blow the whistle. Nevertheless, as shown below, the mere threat that another member of the team will go to authorities may be sufficient to reduce the total level of fraud.

Given that we can rule out any equilibrium in which whistle-blowing occurs, the next step is to determine the equilibrium level of fraud. Although the fear that someone may blow the whistle can affect the equilibrium, it is convenient to first determine the preferred level of fraud assuming whistle-blowing were not possible. *Highs* and *lows* have different preferred levels of total fraud, which are the solutions to the following maximization problem.

$$\max_F EU_i = \frac{s}{N} + \frac{\alpha}{N}\left(v(E) - s + F - F^e - D(F^e)\right) - C(e_i) - \rho\eta_t X\left(\frac{F}{N}\right), \quad t = L, H$$

The first order condition for an interior solution is:

[19] Proofs for all lemmas and propositions are located in Appendix A.

$$\frac{\alpha}{N} - \frac{\rho\eta_t}{N} X'\left(\frac{F}{N}\right) = 0, \quad t = L, H \qquad (3)$$

The assumption that $X'(0) = 0$ rules out a corner solution. The second-order condition for maximization is also satisfied:

$$-\frac{\rho\eta_t}{N^2} X''\left(\frac{F}{N}\right) < 0, \quad t = L, H \qquad (4)$$

Let $P^t > 0$ be implicitly defined by (3), where the arguments are suppressed. This value represents the preferred level of total fraud for a manager of type t, assuming that whistle-blowing does not occur. This preferred level is that which maximizes the expected net benefits from fraud, which we define as the expected utility *derived from fraud* a manager receives given that, as Lemma 1 indicates, whistle-blowing does not occur. With the preferred level of fraud determined for each type, we now determine the level of fraud which will cause whistle-blowing for a given manager.

As shown, in equilibrium no manager will blow the whistle, yet the threat of whistle-blowing may alter the equilibrium level of fraud. The level of fraud that will be tolerated by manager i depends on the manager's type and the level of fraud that he or she has chosen. Define $W^t(f_t^i)$ as the maximum total amount of fraud that does not cause manager i of type t to blow the whistle when i has chosen f_t^i. From (2), $W^t(f_t^i)$ is the non-zero amount of fraud, F, that solves:

$$\frac{\alpha}{N} F - \rho\eta_t X\left(\frac{F}{N}\right) + \eta_t(1-\theta)X(f_t^i) = 0, \quad t = L, H \qquad (5)$$

Figure 1 provides a graphical representation of the preferred and whistle-blowing levels of fraud.

The preferred level of fraud, P^t, maximizes the increase in the value of a manager's equity due to the fraud, $\frac{\alpha}{N}F$, less the expected sanctions, $\rho\eta_t X\left(\frac{F}{N}\right)$. Because punishment is levied against the entire team if no manager blows the whistle, the preferred level of fraud is unaffected by an individual manager's contribution to that fraud. The whistle-blowing level of fraud, $W^t(f_t^i)$, is the non-zero level

of fraud at which a manager is indifferent about blowing the whistle (i.e. when the expected net benefits if whistle-blowing does not occur are equal to the benefit of blowing the whistle). If a manager is responsible for some of the fraud ($f_t^i > 0$), as in Figure 1, then indifference occurs at negative expected benefits as described by (5), because the manager will be punished for his or her individual contribution if whistle-blowing occurs. As should be clear from Figure 1, it is straightforward to show that $W^t(f_t^i)$ is increasing in f_t^i. If $f_t^i = 0$, then indifference occurs at the horizontal axis. Similarly, if full amnesty is granted to whistle-blowers, $\theta = 1$, indifference occurs at the horizontal axis.

Lemma 2: *The preferred level of fraud for a given type of manager is less than the level that causes whistle-blowing, regardless of the manager's individual contribution to total fraud. Formally,* $P^t < W^t(f_t^i)$ *for all* $f_t^i \geq 0$.

Whistle-blowing occurs when there is *too much* fraud for a manager to accept the risk of external punishment, so it is not surprising that this amount must be larger than the preferred level.

Lemma 3: *Highs prefer less fraud than lows. Formally,* $P^H < P^L$.

The above lemma states the intuitive result that those managers with a higher sensitivity to sanction prefer less fraud than managers with a lower sensitivity. This follows from the fact that both types receive the same benefit from any given level of fraud, but *highs* receive greater punishment, if detected, than the *lows*.

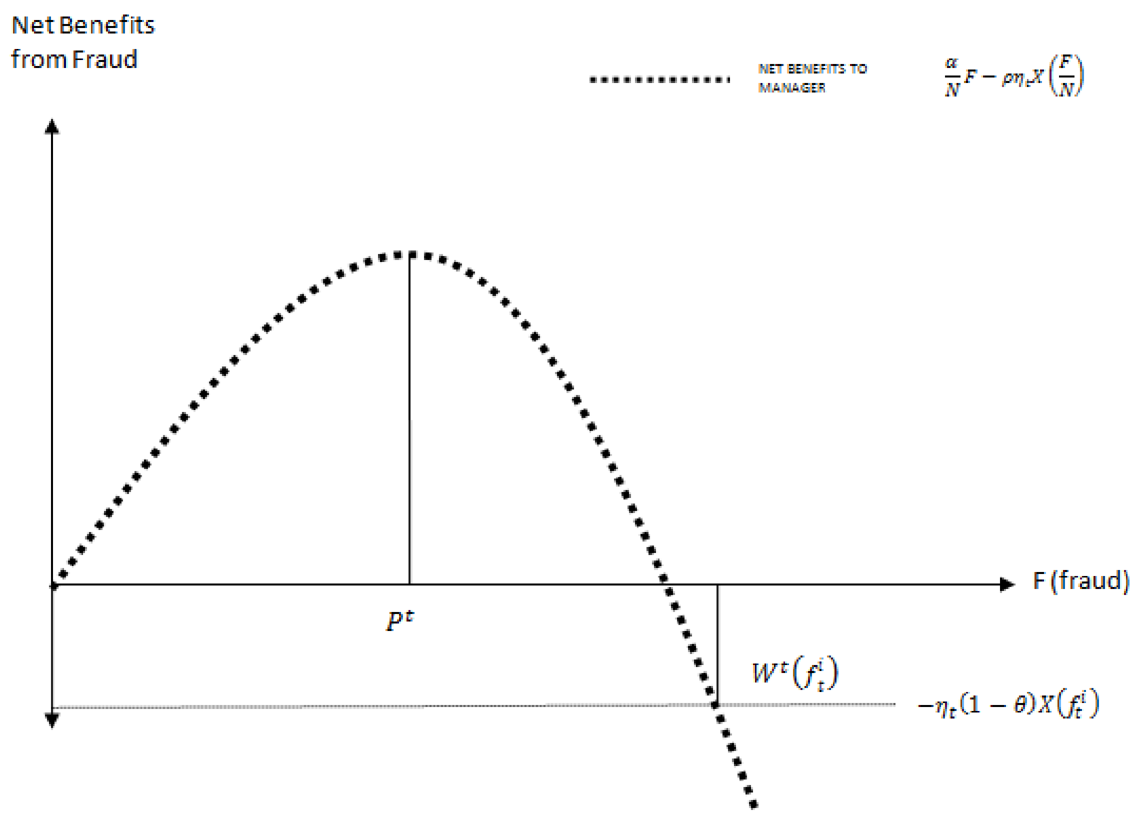

Figure 1: Preferred and whistle-blowing levels of fraud

The preferred and whistle-blowing levels of fraud for a manager who commits a positive level of fraud and where full-amnesty from punishment is not granted. (i.e. $\boldsymbol{f_t^i} > 0,\ \boldsymbol{\theta} < 1$)

Lemma 4: *If the equilibrium level of fraud exceeds the preferred level of some type t, then all managers of type t must commit zero fraud. Formally, if* $F^* > P^t \ for\ some\ t = L, H, then\ f_t^* = 0$.

If the equilibrium level of fraud is higher than the preferred level for that type, a manager of that type would be better off decreasing his or her individual contribution to the fraud. Therefore, the equilibrium level of fraud cannot exceed the preferred level of that type unless managers of that type commit no fraud. We can now characterize the equilibrium.

Proposition 1: *At a subgame-perfect symmetric equilibrium*

(i) *total fraud equals* $F^* = Min\{P^L, W^H(0)\}$*;*

(ii) *the highs commit no fraud,* $f_H^* = 0$ *;*

(iii) *the lows commit a positive level of fraud,* $f_L^* = min\left\{\frac{P^L}{N_L}, \frac{W^H(0)}{N_L}\right\}$*; and*

(iv) *no manager blows the whistle.*

At equilibrium, the lows commit either their preferred level of fraud or the greatest amount that does not trigger a high to report the illegal activity. The *highs* commit no fraud, but do not blow the whistle, implying that they are no worse off than if fraud were impossible. Important to note is that the composition of the team does not matter, as long as there is at least one of each type. The equilibrium is determined by the preferred level of fraud for the *low* type and the whistle-blowing level of the *high* type, not the proportion of each type in the team. Figures 2 and 3 provide a graphical illustration for each of the two cases where the respective values of $W^H(0)$ and P^L differ.

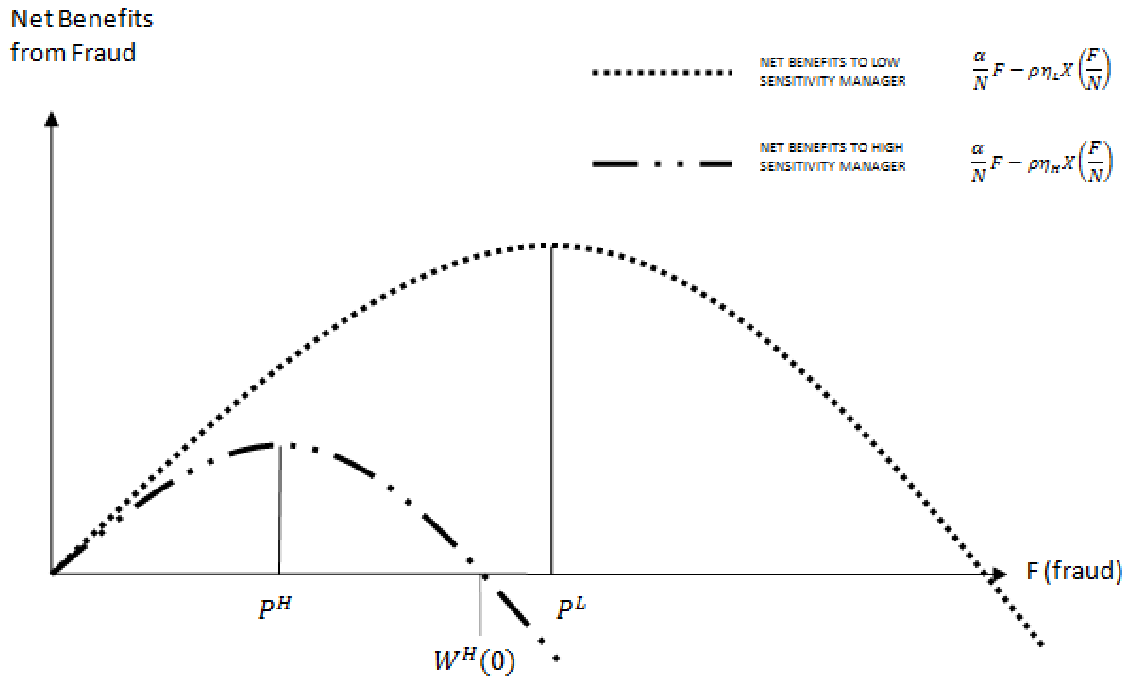

Figure 2: Expected benefit of fraud when types are different.

The expected benefit of fraud to each type of manager when the managers are "sufficiently different." (i.e. $W^H(0) < P^L$)

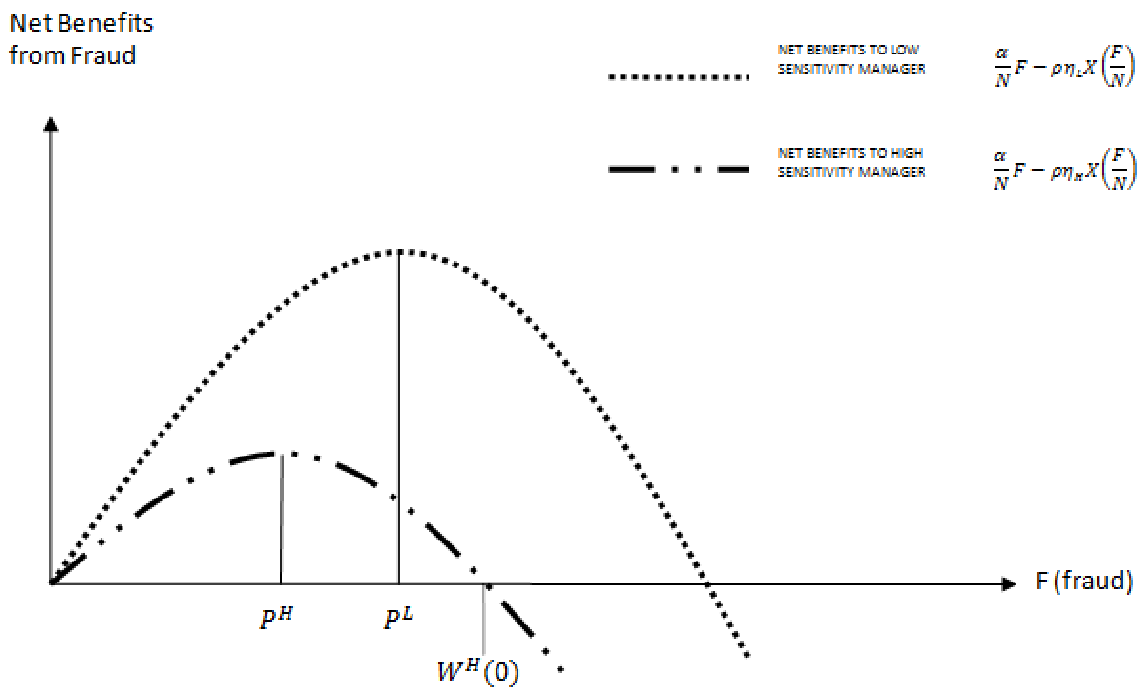

Figure 3: Expected benefit of fraud when managers are similar.

The expected benefit of fraud to each type of manager when the managers are "sufficiently similar." (i.e. $\boldsymbol{W^H(0) > P^L}$)

When the whistle-blowing condition for the *high* is less than the preferred level for the *low*, given that the *high* commits no fraud (Lemma 4), then the only choices of fraud acceptable to both types is the range given by P^H to $W^H(0)$. *Lows* push the level of fraud as high as possible without inducing the highs to blow the whistle.

In Figure 3, the preferred level of fraud for the *low* is below the whistle-blowing condition for the *high*, so the equilibrium level of fraud is the one that is preferred by the *lows*. Both types benefit from the fraud, although the *highs* do not contribute to it.

Proposition 2: *The relative magnitudes of η_L and η_H determine the nature of the equilibrium.*

(i) *If the two types are sufficiently similar, then the equilibrium fraud equals the level preferred by the lows. That is, if η_H is sufficiently close to η_L, then $F^* = P^L$.*

(ii) *If the two types are sufficiently different, then the equilibrium fraud equals the level at which the highs are indifferent between blowing the whistle and not. That is, if η_H is sufficiently large relative to η_L, then $F^* = W^H(0)$.*

The previous proposition implies that whistle-blowing may not affect the equilibrium level of fraud if the managers are not sufficiently different. As illustration, assume that all managers are identical. In a symmetric equilibrium, these managers would divide their preferred level of fraud. Whistle-blowing would be entirely irrelevant. Now, assume that there are two types, but the *highs* are so averse to committing fraud that they receive infinite disutility from any sanction. The threat of their whistle-blowing would result in zero fraud being committed. It is the heterogeneity of managers that allows whistle-blowing to reduce the equilibrium level of fraud from that preferred by the least sensitive type.

The source of heterogeneity need not be the disutility of sanction. We model disutility from sanction as the source of heterogeneity because it is intrinsic to the agent, like risk-aversion, but can encapsulate a number of different factors. We do not model differences in compensation because heterogenous compensation may undermine the team framework. An owner could hire a manager with a large salary and zero equity share, and this manager would exert zero effort (standard principal-agent result) but would blow the whistle for any positive choice of fraud. This is equivalent to hiring an internal auditor. One might expect a managerial team to hide their fraud from internal auditors, and likewise, to hide their fraud from a manager obviously hired for the purpose of ratting them out – such a member would not truly be part of the team. As we are examining the incentives to commit fraud and engage in whistle-bloswing among members of a team, we assume that compensation is the same for all managers.

Proposition 3: *Granting amnesty to whistle-blowers does not alter the equilibrium level of fraud.*

In equilibrium, *highs* do not commit fraud. When whistle-blowing occurs, punishment is based on the individual choice of fraud, so *highs* would face zero punishment if they blew the whistle. As such, there is no penalty to be reduced, so amnesty does not change their behavior. *Lows* are responsible for all of the fraud, which is never greater than their preferred level. So, in equilibrium, it is not optimal for the lows to blow the whistle, even with full amnesty. The conclusion is that amnesty has no effect on the equilibrium.

The previous analysis implies that in a Subgame Perfect Nash Equilibrium, the fraud choices are independent of the effort choices. Thus, while the managers are rational and anticipate the future choices of fraud, their effort choices do not affect the fraud that will be committed. Each effort choice is

a best-response correspondence with the effort choices of other managers in the team. The assumptions that the value of the firm is a concave function of team effort and that the cost of effort is a convex function of individual effort imply that choices of effort are strategic substitutes.

The manager's problem, where $E_{-i} = \sum_{j \neq i} e_j$ and $F^* = Min\{P^L, W^H(0)\}$ is as follows:

$$\max_{e_i} \mathrm{EU_i} = \frac{s}{N} + \frac{\alpha}{N}(v(e_i + E_{-i}) - s + F^* - F^e - D(F^e)) - C(e_i) - \rho\eta_t X\left(\frac{F^*}{N}\right), \qquad t = L, H$$

The first-order condition is

$$\frac{\alpha}{N} v^{'}(e_i + E_{-i}) - C^{'}(e_i) = 0 \qquad (6)$$

The above implicitly defines the best-response function of a manager, given the share of equity and effort exerted by other managers. The second order condition for maximization is satisfied.

$$\frac{\alpha}{N} v^{''}(e_i + E_{-i}) - C^{''}(e_i) < 0 \qquad (7)$$

Notice that both types of managers are identical in the characteristics that determine the choice of effort. It is, therefore, not surprising that in equilibrium the managers will choose identical effort levels.

Proposition 4: *In equilibrium, both types of manager choose the same level of effort, e^*, which is implicitly defined by:* $\frac{\alpha}{N} v^{'}(Ne^*) - C^{'}(e^*) = 0 \qquad (8)$

As discussed in the introduction, previous research focusing on single-agent models has shown that equity compensation is a double-edged sword increasing both effort and fraud. While our focus has been on a team setting, which allows us to explore the impact of Sarbanes-Oxley's provisions on the level of fraud, the present model nevertheless yields predictions that are consistent with previous

research. As shown by the next two propositions, an increase in equity compensation yields greater team effort and greater team fraud.

Proposition 5: *An increase in equity compensation, α, increases the equilibrium level of team effort, $E^* = Ne^*$.*

The value of the firm depends on team effort, so effort is akin to a public good in our model. The benefits of effort accrue to all managers, but the cost of effort is borne privately. As such, each manager takes the effort choices of other managers as given and chooses an effort level such that the marginal benefit of additional effort equals the marginal cost. Increasing equity compensation increases the marginal benefit of each unit of effort, while the marginal cost remains the same, causing all managers to increase their effort.

Proposition 6: *The equilibrium level of total fraud, F^*, decreases if either equity compensation, α, decreases or the probability of detection, ρ, increases.*

Within the present model, owners may control fraud by reducing the level of equity compensation or increasing auditing efforts so as to increase the probability that fraud will be detected. Both options have corresponding costs. As shown by Proposition 5, decreasing equity compensation implies less team effort and less overall firm value. Audits have direct costs as well as indirect costs, such as diverting managerial efforts from productive endeavors to assisting auditors. While firms may not

have much incentive to detect fraud (Robison and Santore, 2008), the Sarbanes-Oxley Act attempts to increase the likelihood that fraud is detected.[20]

Conclusion

The Sarbanes-Oxley Act was passed in an attempt to reduce accounting fraud and restore investor confidence in financial reporting. This paper has focused on the implications of two important provisions of the Act: protections for whistle-blowing employees and the requirement that management sign-off on financial statements. The latter provision essentially implies that a large-scale fraud requires complicity among members of the managerial team.

Our analysis suggests that these provisions can decrease the total amount of fraud committed by the team by inducing managers to act as monitoring agents. Although whistle-blowing is not predicted to occur in equilibrium, the threat of whistle-blowing restricts fraudulent activity. This indicates that Sarbanes-Oxley could be effective in reducing fraud without costly investment in internal monitoring if its provisions are adequately enforced.

Our findings are consistent with previous theoretical and empirical literature on the relationship between managerial fraud and equity compensation. In our team setting, greater equity compensation induces greater effort from firm managers but also encourages greater misreporting of earnings. By formally modeling whistle-blowing in teams, we are able to generalize the main results of previously studied single-agent models while examining the likely effects of policy such as Sarbanes-Oxley.

[20] Sections 408 of the Sarbanes-Oxley Act identifies factors for the SEC staff and other regulators to use as prospective problems in financial reporting, and Section 404 requires that firms publicly disclose “material weaknesses” in their internal controls over financial reporting. Financial reporting practices now receive more scrutiny from outsiders, increasing the probability of detection. (Alexander and Weiss, 2007)

The analysis also sheds light on the importance of a managerial team's composition. The threat of whistle-blowing has an effect on the level of fraud only when there is sufficient heterogeneity in the team. Since one can view each managerial hire as a random draw from a pool of applicants, a larger team is more likely to have at least one manager who is highly sensitive to sanctions and thus willing to blow the whistle for even minor infractions.

It is interesting to note that formal guidelines for reduced sentencing are absent from the Sarbanes-Oxley Act. Although it is expected that prosecutors would grant some degree of leniency to executives who decide to cooperate with the government, such reductions in penalty have not been codified in law as they were in the case of whistle-blowing on price-fixing cartels[21]. Our results predict that such amnesty provisions will have no effect on behavior because those managers who are most likely to blow the whistle are not those managers who are responsible for the fraud.

Finally, our results were derived within a perfect information environment. If there is uncertainty regarding either the preferences of the other managers or the fraud production technology, then it is possible that whistle-blowing would occur, at least with some probability. However, one of the insights of the analysis is that the frequency with which managers report fraudulent activity is a poor indicator of the effectiveness of the Sarbanes-Oxley Act's provisions. The effectiveness of the Act must be assessed in terms of the reduction of the level of fraudulent activity, not the frequency with which fraud is reported.

[21] The US Antitrust Division created a "Leniency Policy" in 1978. Basically, a cartelist which reports the existence of a cartel to regulators is granted immunity from punishment. Apesteguia, Dufwenberg, and Selten (2007) describe and experimentally test the effectiveness of such a policy, and also provide a concise review of the relevant literature.

CHAPTER II: MANAGERIAL TEAMS, WHISTLE-BLOWING, AND FRAUD – AN EXPERIMENTAL ANALYSIS

Introduction

To test the theory described in the previous chapter, we conduct a series of laboratory experiments to test the theoretical predictions and to inform us of effects unexplained by our model. Experimental evidence is most useful for determining the effect of different institutions (Davis and Holt, 1993), and here we investigate how changes in whistle-blower protections and team composition affect behavior. With field data, we may only observe fraud that is detected and publically punished, while in a controlled laboratory setting, we are able to observe attempted fraud and control for other characteristics (e.g. team size, market performance, and support for whistle-blowing) that are exogenous in real world settings.

From the model, we have four primary research hypotheses.

Research Hypothesis 1: *If whistle-blowing is possible, the total fraud committed when both managers face low sanctions is greater than when one of the two managers faces high sanctions.*

Research Hypothesis 2: *If whistle-blowing is not possible, the total fraud committed when both managers face low sanctions will be the same as when one of the two managers faces high sanctions.*

These hypotheses follow directly from Propositions 1 and 2 of the model. Basically, if managers in a team are sufficiently close to identical, they will have little difficulty coordinating on a total amount of fraud and whistle-blowing will be irrelevant. If managers have sharply different preferences, managers who prefer more fraud can simply choose more fraud and overrule the preferences of managers who prefer less, but if whistle-blowing is possible, then the managers who prefer more fraud must take into account the level of fraud that will compel managers who prefer less to blow the whistle.

Research Hypothesis 3: *Whistle-blowing will not occur.*

Research Hypothesis 4: *Other things equal, granting amnesty does not alter the total level of fraud.*

These hypotheses directly follow from Propositions 1 and 3 of the model, which suggest that whistle-blowing will not occur in equilibrium and (because whistle-blowing will not occur) that granting amnesty (reduced penalties) to whistle-blowers has no effect on the equilibrium choice of fraud. The lack of whistle-blowing predicted by the theoretical model is derived from risk-neutral managers with full information accurately restraining their fraud to avoid inducing other managers to blow the whistle. If, in reality, managers have inaccurate beliefs regarding the preferences of other managers, errors in choosing fraud can be expected. Since the theoretical prediction is zero whistle-blowing, errors in fraud that induce whistle-blowing may only be made in the direction of greater whistle-blowing.

We use experimental evidence to shed light on what happens if the assumptions of the model are relaxed. We anticipate observing whistle-blowing as we do in the 'real world', because we expect managers to improperly coordinate and make mistakes regarding the preferences of other managers. This phenomenon has likely entrapped corporate executives in the past. It is unlikely that the perpetrators in recent high-profile accounting fraud cases committed fraud with the certainty that they would be caught, but instead made a mistake or a gamble that failed. Failure to correctly coordinate in the first stage of the game would render our predictions about whistle-blowing moot.

If whistle-blowing does occur, the theoretical result regarding amnesty no longer holds. We therefore conjecture that amnesty will increase the rate of whistle-blowing. If managers commit 'too much' fraud, amnesty decreases the cost of blowing the whistle, and will thus increase the rate of whistle-blowing. Amnesty also creates an incentive to blow the whistle as a defense against other managers choosing to blow the whistle. Suppose that a *high*-type manager commits a positive level of

fraud, which is inconsistent with the theoretical equilibrium. The choice of blowing the whistle is essentially a choice between a lottery (probability ρ of being punished for total fraud and probability $(1-\rho)$ of getting away with it) and a certainty equivalent (no fraud occurs, and a known penalty based on the individual level of fraud is assessed). Without amnesty, the certainty equivalent decreases, making it relatively less attractive to blow the whistle. With amnesty, the certainty equivalent remains unchanged.

The promise of amnesty in the whistle-blowing stage may affect the choice of fraud in the first stage. As such, we examine the effect, if any, of amnesty on the fraud attempted by managers. With full amnesty, the certainty equivalent from blowing the whistle is the same at any individual choice of fraud as it is with committing zero fraud without amnesty. Thus, without amnesty, committing fraud locks the manager into a penalty if whistle-blowing occurs, while with amnesty managers are free to choose fraud knowing it can be withdrawn if there is a coordination failure and total fraud is 'too high'. This may lead managers to attempt more fraud. On the other hand, the increased propensity for other managers to blow the whistle may lead managers to attempt less to avoid the possibility of being caught with a high penalty if he or she does not blow the whistle and another manager does. We attempt to determine this effect through experimental evidence.

If there is out-of-equilibirum behavior, we expect amnesty to increase the incentive for *low*-type managers to blow the whistle more than it does for *highs*. As stated before, without amnesty, a *low*-type should never blow the whistle. With amnesty, a *low*-type should blow the whistle if he or she expects any manager in the team to blow the whistle.

Experimental Design

The objective of these experiments is to allow empirical tests of the theoretical propositions put forth on the effect of heterogeneous preferences for fraud and institutional support for whistle-blowing on fraudulent activity. Specifically, we test whether whistle-blowing 'matters', and the degree to which the decision to engage in fraud is affected by preferences of team managers interacting with an ability to blow the whistle. Furthermore, we test whether and how amnesty provisions (penalty reductions for whistle-blowers) affects behavior.

To perform these tests, we conduct laboratory experiments wherein we allow and disallow whistle-blowing, have teams of identical managers and managers with different sanctions for detected fraud, and wherein those who blow the whistle are still punished for the fraud they attempted and wherein those who blow the whistle are granted full amnesty for their attempted fraud. With two states for each of three treatment variables, a full-design would usually require eight (2^3) treatments, but amnesty is only an issue when whistle-blowing is possible, and thus treatments with amnesty but no whistle-blowing are not required. Thus, there are six total treatments, each of which is described in Table 1.

In spring of 2009, 180 subjects recruited from the general population at the University of Tennessee participated in one of 12 experimental sessions conducted at the Experimental Economics Laboratory. There are two sessions (replications) of each treatment, with 16 subjects in the first and 14 subjects in the second (N=30 per treatment). Approximately 82% of subjects had previously participated in an economics experiment. Average earnings were roughly $20.00, and sessions lasted for approximately one hour on average.

Table 1: Treatment Descriptions

Treatment Code	Description
NW-LL-NA	No whistle-blowing. Both managers are 'lows'. No amnesty (although this is irrelevant since there is no whistle-blowing).
NW-HL-NA	No whistle-blowing. One manager is 'low' and the other is 'high'. No amnesty (although this is irrelevant since there is no whistle-blowing).
W- LL – NA	Whistle-blowing. Both managers are 'low' types. No amnesty for whistle-blowers (a manager pays the same penalty if she blows the whistle as she would if the other manager blows the whistle).
W-HL-NA	Whistle-blowing. One manager is 'low' and the other is 'high'. No amnesty for whistle-blowers (a manager pays the same penalty if she blows the whistle as she would if the other manager blows the whistle).
W-LL-A	Whistle-blowing. Both managers are 'low penalty' type. Amnesty for whistle-blowers (whistle-blowers pay no penalty for attempted fraud).
W-HL-A	Whistle-blowing. One manager is 'low' and the other is 'high'. Amnesty for whistle-blowers (whistle-blowers pay no penalty for attempted fraud).

In all six treatments, subjects played the role of a manager in a group with one other manager. Subjects were given a project with a true value of $100, but were given the opportunity to fraudulently inflate that value. Both subjects in a group simultaneously chose how much fraud to commit, the sum of which was added to the actual value to form the reported value. Subjects stood to earn 50% of the reported value, penalties for fraud notwithstanding. There was then a 25% chance[22] that any fraudulent inflation would be detected and penalties would be levied on both managers based on the total amount of fraud committed. In treatments with whistle-blowing (W-LL-NA, W-HL-NA, W-LL-A, W-HL-A), an intermediate stage was inserted where managers were given the option of preventing the fraud (whistle-blowing) after the total had been revealed but before any detection would occur. If either manager chose to blow the whistle, no fraud occurred but each manager was punished based on their individual choice of fraud. In the amnesty treatments (W-HL-A, W-LL-A), a whistle-blowing manager was exempt from penalty. Finally, in treatments with different sanctions(NW-HL-NA, W-HL-NA, W-HL-A), subjects were randomly assigned a type, *high* or *low*, and remained that type for the entirety of the experiment while being randomly matched with a player of the different type each round. Sanctions for each level of fraud were chosen discretely to give clean integer predictions while following the assumptions and structure of the theory. Subjects were given tables with payoffs for all possible outcomes in the game. Instructions for all treatments, as well as these tables (from which all parameters can be determined), are located in Appendix B and Appendix C.

Decisions were made via computer. The experiments were programmed and conducted with the software z-Tree (Fischbacher, 2007). The software collected all decisions and made all relevant earnings calculations. Written instructions were provided to each participant and displayed on-screen. The experiment moderator read instructions aloud, one screen at a time, and any questions were answered

[22] Five rounds (25% of the twenty) were randomly chosen in advance for the fraud to be detected, to hold the timing of detection rounds constant across all treatments.

prior to proceeding to the next instruction screen. During the instructions, participants were asked to answer four questions on the computer to assess their understanding of how earnings are calculated, and were unable to proceed until the questions were correctly answered. Those who were unable to perform the calculations on their own were able to ask an experiment moderator for help, who would then re-explain procedures and field questions. Following the instructions, there was one unpaid practice round, where questions were encouraged and addressed. Upon conclusion of the experiment, a short questionnaire was administered to obtain demographic information and qualitative assessments of the experiment design and instruction clarity.

In order to investigate the role of risk-attitudes[23], we include in our econometric analysis a risk measure elicited through a lottery-choice procedure (e.g. Holt and Laury (2002)). We borrow the procedure from Evans et. al (2009), and its validity is determined by whether risk attitudes are similar across the risk elicitation and fraud experiments. We hope this is so, since the procedure used to elicit risk attitudes is reasonably similar to the decision made in the fraud experiment: in both, subjects choose between lotteries (and with whistle-blowing, a certainty equivalent).

Evans et. al (2009) make two changes to the Holt and Laury (2002) procedure that we duplicate here. [24] First, to reduce the effects of potential participant confusion, participants made choices between a certain payoff and a lottery, rather than between two lotteries. Second, the first and last decision tasks involved a choice between two certain (different) payoffs to test subject understanding and payoff saliency.

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[23] Since increasing the sanction increases the risk, is it straightforward to see that the sensitivity to sanction could easily stand as a risk-aversion term. Harvesting and sorting student participants by risk types was prohibitively expensive with the resources available, so we induce the effect by assigning different sanction types. However, greater aversion to risk will interact with the sanctions, and must be controlled for.

[24] The Holt and Laury (2002) procedure is frequently used in economic experiments(e.g. Evans et al. (2009), Dickinson (2009) and Gangadharan and Nemes (2009)) and in field experiments (e.g. Harrison et al. (2007) and Shearer and Bellemare (2006)).

Table 2 presents the eleven decision tasks in the risk preference experiment. As a reference point, Table 2 also presents the implied range of the coefficient of relative risk aversion, *r*, for the CRRA utility function $U(x) = \frac{x^{1-r}}{1-r}$ for an individual who switches from the certain payoff (Option A) to an uncertain payoff (Option B) at this gamble. Choices are simultaneous (without feedback) and one randomly determined decision task determines payoffs. To prevent spillover effects, announcement of the elicitation experiment outcome occurs after the completion of the fraud experiment.

Results

The experiment was parameterized such that $P^L = 80$ (risk-neutral *low*-type managers maximize their expected utility when there are 80 units of total fraud) and $W^H(0) = 40$ (a risk-neutral *high*-type manager who has committed 0 units of fraud will tolerate a maximum of 40 units of total fraud before blowing the whistle). Table 3 presents the theoretical predictions for attempted fraud by the group, which is P^L for treatments where there is no whistle-blowing or no *high*-types, and $W^H(0)$ for treatments with whistle-blowing and both *low* and *high* types. All treatments save NW_HL_NA show a statistically significantly greater average observed amount of attempted fraud than the prediction.

Table 4 presents the theoretical predictions for effective fraud by the group. Effective fraud is the amount of fraud that is not stopped within the company by whistle-blowers.. Effective fraud is equal to the attempted fraud if whistle-blowing does not occur, and equals zero if whistle-blowing prevents the fraud. From the perspective of shareholders and policymakers, effective fraud may be the relevant measure because it determines the damage to the firm value and the reputation of the market, while attempted fraud is relevant for studying the choices of managers.

Table 2. Parameters and Results of Risk Elicitation Experiment

Decision Task	Option A	Option B	CRRA coefficient of relative risk aversion (*r*)	Proportion of Participants
1	Receive \$3.00	0% chance of \$5.00 100% chance of \$0.50	–	0
2	Receive \$3.00	10% chance of \$5.00 90% chance of \$0.50	[-∞, -3.508]	0.006
3	Receive \$3.00	20% chance of \$5.00 80% chance of \$0.50	[-3.507, -2.146]	0
4	Receive \$3.00	30% chance of \$5.00 70% chance of \$0.50	[-2.145, -1.336]	0
5	Receive \$3.00	40% chance of \$5.00 60% chance of \$0.50	[-1.335, -.742]	0.072
6	Receive \$3.00	50% chance of \$5.00 50% chance of \$0.50	[-.741, -.250]	0.094
7	Receive \$3.00	60% chance of \$5.00 40% chance of \$0.50	[-.249, .194]	0.200
8	Receive \$3.00	70% chance of \$5.00 30% chance of \$0.50	[.195, .631]	0.356
9	Receive \$3.00	80% chance of \$5.00 20% chance of \$0.50	[.632, 1.112]	0.172
10	Receive \$3.00	90% chance of \$5.00 10% chance of \$0.50	[1.113, 1.758]	0.056
11	Receive \$3.00	100% chance of \$5.00 0% chance of \$0.50	[1.759, ∞]	0.039

Notes: The risk coefficient corresponds to an individual that switches from the certain payoff (Option A) and the uncertain payoff (Option B) at this task. One individual accepted the \$3.00 certainty equivalent over a 100% chance of \$5.00.

Table 3. Mean Level of Attempted Fraud by Group

Treatment	Predicted	Observed (std. error)	Student t-test p-value
NW-LL-NA	80.00	89.40 (2.51)	0.002
NW-HL-NA	80.00	79.73 (4.70)	0.956
W-LL-NA	80.00	91.60 (3.28)	0.003
W-HL-NA	40.00	51.80 (3.99)	0.010
W-LL-A	80.00	85.40 (1.79)	0.009
W-HL-A	40.00	94.33 (4.64)	0.000

Observed values are group means over all periods. N=15 for each treatment cell. H_0: Predicted = Observed

Table 4. Total Level of Effective Fraud by Group

Treatment	Predicted	Observed (std. error)	Student t-test p-value
NW-LL-NA	80.00	89.40 (2.51)	0.002
NW-HL-NA	80.00	79.73 (4.70)	0.956
W-LL-NA	80.00	84.67 (2.65)	0.101
W-HL-NA	40.00	40.93 (3.30)	0.781
W-LL-A	80.00	51.67 (4.28)	0.000
W-HL-A	40.00	19.47 (4.45)	0.000

Observed values are group means over all periods. N=15 for each treatment cell. H_0: Predicted = Observed

Attempted and effective fraud are, by definition, the same when whistle-blowing is not possible, so there is no difference between the two in those treatments. Effective fraud is slightly lower if whistle-blowing is possible and whistle-blowers face full penalties for their attempted fraud, and substantially lower if whistle-blowing is possible and whistle-blowers are given full amnesty for their attempted fraud.

Observed effective fraud is statistically significantly greater than the predicted value when both managers are *low*-types and whistle-blowing is not possible. We are unable to reject our null hypothesis that observed effective fraud is statistically different from the predicted value when there is a *low*-type and *high*-type manager on a team and whistle-blowing is not possible, or when whistle-blowing is possible and there is no amnesty. Finally, when whistle-blowers are granted amnesty, observed effective fraud is statistically significantly below predicted values.

Table 5 presents the predicted and observed changes between treatments. There are seven ways to change one treatment variable while holding the other two constant. For example, the first row holds the types (both *low*) and amnesty provision (no amnesty) constant, and shows the change when the no-whistleblowing regime was changed to a whistle-blowing regime. The predicted change is 0, and the observed change is 2.20, and we find we are unable to reject the null hypothesis that the predicted and observed means are equal, or in the latter case with the Kolmogorov-Smirnov test[25], that the distributions are the same.

[25] The Kolmogorov-Smirnov test is more appropriate as it does not require any distributional assumptions. The t-test is reported because it is common.

Table 5. Changes Across Treatments of Group Levels of Attempted Fraud

Treatment Change (values held constant)	Predicted Change	Observed Change	Student t-test** p-value	Kolmogorov-Smirnov Test p-value
NW->W (LL, NA)	0.00	2.20	0.597	0.876
NW->W (HL, NA)	-40.00	-27.93	0.000	0.005
LL->HL (W, NA)	-40.00	-39.80	0.000	0.000
LL->HL (NW, NA)	0.00	-9.67	0.084	0.116
LL->HL (W, A)	-40.00	8.93	0.089	0.014
NA->A (LL, W)	0.00	-6.20	0.110	0.273
NA->A (HL, W)	0.00	42.53	0.000	0.000

Observed values are group means over all periods. N=15 for each treatment cell.
**H_0: Observed Change = 0.

The directions of observed changes between treatments match the predictions for five changes. Two treatment changes do not have the theoretically expected result. Moving from groups with two *low*-type managers (henceforth referred to as LL) to groups with a *high* and *low* type manager (henceforth referred to as HL), theory predicts a decrease of 40 units of attempted fraud, but we observe an *increase* of 8.93 units. Likewise, theory would suggest there is no change from granting amnesty, yet we observe an increase of 42.53 units of fraud when amnesty is implemented in the HL case. This suggests that amnesty encourages managers to attempt more fraud, possibly due the fact it allows managers to correct for coordination errors after they have been made.

Table 6 presents the same seven treatment changes, but with effective fraud. As with attempted fraud, the directions of the observed changes between treatments are as predicted for five changes and the changes that do not correspond to theory involve amnesty provisions. Theory suggests that amnesty has no effect, but for both possible group compositions, LL and HL, the observed changes are -33.00 and -21.47, respectively, when moving from a no-amnesty to amnesty state. This suggests, contrary to our fourth research hypothesis, that amnesty provisions simultaneously increase attempted fraud and decrease effective fraud, likely by making blowing the whistle cheaper.

Table 6. Changes Across Treatment of Group Levels of Effective Fraud

Treatment Change (values held constant)	Predicted Change	Observed Change	Student t-test p-value	Kolmogorov-Smirnov Test p-value
NW->W (LL, NA)	0.00	-4.73	0.206	0.273
NW->W (HL, NA)	-40.00	-38.80	0.000	0.000
LL->HL (W, NA)	-40.00	-43.73	0.000	0.000
LL->HL (NW, NA)	0.00	-9.67	0.084	0.116
LL->HL (W, A)	-40.00	-32.20	0.000	0.000
NA->A (LL, W)	0.00	-33.00	0.000	0.000
NA->A (HL, W)	0.00	-21.47	0.001	0.000

Observed values are group means over all periods. N=15 for each treatment cell. H_0: Observed Change = 0.

We now examine behavior at the individual level. Figures 4-6 show the total attempted and effective levels of fraud over time, as discussed before, as well as the individual choices of fraud and their predictions for each type. We will walk through a numerical explanation of the difference between treatments, but readers may find it useful to refer to these figures for a visual representation of the data.

Table 7 presents predicted and observed choices of fraud at the individual level for the both types: L and H. In the LL treatments there are two asymmetric equilibria (0, 80; 20, 60) and one symmetric equilibrium (40, 40). We compare our results to the symmetric equilibrium. We are unable to reject the null hypothesis that the observed choice of attempted fraud is equal to the predicted value in five of the six treatments for the *lows*. The *highs* overshoot their predicted levels of fraud in every treatment, which is not unexpected due to boundary effects (e.g. Andreoni (1995), Chan et al (1994)). the aforementioned boundary effects. In the HL treatment with no amnesty, the *lows* commit less fraud than the equilibrium prediction, but this is likely compensation for the *highs* committing more than the equilibrium prediction. The previously discussed group-level analysis found total fraud to be close to the predicted values.

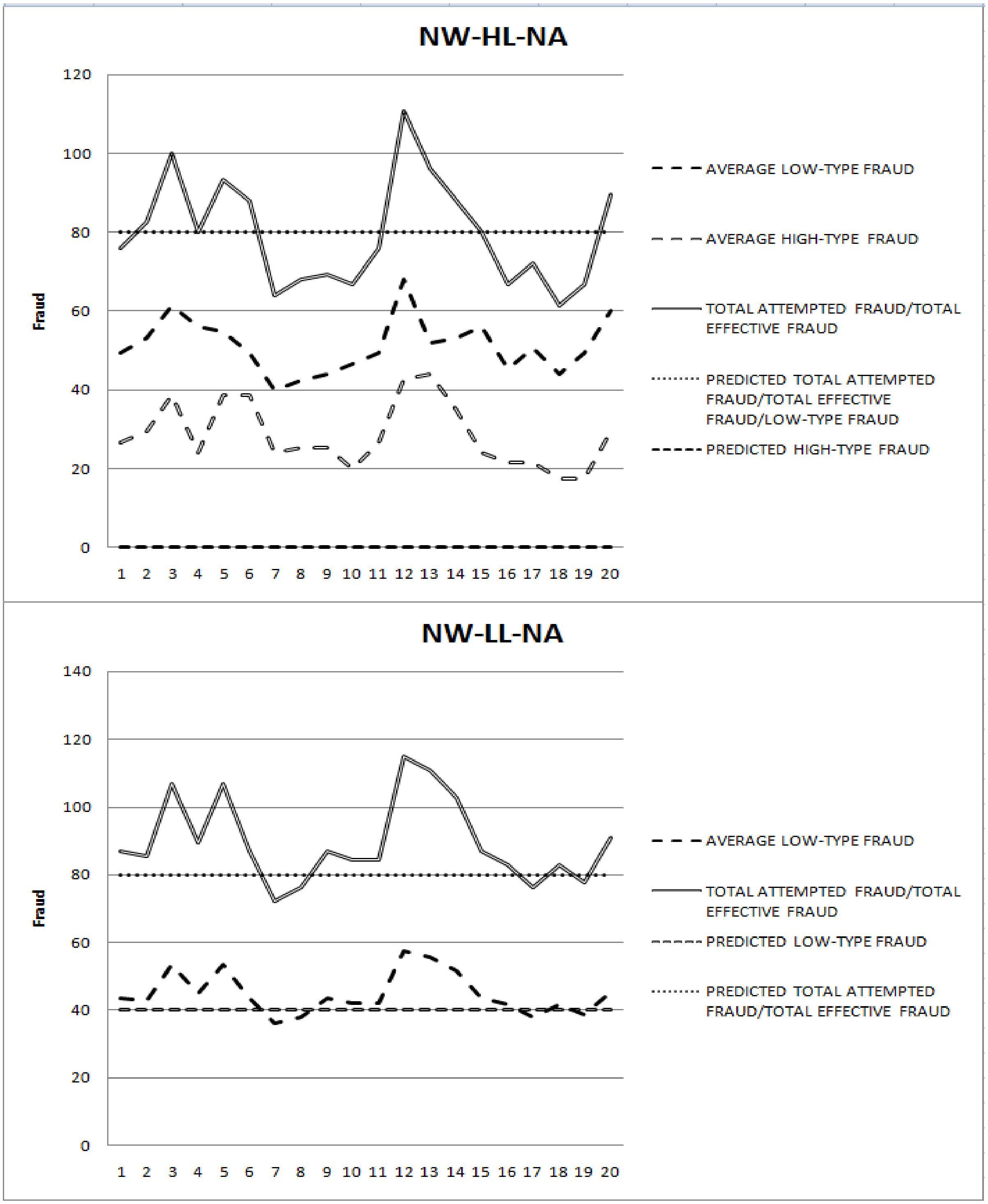
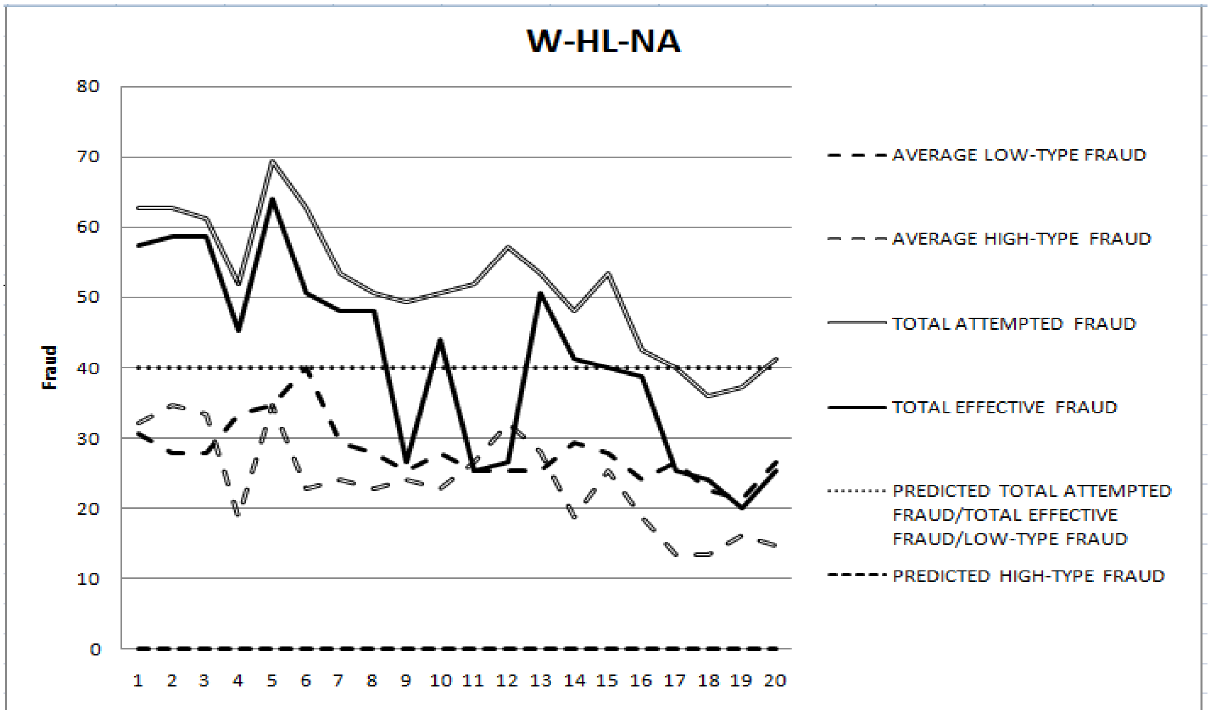


Figure 4: Fraud when whistle-blowing not possible.

Items in the legend separated by / have the same value.



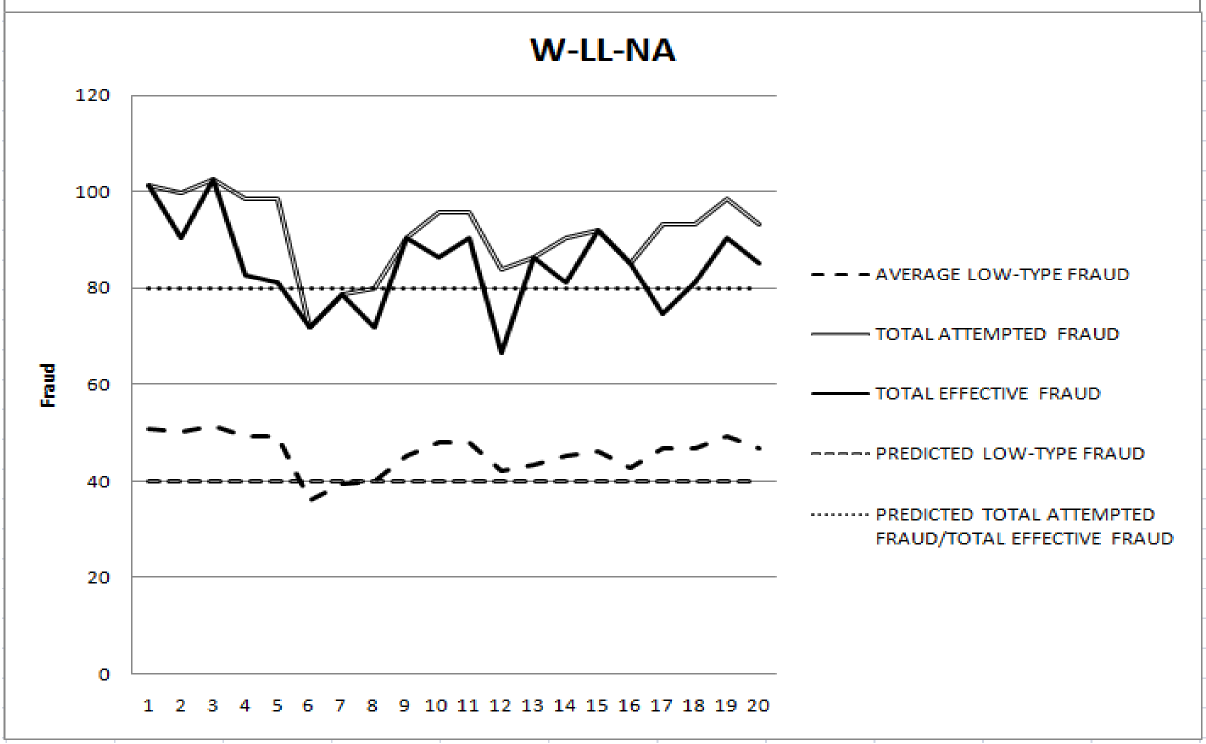


Figure 5: Fraud when whistle-blowing possible but no amnesty.

Items in the legend separated by / have the same value.

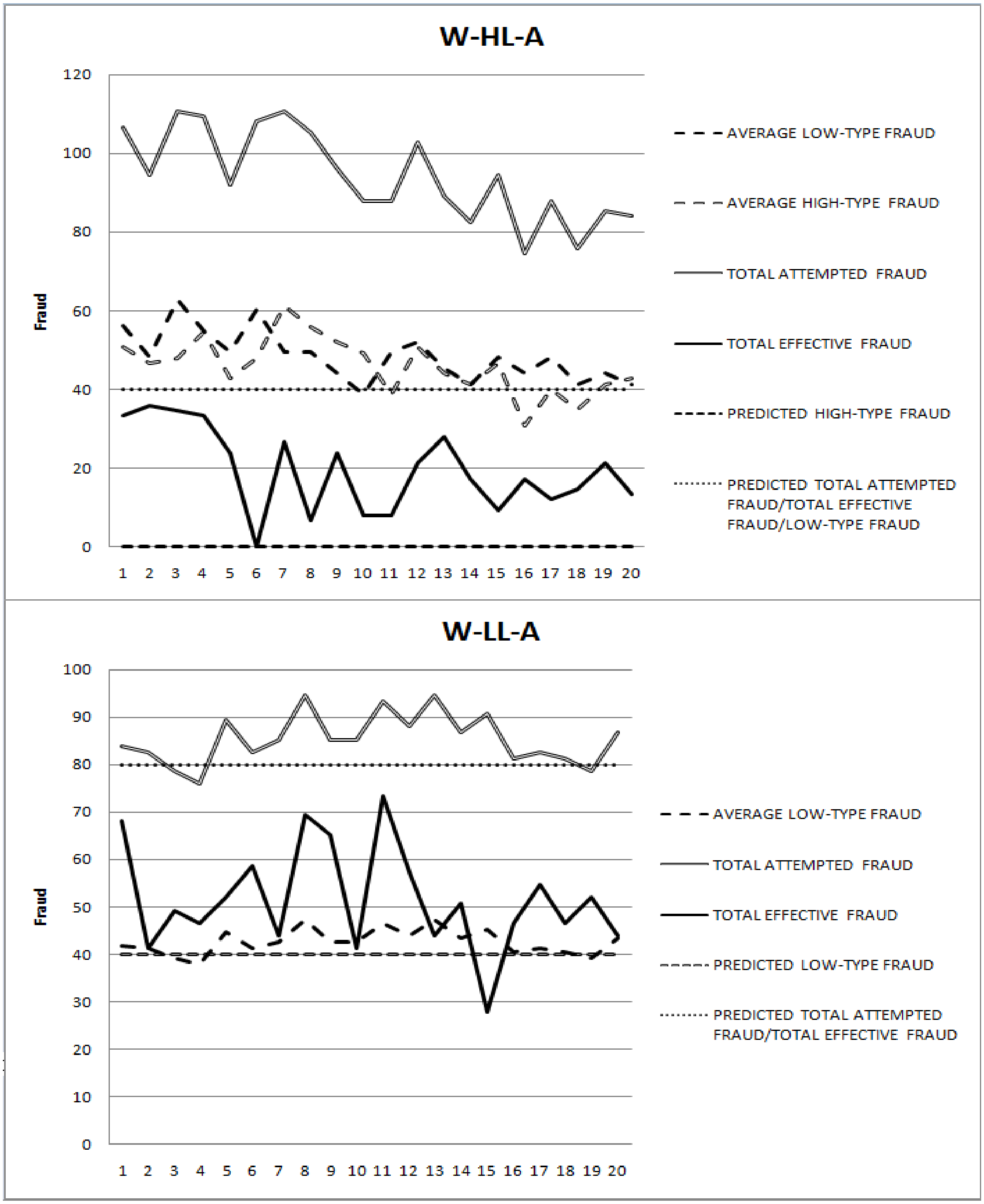


Figure 6: Fraud when whistle-blowing possible and there is amnesty.

Items in the legend separated by / have the same value.

Table 7. Individual Fraud

Treatment	Low Prediction	Low Observed (std. error)	Student t-test p-value	High Prediction	High Observed (std. error)	Student t-test p-value
NW-LL-NA	40-sym	44.70 (4.05)	0.255	N/A	N/A	N/A
NW-HL-NA	80.00	51.27 (5.07)	0.001	0.00	28.47 (5.99)	0.000
W-LL-NA	40-sym	45.80 (3.50)	0.108	N/A	N/A	N/A
W-HL-NA	40.00	28.00 (6.19)	0.073	0.00	23.80 (4.89)	0.000
W-LL-A	40-sym	42.70 (3.23)	0.410	N/A	N/A	N/A
W-HL-A	40.00	48.33 (7.29)	0.272	0.00	46.00 (7.00)	0.000

Observed values are individual means over all periods. N=30 for each LL treatment cell, N=15 for HL. H_0: Predicted = Observed

Table 8 shows how subjects performed relative to the theoretically predicted behavior. Predicted profit is the expected profit over all rounds.[26] If all managers behaved honestly, and no fraud was committed, both types would earn $50 in each round. In the treatments with no whistle-blowing, subjects earned more than 80% of what they would earn had they played the equilibrium strategy. *Low*-types earned approximately $13 more per round than they would have if fraud had not been committed, while *high*-types earned approximately $23 less. When whistle-blowing was possible, but there was no amnesty, both *lows* and *highs* earned less. The *lows* earn approximately the same amount less than predicted regardless of whether or not the treatment is LL or HL. When there is amnesty, both types earn even less than whistle-blowing without amnesty. Regardless of whistle-blowing or amnesty being possible , *lows* earn about the same whether the treatment is LL or HL. This decrease in earnings from whistle-blowing, and, subsequently, amnesty provisions, may have important implications for contracts needed to reach reservation utility for managers.

[26] For example, in NW-LL-NA, the expected total fraud is 80. This means that in 75% of the rounds, the profit is $90. In 25% of the rounds, the profit is $30, for an expected value of $75 for the lows.

Table 8. Individual Profit

Treatment	Low Predicted Profit	Low Observed	Low Difference	Low Efficiency	High Predicted Profit	High Observed	High Difference	High Efficiency
NW-LL-NA	$75.00	$63.02	$11.98	84.03%	N/A	N/A	N/A	N/A
NW-HL-NA	$75.00	$62.99	$12.01	83.99%	$33.75	$27.48	$6.27	81.42%
W-LL-NA	$75.00	$49.35	$25.65	65.80%	N/A	N/A	N/A	N/A
W-HL-NA	$65.00	$38.38	$26.62	59.05%	$52.50	$24.42	$28.08	46.51%
W-LL-A	$75.00	$37.08	$37.92	49.44%	N/A	N/A	N/A	N/A
W-HL-A	$65.00	$27.49	$37.51	42.29%	$52.50	$3.33*	$49.17	6.34%*

*One *high* subject was detected or had the whistle blown on him/her while committing large amounts of fraud multiple times. Dropping that subject results in an observed of $14.54 and an efficiency of 27.69%.

We now turn to a regression analysis of the individual choice of fraud. Table 9 presents the summary statistics for individual-level variables. Table 10 presents regression results for four specifications. The first specification contains only the treatment variables and thus has identical results to that of Table 7. The second specification factors in a subject's risk posture. In the risk-elicitation mechanism, six safe choices corresponds to risk-neutrality. In the regression, the number of safe choices is normalized so that a value of zero represents risk-neutrality, with negative numbers representing risk-loving preferences, and positive numbers representing increasing risk-aversion. The third specification factors in last period results, such as whether or not subjects were penalized in the preceding period, and changes over time. Finally, the fourth specification contains risk-aversion, last period's results, and the reciprocal of the period to account for learning effects.

As the magnitude and significance of coefficients remain relatively stable across the specifications, we will restrict discussion to the fourth, full model. In that model, the coefficients on the treatment variables represent the choice of fraud for a risk-neutral, *low*-type manager who has played the game for an infinite number of rounds and has completed learning, and was not penalized in the preceding period.

Table 9. Description of Individual Level Variables

Variable name	Description	Sample mean (std. dev.)
W_HL_NA	= 1 if treatment is whistle-blowing, two types, no amnesty.	0.167 (0.372)
W_LL_NA	= 1 if treatment is whistle-blowing, one type, no amnesty	0.167 (0.372)
W_HL_A	= 1 if treatment is whistle-blowing, two types, full amnesty	0.167 (0.372)
W_LL_A	= 1 if treatment is whistle-blowing, one type, full amnesty	0.167 (0.372)
NW_HL_NA	= 1 if treatment is no whistle-blowing, two types, no amnesty	0.167 (0.372)
NW_LL_NA	= 1 if treatment is no whistle-blowing, one type, no amnesty	0.167 (0.372)
Risk Posture	= 0 if player made 6 safe choices in risk-elicitation mechanism.	0.783 (1.488)
Risk Posture * W_HL_NA	= 0 if risk neutral and treatment is W_HL_NA	0.161 (0.776)
Risk Posture * W_LL_NA	= 0 if risk neutral and treatment is W_LL_NA	0.100 (0.668)
Risk Posture * W_HL_A	= 0 if risk neutral and treatment is W_HL_A	0.122 (0.834)
Risk Posture * W_LL_A	= 0 if risk neutral and treatment is W_LL_A	0.117 (0.509)
Risk Posture * NW_HL_NA	= 0 if risk neutral and treatment is NW_HL_NA	0.122 (0.574)
Risk Posture * NW_LL_NA	= 0 if risk neutral and treatment is NW_LL_NA	0.161 (0.625)
IsHigh* Risk Posture *W_HL_NA	=0 if risk neutral high-type and treatment is W_HL_NA	0.106 (0.466)
IsHigh* Risk Posture *W_HL_A	=0 if risk neutral high-type and treatment is W_LL_NA	0.039 (0.487)
IsHigh* Risk Posture *NW_HL_NA	=0 if risk neutral high-type and treatment is NW_HL_NA	0.050 (0.338)
WhistleBefore	=1 if whistle was blown in individual's group last period	0.224 (0.417)
WhistleBefore * W_HL_NA	= 1 if whistle was blown in individual's group last period and treatment is W_HL_NA	0.043 (0.202)
WhistleBefore * W_LL_NA	= 1 if whistle was blown in individual's group last period and treatment is W_LL_NA	0.009 (0.094)
WhistleBefore* W_HL_A	= 1 if whistle was blown in individual's group last period and treatment is W_HL_A	0.116 (0.320)
WhistleBefore * W_LL_A	= 1 if whistle was blown in individual's group last period and treatment is W_LL_A	0.057 (0.231)
WhistleBefore*W_HL_NA*IsHigh	= 1 if high-type whistle was blown in individual's group last period and treatment is W_HL_NA	0.021 (0.145)
WhistleBefore*W_HL_A*IsHigh	= 1 if high-type whistle was blown in individual's group last period and treatment is W_HL_A	0.058 (0.233)
DetectedBefore	=1 if detected by outside authorities if whistle not blown	0.188 (0.391)
DetectedBefore * W_HL_NA	= 1 if detected before and treatment is W_HL_NA	0.027 (0.161)
DetectedBefore * W_LL_NA	= 1 if detected before and treatment is W_LL_NA	0.038 (0.191)
DetectedBefore * W_HL_A	= 1 if detected before and treatment is W_HL_A	0.012 (0.107)
DetectedBefore * W_LL_A	= 1 if detected before and treatment is W_LL_A	0.028 (0.166)
DetectedBefore * W_HL_NA	= 1 if detected before and treatment is NW_HL_NA	0.042 (0.200)
DetectedBefore * NW_LL_NA	= 1 if detected before and treatment is NW_LL_NA	0.042 (0.200)
IsHigh*DetectedBefore*W_HL_NA	=1 if high-type and detected before and treatment is W_HL_NA	0.013 (0.114)
IsHigh*DetectedBefore*W_HL_A	= 1 if high-type and detected before and treatment is W_HL_A	0.006 (0.076)
IsHigh*DetectedBefore*NW_HL_NA	= 1 if high-type and detected before and treatment is NW_HL_NA	0.021 (0.143)
1/Period * W_HL_NA	= Reciprocal of period * 1 if treatment is W_HL_NA	0.030 (0.111)
1/Period * W_LL_NA	= Reciprocal of period * 1 if treatment is W_LL_NA	0.030 (0.111)
1/Period * W_HL_A	= Reciprocal of period * 1 if treatment is W_HL_A	0.030 (0.111)
1/Period * W_LL_A	= Reciprocal of period * 1 if treatment is W_LL_A	0.030 (0.111)
1/Period * W_HL_NA	= Reciprocal of period * 1 if treatment is NW_HL_NA	0.030 (0.111)
1/Period * NW_LL_NA	= Reciprocal of period * 1 if treatment is NW_LL_NA	0.030 (0.111)
1/Period * W_HL_NA * IsHigh	=IfHigh* Reciprocal of period * 1 if treatment is W_HL_NA	0.015 (0.080)
1/Period * W_HL_A * IsHigh	=IfHigh* Reciprocal of period * 1 if treatment is W_HL_A	0.015 (0.080)
1/Period * NW_HL_NA * IsHigh	=IfHigh* Reciprocal of period * 1 if treatment is NW_HL_NA	0.015 (0.080)
Attempted Fraud (dependent)	= Attempted fraud by an individual	60.98 (29.20)

Table 10. OLS Regression (Both Types)

	Predicted Value	Attempted Fraud Treatment Only	Attempted Fraud w/risk	Attempted Fraud w/time	Attempted Fraud w/risk and time
W_HL_NA	40.00	28.00** (6.00)	31.29** (3.90)	29.26* (6.43)	33.86 (5.55)
W_LL_NA	40.00-sym	45.80* (3.45)	45.91 (3.79)	43.68 (4.02)	43.79 (4.31)
W_HL_A	40.00	48.33 (7.07)	47.41 (5.57)	33.24 (5.30)	36.37 (7.09)
W_LL_A	40.00-sym	42.70 (3.19)	41.37 (4.33)	41.05 (2.73)	39.76 (3.86)
NW_HL_NA	80.00	51.27*** (4.92)	43.22*** (4.60)	48.03*** (4.87)	47.86*** (5.44)
NW_LL_NA	40.00-sym	44.70 (4.00)	52.88*** (4.38)	41.53 (4.00)	49.70** (4.40)
Ishigh*W_HL_NA	-40.00	-4.20*** (7.65)	-6.19*** (7.01)	-7.02*** (8.30)	-7.49*** (7.38)
Ishigh*W_HL_A	-40.00	-2.33*** (9.80)	-6.50*** (11.36)	-1.19*** (10.71)	-4.72*** (11.99)
Ishigh*NW_HL_NA	-80.00	-22.80*** (7.62)	-15.59*** (8.51)	-23.94*** (7.70)	-16.74*** (8.47)
Risk Posture *W_HL_NA	(-)		-7.84** (3.04)		-7.79** (3.07)
RiskPosture*W_LL_NA	(-)		-0.19 (1.99)		-0.19 (1.98)
RiskPosture*W_HL_A	(-)		-2.51 (3.32)		-2.36 (3.30)
RiskPosture*W_LL_A	(-)		1.90 (3.92)		1.88 (3.93)
Risk Posture*NW_HL_NA	(-)		0.19 (2.54)		0.19 (2.55)

Table 10 continued…

	Predicted Value	Attempted Fraud Treatment Only	Attempted Fraud w/risk	Attempted Fraud w/time	Attempted Fraud w/risk and time
Risk Posture* NW_LL_NA	(-)		-8.46** (2.20)		-8.46*** (2.21)
Ishigh*RiskPosture*W_HL_NA			5.29 (4.45)		4.64 (4.29)
Ishigh* RiskPosture*W_HL_A			6.06 (5.03)		5.33 (5.01)
Ishigh* RiskPosture*NW_HL_NA			-11.93** (4.69)		-11.93** (4.71)
Detected Before*W_HL_NA				-1.12 (3.52)	-1.10 (3.58)
Detected Before*W_LL_NA				0.83 (2.44)	0.83 (2.44)
Detected Before*W_HL_A				13.42 (8.09)	13.76* (7.71)
Detected Before*W_LL_A				2.58 (2.89)	2.64 (2.85)
Detected Before*NW_HL_NA				10.71** (4.58)	10.71** (4.59)
Detected Before*NW_LL_NA				11.07*** (3.28)	11.07*** (3.29)
DetectedBefore* IsHigh *W_HL_NA				11.15 (7.82)	11.42 (7.79)
DetectedBefore* IsHigh *W_HL_A				-19.08 (13.89)	-18.75 (13.78)
DetectedBefore* IsHigh *NW_HL_NA				3.11 (7.30)	3.11 (7.31)
Whistle Before*W_HL_NA				-6.88 (5.34)	-4.98 (4.49)
Whistle Before*W_LL_NA				8.50 (6.45)	8.50 (6.44)
Whistle Before*W_HL_A				14.23* (7.62)	13.26* (7.60)

Table 10 continued…

	Predicted Value	Attempted Fraud Treatment Only	Attempted Fraud w/risk	Attempted Fraud w/time	Attempted Fraud w/risk and time
Whistle Before*W_LL_A				3.94 (4.03)	3.86 (4.14)
WhistleBefore* IsHigh *W_HL_NA				-3.40 (7.08)	-5.94 (6.31)
WhistleBefore* IsHigh *W_HL_A				1.37 (10.69)	1.07 (10.50)
1/P*W_HL_NA				3.81 (3.66)	4.37 (3.47)
1/P*W_LL_NA				8.22 (7.15)	8.22 (7.16)
1/P*W_HL_A				23.80** (10.37)	23.16** (10.29)
1/P*W_LL_A				-0.75 (5.40)	-0.77 (5.41)
1/P*NW_HL_NA				3.14 (3.90)	3.14 (3.91)
1/P*NW_LL_NA				2.25 (3.52)	2.25 (3.52)
1/P*IsHigh*W_HL_NA				10.61 (7.76)	9.88 (7.65)
1/P* IsHigh *W_HL_A				-4.22 (16.43)	-4.41 (16.52)
1/P* IsHigh *NW_HL_NA				2.05 (6.54)	2.05 (6.56)
F		83.61	55.48	28.97	24.96
R^2		0.68	0.70	0.69	0.71
N (observations)		3600	3600	3600	3600
N (subjects)		180	180	180	180

We cannot reject the null hypothesis for four of our six treatment coefficients that the estimated coefficients are equal to their predicted values. Risk-neutral *low*-types commit slightly more fraud than predicted when whistle-blowing is not possible. When the *high*-types are expected to commit 40 units less fraud than the *lows*, they commit 7.49 and 4.72 units less respectively, and when they are expected to commit 80 units less, they commit 16.74 units less on average.

Risk-aversion has a negative effect in some treatments. There is no difference in the effect of risk aversion on the *highs* and the *lows* when whistle-blowing is possible, but when it is not possible, the effect of risk-aversion on *highs* is greater. Being detected in the previous period only has a strongly significant effect when whistle-blowing is not possible, which is likely due to the gambler's fallacy (Camerer (1995)). In treatments with whistle-blowing, a manager's ability to blow the whistle acts as a deterministic reason to restrain fraud, and so the effect of the gambler's fallacy is reduced. Interestingly, there seems to only be a significant effect from having the whistle-blown on an individual in the previous period when amnesty is possible, wherein the choice of fraud increases. Finally, learning only has a strong effect on the decision of *lows* in the W-HL-A treatment, which is arguably the most complex one to coordinate in.

Table 11 presents regression results for the *high*-types only. These can be found using the interaction effects from Table 10, but are presented here for ease of understanding. Maintaining focus on the fourth specification, the expected choice of fraud for a risk-neutral high type is zero in all treatments, and in all treatments, the actual choice of fraud is substantially higher. However, none of the coefficients are statistically different from each other (F=0.96, p=0.391).

Interestingly, risk-aversion has the expected negative impact on the choice of fraud when whistle-blowing is not possible. Being detected in the previous period causes an increase in fraud of

Table 11. OLS Regression (High-Types Only)

	Predicted Value	Attempted Fraud Treatment Only	Attempted Fraud w/risk	Attempted Fraud w/risk and lags	Attempted Fraud w/risk and all
W_HL_NA	0.00	23.80***	27.03***	22.24***	26.37***
		(4.77)	(4.77)	(5.30)	(4.92)
W_HL_A	0.00	46.00***	44.34***	32.06***	31.65***
		(6.85)	(7.07)	(9.41)	(9.76)
NW_HL_NA	0.00	28.47***	35.51***	24.08***	31.13***
		(5.86)	(6.51)	(6.02)	(6.56)
Risk Posture *W_HL_NA	(-)		-2.55		-3.14
			(3.28)		(3.03)
Risk Posture*W_HL_A	(-)		3.55		2.98
			(3.82)		(3.81)
Risk Posture* NW_HL_NA	(-)		-11.74***		-11.74***
			(3.97)		(3.99)
Detected Before*W_HL_NA				10.04	10.32
				(7.05)	(6.99)
Detected Before*W_HL_A				-5.70	-4.99
				(11.40)	(11.53)
Detected Before*NW_HL_NA				13.82**	13.82**
				(5.74)	(5.75)
Whistle Before*W_HL_NA				-10.28**	-10.91**
				(4.69)	(4.48)
Whistle Before*W_HL_A				15.60**	14.33*
				(7.57)	(7.32)
1/P*W_HL_NA				14.42**	14.25**
				(6.92)	(6.89)
1/P*W_HL_A				19.58	18.75
				(12.86)	(13.05)
1/P*NW_HL_NA				5.18	5.18
				(5.31)	(5.32)
F		31.20	19.74	9.86	10.63
R^2		0.51	0.54	0.54	0.56
N (observations)		900	900	900	900
N (subjects)		45	45	45	45

*, **, and *** denote parameter is statistically different from zero at the 10%, 5%, and 1% significance levels, respectively. For treatment variables, *, **, and *** denote parameter is statistically different from predicted value at the 10%, 5%, and 1% significance levels , respectively.

greatest magnitude in the no whistle-blowing treatment, likely due to the gambler's fallacy. As for the lows, whistle-blowing in the previous period decreases fraud when there is no amnesty, but increases it when there is amnesty.

Given that, in contrast to Hypothesis 3, we do observe whistle-blowing, we now examine the whistle-blowing decision itself. Table 12 shows the proportion of rounds in which each type elected to blow the whistle in each treatment, and what percentage of groups had at least one whistle-blower in a given period. Amnesty resulted in a 30.7 percentage point increase in the frequency of a group self-reporting its fraud in the LL case, and a 46.0 percentage point increase in the HL case. Likewise, moving from LL to HL increased the rate of whistle-blowing by 21.4 percentage points when there was no amnesty, and 36.7 percentage points when there was amnesty. Something that immediately stands out is that in the HL groups, *low* and *high* types tend to blow the whistle at the same rate. This makes sense in the amnesty treatment, as a manager who has committed a positive level of fraud is strictly better off blowing the whistle if he or she expects another member to blow the whistle, but this is not true for when amnesty is not possible.

Table 12. Rates of whistle-blowing

Treatment	% Highs Predicted to Blow Whistle	% Highs Blowing Whistle	% Lows Predicted to Blow Whistle	% Lows Blowing Whistle	% Groups Had At Least One Whistle-blower
W-LL-NA	0.0%	N/A	0.0%	2.8%	5.6%
W-HL-NA	0.0%	14.3%	0.0%	13.3%	27.0%
W-LL-A	0.0%	N/A	0.0%	22.5%	36.3%
W-HL-A	0.0%	52.7%	0.0%	55.7%	73.0%

Table 13 and Table 14 present whistle-blowing conditional on a manager's choice of fraud and the choice of ther other player, respectively. In the W-HL-NA treatment, the vast majority of whistle-blowing by *lows* came from lows who had chosen zero fraud. This, along with comments made by several of the participants, implies there may be some spite at work despite random rematching of groups each round. We examine this during the subsequent regression analysis.

Table 15 and Table 16 present the number of *lows* and *highs*, respectively, who chose to blow the whistle after choosing a specific level of fraud for each treatment, as well as the percentage of players of that type who chose that level of fraud and elected to blow the whistle. W-LL-NA has rates of whistle-blowing low enough to be largely dismissed. In W-HL-NA, there is a clear trend for both *highs* and *lows* to only blow the whistle if they themselves committed a small amount of fraud. In the amnesty treatments, the propensity to blow the whistle tends to increase as the fraud chosen by a manager increases, aside from spikes for the *lows* at a choice of zero fraud.

Table 13. Whistle-blowing (conditional on own choice of fraud)

Treatment	HIGHS CHOOSING ZERO FRAUD % Blowing Whistle	HIGHS CHOOSING POSITIVE FRAUD % Blowing Whistle	LOWS CHOOSING ZERO FRAUD % Blowing Whistle	LOWS CHOOSING POSITIVE FRAUD % Blowing Whistle
W-LL-NA	N/A	N/A	2.4% (N=42)	2.9% (N=558)
W-HL-NA	31.1% (N=122)	2.8% (N=178)	41.0% (N=83)	2.8% (N=217)
W-LL-A	N/A	N/A	51.1% (N=47)	20.1% (N=553)
W-HL-A	22.8% (N=79)	63.3% (N=221)	69.4% (N=36)	53.8% (N=264)

Table 14. Whistle-blowing (conditional on other player's fraud)

Treatment	HIGHS – OTHER PLAYER <= EQUIL. % Blowing Whistle	HIGHS – OTHER PLAYER > EQUIL. % Blowing Whistle	LOWS – OTHER PLAYER <= EQUIL. % Blowing Whistle	LOWS – OTHER PLAYER > EQUIL. % Blowing Whistle
W-LL-NA	N/A	N/A	0.5% (N=415)	8.1% (N=185)
W-HL-NA	11.8% (N=263)	32.4% (N=37)	11.4% (N=122)	14.6% (N=178)
W-LL-A	N/A	N/A	19.6% (N=429)	29.8% (N=171)
W-HL-A	47.2% (N=180)	60.8% (N=120)	60.8% (N=79)	53.8% (N=221)

Table 15. Whistle-blowing for low-types

Treatment	Fraud = 0	Fraud = 20	Fraud = 40	Fraud = 60	Fraud = 80	Fraud = 100
W-LL-NA (N=17)	1 / 42 (2.4%)	3 / 85 (3.5%)	11 / 288 (3.8%)	1 / 89 (1.1%)	1 / 34 (2.9%)	0 / 62 (0.0%)
W-HL-NA (N=40)	34 / 83 (41.0%)	6 / 101 (5.9%)	0 / 79 (0.0%)	0 / 11 (0.0%)	0 / 2 (0.0%)	0 / 24 (0.0%)
W-LL-A (N=135)	24 / 47 (51.1%)	20 / 112 (17.9%)	38 / 270 (14.1%)	26 / 102 (25.5%)	8 / 22 (36.4%)	19 / 47 (40.4%)
W-HL-A (N=167)	25 / 36 (69.4%)	26 / 73 (35.6%)	25 / 71 (35.2%)	29 / 39 (74.4%)	8 / 12 (66.7%)	54 / 69 (78.3%)

Table 16. Whistle-blowing for high-types

Treatment	Fraud = 0	Fraud = 20	Fraud = 40	Fraud = 60	Fraud = 80	Fraud = 100
W-HL-NA (N=43)	38 / 122 (31.1%)	3 / 79 (3.8%)	2 / 54 (3.7%)	0 / 22 (0.0%)	0 / 11 (0.0%)	0 / 12 (0.0%)
W-HL-A (N=158)	18 / 79 (22.8%)	35 / 71 (49.3%)	16 / 26 (61.5%)	10 / 17 (58.8%)	12 / 19 (63.2%)	67 / 88 (76.1%)

Table 17 presents a regression analysis of the choice to blow the whistle. For robustness, four specifications are reported. The first contains the treatment variables as well as interactions for if a manager was a *high*-type. The second specification also includes risk-posture measures.The third specification does not include risk-posture, but does include the amount of fraud chosen by each manager on the team and whether or not penalties (through whistle-blowing or external detection) were levied in the previous period, as well as the reciprocal of the period as a learning measure. The fourth specification contains everything in the third, plus risk posture. Following the pattern of previous discussion, we focus discussion on the fourth specification. The coefficients on the treatment variables represent the propensity for a risk-neutral *low*-type manager who has played the game and completed learning, who has committed zero fraud and has been partnered with someone who has committed zero fraud, and who did not have the whistle-blown in their group the previous period, to blow the whistle.

In both LL treatments, the coefficients are not statistically different from zero, as expected. In HL treatments, there is an underlying 16.7% propensity to blow the whistle when there is no amnesty, and 24.9% propensity to do so when there is. There is no statistically significant difference in the the rate at which *highs* choose to blow the whistle in those treatments.

The coefficients on the fraud interactions represent the change in the propensity to blow the whistle for an increase in one choice of fraud. The choices in the experiment were 0, 20, 40, 60, 80, and 100, so the coefficient represents the marginal change in the willingness to blow the whistle moving over one of those blocks of 20 units.

Table 17. OLS Regression (Whistle-blowing)

	Predicted Value	Blow Likelihood Treatment Only	Blow likelihood w/risk	Blow likelihood w/risk and fraud	Blow likelihood w/risk, fraud, and time
W_HL_NA	0.000	0.133*** (0.050)	0.107*** (0.038)	0.184** (0.079)	0.167** (0.077)
W_LL_NA	0.000	0.028*** (0.008)	0.027*** (0.008)	-0.027 (0.018)	-0.027 (0.019)
W_HL_A	0.000	0.557*** (0.072)	0.594*** (0.079)	0.208 (0.130)	0.249* (0.145)
W_LL_A	0.000	0.225*** (0.042)	0.229*** (0.055)	0.031 (0.069)	0.036 (0.067)
Ishigh*W_HL_NA	0.000	0.010 (0.062)	0.060** (0.062)	-0.058 (0.092)	0.001 (0.092)
Ishigh*W_HL_A	0.000	-0.030 (0.091)	-0.102 (0.090)	0.019 (0.161)	-0.034 (0.179)
Fraud*W_HL_NA*20	(-)			-0.086** (0.033)	-0.078** (0.033)
Fraud*W_LL_NA*20	(-)			-0.008* (0.005)	-0.008* (0.005)
Fraud*W_HL_A*20	(+)			0.062 (0.038)	0.057 (0.037)
Fraud*W_LL_A*20	(+)			0.007 (0.023)	0.008 (0.024)
IsHigh*Fraud*W_HL_NA*20	(-)			-0.001 (0.040)	-0.009 (0.040)
IsHigh*Fraud*W_HL_A*20	(+)			0.028 (0.042)	0.026 (0.041)
Other Fraud*W_HL_NA	(+)			0.021 (0.020)	0.022 (0.020)
Other Fraud*W_LL_NA	(+)			0.034*** (0.012)	0.034*** (0.012)
Other Fraud*W_HL_A	(+)			-0.002 (0.023)	-0.001 (0.023)

*, **, and *** denote parameter is statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

Table 17 continued…

	Predicted Value	Blow Likelihood Treatment Only	Blow likelihood w/risk	Blow likelihood w/risk and fraud	Blow likelihood w/risk, fraud, and time
Other Fraud*W_LL_A	(+)			0.037 (0.022)	0.037 (0.023)
IsHigh*Other Fraud*W_HL_NA	(+)			0.052* (0.031)	0.051* (0.030)
IsHigh*Other Fraud*W_HL_A	(+)			0.009 (0.037)	0.016 (0.038)
Risk Posture *W_HL_NA	(+)		0.039* (0.021)		0.009 (0.019)
Risk Posture *W_LL_NA	(+)		0.002 (0.005)		0.001 (0.005)
Risk Posture *W_HL_A	(+)		-0.037 (0.034)		-0.025 (0.032)
Risk Posture *W_LL_A	(+)		0.005 (0.037)		-0.010 (0.027)
IsHigh * Risk Posture *W_HL_NA	(-)		-0.058* (0.034)		-0.037 (0.027)
IsHigh * Risk Posture *W_HL_A	(-)		0.113*** (0.038)		0.086** (0.037)
Whistle Before*W_HL_NA				0.165*** (0.033)	0.165*** (0.032)
Whistle Before*W_LL_NA				0.038 (0.055)	0.038 (0.055)
Whistle Before*W_HL_A				0.283*** (0.088)	0.274*** (0.077)
Whistle Before*W_LL_A				0.290*** (0.078)	0.290*** (0.078)
IsHigh*Whistle Before*W_HL_NA				-0.107* (0.062)	-0.116* (0.057)
IsHigh*Whistle Before*W_HL_A				-0.198** (0.099)	-0.213** (0.086)

*, **, and *** denote parameter is statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

Table 17 continued

	Predicted Value	Blow Likelihood Treatment Only	Blow likelihood w/risk	Blow likelihood w/risk and fraud	Blow likelihood w/risk, fraud, and time
1/P*W_HL_NA				0.008	0.005
				(0.074)	(0.073)
1/P*W_LL_NA				-0.034	-0.034
				(0.024)	(0.179)
1/P*W_HL_A				0.035	0.032
				(0.131)	(0.120)
1/P*W_LL_A				0.010	0.010
				(0.072)	(0.072)
IsHigh*1/P*W_HL_NA				-0.013	-0.010
				(0.118)	(0.118)
IsHIgh*1/P*W_LL_A				0.056	0.041
				(0.203)	(0.197)
F		35.96	22.75	17.42	16.06
R2		0.39	0.41	0.48	0.48
N (observations)		2400	2400	2400	2400
N (subjects)		120	120	120	120
N (groups)		60	60	60	60

*, **, and *** denote parameter is statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

As expected, willingness to blow the whistle decreases in the person's own fraud in the no-amnesty treatments, wherein they will be punished for the fraud they were going to commit. The propensity to blow the whistle increases in the other manager's fraud, which also makes sense, because there's now an incentive to self-report fraud in order to avoid being punished if the other managers in the group blow the whistle. If the whistle was blown in their group last period, *lows* increase their rate of whistle-blowing, even when there is no amnesty, by 16.5 percentage points in the following period. This can likely be explained, judging from comments made by some of the participants, to be motivated by spite.   In the amnesty treatments, whistle-blowing in the previous period increases whistle-blowing by roughly 27 percentage points.

Table 18 presents regression results for the *high*-types only. These can be found using the interaction effects from Table 17, but are presented here for ease of understanding. Once again, we restrict discussion to the fourth, fully specified model. The coefficients on the treatment variables represent the average whistle-blowing of a risk-neutral *high*-type who has committed no fraud in a group where the other person has committed no fraud, has played the game an infinite number of rounds and finished learning, and did not have the whistle-blown in their group in the previous period.

We find that when a manager increases their choice of fraud one increment (a jump of 20), the propensity to blow the whistle decreases 8.7% in when there is no amnesty, and increases 8.4% when there is amnesty, which corresponds with the intuition discussed earlier. The propensity to blow the whistle also rises with increases in the fraud of the other player when there is no amnesty, while it is statistically insignificant when there is amnesty. Being risk-averse decreases the propensity to blow the whistle when there is no amnesty, which is unexpected, while it sharply increases the propensity to

Table 18. OLS Regression (Whistle-blowing: High-types only)

	Predicted Value	Blow Likelihood Treatment Only	Blow likelihood w/risk	Blow likelihood w/risk and fraud	Blow likelihood w/everything
W_HL_NA	0.000	0.143*** (0.037)	0.168*** (0.050)	0.127** (0.048)	0.168*** (0.052)
W_HL_A	0.000	0.527*** (0.056)	0.491*** (0.045)	0.227** (0.099)	0.214* (0.108)
Fraud*W_HL_NA*20	(-)			-0.084*** (0.023)	-0.087*** (0.024)
Fraud*W_HL_A*20	(+)			0.090*** (0.018)	0.084*** (0.017)
Other Fraud*W_HL_NA	(+)			0.073*** (0.024)	0.074*** (0.023)
Other Fraud*W_HL_A	(+)			0.007 (0.030)	0.015 (0.030)
Risk Averse *W_HL_NA	(+)		-0.019 (0.027)		-0.029 (0.020)
RiskAverse*W_HL_A	(+)		0.076*** (0.018)		0.061*** (0.019)
Whistle Before*W_HL_NA				0.057 (0.053)	0.049 (0.048)
Whistle Before*W_HL_A				0.085* (0.046)	0.061 (0.040)
1/P*W_HL_NA				-0.005 (0.093)	-0.005 (0.094)
1/P*W_HL_A				0.090 (0.157)	0.072 (0.159)
F		51.46	37.37	18.16	19.66
R^2		0.43	0.47	0.54	0.55
N (observations)		600	600	600	600
N (subjects)		30	30	30	30
N (groups)		30	30	30	30

*, **, and *** denote parameter is statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

blow the whistle when there is amnesty – which is not surprising at all. Having had the whistle-blown in the previous period has no effect on the *highs,* although it had a substantial effect on the lows.

Conclusion

In this paper, we use data generated by laboratory experiments to test our theory of the incentives for a managerial team to commit fraud under different policy regimes. By using data collected in a controlled laboratory setting, we are able to observe decisions to commit fraud whether or not the fraud is detected, which gives us an important advantage over field data.

Our analysis suggests that these provisions can decrease the total amount of fraud committed by the team by inducing managers within the team to act as monitoring agents. Although whistle-blowing is not predicted to occur in equilibrium, our experimental test finds that whistle-blowing does occur, as we observe in the real world. If no amnesty is granted to whistle-blowers, we find that both attempted and effective fraud are reduced from when whistle-blowing is not possible. With amnesty provisions, we find that the effective fraud is further reduced, but attempted fraud increases. This indicates that Sarbanes-Oxley could be effective in reducing fraud without costly investment in internal monitoring if its provisions are adequately enforced, and that amnesty provisions are useful for maximizing the reduction of fraud that affects markets at the expense of greater prosecutions of offenders.

The analysis also sheds light on the importance of a managerial team's composition. The threat of whistle-blowing has an effect on the level of fraud only when there is sufficient heterogeneity in the team. Since one can view each managerial hire as a random draw from a pool of applicants, a larger team is more likely to have at least one manager who is highly sensitive to sanctions and thus willing to blow the whistle for even minor infractions.

CHAPTER III: THE EFFECT OF CONTINGENT FEE CAPS ON THE QUALITY OF LEGAL SERVICES

Introduction

In the United States, plaintiffs in civil suits often compensate their attorneys with contingent fees, so that the attorney is entitled to a share of any awarded damages. The merits of contingent compensation have been debated for decades, with several states moving to impose limits on contingent fees even as a number of countries allow them for the first time. Regardless of where one stands on the issues, there is no doubt as to the economic significance of the market. The market for legal services is responsible for overseeing the transfer of billions in wealth each year. There are over 1.1 million practicing attorneys in the United States, and one estimate for the total cost of torts (including incurred damages, defense costs, and administrative expenses) in the U.S. is $252 billion (Towers Perrin (2008)) for 2007 alone.

Improving the efficiency of this market has thus drawn great interest from academic economists, who in recent years have argued that contingent fees may improve economic efficiency in various ways. Supporters of contingent fees point out that that they allow clients with liquidity constraints access the market for legal services, and that the use of contingent fees shifts the risk to attorneys who are less risk averse. It has also been argued that contingent fees can improve efficiency by correcting problems resulting from asymmetric information, ultimately improving the quality of legal services. This improvement in quality is the focus of this paper.

Previous research has shown that contingent fees can alter the quality of legal services in at least two ways. The first is by inducing greater effort from attorneys. Danzon (1983) explores the moral hazard problem that results when attorneys are paid fixed fees rather than contingent fees. Hay (1996) uses a moral hazard model to analyze the optimal linear contingent fee. He shows that the optimal fee

will allow attorneys to earn rents and reduce underinvestment of effort in the case. Santore and Viard (2001) derive the optimal contingent fee in a moral hazard model with non-negative fixed fees and show that restrictions on fixed fees allow attorneys to earn rents. McKee et. al. (2007) use a series of economic experiments to test a moral hazard model with contingent compensation and find that clients are sophisticated enough to use contingent fees to obtain greater effort.

The second way that contingent fees may alter the quality of legal services is by allowing clients to screen low-quality attorneys. While attorneys may gain a reputation over time, the quality and ability of any given lawyer is unobservable to potential clients. Contingent fees may provide a mechanism for revealing the quality of an attorney by allowing contracts that are only profitable to attorneys with a high likelihood of winning the case.

Rubinfeld and Scotchmer (1993) develop a theoretical model wherein clients have information about the quality of their case that is unobservable to attorneys, while attorneys have information about their ability that is unobservable to the clients. They find that when case quality is unobservable by attorneys, a client with a high-quality case will be willing to pay a relatively high fixed fee, and a client with a relatively low-quality case will be willing to pay a relatively high contingent fee. They also find that when attorney quality is unobservable to clients, a well-informed high-quality attorney will signal his or her ability by working for a relatively high contingent fee.

We derive similar results using a model of contingent fee contracts that closely resembles section four of Rubinfeld and Scotchmer (1993), where attorneys are of unobservable quality. An absence of field data prevents an evaluation of these results using traditional empirical methods, so we present results from a laboratory experiment designed to test the behavioral hypotheses regarding the ability of contingent fees to screen low-quality attorneys. As McKee et. al (2007) use experimental

evidence to provide empirical support for the ability of contingent fees to alleviate the moral-hazard problems, we use experimental evidence to support the ability of contingent fees to improve average attorney quality by allowing clients to screen low-quality attorneys.

In addition to testing whether or not clients are sophisticated enough to screen, we address a current policy debate: whether or not to restrict contingent fees. As of October 2005, 23 states[27] limit contingent fees, with most using a system wherein awards are assigned to brackets akin to the income tax code. In Illinois, for example, attorney fees are not to exceed 1/3 of the first $150,000, 1/4 of $150,001 to $1,000,000, and 1/5 of awards over one million dollars.[28] The American Bar Association[29] opposes these restrictions on grounds that they deny access to representation by those who cannot afford to pay large fixed fees and reduces the incidence of meritorious claims.

Helland and Tabarrok (2005) examine the effect of contingent fee caps on the legal system. They find, contrary to arguments frequently made by proponents of tort reform, that caps on contingent fees are likely to result in more low-value "junk suits" in the legal system. They argue that attorneys have greater incentive to screen out low-quality cases when they are paid only if they win. Helland and Tabarrok(2003) use empirical evidence on dropped medical malpractice cases to show that in states with contingent fee caps, more cases were filed that did not have sufficient merit to proceed all the way through trial.

While the work of Rubinfeld and Scotchmer (1993) allows for unrestricted contracts, we consider the effect of restrictions on contingent fees on the optimal contract to capture the effects of legislated contingent fee caps. In theory, restricting contingent fees can prevent screening and reduce

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[27] CA,CT,DE,FL,HI,IL.IN,IA,KS,ME,MA,MI,NV,NH,NJ,NY,OK,OR,TN,UT,WA,WI,WY
[28] http://www.ncsl.org/standcomm/sclaw/statelaws1.htm - National Conference of State Legislatures
[29] ABA (2004)

client welfare. However, weak restrictions that should not prevent screening may make screening more or less difficult in practice. In our laboratory experiments, we institute a cap on the contingent fees that clients may offer attorneys, and vary that cap across treatments to measure the effect of contingent fee caps on the ability of clients to screen out low-quality attorneys (and thus increase average attorney quality) and on client welfare itself. We find that more restrictive contingent fee caps cause a decrease in a client's ability to screen low-quality attorneys, the average quality of legal services, and client welfare even though, in theory, the relatively weak caps used in the experiment should have no effect.

The Model

A risk-averse client with a strictly concave von Neumann-Morgenstern utility function $v(.)$, where $v^{'}(.) > 0$ and $v^{''}(.) < 0$, wishes to file suit against a third party for exogenous damages, D**.** The case will return an award for damages to the plaintiff, gross of legal fees, of either D_H or D_L[30], (where $D_H > D_L$), depending on the outcome. We normalize the client's income and utility prior to filing the lawsuit to zero ($v(0) = 0$).

The client, needing representation, selects at random from A risk-neutral attorneys and offers a contract. This contract consists of a share of the award (contingent fee), s, and a fixed fee, f. Each of the A attorneys is one of two types, based on his or her ability to win maximum damages from a given case. There is probability z an attorney is a high-ability type (a *high*) and $(1 - z)$ probability that an attorney is a low-ability type (a *low*), where $0 < z < 1$. It is assumed that A is large enough so that there are $zA \geq 1$ *highs* and $(1 - z)A \geq 1$ *lows*. *Highs* have exogenous probability p^H of winning the case, while the *lows* have exogenous probability p^L, where $1 > p^H > p^L > 0$. Finally, assume that attorneys have

[30] If $D_L = 0$ one may interpret the low judgment as "losing" the suit. Similarly, one may interpret the judgment values as settlement values, with high-ability attorneys being more likely to achieve a large settlement.

different opportunity costs, $c^i, i = H, L$ of pursuing the case. In subsequent figures and the experiments, we make the assumption that attorneys of higher quality face higher opportunity costs of accepting a case, $c^H \geq c^L$. This assumption is not required for our proof of the optimal contract, but is used because it is the interesting case in which sufficiently low contingent fees will prevent screening of *low* quality attorneys. The values of A, z, p^H, p^L, D_H, D_L, c^H, and c^L are all known to the client. Furthermore, assume that it is potentially profitable to hire either type of attorney. Mathematically, this can be stated as: $p^i D_H + (1 - p^i) D_L \geq c^i, \quad i = L, H,$

The timing of the game is as follows:

> Stage 1: The client chooses a compensation package consisting of a contingent fee, s, and a fixed fee, f, to offer attorneys.
>
> Stage 2: A client offers the contract to a random attorney. The transaction is complete and binding if the attorney accepts the contract. If the attorney declines to select a contract, the client searches out another random attorney to offer the contract.[31]

The offer is binding, so if an attorney chooses to accept, the client hires the attorney. An attorney will accept the contract it returns expected revenue greater than the attorney's opportunity cost.

An attorney of type *i* who is paid according to contract (s, f) earns expected profit equal to:

$$E(\pi^i) = p^i s D_H + (1 - p^i) s D_L + f - c^i, \quad i = L, H \qquad (8)$$

[31] We assume that search for a new attorney is costless, which implies that it is never optimal to offer two distinct contracts.

The probability of obtaining a large judgment, p^i, impacts only the expected award, because the fixed fee and costs are collected and paid regardless of the outcome of the case. An attorney will accept a case if his or her expected profit is non-negative.

$$p^i s D_H + (1 - p^i) s D_L + f \geq c^i, \quad i = L, H \qquad (9)$$

The risk-averse client wishes to maximize his or her expected utility by acquiring the greatest probability of winning the case at the least cost. The expected utility is expressed mathematically as:

$$V(f, s, p^i) = p^i v((1 - s) D_H - f) + (1 - p^i) v((1 - s) D_L - f), \qquad i = L, H \qquad (10)$$

To hire an attorney and maximize expected utility, the client should choose a fixed fee and contingent fee that cause (9) to bind for at least one type of attorney. Offering less profitable contracts would cause no attorney to be hired, violating our assumption that it is profitable for the client to obtain representation. Offering more would increase costs with no corresponding benefit, and leave the client with a profitable deviation in the offered contract. For any two contracts with the same break-even expected cost, the risk-averse client prefers the one with a higher contingent fee, as a contingent fee is paid only if the client achieves a high-wealth state (wins the case) and thus insures the client against a reduction in wealth.[32] As such, we find it useful to calculate the break-even simple contingent fee, σ, for each *type*.

$$\sigma^i = \frac{c^i}{p^i D_H + (1 - p^i) D_L}, \quad i = L, H \qquad (11)$$

[32] A risk-neutral client would be indifferent between all contracts on the break-even contract line for a *high* that screenedthe *low*.

Because of differences in the probability of winning between attorneys, it is possible to construct a compensation package which only one type would accept. The *high* has a greater probability of winning the large award than does a *low*, so even with a higher opportunity cost of taking a case ($c^H > c^L$), it is possible to offer a *high* a contingent fee contract that the low cannot accept without losing money. In fact, if $c^H > c^L$, $\sigma^H < \sigma^L$, and $\sigma^L < 1$, screening the *lows* requires contingent fees, as the smallest fixed fee a *high* would accept would also be accepted by a *low ($f = c^H > c^L$).* Similarly, because the *low* has a lower opportunity cost of taking the case, there are fixed-fee heavy contracts that only a *low* would accept. There are also contracts that neither or both types would choose to accept. Because we are interested in screening of the *lows*, this section focuses on the case where $\sigma^H < \sigma^L$. Discussion of the case where $\sigma^L < \sigma^H$ may be found in Appendix E. Figure 7 presents the zero-profit lines for *high* and *low*-type attorneys, and shows what contracts induce screening of a given type, and what contracts are acceptable to a given type.

In this paper, we consider legal constraints on the contract a client may offer. The first constraint is that the fixed fee must be non-negative ($f \geq 0$). The American Bar Association Model Rules of Professional Conduct prohibit an attorney from purchasing a case from a client. We derive the optimal contract with this restriction in mind.

Lemma 1: *Suppose that $\sigma^H < \sigma^L$*, *then the equilibrium contract is*($s = \sigma^H, f = 0$).

The proof of Lemma 1 is located in Appendix D. The intuition behind the result is straightforward: A contract with a fixed fee cannot be an equilibrium, because efficient risk sharing

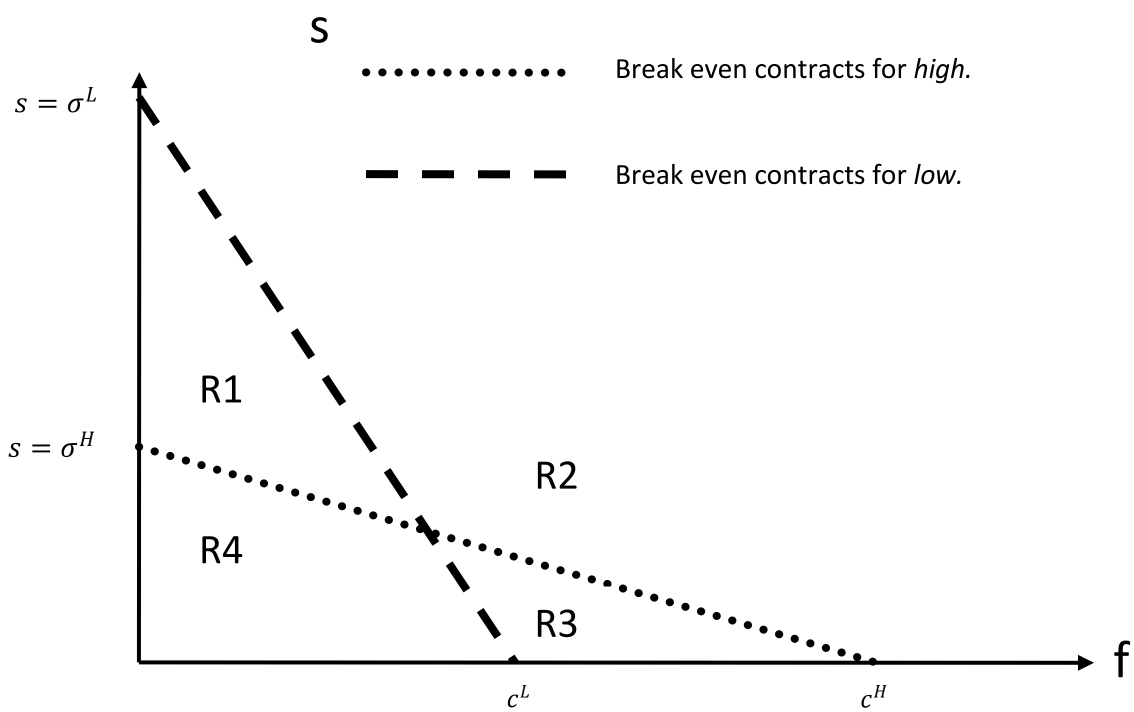

Figure 7: Contract space for attorneys of high and low ability.

R1: Only the *high* will accept these contracts.

R2: Both types of attorney will accept these contracts.

R3: Only the *low* will accept these contracts.

R4: Neither type of attorney will accept these contracts.

requires that the risk be shifted away from the risk-averse client to the risk-neutral attorney. If allowable, efficient risk-sharing would suggest that the client will sell the case at a price only the *highs* can afford to pay. In this case, the optimal contract would be $(s = 1, f = c_H - p_H D_H - (1 - p_H) D_L)$. However, as this contract is prohibited by restrictions on negative fixed fees, the closest contract that would be offered by a fully-informed client is $(s = \sigma^H, f = 0)$[33], which is our full-information competitive benchmark as we examine the effect of contingent fee caps. Formally, we restrict contingent fees to be no greater than $\bar{s} \leq 1$, where $\bar{s}$ is a statutory contingent fee cap placed on the share of damages an attorney can collect. We wish to characterize the equilibrium contracts offered in the face of these restrictions.

The optimal contract depends on the values of z, A, and $\bar{s}$. When a high-quality attorney can be obtained for a lower expected cost than a low-quality attorney, it is clearly optimal to offer a contract that screens out low-ability attorneys. A cap need not have an effect, as long as it remains above the break-even simple contingent fee for a high, σ^H. The equilibrium becomes more complicated, however, if caps are set below the intersection of the break-even contract lines for each type ($\bar{s} < \frac{c^H - c^L}{(p^H - p^L)(D_H - D_L)}$), which prevents screening of the *lows*. It may be optimal for clients to pool types, or to actually separate out the lows. Figure 8, restricted to $f \geq 0$, shows how the characterization of the optimal contract may change over different values for $\bar{s}$. If caps are high enough, the optimal contract screens the *lows*. If caps are sufficiently low, the optimal contract may screen the *highs* or pool types, depending on the proportion of each type in the market and their respective opportunity costs and probability of winning the case .

[33] The moral hazard literature reaches the same conclusion, though for different reasons. Santore and Viard (2001), find that optimal attorney effort will be obtained by allowing attorneys to “buy the case.”.

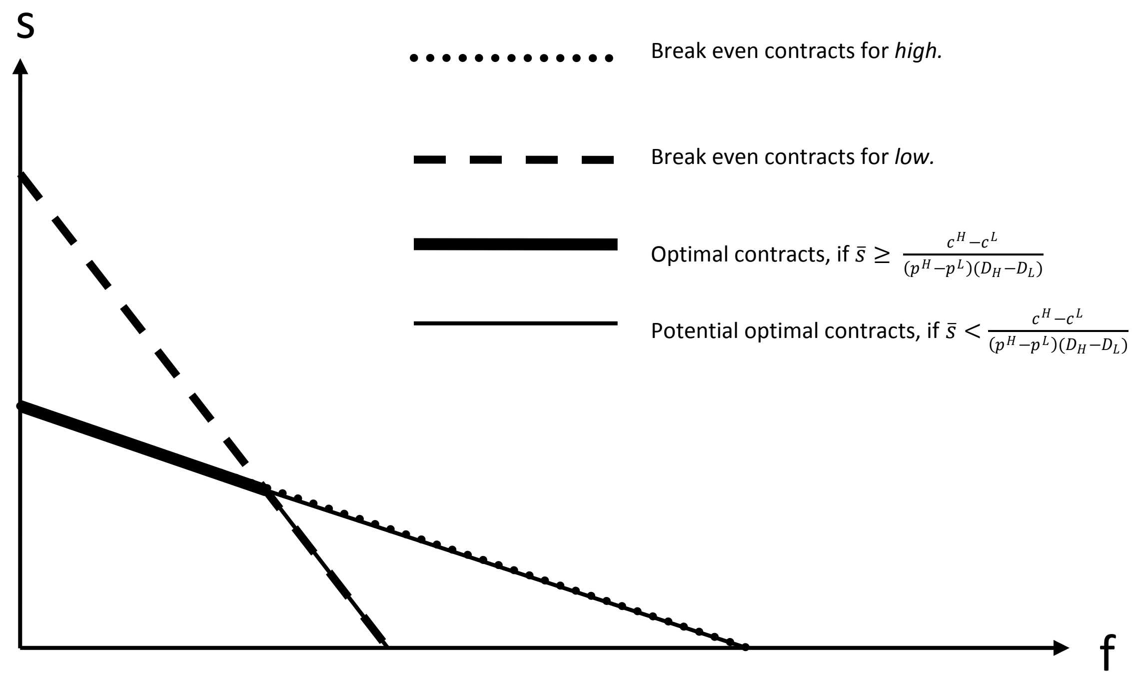

Figure 8: Optimal contracts based on contingent fee limits.

Given a selection of contracts to offer with the same expected payoff, we know from Lemma 1 that a client would prefer the one with the highest contingent fee. This allows us to reduce the potential contracts a client may offer to three:

1) A separating contract with the highest possible share of compensation derived from the contingent fee, such that the high-ability attorney breaks even and the low-ability attorney loses money in expectation.
2) A separating contract with the highest possible share of compensation derived from the contingent fee, such that the low-ability attorney breaks even and the high-ability attorney loses money in expectation.
3) A pooling contract with the highest possible share of compensation derived from the contingent fee, such that the low-ability attorney breaks even and the high-ability attorney earns rents in expectation.

Proposition 1: *Suppose that $\sigma^H < \sigma^L$ and the contingent fee cap is at least as great as the contingent-fee where the break-even contract lines of each type intersect, ($\bar{s} \geq \frac{c^H - c^L}{(p^H - p^L)(D_H - D_L)}$), the client offers a contract that screens the low-type attorneys and is given by ($s = min\{\bar{s}, \sigma^H\}, f = c^H - p^H s D^H - (1 - p^H) s D^L$).*

If $\bar{s} > \sigma^H$, the optimal contract provided in Lemma 1 remains feasible for the client. If the cap does bind, but it remains possible for the client to screen the *lows*, then the client offers the contract that shifts as much risk as possible to the attorney while screening the *lows* and satisfying the participation constraint for a *high*.

If $\bar{s} < \frac{c^H - c^L}{(p^H - p^L)(D_H - D_L)}$ or $\sigma^H > \sigma^L$, screening the *lows* is not possible. We are most interested in cases where screening of the *lows* is possible, so for ease of exposition, analysis of the optimal contract when *lows* cannot be screened may be found in Appendix E.

It is straightforward to show that contingent fees improve client welfare by altering the average quality of attorneys in the market. Assume that contingent fees are prohibited ($\bar{s} = 0$). The client now has two reasonable choices of contracts: $(s = 0, f = c^H)$ or $(s = 0, f = c^L)$. Choosing the first contract yields expected utility for the client equal to:

$$EV = (zp^H + (1-z)p^L)v(D_H - c^H) + \big(1 - (zp^H + (1-z)p^L)\big)v(D_L - c^H) \quad (12)$$

Choosing the second contract yields the client expected utility of:

$$EV = (p^L)v(D_H - c^L) + (1 - p^L)v(D_L - c^L) \qquad (13)$$

With no cap on contingent fees, the optimal contract is $(s = \sigma^H, f = 0)$, which yields expected utility:

$$EV = (p^H)v((1-\sigma^H)D_H) + (1 - p^H)v((1-\sigma^H)D_L) \qquad (14)$$

Because $(1-\sigma^H)D_i = D_i - c^H$, for any $z < 1$, $(14) > (12)$. Our condition that $\sigma^H < \sigma^L$, is sufficient to show that $(14) > (13)$. Thus, clients are better off with contingent fees because, for a contract with the same cost to the client, the expected probability the hired attorney will win maximum damages is reduced without contingent fees. [34]

[34] The contract used in (12) has the average attorney with a $(zp^H + (1-z)p^L)$ chance of winning. The contract used in (13) has the average attorney with a p^L chance of winning. Both are lower than the contract used in (14)'s p^H chance of winning.

Experimental Design

We've shown that contingent fees may improve the quality of legal services by allowing clients to screen low-quality attorneys. However, if clients are not sophisticated enough to engage in screening, this behavior will not be observed in practice. We find that contingent fee caps should not matter as long as they are set above the break-even simple contingent fee for the highs, but it is possible a cap which would not change the behavior of a theoretical client will change the behavior of a human client. For example, by shrinking the set of allowable contracts, clients may have an easier time solving the game. Conversely, caps may have adverse consequences by functioning as a "focal point", in the sense that it may draw a player who does not consciously understand the optimal contract into making an instinctual out-of-equilibrium decision. In a laboratory setting, we can create a market for legal services where the quality of an attorney is known, and most variables and parameters can be controlled for. In this setting we can observe how caps affect actual behavior.

Experimental evidence has been used to examine questions about the compensation of legal representation in the past. For example, Mckee et. al. (2007) experimentally test a moral hazard model with contingent compensation and find that clients are sophisticated enough to use contingent fees to obtain greater attorney effort. Here, we wish to see if clients are sophisticated enough to use contingent fees to screen low-ability attorneys. For caps that are lower than the break-even simple contingent fee for the highs, we wish to see to what extent client welfare is reduced. To answer these questions, we use experimental evidence.

The objective of these experiments is to allow empirical tests of the theoretical propositions put forth on the effect of contingent fee caps on the ability of clients to screen out low-ability attorneys. We have established that in theory, contingent fees caps may decrease welfare by forcing risk onto risk-

averse clients, and by reducing the odds of success on meritorious cases. In order to demonstrate the predictive power of the theory, we use experimental evidence to test our predictions to see if they align with observed behavior.

In spring of 2009, 90 subjects recruited from the general population at the University of Tennessee participated in one of 6 experimental sessions conducted at the Experimental Economics Laboratory. There are two sessions (replications) of each treatment, with N=16 in the first and N=14 in the second (leading to N=30 per treatment). Average earnings were approximately $20, and sessions lasted for approximately one hour on average.

Decisions were made via computer. The experiments were programmed and conducted with the software z-Tree (Fischbacher, 2007). The software collected all decisions and made all relevant earnings calculations. Written instructions were provided to each participant[35] and displayed on-screen. The experiment moderator read instructions aloud, one screen at a time, and any questions were answered prior to proceeding to the next instruction screen. During the instructions, participants were asked to answer two questions on the computer to assess their understanding of how earnings were calculated. They were unable to proceed until the questions were correctly answered. Those who were unable to perform the calculations on their own were able to ask an experiment moderator for help, who would then re-explain procedures and field questions. Following the instructions, there was one unpaid practice round, where questions were encouraged and addressed. Upon conclusion of the experiment, a short questionnaire was administered to obtain demographic information and qualitative assessments of the experiment design and instruction clarity.

[35] Instructions and tables given to subjects may be found in Appendices G and H.

Subjects were informed that they were the manager of a project, and needed to hire a specialist in order to complete the project and realize revenue (D_H =\$100). If the project failed, no revenue was obtained (D_L =\$0). Subjects were given the opportunity to construct a contract to offer specialists, which consisted of a fixed fee and a share of revenue (contingent fee). It was common knowledge that there were two types of specialist in the market (Type A and Type B), with different probabilities of being successful and realizing the revenue ($p_H = 0.75, p_L = 0.25$). The proportion of types was also common knowledge ($z = 0.5$), as was the fact that the specialist had to have their costs met in order to accept the contract, and that the costs for the Type A were higher ($c_H = \$30, c_L = \$20$). The difference in costs and probabilities of winning provide us with different break-even contingent fees between the types: ($\sigma^H = 40\%,\ \sigma^L = 80\%$). The three treatments we conduct are identical save for different maximum contingent fees that could be offered in the contract – to test the effect of contingent fee caps on behavior. The treatments are described in Table 19.

Subjects would construct the contract and offer it to the market (as search is costless, a broadcast offer is equivalent in expectation to sequential search with the optimal contract). If no type could at least break-even, the project did not succeed and returned revenue of \$0. If only one type at least broke-even, then that type was hired and the revenue paid with probability corresponding to the type hired. The cost of the hire was deducted from the revenue, and the remainder returned to the subject. If both types at least broke even, the type was chosen by coin-flip . 20 rounds per session were used, with each round having a new project. After the final round, subjects received their earnings

Table 19. Contingent Fee Experiment Treatment Descriptions

Treatment Code	Description
Cap25	The maximum contingent fee that may be offered is 25%.
Cap50	The maximum contingent fee that may be offered is 50%.
Cap100	The maximum contingent fee that may be offered is 100%.

privately and in cash, and left the lab one-by-one without any discussion. Figure 9 shows the break-even contracts for the two types as well as the congtinency fee caps for the treatments.

In order to investigate the role of risk-attitudes we include in our econometric analysis a risk measure elicited through a preceding paired lottery-choice procedure as in the previous chapter (e.g. Holt and Laury(2002)).

Table 20 presents the results of the risk-elicitation procedure. Risk-neutral and risk-averse clients should prefer to screen low-ability attorneys at all three caps which are used, so we expect to find no difference between risk-aversion and risk-neutral risk postures in the analysis.

Results

The equilibrium contract for a risk-averse client is the one with the greatest contingent fee on the break-even contract line for the *high*-type attorney. The lowest simple contingent fee that a *high* will accept (σ^H) given our parameters is a 40% rate, which is allowable under both the 50% and 100% caps. With a cap at 25%, it is still possible to screen the *low*-types, and the equilibrium contract is a contingent fee of 25% and a fixed fee of $11.25. Conditional on screening the lows, a risk-neutral client will be indifferent between any two break-even contracts since they yield they same expected income to the client.

Table 21 presents the average contract offered by clients in each of the three treatments, and compares the average to the equilibrium contract for each treatment. A cursory examination of Table 21 shows that clients tended to offer a smaller contingent fee and larger fixed fee than the equilibrium.

Figure 10 presents the movement of expected client and attorney profit over time, as well as the average contingent and fixed fees offered. The upper-left graph shows the average expected profit for clients based on the contract they offered over time. Equilibrium contracts yield an expected profit

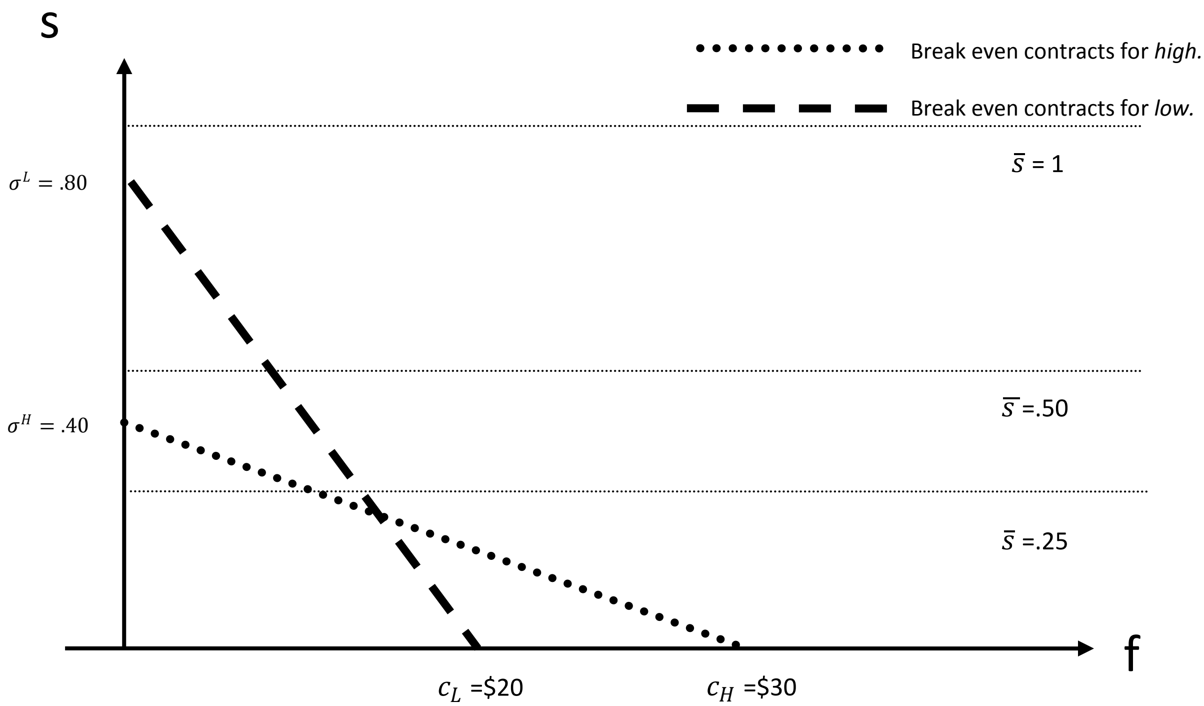

Figure 9: Contingent Fee Caps Used in Experimental Design

Table 20. Parameters and Results of Risk-Elicitation Experiment

Decision Task	Option A	Option B	CRRA coefficient of relative risk aversion (*r*)	Proportion of Participants
1	Receive $3.00	0% chance of $5.00 100% chance of $0.50	–	0
2	Receive $3.00	10% chance of $5.00 90% chance of $0.50	[-∞, -3.508]	0
3	Receive $3.00	20% chance of $5.00 80% chance of $0.50	[-3.507, -2.146]	0
4	Receive $3.00	30% chance of $5.00 70% chance of $0.50	[-2.145, -1.336]	0
5	Receive $3.00	40% chance of $5.00 60% chance of $0.50	[-1.335, -.742]	0.033
6	Receive $3.00	50% chance of $5.00 50% chance of $0.50	[-.741, -.250]	0.122
7	Receive $3.00	60% chance of $5.00 40% chance of $0.50	[-.249, .194]	0.189
8	Receive $3.00	70% chance of $5.00 30% chance of $0.50	[.195, .631]	0.356
9	Receive $3.00	80% chance of $5.00 20% chance of $0.50	[.632, 1.112]	0.189
10	Receive $3.00	90% chance of $5.00 10% chance of $0.50	[1.113, 1.758]	0.033
11	Receive $3.00	100% chance of $5.00 0% chance of $0.50	[1.759, ∞]	0.044

Notes: The risk coefficient corresponds to an individual that switches from the certain payoff (Option A) and the uncertain payoff (Option B) at this task. Three individuals accepted the $3.00 certainty equivalent over a 100% chance of $5.00.

Table 21. Average Contract Offered

Treatment	Equilibrium Fixed Fee	Observed Fixed Fee (last five rounds)	Equilibrium Contingent Percentage	Observed Contingent Percentage (last five rounds)
Cap = 25%	$11.25	$21.26 ($18.39)	25.0%	18.55% (19.43%)
Cap = 50%	$0.00	$14.62 ($12.05)	40.0%	28.30% (29.53%)
Cap = 100%	$0.00	$8.75 ($6.81)	40.0%	33.13% (33.07%)

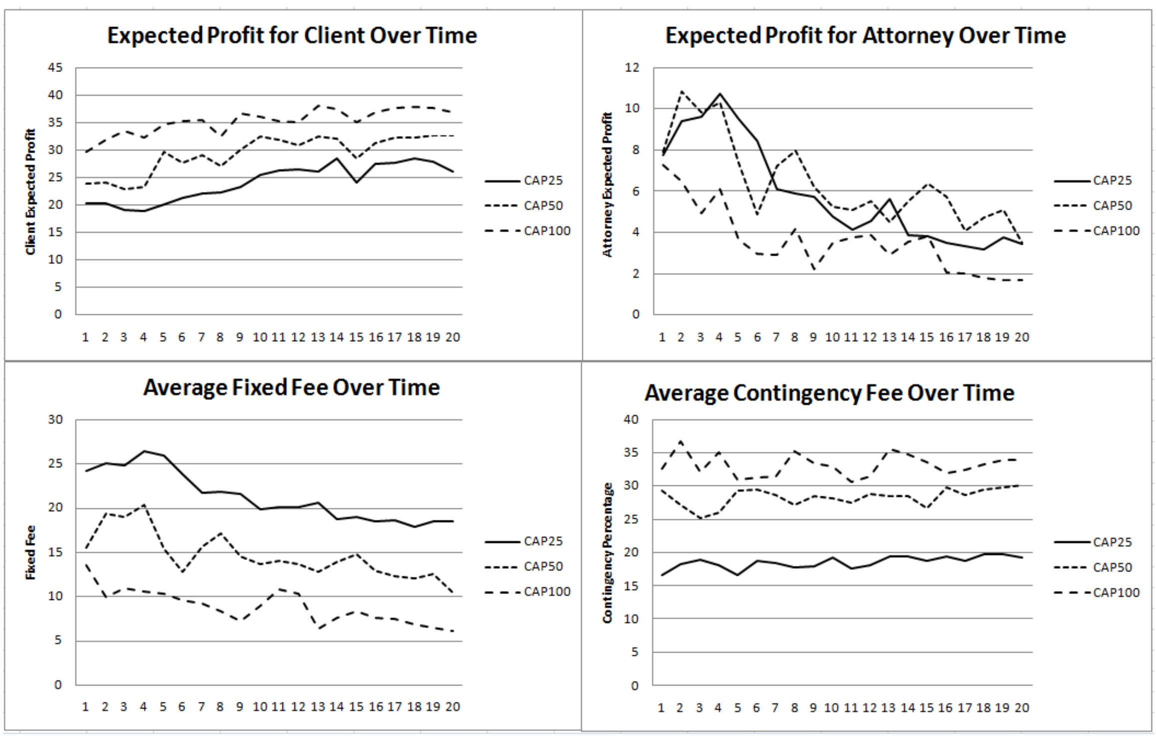

Figure 10: Expected Profit from Contract and Contract Parameters Over Time

of $45.00 lab dollars per round. Performance is positively correlated with the size of the cap, with earnings highest for clients with no cap and lowest with a 25% cap. The upper-right graph shows expected profit for the attorney over time. In all treatments, attorney profit diminished as the game proceeded and subjects learned to capture more of the available revenue. Attorney profit is consistently lowest when there is no cap, and roughly equal when caps are at 50% and 25%. The average fixed fee fell over time, and was higher in treatments with a lower contingent fee cap. Conversely, contingent fees rose as the cap rose.

To examine the ability of clients to screen, we analyze the rate at which the *lows* were screened. Table 22 shows the rates of screening *low* type attorneys. The rate at which such screening occurred was positively related to the size of the cap, and improved over time (an approximately five percentage point increase in the last five rounds compared to the entire treatment).

A sufficiently risk-loving client may prefer to hire a low-ability attorney, while risk-neutral and risk-averse clients will always prefer to screen a low-ability attorney. The last two columns of Table 22 show the rates at which people screened the *lows* based on their risk-posture. The relationship holds across treatments, but risk-loving clients do tend to screen less. Figure 11 shows the average contracts offered plotted on the break-even contract lines for each type of attorney. In the Cap25 treatment, the average contract failed to screen low-ability attorneys. In the Cap50 treatment, the average contract did not screen low-ability attorneys at first, but did in the last five rounds. In the Cap100 treatment, the average contract screened low-ability attorneys for the length of the experiment.

Table 22. Rates of Screening Low-Type

Treatment	Observed (All Rounds)	Observed (Last Five Rounds)	Risk-loving (all rounds)	Risk-neutral/averse (all rounds)
Cap = 25%	26.83%	31.33%	19.00%	28.40%
Cap = 50%	57.67%	62.67%	50.00%	60.00%
Cap = 100%	71.83%	76.67%	50.00%	76.20%

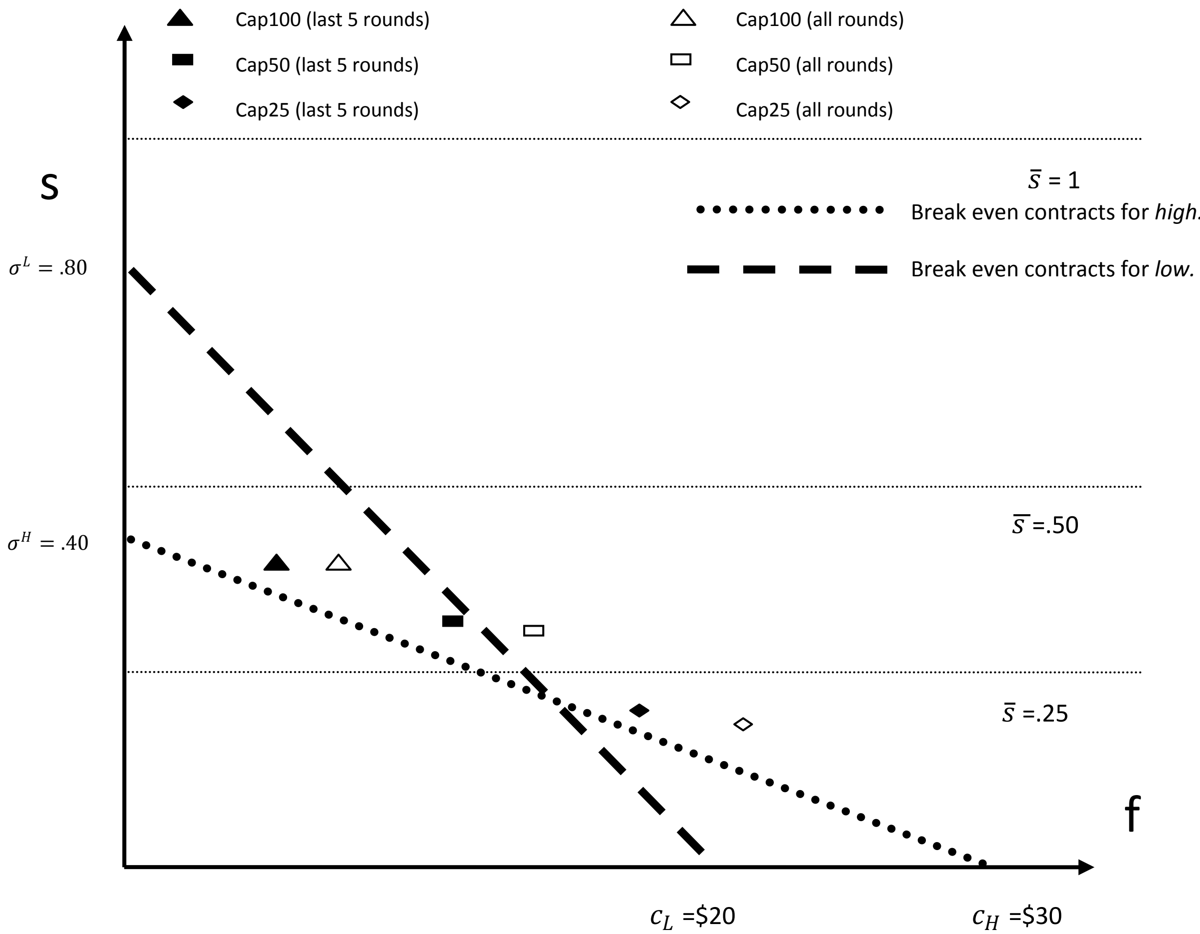

Figure 11: Average contracts offered by treatment.

Figure 12 shows the screening effects of contracts over time in all three treatments. The bottom region represents the contracts that screen the *low* type, which again, represents a larger proportion of all contracts when the cap is higher. The black region represents the contracts that pool types, which are by far the second most common type. The final graph in the lower right presents the information in Table 22 in visual form.

We now turn to a regression analysis to confirm the graphical analysis. Table 23 presents results for the probability of screening a low-type. Four specifications are used for robustness. The first contains only the treatment variables. The second contains the reciprocal of the period, allowing coefficients on the treatment variables to be interpreted as effects after learning has been completed. The third contains risk-preferences interacted with the treatment variables, allowing the treatment coefficients to be interpreted as the decision by a risk-neutral (or possibly unconfused, as James(2007) finds a correlation between Holt & Laury (2002) performance and confusion) subject. Finally, the fourth specification contains risk-attitudes and time.

In all specifications, the coefficient on cap25 (a cap of 25%) is significantly lower than the coefficient on cap100 (a cap of 100%), implying that performance falls dramatically as the cap declines. The coefficient on cap50 is consistently in between cap25 and cap100, but in the specifications without risk-preference, we cannot reject the null hypothesis that the coefficient on cap50 is the same of that of cap100. With risk-preference, we can reject the null hypothesis that the coefficient on cap50 is the same as that on cap100, but cannot reject the null hypothesis that it is the same as that on cap25. The negative sign on the reciprocal of the period indicates that subjects do improve over time. Finally, risk-neutrality and risk-aversion carry the same effect on two of the three treatments, which supports our prediction that risk-neutral and risk-averse agents will screen at the same rate.

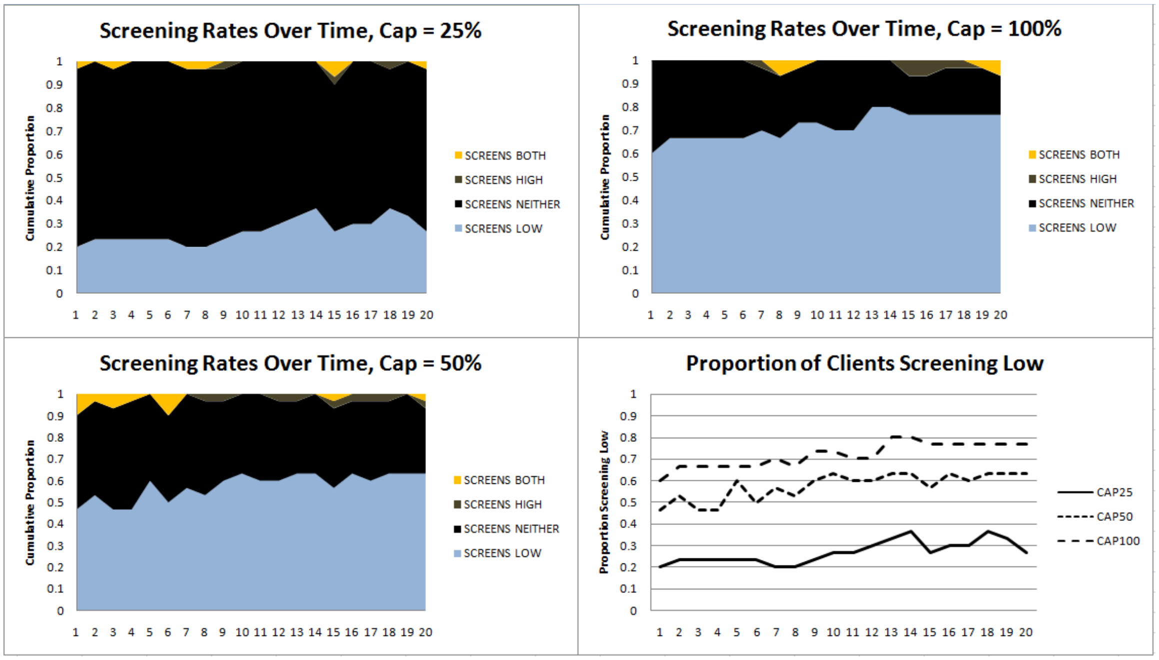

Figure 12: Screening Rates for all Treatments

Table 23. OLS Regression (Probability of Screening Low)

	Probability of Screening Low Treatment Only	Probability of Screening Low Treatment w/Time	Probability of Screening Low Treatment w/Risk	Probability of Screening Low Treatment w/Risk and Time
Cap25	0.268***	0.298***	0.187	0.216*
	(0.073)	(0.075)	(0.119)	(0.119)
Cap50	0.577***	0.606***	0.517***	0.546***
	(0.080)	(0.081)	(0.187)	(0.188)
Cap100	0.718***	0.748***	0.930***	0.960***
	(0.071)	(0.072)	(0.048)	(0.049)
RiskAverse * Cap25			0.105	0.105
			(0.136)	(0.136)
RiskAverse * Cap50			0.113	0.113
			(0.213)	(0.213)
RiskAverse * Cap100			-0.234**	-0.234**
			(0.099)	(0.099)
RiskLoving * Cap25			-0.018	-0.018
			(0.163)	(0.163)
RiskLoving * Cap50			-0.017	-0.017
			(0.252)	(0.252)
RiskLoving * Cap100			-0.384*	-0.384*
			(0.195)	(0.195)
1/Period		-0.163***		-0.163***
		(0.047)		(0.047)
F	55.74	43.48	55.99	50.56
R^2	0.58	0.59	0.61	0.61
N (observations)	1800	1800	1800	1800
N (subjects)	90	90	90	90

Risk-loving preferences (and risk-aversion in the cap100 treatment) cause deviations from the screening rate, which for sufficiently risk-loving behavior would be consistent with theory, although this may be due to the fact that extreme values in the Holt and Laury (2002) experiment are correlated with confusion.

Table 24 presents a regression on client performance. The coefficients represent the percentage of the expected profit from the optimal contract ($45) that was earned. From a client-standpoint, performance is consistently higher where there is no cap than when the cap is 50%, which is itself higher than when the cap is at 25%. The same four specifications are used, with the exception being that the effects of being risk-averse and risk-loving were pooled over the treatments after it was determined there was no statistically significant difference between the treatment interactions. Being risk-loving decreases performance, and consistent with previous results, subjects do better over time.

It is precarious to draw too many conclusions about attorney welfare from this analysis, because the number of cases are held fixed and the analysis assumes that one case is assigned to one attorney. We find that per-attorney economic profit increases as the cap becomes more strict, which stands in contrast to ABA opposition to caps, but this is easily explained if the argument that contingent fees push more cases into the system (either frivolous or from people of reduced means) is true. Nonetheless, a few insights can be gained from looking closely at the effect of caps on attorney welfare. First, low-quality attorneys clearly fare better with lower caps. The model suggests that if caps are sufficiently high, low-quality attorneys are screened and do not serve clients. *Lows* earn profits if clients offer pooling contracts or screen the highs, so if caps lead to either type of contract being offered, the *lows* benefit. We find that as the cap is decreased, the percentage of pooling contracts increases even

Table 24. OLS Regression (Client Profit Efficiency)

	Client Efficiency Treatment Only	Client Efficiency Treatment w/Time	Client Efficiency Treatment w/Risk	Client Efficiency Treatment w/Risk and Time
Cap25	53.57*** (5.10)	57.35*** (5.03)	62.05*** (7.49)	65.83*** (7.39)
Cap50	65.19*** (6.81)	68.97*** (6.81)	73.62*** (8.05)	77.40*** (8.00)
Cap100	78.48*** (5.12)	82.26*** (5.11)	86.05*** (6.11)	89.83*** (6.04)
RiskAverse			-6.79 (6.79)	-6.79 (6.80)
RiskLoving			-19.65** (9.66)	-19.65** (9.66)
1/Period		-21.01*** (4.26)		-21.01*** (4.26)
F	145.65	128.61	108.94	108.94
R^2	0.76	0.76	0.77	0.77
N (observations)	1800	1800	1800	1800
N (subjects)	90	90	90	90

though we never decreased the cap to the point that pooling contracts or screening the highs was optimal.

For the high-quality attorneys, we found that when the cap was raised there was an increase in contracts offered that screened the lows, but clients also became better at capturing the rent. The effect on total attorney profit was not statistically different between the treatments. Table 25 presents the aggregate expected profit earned by each type across the different treatments. If the contract offered by a client screened one type, the other was assumed to accept the contract and the expected profit was calculated. If the contract offered pooled types, it was assumed there was a 50% chance that it was accepted by a *low*-quality attorney and a 50% chance it was accepted by a *high*-quality attorney , since this was the proportion specified in the design. $0 profit was assumed for all other cases. Each cell contains the number of contracts that screened the other type, and the number of contracts that

Table 25. Total Profit by Attorney Type by Treatment

Treatment	Total Expected Profit Earned By High-Quality Attorneys (std. err) S=contracts that screened lows P=pooling contracts	Total Expected Profit Earned By Low-Quality Attorneys S=contracts that screened highs P=pooling contracts
Cap = 25%	$1,587.10 ($325.05) S = 161 P = 429	$1,934.19 ($338.88) S = 3 P = 429
Cap = 50%	$1,985.97 ($517.76) S = 347 P = 233	$1,851.95 ($271.39) S = 9 P = 233
Cap = 100%	$1,355.97 ($398.57) S = 431 P = 156	$785.48 ($141.90) S = 7 P = 156

pooled types.

We examine the profit earned by individual attorneys in Table 26, which presents attorney performance over the three treatments. The dependent variable in this case is the economic profit of the attorney. The same four specifications as before are used. Once risk-preferences are factored in for the clients, attorney profit is not statistically diferent from zero when the cap is 100%. There is no stastitically significant difference between earnings when the cap is 25% and when it is 50%. As risk-loving behavior seems to be correlated with earning less for clients, the corresponding attorneys earn more.

Conclusion

The public debate over tort reform has focused on whether or not caps on contingent fees reduce frivolous lawsuits or reduce access to legal representation for the poor. Economists have added to the debate by arguing that contingent fees may improve the quality of legal services by inducing greater attorney effort and by allowing clients to screen low-quality attorneys. Unfortunately, there is limited field data available to test whether clients are sophisticated enough to use contingent fees in the manner predicted by theory. We attempt to fill this gap in the literature with data derived from controlled laboratory experiments.

In this paper, we use an adverse selection mode to examine the effect of contingent fee caps on the contracts will be offered by clients. We find that stringent caps may reduce the average quality of legal representation by preventing the screening of low-quality attorneys. Using an experimental design, we also show that while clients are sophisticated enough to use contingent fees to screen low-ability attorneys, they are less likely to succeed at doing so with stringent caps on contingent fees – even if the caps should not, in theory, prevent screening. If clients do not screen low-quality attorneys, they

Table 26. OLS Regression (Attorney Economic Profit)

	Attorney Economic Profit Treatment Only	Attorney Economic Profit Treatment w/Time	Attorney Economic Profit Treatment w/Risk	Attorney Economic Profit Treatment w/Risk and Time
Cap25	5.86***	4.82***	3.73**	2.68*
	(1.18)	(1.11)	(1.59)	(1.53)
Cap50	6.40***	5.35***	4.38***	3.33**
	(1.62)	(1.65)	(1.64)	(1.65)
Cap100	3.57***	2.52**	1.69	0.64
	(0.98)	(0.94)	(1.14)	(1.08)
RiskAverse			1.91	1.91
			(1.36)	(1.36)
RiskLoving			4.04*	4.03*
			(2.39)	(2.39)
1/Period		5.82***		5.82***
		(1.42)		(1.42)
F	17.56	14.11	11.42	9.75
R^2	0.25	0.26	0.26	0.27
N (observations)	1800	1800	1800	1800
N (subjects)	90	90	90	90

typically offer a pooling contract, allowing low-quality attorneys to serve clients and reducing the average quality of attorneys in the market. As a result, client welfare is decreased with restrictive caps.

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APPENDICES

Appendix A: Proofs from Chapter I

<u>*Proof of Lemma 1*</u>: Suppose, to the contrary, that $F^{*} > 0$ is the equilibrium level of fraud and that some manager finds it optimal to blow the whistle. In this case, a manager who chooses a positive level of fraud receives no benefit from fraud and pays a penalty with certainty (recall equation 1). Thus, any manager committing positive fraud would have a profitable deviation because this manager would be better off committing zero fraud, contradicting the assumption of equilibrium. ■

<u>*Proof of Lemma 2*</u>: Define $Z(F) = \frac{\alpha}{N}F - \eta_t \rho X\left(\frac{F}{N}\right)$ and rewrite (5) as

$$Z(F) + \eta_t(1-\theta)X(f_t^i) = 0, \quad t = L, H \qquad (A1)$$

Now observe that the first and second derivatives of $Z(F)$ are the expressions in (2) and (3). It follows that $Z(F)$ is concave, achieves a maximum at $F = P^t$, and is positive at all $F \leq P^t$. Since the term $\eta_t(1-\theta)X(f_t^i)$ in (5') is non-negative at all $f_t^i \geq 0$, the solution to (A1) must occur at $F > P^t$ for all $f_t^i \geq 0$. ■

<u>*Proof of Lemma 3*</u>: Implicit differentiation of (3) yields

$$\frac{\partial P^t}{\partial \eta_t} = \frac{-NX'\left(\frac{F}{N}\right)}{\eta_t X''\left(\frac{F}{N}\right)} < 0, \quad t = L, H \qquad (A2)$$

where the sign follows from $X' > 0, X'' > 0$. Since $\eta_H > \eta_L$, we have $P^H < P^L$. ■

<u>*Proof of Lemma 4*</u>: Suppose, to the contrary, that for some type *t* we have $F^{*} > P^t$ and $f_t^{*} > 0$. This cannot be an equilibrium because a manager of type t could increase his or her payoff by choosing a lower level of fraud. ■

The next two Lemmas are not stated in the text but are used by Proposition 1.

Lemma 5: *There does not exist an equilibrium in which* $F^{*} < Min\{P^L, W^H(0)\}$.

Proof of Lemma 5: Suppose, to the contrary, that there exists an equilibrium in which $F^* < Min\{P^L, W^H(0)\}$. First, observe that for any $F' < Min\{P^L, W^H(0)\}$ neither type wishes to blow the whistle since $F' < W^H(0) \leq W^H(f_H^*)$ and $F' < P^L < W^L(0) \leq W^L(f_L^*)$. Second, observe that at any $F^* < P^L$, a *low* would prefer to increase his or her chosen level of fraud to $f' = f_L^* + \varepsilon$ where $0 < \varepsilon \leq P^L - F^*$ as long as doing so does not cause some manager to blow the whistle. However, it has already been shown that no manager will blow the whistle as long as $F^* + \varepsilon < Min\{P^L, W^H(0)\}$. It follows that a *low* could increase his or her payoff by increasing his or her level of fraud by some small ε without inducing whistle-blowing, contradicting the assumption of equilibrium. ■

Lemma 6: *There does not exist an equilibrium in which* $F^* > Min\{P^L, W^H(0)\}$ **.**

Proof of Lemma 6: First, consider the case in which$P^L \leq W^H(0)$ and suppose, to the contrary, that there exists an equilibrium in which $F^* > P^L$. By Lemmas 3 and 4 we must have $f_L^* = f_H^* = 0$, which contradicts the supposition that $F^* > P^L$. Second, consider the case in which $P^L > W^H(0)$ and suppose, to the contrary, that there exists an equilibrium in which $F^* > W^H(0)$. By Lemma 2 we have $F^* > P^H$ which, along with Lemma 4, implies $f_H^* = 0$. Thus, a *high* who has not committed fraud would blow the whistle since $F^* > W^H(0)$. However, from Lemma 1 we know that we cannot have an equilibrium in which a manager blows the whistle. ■

Proof of Proposition 1: By Lemma 5 we have $F^* \leq P^L$. Lemmas 2 and 6 imply $P^H < F^*$. By Lemma 4, $P^H < F^*$ implies $f_H^* = 0$. Therefore, we must have $f_L^* > 0$. There are now two mutually exclusive cases to consider.

The first case is when $P^L \leq W^H(0)$. Here we have $F^* = P^L$, $f_H^* = 0$ and $f_L^* = \frac{P^L}{N_L}$. The *highs* do not have a profitable deviation because $F^* > P^H$, implying that any increase in fraud would necessarily reduce a *high's* utility. *Lows* do not have a profitable deviation because P^L is defined as the level of fraud that

maximizes their utility, so any change in fraud causes a decrease in utility for a low. (2) is not satisfied strictly for either type so whistle-blowing does not occur. Thus, each manager's actions are a best-response to those of other managers.

The second case is when $P^L > W^H(0)$. Here we have $F^* = W^H(0)$, $f_H^* = 0$ and $f_L^* = \frac{W^H(0)}{N_L}$. The *highs* do not have a profitable deviation because $F^* > P^H$, implying that any increase in fraud would reduce utility for the *highs.* A *low* does not have a profitable deviation to reduce fraud because the level of fraud is below the preferred level for a *low*, nor does a *low* have a profitable deviation to increase fraud because that would cause whistle-blowing. (2) is not satisfied strictly for either type, so whistle-blowing does not occur. Thus each manager's actions are a best-response to those of other managers. ■

Proof of Proposition 2: (i) To start, hold η_H fixed, so that $W^H(0)$ remains fixed. By Proposition 1, $W^H(0) > P^L$ implies $F^* = P^L$, so we need to show that for η_L sufficiently close to η_H we must have $W^H(0) > P^L$. First, equation (3) allows us to write P^L as a function of η_L so we can write $P^L(\eta_L)$. It follows by inspection that $P^L(\eta_H) = P^H$. By Lemma 2 and the fact that $P^L(\eta_H) = P^H$ we have $P^L(\eta_H) < W^H(0)$. It thus follows from the fact that $W^H(0)$ is independent of η_L and the continuity of $P^L()$ that for η_L sufficiently close to η_H we must have $P^L(\eta_L) < W^H(0)$.

(ii) To start, hold η_L fixed, so that P^L remains fixed. By Proposition 1, $W^H(0) < P^L$ implies $F^* = W^H(0)$, so it is sufficient to show that as $\eta_H \to \infty$ we have $W^H(0) \to 0$. By definition, $W^H(0)$ is implicitly defined by (5) when $f_H^* = 0$, which can be rearranged to yield $\frac{\alpha}{\rho N \eta_H} = \frac{X\left(\frac{W^H(0)}{N}\right)}{W^H(0)}$.

The limit of the left hand side of this expression goes to zero as $\eta_H \to \infty$, so we need to show that as $W^H(0) \to 0$ the limit of the right hand side of the expression goes to zero. Since $X(0) = 0$, we need to apply L'Hospital's rule. Taking the derivative of the numerator and denominator with respect to $W^H(0)$

yields $\frac{X'\left(\frac{W^H(0)}{N}\right)}{N}$. Now using the fact that $X^{'}(0) = 0$, it follows that as $W^H(0) \rightarrow 0$ the right hand side of the expression goes to zero. It follows that for any $\eta_L > 0$ there exists a η_H such that $W^H(0) < P^L$. ■

<u>Proof of Proposition 3:</u> From Proposition 1, we know that $F^* = Min\{P^L, W^H(0)\}$. It is therefore sufficient to show that neither P^L nor $W^H(0)$ depend on θ. Equation (3) implies that P^L is independent of θ. From (5) it follows that $W^H(0)$ solves $\frac{\alpha}{N}F - \rho\eta_t X\left(\frac{F}{N}\right) = 0$, which is independent of θ. ■

<u>Proof of Proposition 4</u>: That (8) must be satisfied for every manager follows from the discussion in the text. Now observe that the marginal product of effort for any given manager, $\frac{\alpha}{N}v^{'}(e_i + E_{-i})$, depends only on team effort. Therefore, in equilibrium, we must have $C^{'}(e_i{}^*) = C^{'}\left(e_j{}^*\right)$ which implies $e_i{}^* = e_j{}^*$ since the marginal cost of effort is strictly increasing.

<u>Proof of Proposition 5:</u> Differentiating (8) we can calculate the change in the equilibrium effort for one manager

$$\frac{de^*}{d\alpha} = -\frac{\frac{v^{'}(Ne^*)}{N}}{\alpha v''(Ne^*) - C''(e^*)} \qquad (A3)$$

So the change in team effort is

$$\frac{d(Ne^*)}{d\alpha} = -\frac{v^{'}(Ne^*)}{\alpha v''(Ne^*) - C''(e^*)} \quad > 0 \qquad (A4)$$

where the sign of the above follows from $v^{'} > 0, v^{''} < 0,\ and\ C^{''} > 0$. ■

<u>Proof of Proposition 6</u>: We first show the effect of a change in equity compensation. From Proposition 1, we know that $F^* = Min\{P^L, W^H(0)\}$. We show that increasing equity compensation will increase *both* the preferred level of the fraud for the *lows* and the level that triggers whistle-blowing.

To calculate the change in $W^H(0)$, the whistle-blowing condition resulting from a change in equity, differentiate (5) evaluated at $f_H^* = 0$ with respect to F and α to get:

$$\frac{\partial W^H(0)}{\partial \alpha} = \frac{-\frac{W^H(0)}{N}}{\frac{\alpha}{N} - \frac{\eta_H \rho}{N} X'\left(\frac{W^H(0)}{N}\right)} \qquad (A5)$$

Using arguments similar to those in the proof of Lemma 2, it is straightforward to show that the denominator of (A5) is negative. It follows that $\frac{\partial W^H(0)}{\partial \alpha} > 0$.

To calculate the change in P^L resulting from a change in the share of equity, differentiate (3) with respect to F and α to get:

$$\frac{\partial P^L}{\partial \alpha} = \frac{N}{\rho \eta_L X''(F)} > 0 \qquad (A6)$$

where the sign follows immediately from $X'' > 0$.

We next show the effect of a change in the probability of detection. From Proposition 1, we know that $F^* = Min\{P^L, W^H(0)\}$. We show that increasing the probability of detection will decrease *both* the preferred level of the fraud for the *lows* and the level that triggers whistle-blowing.

Implicit differentiation of (3) yields

$$\frac{\partial P^L}{\partial \rho} = \frac{-NX'\left(\frac{F}{N}\right)}{\rho X''\left(\frac{F}{N}\right)} < 0, \quad t = L, H \qquad (A7)$$

where the sign follows from $X' > 0, X'' > 0$.

To calculate the change in $W^H(0)$, resulting from a change in the probability of detection, differentiate (5) evaluated at $f_H^* = 0$ with respect to F and ρ to get:

$$\frac{\partial W^H(0)}{\partial \rho} = \frac{\eta_H X\left(\frac{W^H(0)}{N}\right)}{\frac{\alpha}{N} - \frac{\eta_H \rho}{N} X'\left(\frac{W^H(0)}{N}\right)} \qquad (A8)$$

Using arguments similar to those in the proof of Lemma 2, it is straightforward to show that the denominator of (A8) is negative. It follows that $\frac{\partial W^H(0)}{\partial \rho} < 0$. ■

Appendix B: Payoff Tables Given To Subjects in Fraud Experiment

	High Chooses 0	High Chooses 20	High Chooses 40	High Chooses 60	High Chooses 80	High Chooses 100
Low Chooses 0	Not Detected Low: $50 High: $50 Detected Low: $50 High: $50	Not Detected Low: $60 High: $60 Detected Low: $52 High: $45	Not Detected Low: $70 High: $70 Detected Low: $50 High: $0	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65)	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210)
Low Chooses 20	Not Detected Low: $60 High: $60 Detected Low: $52 High: $45	Not Detected Low: $70 High: $70 Detected Low: $50 High: $0	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65)	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290)
Low Chooses 40	Not Detected Low: $70 High: $70 Detected Low: $50 High: $0	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65)	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375)
Low Chooses 60	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65)	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375)	Not Detected Low: $130 High: $130 Detected Low: ($230) High: ($465)
Low Chooses 80	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375)	Not Detected Low: $130 High: $130 Detected Low: ($230) High: ($465)	Not Detected Low: $140 High: $140 Detected Low: ($320) High: ($560)
Low Chooses 100	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375)	Not Detected Low: $130 High: $130 Detected Low: ($230) High: ($465)	Not Detected Low: $140 High: $140 Detected Low: ($320) High: ($560)	Not Detected Low: $150 High: $150 Detected Low: ($420) High: ($660)

Table provided in W-HL-A and NW-HL-NA

	High Chooses 0	High Chooses 20	High Chooses 40	High Chooses 60	High Chooses 80	High Chooses 100
Low Chooses 0	Not Detected Low: $50 High: $50 Detected Low: $50 High: $50 Deviation Prevented Low: $50 High $50	Not Detected Low: $60 High: $60 Detected Low: $52 High: $45 Deviation Prevented Low: $50 High: ($20)	Not Detected Low: $70 High: $70 Detected Low: $50 High: $0 Deviation Prevented Low: $50 High: ($175)	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65) Deviation Prevented Low: $50 High: ($350)	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135) Deviation Prevented Low: $50 High: ($545)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210) Deviation Prevented Low: $50 High: ($760)
Low Chooses 20	Not Detected Low: $60 High: $60 Detected Low: $52 High: $45 Deviation Prevented Low: $30 High: $50	Not Detected Low: $70 High: $70 Detected Low: $50 High: $0 Deviation Prevented Low: $30 High: ($20)	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65) Deviation Prevented Low: $30 High: ($175)	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135) Deviation Prevented Low: $30 High: ($350)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210) Deviation Prevented Low: $30 High: ($545)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290) Deviation Prevented Low: $30 High: ($760)
Low Chooses 40	Not Detected Low: $70 High: $70 Detected Low: $50 High: $0 Deviation Prevented Low: ($10) High: $50	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65) Deviation Prevented Low: ($10) High: ($20)	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135) Deviation Prevented Low: ($10) High: ($175)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210) Deviation Prevented Low: ($10) High: ($350)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290) Deviation Prevented Low: ($10) High: ($545)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375) Deviation Prevented Low: ($10) High: ($760)
Low Chooses 60	Not Detected Low: $80 High: $80 Detected Low: $45 High: ($65) Deviation Prevented Low: ($140) High: $50	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135) Deviation Prevented Low: ($140) High: ($20)	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210) Deviation Prevented Low: ($140) High: ($175)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290) Deviation Prevented Low: ($140) High: ($350)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375) Deviation Prevented Low: ($140) High: ($545)	Not Detected Low: $130 High: $130 Detected Low: ($230) High: ($465) Deviation Prevented Low: ($140) High: ($760)
Low Chooses 80	Not Detected Low: $90 High: $90 Detected Low: $30 High: ($135) Deviation Prevented Low: ($310) High: $50	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210) Deviation Prevented Low: ($310) High: ($20)	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290) Deviation Prevented Low: ($310) High: ($175)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375) Deviation Prevented Low: ($310) High: ($350)	Not Detected Low: $130 High: $130 Detected Low: ($230) High: ($465) Deviation Prevented Low: ($310) High: ($545)	Not Detected Low: $140 High: $140 Detected Low: ($320) High: ($560) Deviation Prevented Low: ($310) High: ($760)
Low Chooses 100	Not Detected Low: $100 High: $100 Detected Low: ($20) High: ($210) Deviation Prevented Low: ($520) High: $50	Not Detected Low: $110 High: $110 Detected Low: ($80) High:($290) Deviation Prevented Low: ($520) High: ($20)	Not Detected Low: $120 High: $120 Detected Low: ($150) High: ($375) Deviation Prevented Low: ($520) High: ($175)	Not Detected Low: $130 High: $130 Detected Low: ($230) High: ($465) Deviation Prevented Low: ($520) High: ($350)	Not Detected Low: $140 High: $140 Detected Low: ($320) High: ($560) Deviation Prevented Low: ($520) High: ($545)	Not Detected Low: $150 High: $150 Detected Low: ($420) High: ($660) Deviation Prevented Low: ($520) High: ($760)

Table provided in W-HL-NA

	High Chooses 0	High Chooses 20	High Chooses 40	High Chooses 60	High Chooses 80	High Chooses 100
Low Chooses 0	Low Prevents Deviation Low: $50 High: $50 High Prevents Deviation Low: $50 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($20) High Prevents Deviation Low: $50 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($175) High Prevents Deviation Low: $50 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($350) High Prevents Deviation Low: $50 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($545) High Prevents Deviation Low: $50 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($760) High Prevents Deviation Low: $50 High: $50 Both Prevent Deviation Low: $50 High: $50
Low Chooses 20	Low Prevents Deviation Low: $50 High: $50 High Prevents Deviation Low: $30 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($20) High Prevents Deviation Low: $30 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($175) High Prevents Deviation Low: $30 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($350) High Prevents Deviation Low: $30 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($545) High Prevents Deviation Low: $30 High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($760) High Prevents Deviation Low: $30 High: $50 Both Prevent Deviation Low: $50 High: $50
Low Chooses 40	Low Prevents Deviation Low: $50 High: $50 High Prevents Deviation Low: ($10) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($20) High Prevents Deviation Low: ($10) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($175) High Prevents Deviation Low: ($10) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($350) High Prevents Deviation Low: ($10) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($545) High Prevents Deviation Low: ($10) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($760) High Prevents Deviation Low: ($10) High: $50 Both Prevent Deviation Low: $50 High: $50
Low Chooses 60	Low Prevents Deviation Low: $50 High: $50 High Prevents Deviation Low: ($140) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($20) High Prevents Deviation Low: ($140) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($175) High Prevents Deviation Low: ($140) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($350) High Prevents Deviation Low: ($140) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($545) High Prevents Deviation Low: ($140) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($760) High Prevents Deviation Low: ($140) High: $50 Both Prevent Deviation Low: $50 High: $50
Low Chooses 80	Low Prevents Deviation Low: $50 High: $50 High Prevents Deviation Low: ($310) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($20) High Prevents Deviation Low: ($310) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($175) High Prevents Deviation Low: ($310) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($350) High Prevents Deviation Low: ($310) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($545) High Prevents Deviation Low: ($310) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($760) High Prevents Deviation Low: ($310) High: $50 Both Prevent Deviation Low: $50 High: $50
Low Chooses 100	Low Prevents Deviation Low: $50 High: $50 High Prevents Deviation Low: ($520) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($20) High Prevents Deviation Low: ($520) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($175) High Prevents Deviation Low: ($520) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($350) High Prevents Deviation Low: ($520) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($545) High Prevents Deviation Low: ($520) High: $50 Both Prevent Deviation Low: $50 High: $50	Low Prevents Deviation Low: $50 High: ($760) High Prevents Deviation Low: ($520) High: $50 Both Prevent Deviation Low: $50 High: $50

Table Provided in W-HL-A

	P2 Chooses 0	P2 Chooses 20	P2 Chooses 40	P2 Chooses 60	P2 Chooses 80	P2 Chooses 100
P1 Chooses 0	Not Detected P1: $50 P2: $50 Detected P1: $50 P2: $50 Deviation Prevented P1: $50 P2 $50	Not Detected P1: $60 P2: $60 Detected P1: $52 P2: $52 Deviation Prevented P1: $50 P2: $30	Not Detected P1: $70 P2: $70 Detected P1: $50 P2: $50 Deviation Prevented P1: $50 P2: ($10)	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45 Deviation Prevented P1: $50 P2: ($140)	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30 Deviation Prevented P1: $50 P2: ($310)	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20) Deviation Prevented P1: $50 P2: ($520)
P1 Chooses 20	Not Detected P1: $60 P2: $60 Detected P1: $52 P2: $52 Deviation Prevented P1: $30 P2: $50	Not Detected P1: $70 P2: $70 Detected P1: $50 P2: $50 Deviation Prevented P1: $30 P2: $30	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45 Deviation Prevented P1: $30 P2: ($10)	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30 Deviation Prevented P1: $30 P2: ($140)	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20) Deviation Prevented P1: $30 P2: ($310)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80) Deviation Prevented P1: $30 P2: ($520)
P1 Chooses 40	Not Detected P1: $70 P2: $70 Detected P1: $50 P2: $50 Deviation Prevented P1: ($10) P2: $50	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45 Deviation Prevented P1: ($10) P2: $30	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30 Deviation Prevented P1: ($10) P2: ($10)	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20) Deviation Prevented P1: ($10) P2: ($140)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80) Deviation Prevented P1: ($10) P2: ($310)	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150) Deviation Prevented P1: ($10) P2: ($520)
P1 Chooses 60	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45 Deviation Prevented P1: ($140) P2: $50	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30 Deviation Prevented P1: ($140) P2: $30	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20) Deviation Prevented P1: ($140) P2: ($10)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80) Deviation Prevented P1: ($140) P2: ($140)	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150) Deviation Prevented P1: ($140) P2: ($310)	Not Detected P1: $130 P2: $130 Detected P1: ($230) P2: ($230) Deviation Prevented P1: ($140) P2: ($520)
P1 Chooses 80	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30 Deviation Prevented P1: ($310) P2: $50	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20) Deviation Prevented P1: ($310) P2: $30	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80) Deviation Prevented P1: ($310) P2: ($10)	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150) Deviation Prevented P1: ($310) P2: ($140)	Not Detected P1: $130 P2: $130 Detected P1: ($230) P2: ($230) Deviation Prevented P1: ($310) P2: ($310)	Not Detected P1: $140 P2: $140 Detected P1: ($320) P2: ($320) Deviation Prevented P1: ($310) P2: ($520)
P1 Chooses 100	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20) Deviation Prevented P1: ($520) P2: $50	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80) Deviation Prevented P1: ($520) P2: $30	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150) Deviation Prevented P1: ($520) P2: ($10)	Not Detected P1: $130 P2: $130 Detected P1: ($230) P2: ($230) Deviation Prevented P1: ($520) P2: ($140)	Not Detected P1: $140 P2: $140 Detected P1: ($320) P2: ($320) Deviation Prevented P1: ($520) P2: ($310)	Not Detected P1: $150 P2: $150 Detected P1: ($420) P2: (420) Deviation Prevented P1: ($520) P2: ($520)

Table provided in W-LL-NA

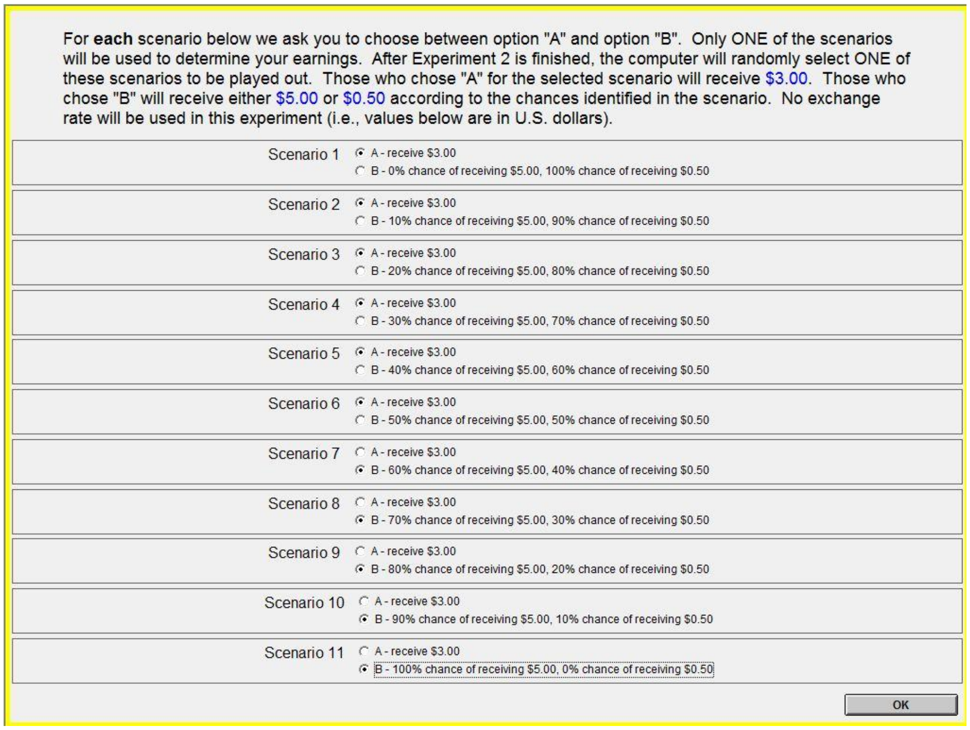
	P2 Chooses 0	P2 Chooses 20	P2 Chooses 40	P2 Chooses 60	P2 Chooses 80	P2 Chooses 100
P1 Chooses 0	Not Detected P1: $50 P2: $50 Detected P1: $50 P2: $50	Not Detected P1: $60 P2: $60 Detected P1: $52 P2: $52	Not Detected P1: $70 P2: $70 Detected P1: $50 P2: $50	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20)
P1 Chooses 20	Not Detected P1: $60 P2: $60 Detected P1: $52 P2: $52	Not Detected P1: $70 P2: $70 Detected P1: $50 P2: $50	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80)
P1 Chooses 40	Not Detected P1: $70 P2: $70 Detected P1: $50 P2: $50	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80)	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150)
P1 Chooses 60	Not Detected P1: $80 P2: $80 Detected P1: $45 P2: $45	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80)	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150)	Not Detected P1: $130 P2: $130 Detected P1: ($230) P2: ($230)
P1 Chooses 80	Not Detected P1: $90 P2: $90 Detected P1: $30 P2: $30	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80)	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150)	Not Detected P1: $130 P2: $130 Detected P1: ($230) P2: ($230)	Not Detected P1: $140 P2: $140 Detected P1: ($320) P2: ($320)
P1 Chooses 100	Not Detected P1: $100 P2: $100 Detected P1: ($20) P2: ($20)	Not Detected P1: $110 P2: $110 Detected P1: ($80) P2:($80)	Not Detected P1: $120 P2: $120 Detected P1: ($150) P2: ($150)	Not Detected P1: $130 P2: $130 Detected P1: ($230) P2: ($230)	Not Detected P1: $140 P2: $140 Detected P1: ($320) P2: ($320)	Not Detected P1: $150 P2: $150 Detected P1: ($420) P2: ($420)

Table provided in W-LL-A and NW-LL-NA

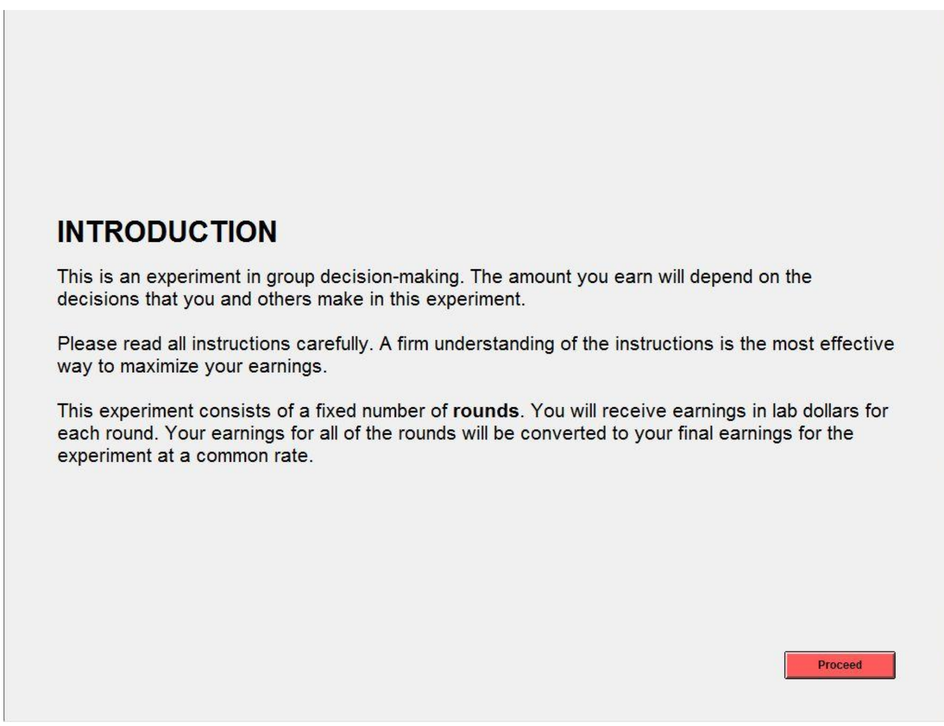
	P2 Chooses 0	P2 Chooses 20	P2 Chooses 40	P2 Chooses 60	P2 Chooses 80	P2 Chooses 100
P1 Chooses 0	P1 Prevents Deviation P1: $50 P2: $50 P2 Prevents Deviation P1: $50 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: $30 P2 Prevents Deviation P1: $50 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($10) P2 Prevents Deviation P1: $50 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($140) P2 Prevents Deviation P1: $50 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($310) P2 Prevents Deviation P1: $50 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($520) P2 Prevents Deviation P1: $50 P2: $50 Both Prevent Deviation P1: $50 P2: $50
P1 Chooses 20	P1 Prevents Deviation P1: $50 P2: $50 P2 Prevents Deviation P1: $30 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: $30 P2 Prevents Deviation P1: $30 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($10) P2 Prevents Deviation P1: $30 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($140) P2 Prevents Deviation P1: $30 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($310) P2 Prevents Deviation P1: $30 P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($520) P2 Prevents Deviation P1: $30 P2: $50 Both Prevent Deviation P1: $50 P2: $50
P1 Chooses 40	P1 Prevents Deviation P1: $50 P2: $50 P2 Prevents Deviation P1: ($10) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: $30 P2 Prevents Deviation P1: ($10) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($10) P2 Prevents Deviation P1: ($10) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($140) P2 Prevents Deviation P1: ($10) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($310) P2 Prevents Deviation P1: ($10) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($520) P2 Prevents Deviation P1: ($10) P2: $50 Both Prevent Deviation P1: $50 P2: $50
P1 Chooses 60	P1 Prevents Deviation P1: $50 P2: $50 P2 Prevents Deviation P1: ($140) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: $30 P2 Prevents Deviation P1: ($140) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($10) P2 Prevents Deviation P1: ($140) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($140) P2 Prevents Deviation P1: ($140) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($310) P2 Prevents Deviation P1: ($140) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($520) P2 Prevents Deviation P1: ($140) P2: $50 Both Prevent Deviation P1: $50 P2: $50
P1 Chooses 80	P1 Prevents Deviation P1: $50 P2: $50 P2 Prevents Deviation P1: ($310) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: $30 P2 Prevents Deviation P1: ($310) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($10) P2 Prevents Deviation P1: ($310) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($140) P2 Prevents Deviation P1: ($310) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($310) P2 Prevents Deviation P1: ($310) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($520) P2 Prevents Deviation P1: ($310) P2: $50 Both Prevent Deviation P1: $50 P2: $50
P1 Chooses 100	P1 Prevents Deviation P1: $50 P2: $50 P2 Prevents Deviation P1: ($520) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: $30 P2 Prevents Deviation P1: ($520) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($10) P2 Prevents Deviation P1: ($520) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($140) P2 Prevents Deviation P1: ($520) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($310) P2 Prevents Deviation P1: ($520) P2: $50 Both Prevent Deviation P1: $50 P2: $50	P1 Prevents Deviation P1: $50 P2: ($520) P2 Prevents Deviation P1: ($520) P2: $50 Both Prevent Deviation P1: $50 P2: $50

Table provided in W-LL-A

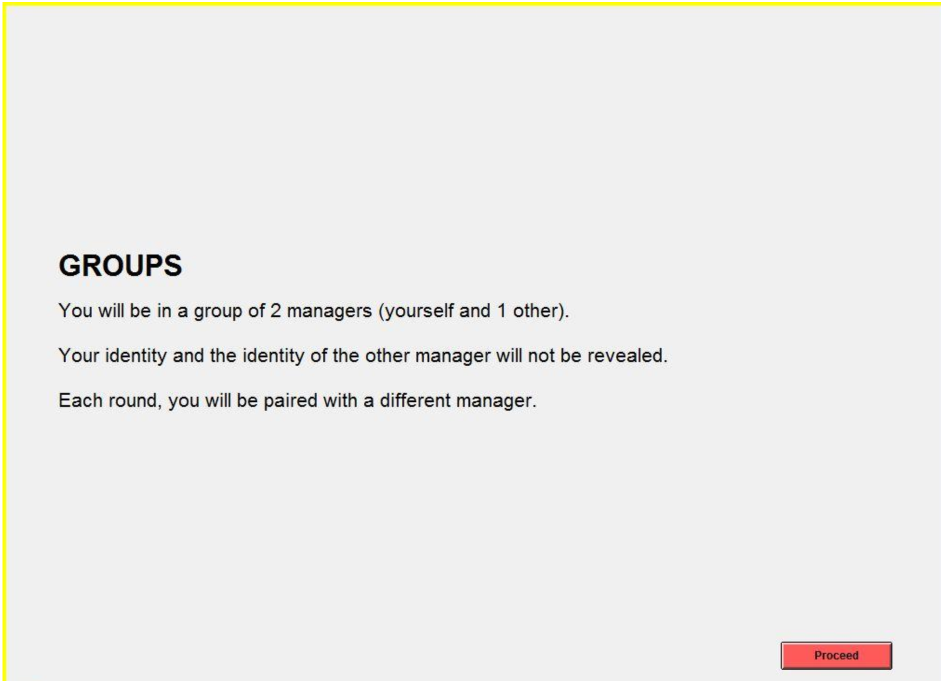
Appendix C: Screenshots/Instructions for Fraud Experiment



Screen 1: Risk Elicitation Mechanism



Screen 2: Introduction Screen (common to all treatments)



Screen 3: Groups (Single Type: W-LL-NA, W-LL-A, NW-LL-NA)

GROUPS

You will be in a group of 2 managers (yourself and 1 other).

Your identity and the identity of the other manager will not be revealed.

Each round, you will be paired with a different manager.

Each manager will be assigned a type, either **high** or **low**, at the beginning of the experiment and will remain that type through all rounds. Every round there will be 1 *high-penalty* and 1 *low-penalty* managers in your group.

The difference between the manager types will be explained in greater detail.

Proceed

Screen 3: Groups (Two Types: W-HL-NA, W-HL-A, NW-HL-NA)

THE GAME

Each round, your group will oversee a project. The earnings for each manager in your group has two components: **share**, and **penalty**.

SHARE

The project has an **actual value**, which is provided by the computer and will not change throughout the experiment. Each manager will have the opportunity to artificially **deviate** from the **actual value**.

Each manager will be paid 50% of the **reported value** of the project. The **reported value**is the sum of the **actual value** and both manager's **deviations**.

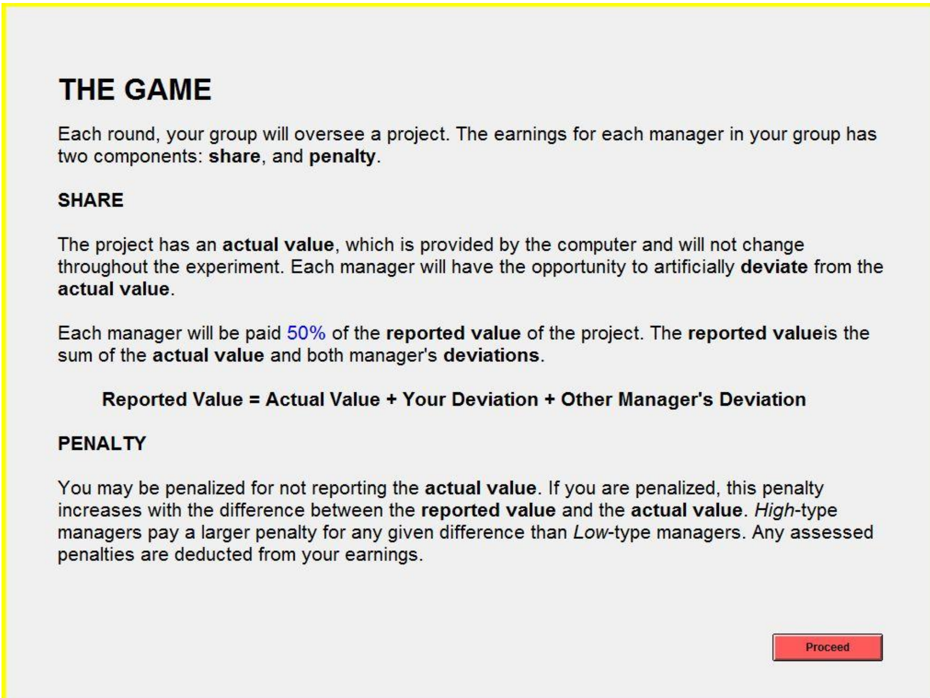
Reported Value = Actual Value + Your Deviation + Other Manager's Deviation

PENALTY

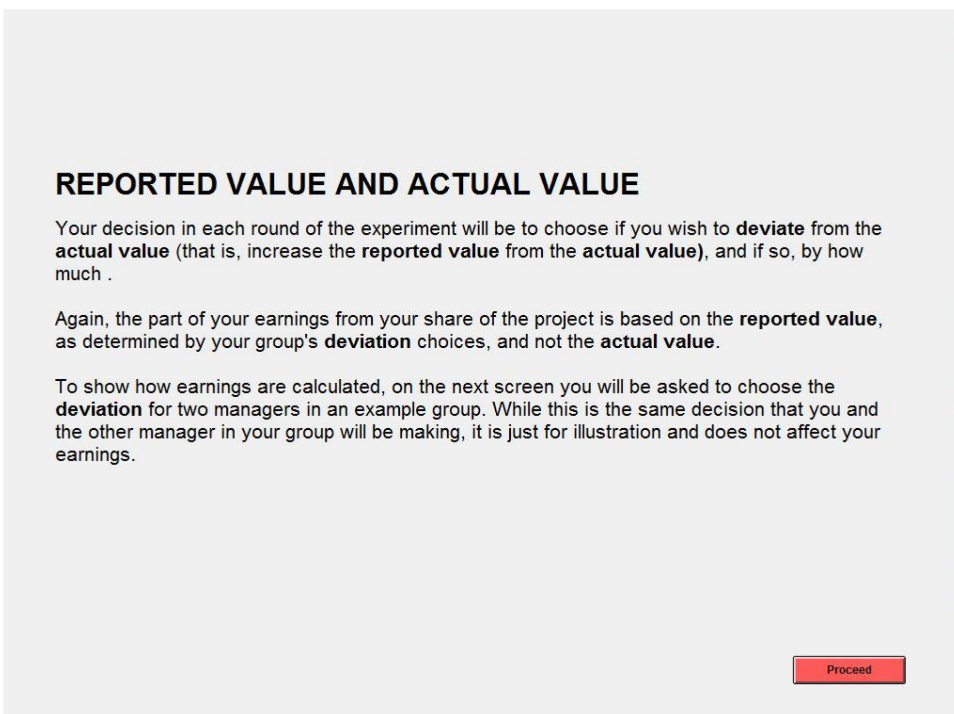
You may be penalized for not reporting the **actual value**. If you are penalized, this penalty increases with the difference between the **reported value** and the **actual value**. Any assessed penalties are deducted from your earnings.

Proceed

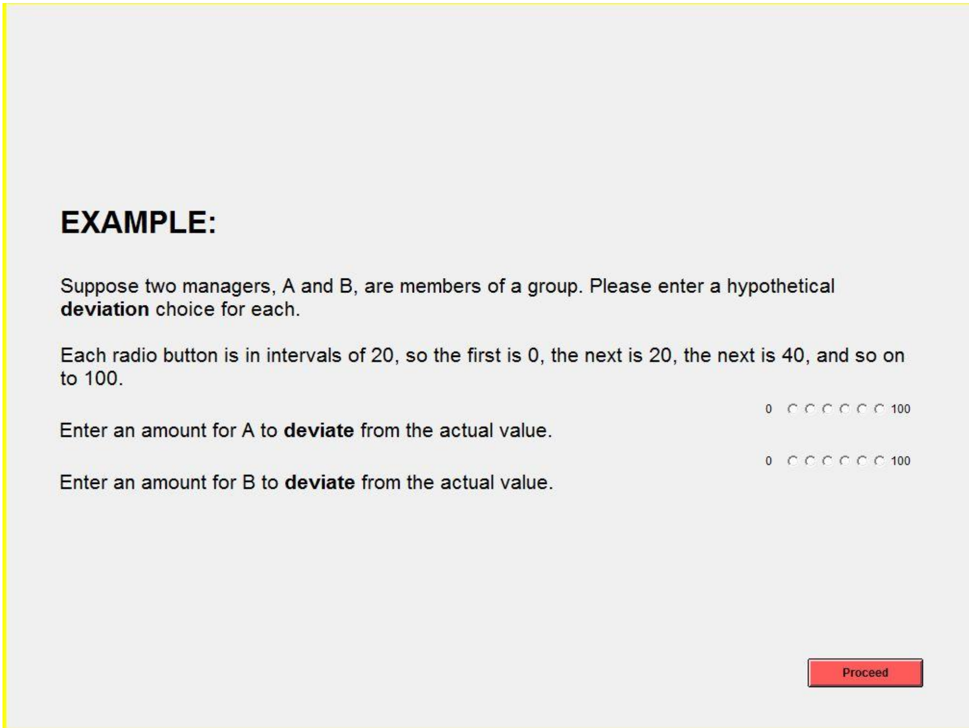
Screen 4: The Game (Single Type: W-LL-NA, W-LL-A, NW-LL-NA)



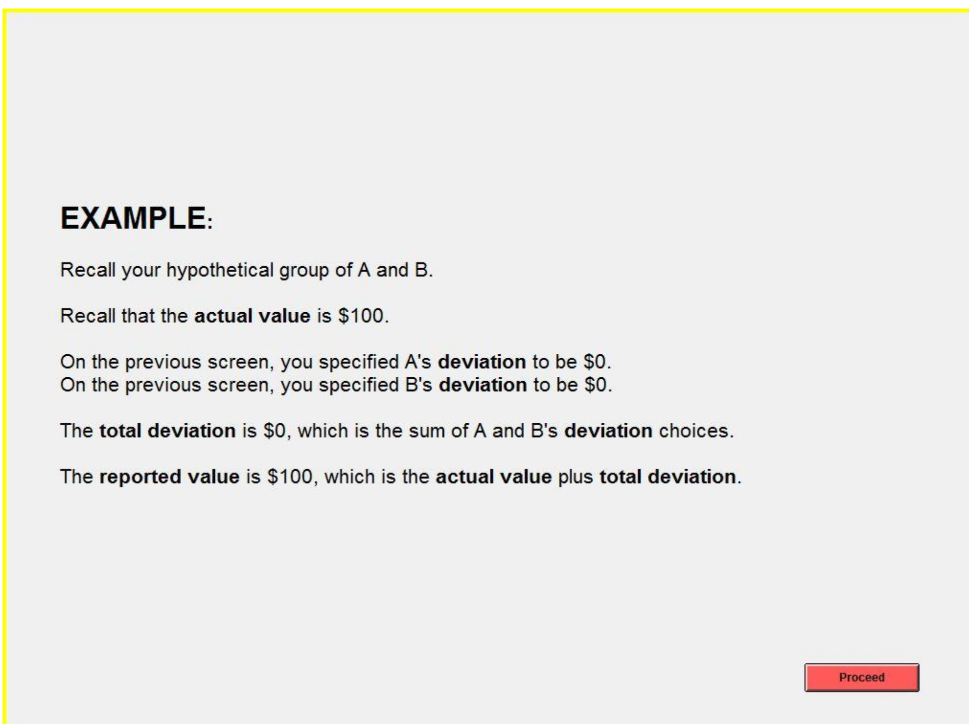
Screen 4: The Game (Two Types: W-HL-NA, W-HL-A, NW-HL-NA)



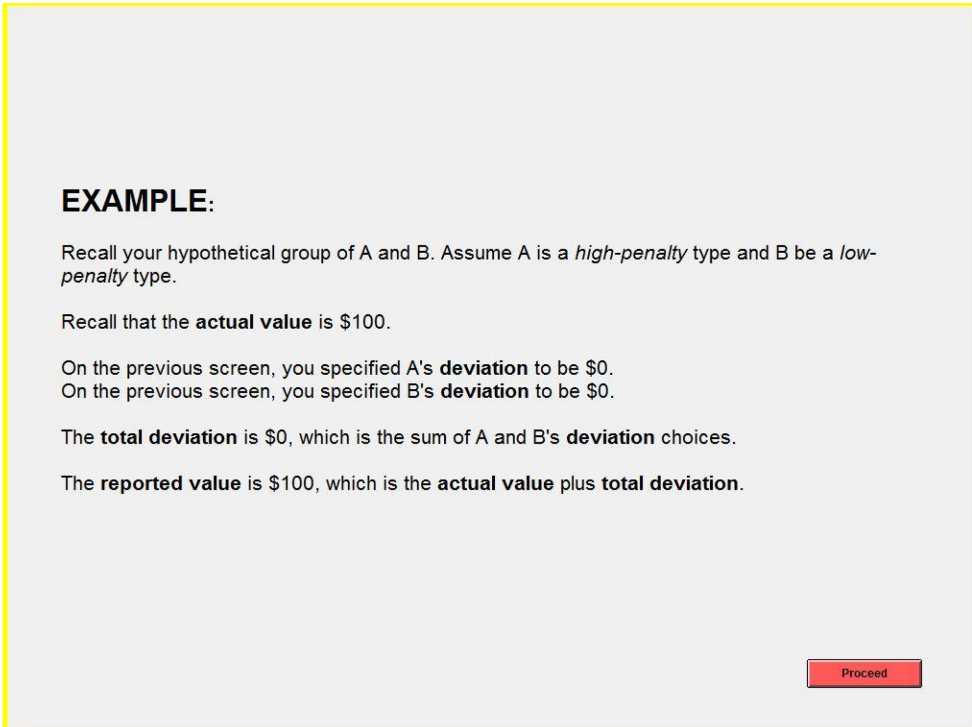
Screen 5: Reported and True Value (same for all treatments)



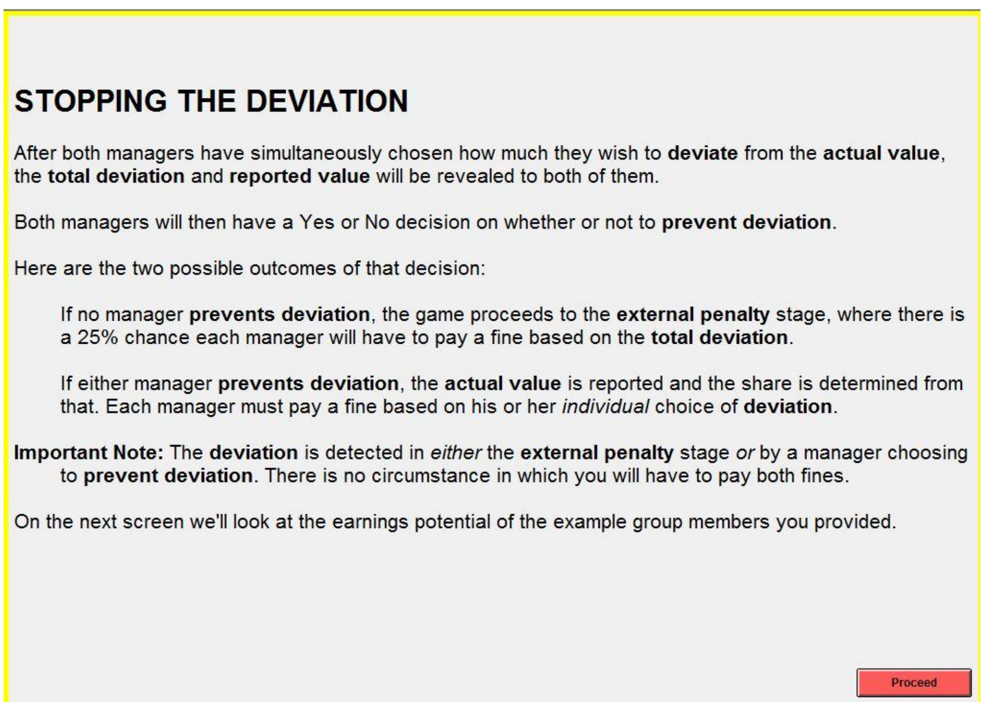
Screen 6: Subjects create their own example. (same for all treatments)



Screen 7: Results of example creation (W-LL-NA, W-LL-A, NW-LL-NA)



Screen 7: Results of example creation (W-HL-NA, W-HL-A, NW-HL-NA)



Screen 8: Description of whistle-blowing (W-LL-NA)

STOPPING THE DEVIATION

After all members of the group have simultaneously chosen how much they wish to **deviate** from the **actual value**, the **total deviation** and **reported value** will be revealed to all members.

Each member of the group will then have a Yes or No decision on whether or not to **prevent deviation**.

There are four possible outcomes of that decision

1: No manager **prevents deviation**, the game proceeds to the **external penalty** stage, where there is a 25% chance each manager will have to pay a fine based the **total deviation**.

2: You **prevent deviation** and the other manager does not. The **actual value** is reported and the share is determined from that. You will not pay a fine, but the other manager will pay based on the *individual* choice of **deviation**.

3: You do not **prevent deviation**, but the other manager does. The **actual value** is reported and the share is determined from that. You will pay a fine based on your *individual* choice of **deviation**. The manager who did **prevent deviation** will pay no fine.

4: You and the other manager both **prevent deviation**. The **actual value** is reported and the share is determined from that. Neither you nor the other manager pay a fine.

> **Important Note:** The **deviation** is detected in *either* the **external penalty** stage *or* by a manager choosing to **prevent deviation**. There is no circumstance in which you will have to pay both fines.

Proceed

Screen 8: Description of whistle-blowing (W-LL-A)

STOPPING THE DEVIATION

After both managers have simultaneously chosen how much they wish to **deviate** from the **actual value**, the **total deviation** and **reported value** will be revealed to both of them.

Both managers will then have a Yes or No decision on whether or not to **prevent deviation**.

Here are the two possible outcomes of that decision:

> If no manager **prevents deviation**, the game proceeds to the **external penalty** stage, where there is a 25% chance each manager will have to pay a fine based on the **total deviation**.
>
> If either manager **prevents deviation**, the **actual value** is reported and the share is determined from that. Each manager must pay a fine based on his or her **type** and *individual* choice of **deviation**.

Important Note: The **deviation** is detected in *either* the **external penalty** stage *or* by a manager choosing to **prevent deviation**. There is no circumstance in which you will have to pay both fines.

On the next screen we'll look at the earnings potential of the example group members you provided.

Proceed

Screen 8: Description of whistle-blowing (W-HL-NA)

STOPPING THE DEVIATION

After all members of the group have simultaneously chosen how much they wish to **deviate** from the **actual value**, the **total deviation** and **reported value** will be revealed to all members.

Each member of the group will then have a Yes or No decision on whether or not to **prevent deviation**.

There are four possible outcomes of that decision

1: No manager **prevents deviation**, the game proceeds to the **external penalty** stage, where there is a 25% chance each manager will have to pay a fine based on his or her **type** and the **total deviation**.

2: You **prevent deviation** and the other manager does not. The **actual value** is reported and the share is determined from that. You will not pay a fine, but the other manager will pay based on **type** and *individual* choice of **deviation**.

3: You do not **prevent deviation**, but the other manager does. The **actual value** is reported and the share is determined from that. You will pay a fine based on **type** and *individual* choice of **deviation**. The manager who did **prevent deviation** will pay no fine.

4: You and the other manager both **prevent deviation**. The **actual value** is reported and the share is determined from that. Neither you nor the other manager pay a fine.

> **Important Note:** The **deviation** is detected in *either* the **external penalty** stage *or* by a manager choosing to **prevent deviation**. There is no circumstance in which you will have to pay both fines.

Proceed

Screen 8: Description of whistle-blowing (W-HL-A)

EXAMPLE

On the previous screen, you specified A's **deviation** to be $0.
On the previous screen, you specified B's **deviation** to be $0.

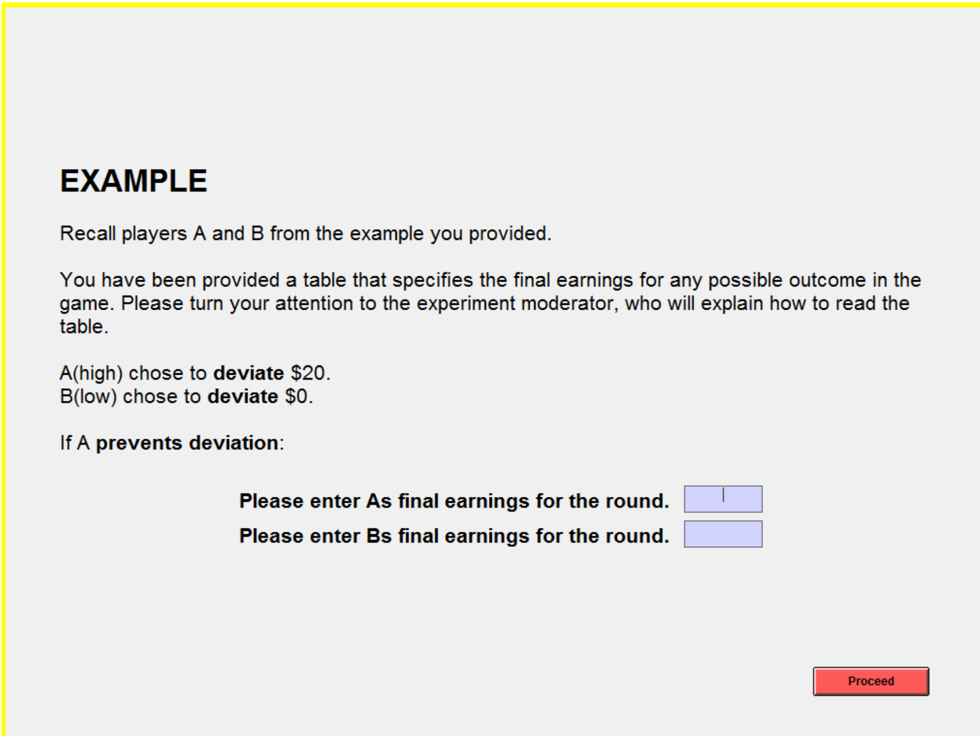
You have been provided a table that specifies the final earnings for any possible outcome in the game. Please turn your attention to the experiment moderator, who will explain how to read the table.

If A **prevents deviation**:

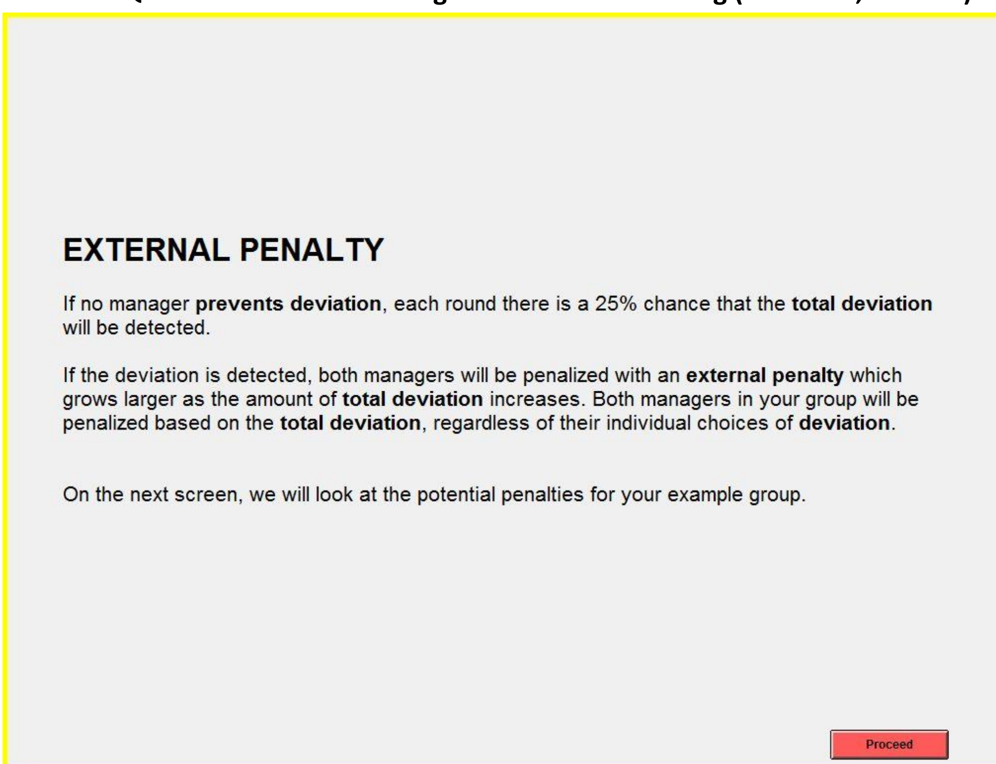
Please enter As final earnings for the round.
Please enter Bs final earnings for the round.

Proceed

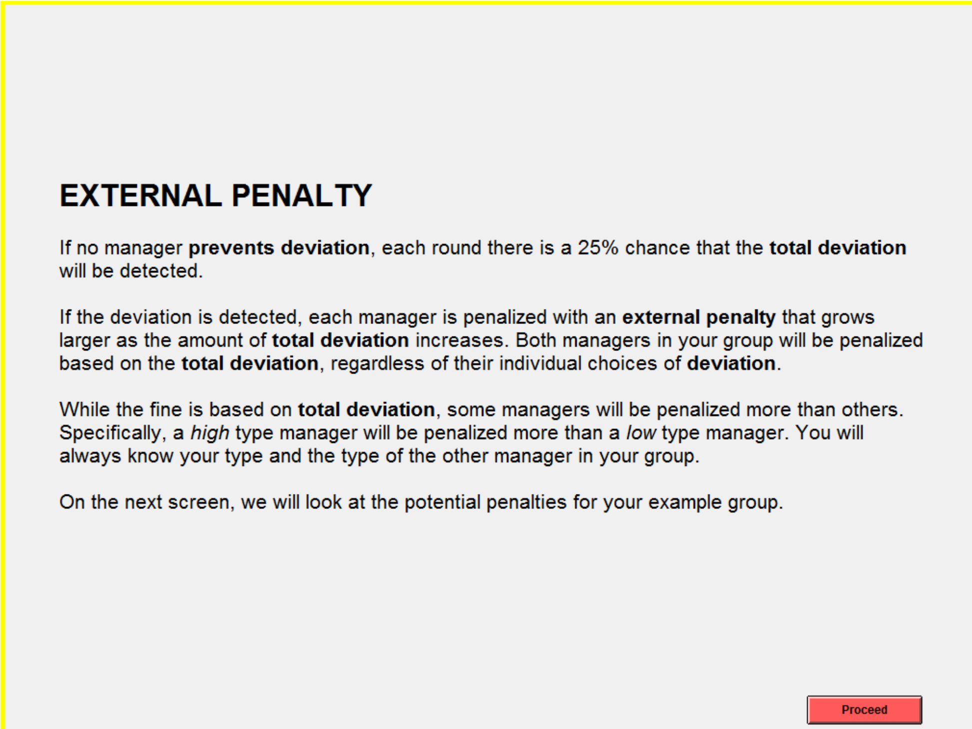
Screen 9: Question of understanding about whistle-blowing (W-LL-NA, W-LL-A)



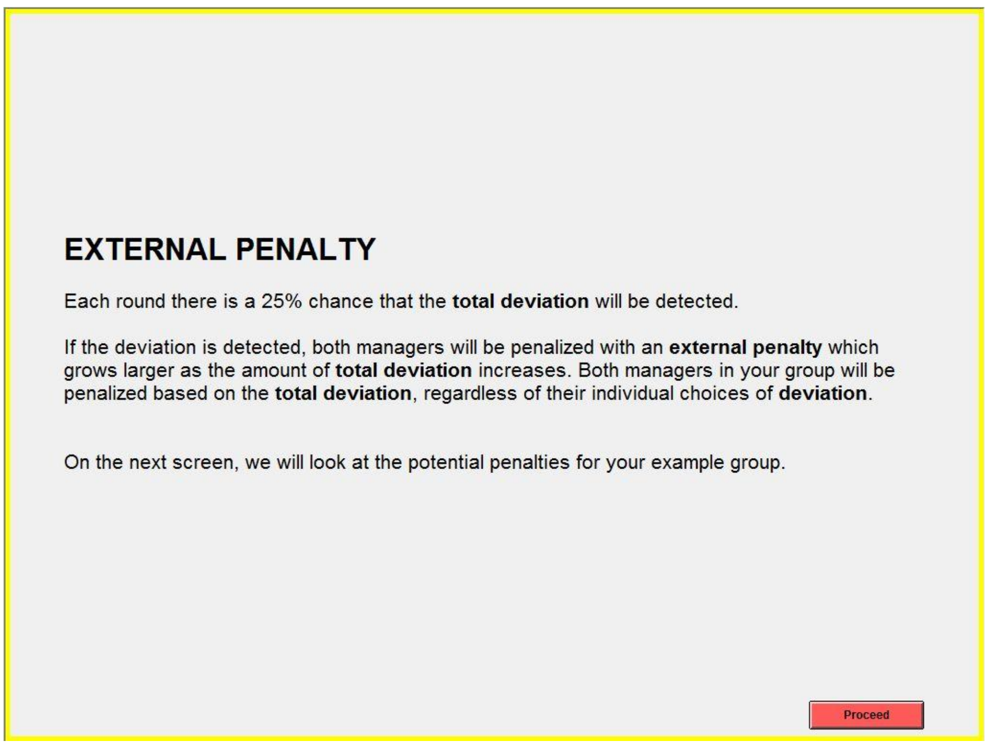
Screen 9: Question of understanding about whistle-blowing (W-HL-NA, W-HL-A)



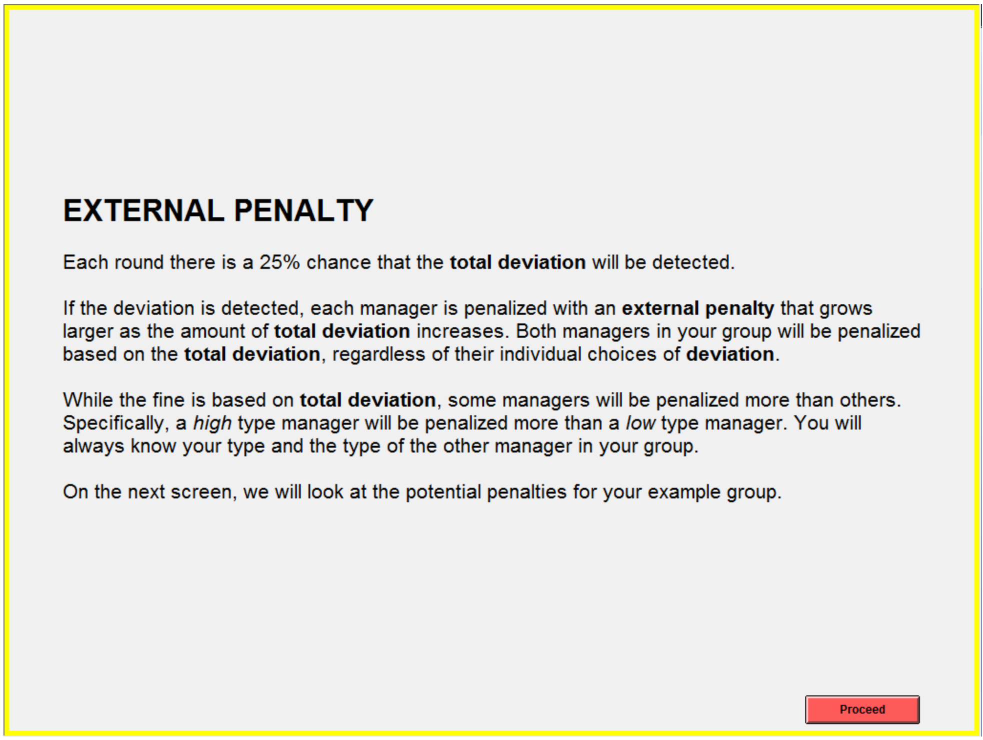
Screen 10: Description of the external penalty (W-LL-NA, W-LL-A)



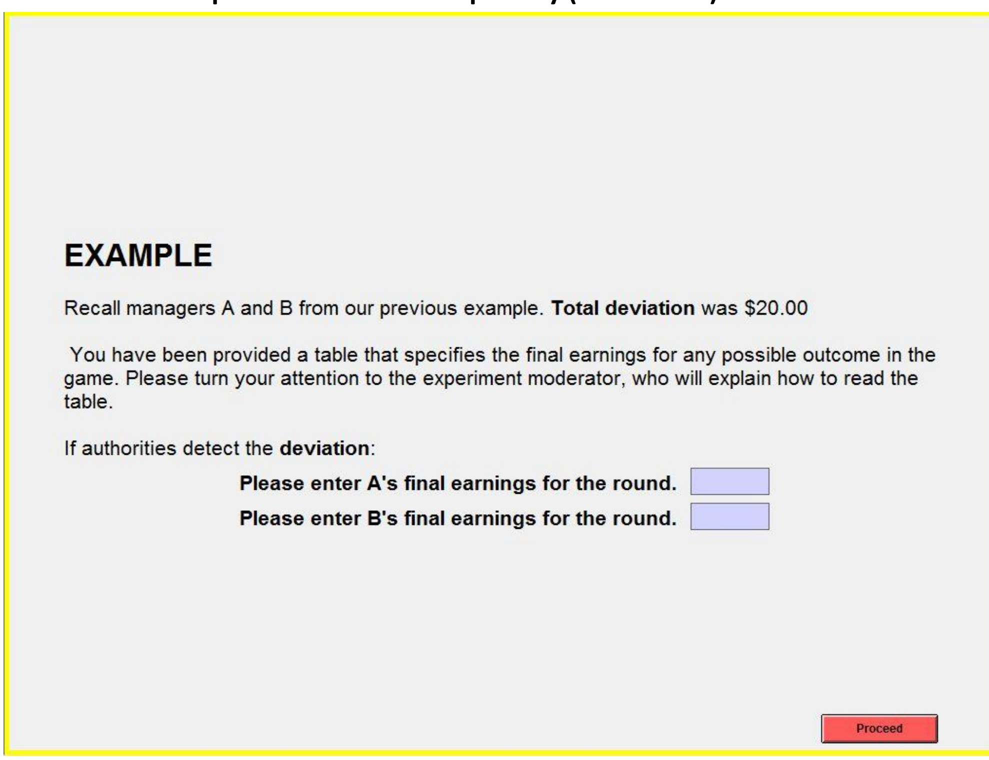
Screen 10: Description of the external penalty (W-HL-NA, W-HL-A)



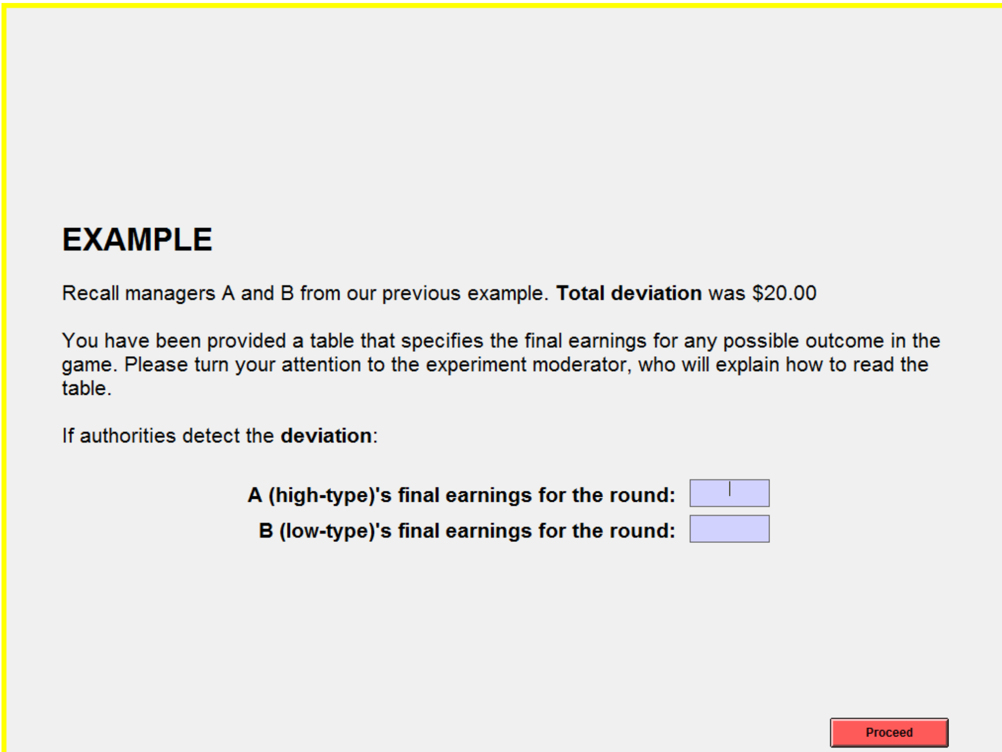
Screen 10: Description of the external penalty (NW-LL-NA)



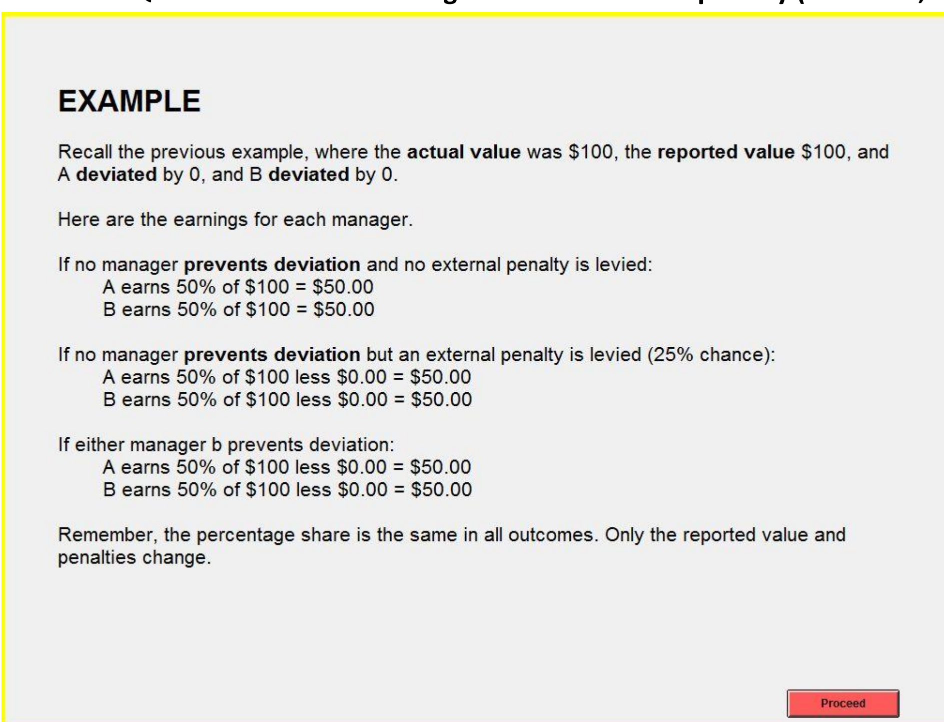
Screen 10: Description of the external penalty (NW-HL-NA)



Screen 11: Question of understanding about the external penalty (W-LL-NA, W-LL-A, NW-LL-NA)



Screen 11: Question of understanding about the external penalty (W-HL-NA, W-HL-A, NW-HL-NA)



Screen 12: Example of payoff calculations (W-LL-NA)

EXAMPLE

Recall the previous example, where the **actual value** was $100, the **reported value** $100, and A **deviated** by 0, and B **deviated** by 0.

Here are the earnings for each manager.

If no manager **prevents deviation** and no external penalty is levied:
  A earns 50% of $100 = $50.00
  B earns 50% of $100 = $50.00

If no manager **prevents deviation** but an external penalty is levied (25% chance):
  A earns 50% of $100 less penalty $0.00 = $50.00
  B earns 50% of $100 less penalty $0.00 = $50.00

If A **prevents deviation**:
  A earns 50% of $100 less penalty $0.00= $50.00
  B earns 50% of $100 less penalty $0.00 = $50.00

If B **prevents deviation**:
  A earns 50% of $100 less penalty $0.00 = $50.00
  B earns 50% of $100 less penalty $0.00 = $50.00

If A and B **prevent deviation**:
  A earns 50% of $100 less penalty $0.00= $50.00
  B earns 50% of $100 less penalty $0.00 = $50.00

Remember, the percentage share is the same in all outcomes. Only the reported value and penalties change.

Proceed

Screen 12: Example of payoff calculations (W-LL-A)

EXAMPLE

Recall the previous example, where the **actual value** was $100, the **reported value** $120, and A **deviated** by 20, and B **deviated** by 0.

Here are the earnings for each manager.

If no external penalty is levied:
  A earns 50% of $120 = $60.00
  B earns 50% of $120 = $60.00

If an external penalty is levied (25% chance):
  A earns 50% of $120 less $8.00 = $52.00
  B earns 50% of $120 less $8.00 = $52.00

Remember, the percentage share is the same in all outcomes. Only the reported value and penalties change.

Proceed

Screen 12: Example of payoff calculations (NW-LL-NA)

EXAMPLE

Recall the previous example, where the **actual value** was $100, the **reported value** $140, and A(high) **deviated** by 20, and B(low) **deviated** by 20.

Here are the earnings for each manager.

If no manager **prevents deviation** and no external penalty is levied:
A(H) earns 50% of $140 = $70.00
B(L) earns 50% of $140 = $70.00

If no manager **prevents deviation** but an external penalty is levied (25% chance):
A(H) earns 50% of $140 less penalty $70.00 = $0.00
B(L) earns 50% of $140 less penalty $20.00 = $50.00

If either manager **prevents deviation**:
A(H) earns 50% of $100 less penalty $70.00 = $-20.00
B(L) earns 50% of $100 less penalty $20.00 = $30.00

Remember, the percentage share is the same in all outcomes. Only the reported value and penalties change.

Proceed

Screen 12: Example of payoff calculations (W-HL-NA)

EXAMPLE

Recall the previous example, where the **actual value** was $100, the **reported value** $120, and A(high) **deviated** by 20, and B(low) **deviated** by 0.

Here are the earnings for each manager.

If no manager **prevents deviation** and no external penalty is levied:
A(H) earns 50% of $120 = $60.00
B(L) earns 50% of $120 = $60.00

If no manager **prevents deviation** but an external penalty is levied (25% chance):
A(H) earns 50% of $120 less penalty $15.00 = $45.00
B(L) earns 50% of $120 less penalty $8.00 = $52.00

If A **prevents deviation**:
A(H) earns 50% of $100 less penalty $0.00= $50.00
B(L) earns 50% of $100 less penalty $0.00 = $50.00

If B **prevents deviation**:
A(H) earns 50% of $100 less penalty $70.00 = $50.00
B(L) earns 50% of $100 less penalty $0.00 = $50.00

If A and B **prevent deviation**:
A(H) earns 50% of $100 less penalty $0.00= $50.00
B(L) earns 50% of $100 less penalty $0.00 = $50.00

Remember, the percentage share is the same in all outcomes. Only the reported value and penalties change.

Proceed

Screen 12: Example of payoff calculations (W-HL-A)

EXAMPLE

Recall the previous example, where the **actual value** was $100, the **reported value** $140, and A(high) **deviated** by 20, and B(low) **deviated** by 20.

Here are the earnings for each manager.

If no external penalty is levied:
A(H) earns 50% of $140 = $70.00
B(L) earns 50% of $140 = $70.00

If an external penalty is levied (25% chance):
A(H) earns 50% of $140 less penalty $70.00 = $0.00
B(L) earns 50% of $140 less penalty $20.00 = $50.00

Remember, the percentage share is the same in all outcomes. Only the reported value and penalties change.

Proceed

Screen 12: Example of payoff calculations (NW-HL-NA)

SUMMARY

1) Each round, you will be reminded the **actual value** of the project.

2) You and the other manager will choose whether to **deviate** from the **actual value** of the project to form the **reported value**, and if so, by how much.

3) The **total deviation**, which is the sum of the individual **deviation** choices, will be revealed to both of you. The **reported value** equals the **actual value** plus the **total deviation**. You will then be asked whether or not you want to **prevent deviation**.

4) You will be told whether or not anyone chose to **prevent deviation**. If a manager prevented deviation, the **reported value** is set equal to the **actual value** and each manager is penalized based on their own choice of **deviation** .

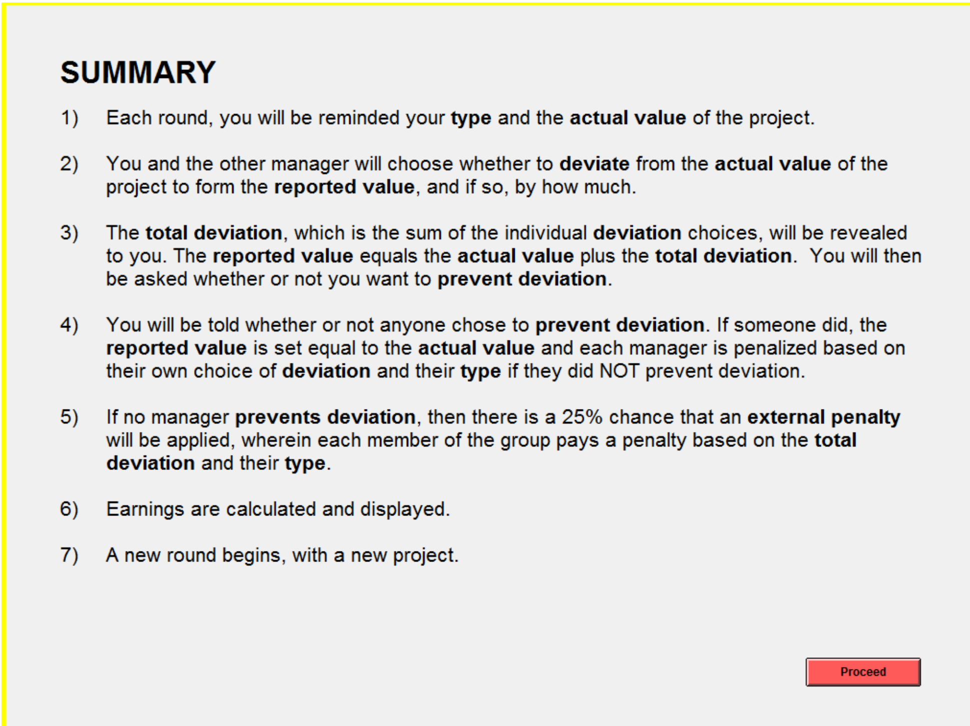
5) If no manager **prevents deviation**, then there is a 25% chance that an **external penalty** will be applied, wherein each manager is penalized based on the **total deviation**.

6) Earnings are calculated and displayed.

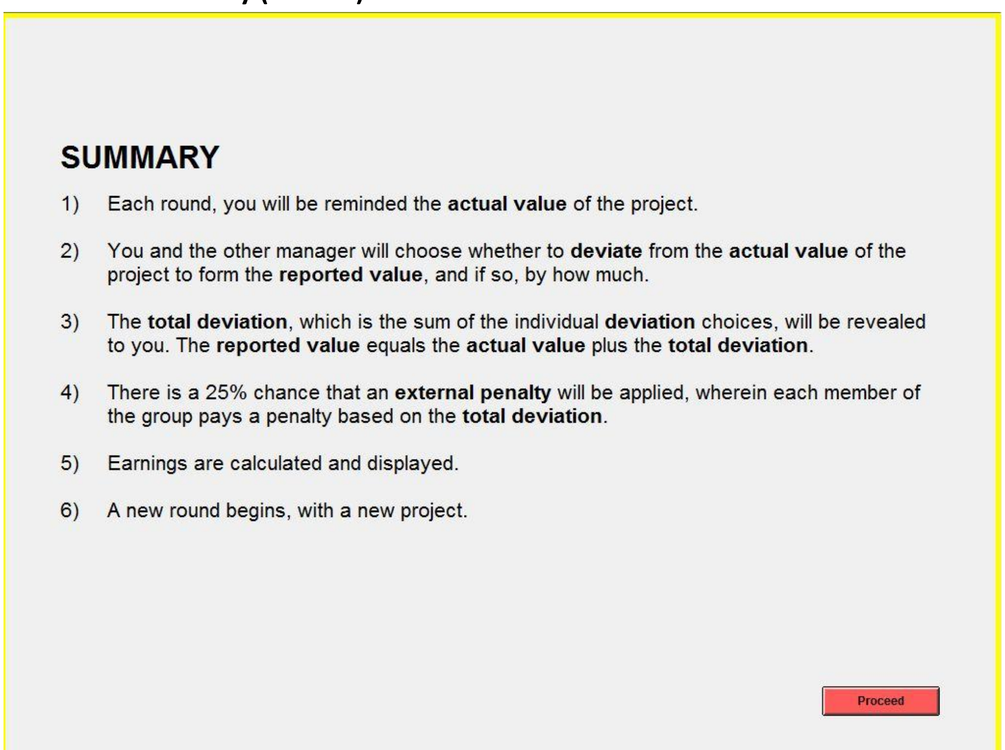
7) A new round begins, with a new project.

Proceed

Screen 13: Summary (W-LL-NA)



Screen 13: Summary (W-LL-A)



Screen 13: Summary (NW-LL-NA)

SUMMARY

1) Each round, you will be reminded your **type** and the **actual value** of the project.

2) You and the other manager will choose whether to **deviate** from the **actual value** of the project to form the **reported value**, and if so, by how much.

3) The **total deviation**, which is the sum of the individual **deviation** choices, will be revealed to both of you. The **reported value** equals the **actual value** plus the **total deviation**. You will then be asked whether or not you want to **prevent deviation**.

4) You will be told whether or not anyone chose to **prevent deviation**. If either manager prevented deviation, the **reported value** is set equal to the **actual value** and each manager is penalized based on their own choice of **deviation** and their **type**.

5) If no manager **prevents deviation**, then there is a 25% chance that an **external penalty** will be applied, wherein each manager is penalized based on the **total deviation** and their **type**.

6) Earnings are calculated and displayed.

7) A new round begins, with a new project.

Proceed

Screen 13: Summary (W-HL-NA)

SUMMARY

1) Each round, you will be reminded your **type** and the **actual value** of the project.

2) You and the other manager will choose whether to **deviate** from the **actual value** of the project to form the **reported value**, and if so, by how much.

3) The **total deviation**, which is the sum of the individual **deviation** choices, will be revealed to you. The **reported value** equals the **actual value** plus the **total deviation**. You will then be asked whether or not you want to **prevent deviation**.

4) You will be told whether or not anyone chose to **prevent deviation**. If someone did, the **reported value** is set equal to the **actual value** and each manager is penalized based on their own choice of **deviation** and their **type** if they did NOT prevent deviation.

5) If no manager **prevents deviation**, then there is a 25% chance that an **external penalty** will be applied, wherein each member of the group pays a penalty based on the **total deviation** and their **type**.

6) Earnings are calculated and displayed.

7) A new round begins, with a new project.

Proceed

Screen 13: Summary (W-HL-A)

SUMMARY

1) Each round, you will be reminded your **type** and the **actual value** of the project.

2) You and the other manager will choose whether to **deviate** from the **actual value** of the project to form the **reported value**, and if so, by how much.

3) The **total deviation**, which is the sum of the individual **deviation** choices, will be revealed to both of you. The **reported value** equals the **actual value** plus the **total deviation**.

4) There is a 25% chance that an **external penalty** will be applied, wherein each manager is penalized based on the **total deviation** and their **type**.

5) Earnings are calculated and displayed.

6) A new round begins, with a new project.

Proceed

Screen 13: Summary (NW-HL-NA)

CHOOSE DEVIATION

You are a ***low***-type manager. Be certain to remember this when referring to the tables.

You will be paid 50% of the **reported value** of the project.

The **actual value** of the project is $100.00.

You may choose to **deviate** from the **actual value**. The **total deviation** is the sum of the individual **deviation** choices of you and the other manager.

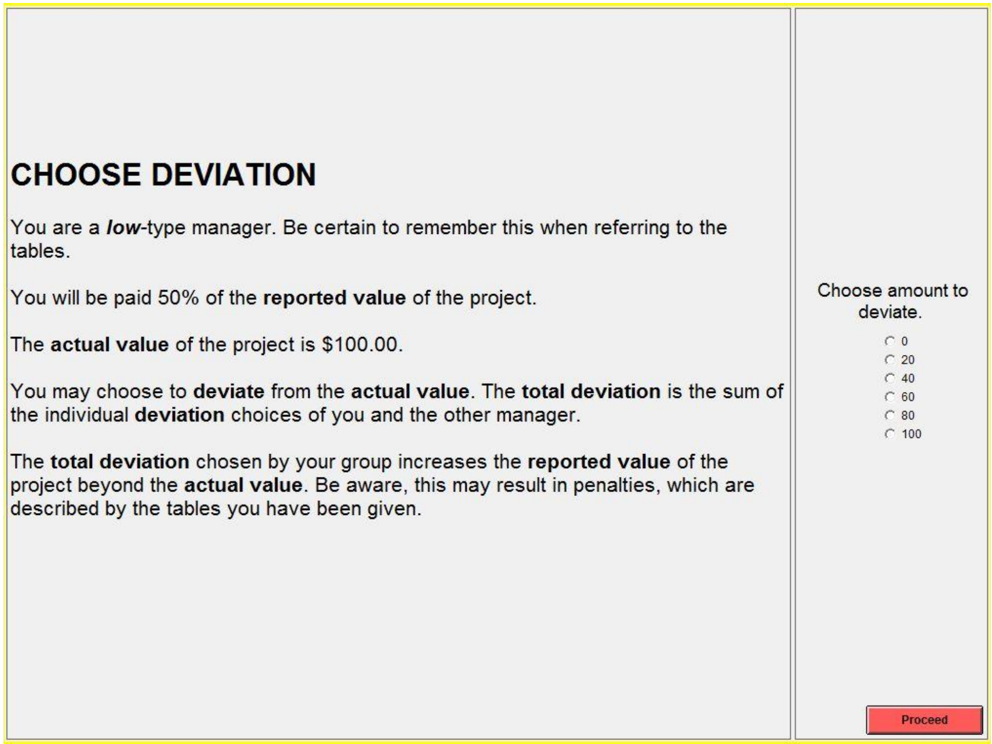
The **total deviation** chosen by your group increases the **reported value** of the project beyond the **actual value**. Be aware, this may result in penalties, which are described by the tables you have been given.

Choose amount to deviate.

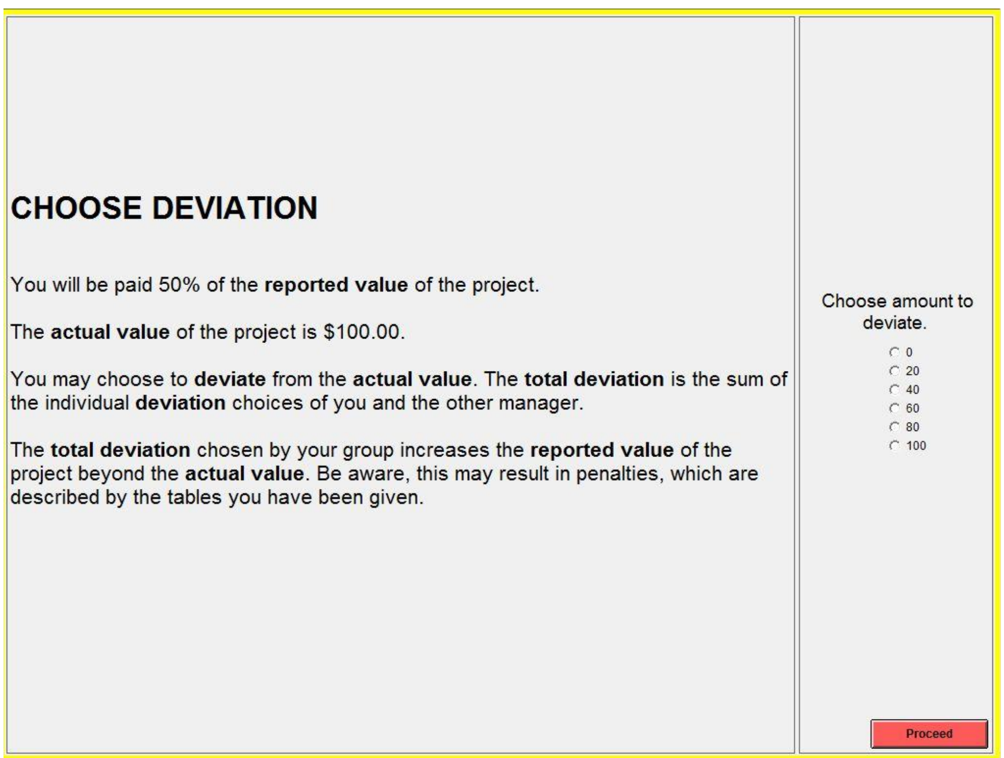
- 0
- 20
- 40
- 60
- 80
- 100

Proceed

Screen 14: Fraud decision screen.



Screen 14: Fraud decision screen.



Screen 14: Fraud decision screen.

DEVIATION PREVENTION DECISION

The **actual value** of the project is	$100.00
Your **deviation** was	$40.00
The other manager's **deviation** was	$0.00
Thus, the **reported value** of the project is	$140.00

If either manager **prevents deviation**, you will receive:

50% of $100.00	=	$50.00
less penalty of	=	$60.00
Total Earnings	=	$-10.00

If no manager **prevents deviation**, but the **deviation** is detected (25% chance), you will receive:

50% of $140.00	=	$70.00
less penalty of	=	$20.00
Total Earnings	=	$50.00

If no manager **prevents deviation** and the **deviation** is not detected, you will receive:

50% of $140.00	=	$70.00
Total Earnings	=	$70.00

Do you wish to **prevent deviation** and report the actual value?

- No
- Yes

Proceed

Screen 15: Whistle-blowing decision screen.

DEVIATION PREVENTION DECISION

The **actual value** of the project is	$100.00
Your **deviation** was	$0.00
The other manager's **deviation** was	$0.00
Thus, the **reported value** of the project is	$100.00

If the other manager **prevents deviation** and you don't, you will receive:

50% of $100.00	=	$50.00
less penalty of	=	$0.00
Total Earnings	=	$50.00

If you **prevent deviation**, you will receive:

50% of $100.00	=	$50.00

If no manager **prevents deviation**, but the **deviation is detected** (25% chance), you will receive:

50% of $100.00	=	$50.00
less penalty of	=	$0.00
Total Earnings	=	$50.00

If no manager **prevents deviation** and the **deviation**is not detected , you will receive:

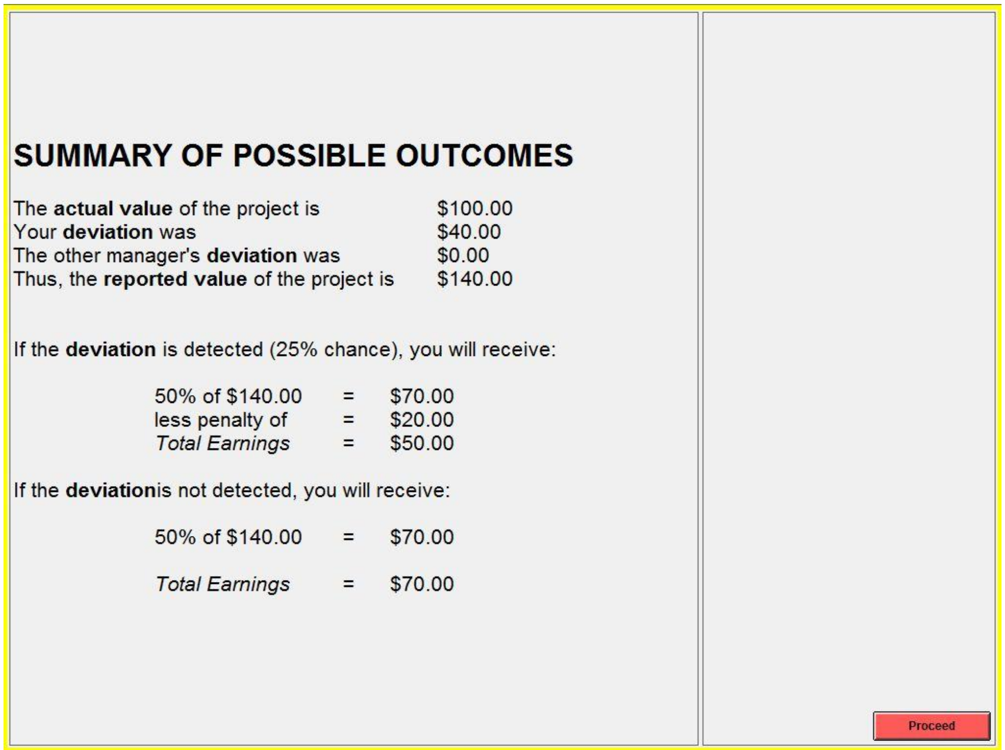
50% of $100.00	=	$50.00
Total Earnings	=	$50.00

Do you wish to **prevent deviation** and report the actual value?

- No
- Yes

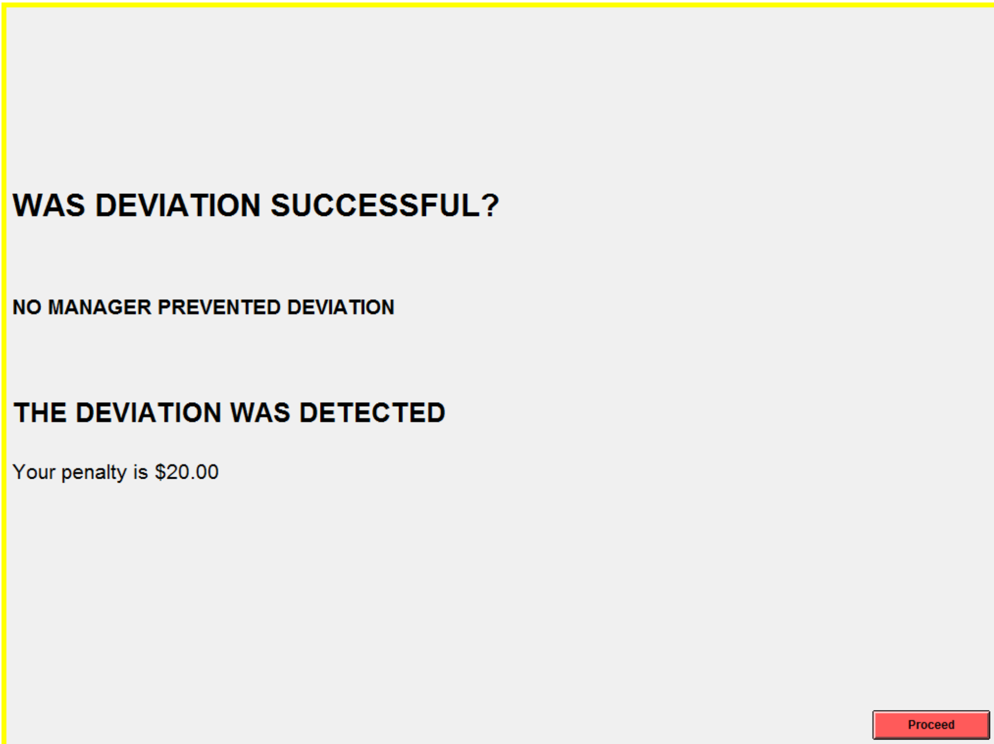
Proceed

Screen 15: Whistle-blowing decision screen. (W-LL-A, W-HL-A)



Screen 15: Replacement for whistle-blowing screen in NW treatments (NW-LL-NA, NW-HL-NA)

Screen 16: Detection results (whistle was blown)



Screen 16: Detection results (external detection)

Screen 16: Detection results (W-LL-NA, W-LL-A, W-HL-NA, W-LL-A) In the NW treatments, the line "No manager prevented deviation" is deleted.

RESULTS

The **actual value** of the project is	\$100.00
Your **deviation** was	\$60.00
The other manager's **deviation** was	\$0.00
Thus, the **reported value** of the project is	\$160.00

DEVIATION PREVENTION

Occurred: At least one manager in your group prevented deviation. A penalty has been levied on each manager based on his or her individual choice of deviation.

EARNINGS

	Share:	50% of \$100.00	=	\$50.00
less	Penalty:			\$190.00
Total Earnings:				\$-140.00

Proceed

Screen 17: Payoff screen (whistle was blown)

RESULTS

The **actual value** of the project is	\$100.00
Your **deviation** was	\$40.00
The other manager's **deviation** was	\$0.00
Thus, the **reported value** of the project is	\$140.00

DEVIATION PREVENTION

Did not occur: No manager in your group prevented deviation.

EXTERNAL DETECTION

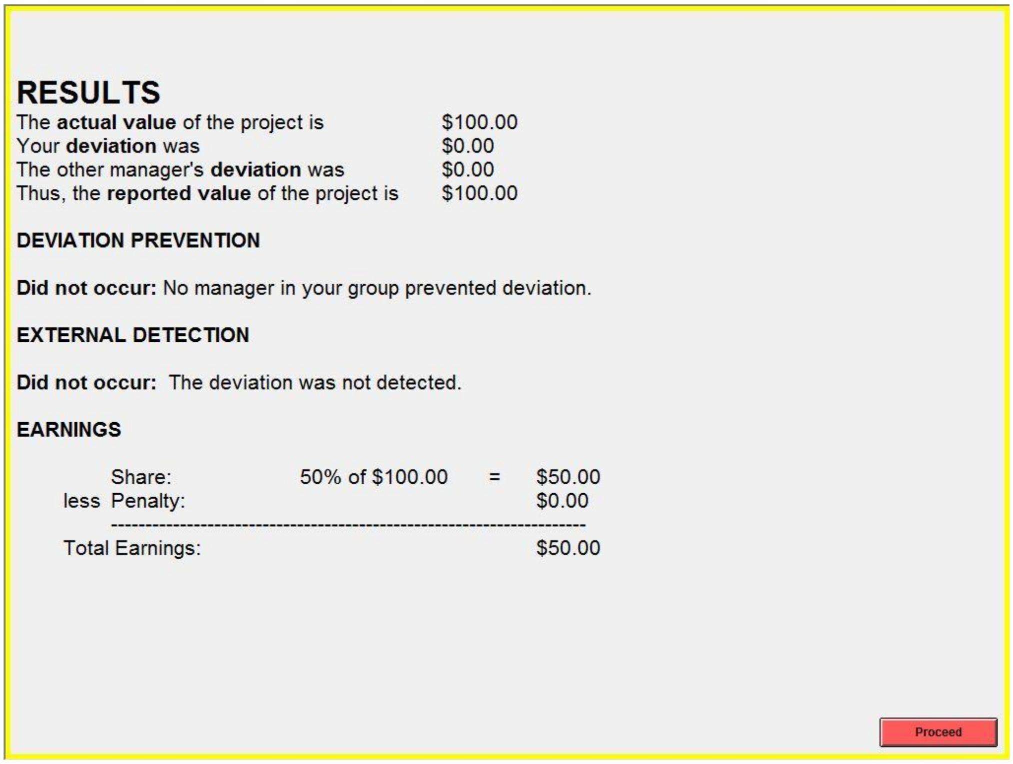
Occurred: The **deviation** was detected. An external penalty has been levied on all managers based on the **total deviation**.

EARNINGS

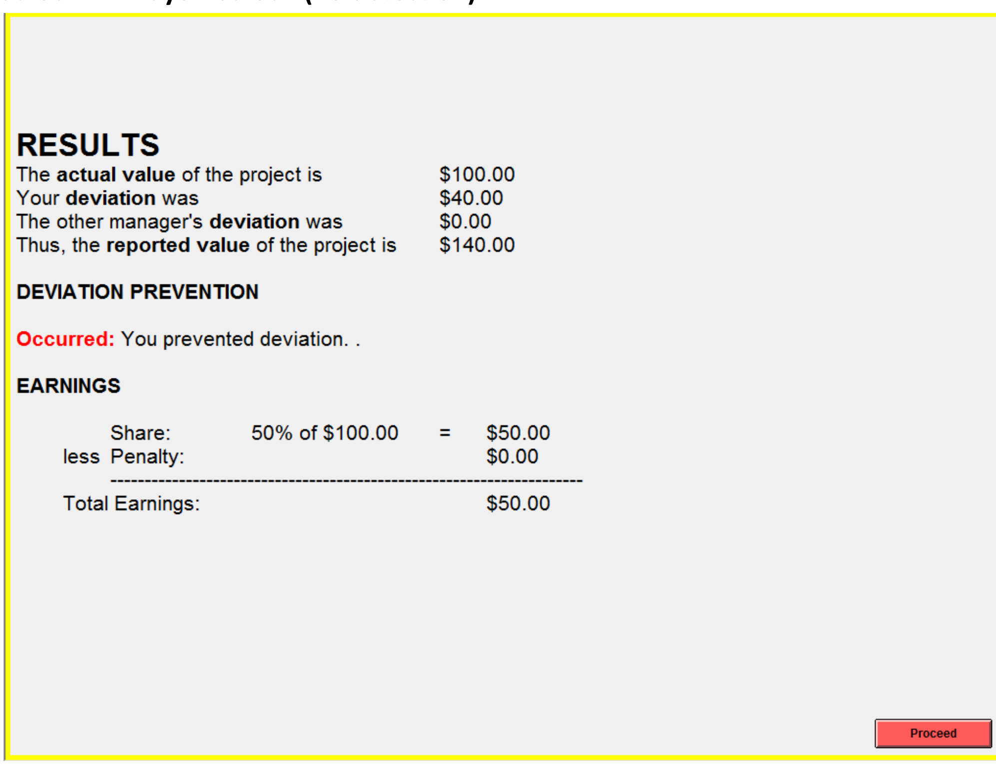
	Share:	50% of \$140.00	=	\$70.00
less	Penalty:			\$20.00
Total Earnings:				\$50.00

Proceed

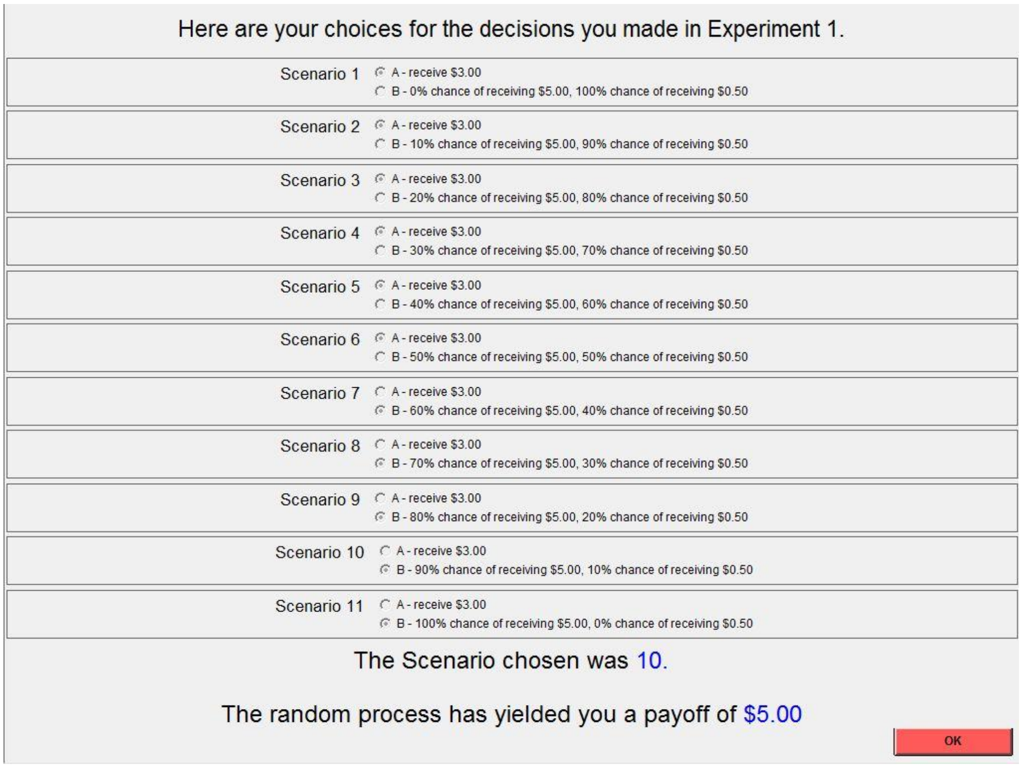
Screen 17: Payoff screen (external detection)



Screen 17: Payoff screen (no detection)



Screen 17: Payoff screen (blew whistle with amnesty)



Here are your choices for the decisions you made in Experiment 1.

Scenario 1 — A - receive $3.00 / B - 0% chance of receiving $5.00, 100% chance of receiving $0.50

Scenario 2 — A - receive $3.00 / B - 10% chance of receiving $5.00, 90% chance of receiving $0.50

Scenario 3 — A - receive $3.00 / B - 20% chance of receiving $5.00, 80% chance of receiving $0.50

Scenario 4 — A - receive $3.00 / B - 30% chance of receiving $5.00, 70% chance of receiving $0.50

Scenario 5 — A - receive $3.00 / B - 40% chance of receiving $5.00, 60% chance of receiving $0.50

Scenario 6 — A - receive $3.00 / B - 50% chance of receiving $5.00, 50% chance of receiving $0.50

Scenario 7 — A - receive $3.00 / B - 60% chance of receiving $5.00, 40% chance of receiving $0.50

Scenario 8 — A - receive $3.00 / B - 70% chance of receiving $5.00, 30% chance of receiving $0.50

Scenario 9 — A - receive $3.00 / B - 80% chance of receiving $5.00, 20% chance of receiving $0.50

Scenario 10 — A - receive $3.00 / B - 90% chance of receiving $5.00, 10% chance of receiving $0.50

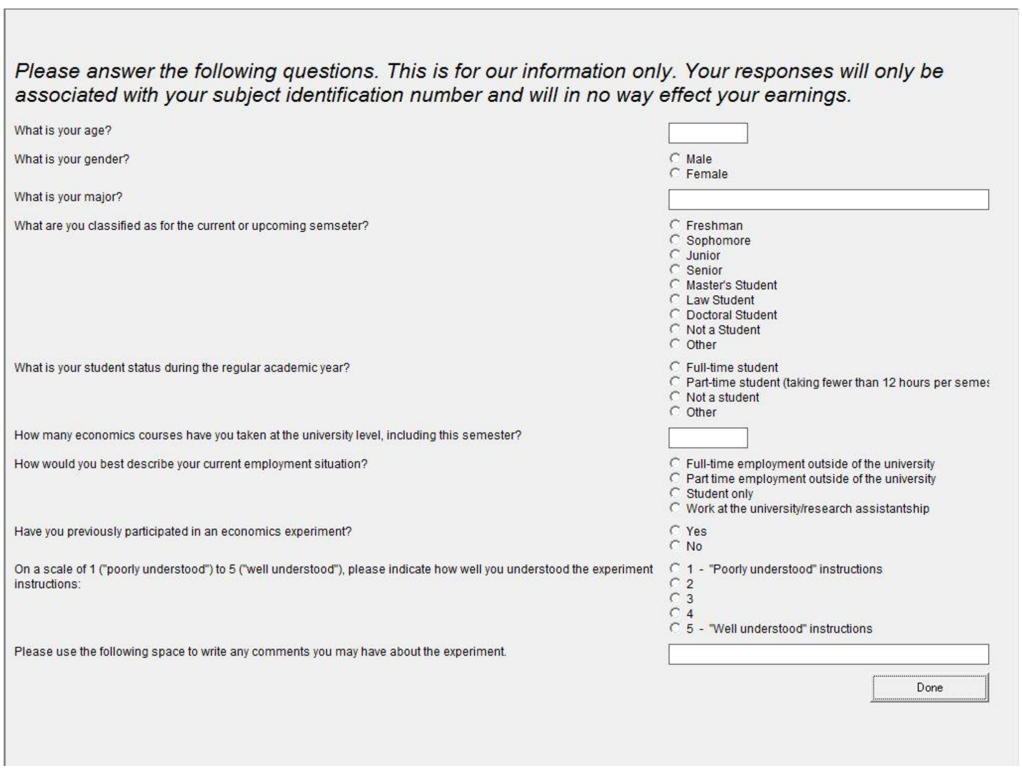
Scenario 11 — A - receive $3.00 / B - 100% chance of receiving $5.00, 0% chance of receiving $0.50

The Scenario chosen was 10.

The random process has yielded you a payoff of $5.00

OK

Screen 18: Risk-elicitation mechanism results



Please answer the following questions. This is for our information only. Your responses will only be associated with your subject identification number and will in no way effect your earnings.

What is your age?

What is your gender? — Male / Female

What is your major?

What are you classified as for the current or upcoming semseter? — Freshman / Sophomore / Junior / Senior / Master's Student / Law Student / Doctoral Student / Not a Student / Other

What is your student status during the regular academic year? — Full-time student / Part-time student (taking fewer than 12 hours per semes / Not a student / Other

How many economics courses have you taken at the university level, including this semester?

How would you best describe your current employment situation? — Full-time employment outside of the university / Part time employment outside of the university / Student only / Work at the university/research assistantship

Have you previously participated in an economics experiment? — Yes / No

On a scale of 1 ("poorly understood") to 5 ("well understood"), please indicate how well you understood the experiment instructions: — 1 - "Poorly understood" instructions / 2 / 3 / 4 / 5 - "Well understood" instructions

Please use the following space to write any comments you may have about the experiment.

Done

Screen 19: Questionnaire

Appendix D: Proofs from Chapter III

Proof of Lemma 1:

We need to show that the client's optimal contract is $(s = \sigma^H, f = 0)$.

First, it is straightforward to show that no separating or pooling contract can exist in equilibrium that does not lie on the break-even line for at least one type of attorney. A contract that causes both types of attorney to earn positive economic profits cannot be an equilibrium, because the client can offer slightly less and still hire the same type of attorney for the same result at less cost. A contract that causes neither type to at least break-even cannot be an equilibrium, because of the assumption that it is optimal to hire an attorney.

Second, we show that clients will not offer fixed fees.

Recall the iso-profit line for an attorney:

$$E(\pi^i) = p^i s D_H + (1 - p^i) s D_L + f - c^i, \quad i = L, H \qquad (8)$$

We calculate the slope of the attorney's iso-profit line, $\frac{ds}{df}$, by totally differentiating (8) with respect to s and f.

$$\frac{ds}{df} = \frac{1}{p^i D_H + (1 - p^i) D_L} \qquad (A9)$$

Recall the client's expected utility function:

$$V(f, s, p^i) = p^i v\big((1 - s)D_H - f\big) + \big(1 - p^i\big) v\big((1 - s)D_L - f\big), \qquad i = L, H \qquad (10)$$

We calculate the slope of a client's indifference curve, $\frac{ds}{df}$, by totally differentiating (10) with respect to s and f.

$$\frac{ds}{df} = -\frac{p^i v'\big((1-s)D_H - f\big) + \big(1-p^i\big)v'((1-s)D_L - f)}{D_H p^i v'\big((1-s)D_H - f\big) + D_L(1-p^i)v'((1-s)D_L - f)} \qquad (A10)$$

Then, using the concavity of $v(.)$, it is straightforward to show that

$$\frac{ds}{df} > \frac{1}{p^i D_H + (1-p^i)D_L} \quad if \quad s < 1 \qquad (A11)$$

$$\frac{ds}{df} = \frac{1}{p^i D_H + (1-p^i)D_L} \quad if \quad s = 1 \qquad (A12)$$

Thus, the indifference curve of a consumer who wins with probability p^i has a steeper slope than that of an attorney who wins with probability p^i, except at a full insurance contract (i.e., $s = 1$), in which case, the two slopes are equal.

Figure 13 depicts an indifference curve for a client who hires an attorney of type i as well as iso-profit margin lines for an attorney of type i. For any contract with a positive fixed fee, there exists a simple contingent fee that yields greater expected utility to the client and greater expected profit to the attorney. Simple contingent fees are less efficient than allowing the attorney to purchase the case, which would shift all risk to the risk-neutral attorney. However, as discussed, attorneys may not charge a negative fixed fee. Consequently, simple contingent fees are the most efficient fee structure that are permissible.

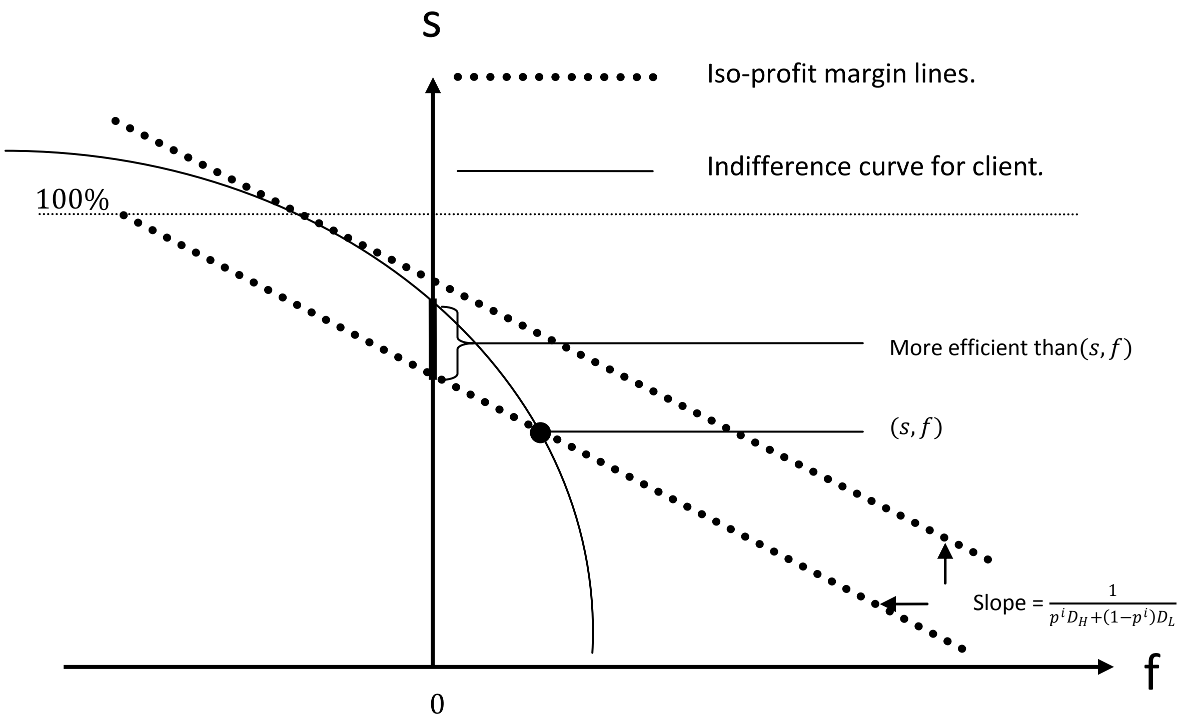


Figure 13: Contingent fees are the most efficient form of contract

Finally, having shown that it is optimal for the client to offer a simple contingent fee, we show that a client should offer the break-even simple contingent fee for the *high* type.

For any contingent fees s and $s^{'} < s$, from (10) it must be true that $V(0, s', p^H) < V(0, s, p^H) < V(0, s, p^L)$.

Therefore, from the assumption that $\sigma^H < \sigma^L$, the optimal contract is $s = \sigma^H, f = 0$. ■

Appendix E: Discussion of the Optimal Contract When Screening the Lows is Not Possible.

If $\sigma^L < \sigma^H$, screening the low is not possible with any contingent fee. Also, if To examine $\sigma^H < \sigma^L$, but $c^H > c^L$,the break-even iso-profit lines for both types intersect. If a contingent fee cap is set below this intersection, it is again not possible to screen *low*-quality attorneys. In cases where the contingent fee cap is sufficiently low (which would be any cap if $\sigma^L < \sigma^H$), the optimal contract may screen *high*-quality attorneys rather than pool types. Because it is never optimal for a client to offer a contract that allows both types to earn positive expected profits, there are two feasible candidates for the optimal contract if contingent fee caps are set below the intersection: a separating contract which screens the *highs*, and a pooling contract where the *highs* break even and the *lows* earn rents.

Let $V_L(s, f, p^L)$ be the expected utility of a client who screens out the *highs* with a separating contract: $(s = \bar{s}, f = c^L - p^L\bar{s}D_H - (1 - p^L)\bar{s}D_L)$.

$$V_L(s, f, p^L) = p^L v\big((1 - s)D_H - f\big) + (1 - p^L)v\big((1 - s)D_L - f\big) \qquad (A13)$$

Let V_{HL} be the expected utility of a client who offers the least expensive pooling contract: $(s = \bar{s}, f =$ *cH−pHsDH−1−pHsDL.*

$$\begin{aligned} V_{HL}(s, f, p^L, p^H, z) \\ &= z\left(p^H v\big((1 - s)D_H - f\big) + (1 - p^H)v\big((1 - s)D_L - f\big)\right) \\ &+ (1 - z)\left(p^L v\big((1 - s)D_H - f\big) + (1 - p^L)v\big((1 - s)D_L - f\big)\right) \qquad (A14) \end{aligned}$$

If $V_{HL} \geq V_L$, the pooling contract will be offered. Otherwise, the separating contract will be offered.

Proposition 2: *For z sufficiently close to 0, the separating contract will be offered.*

As the proportion of *highs* in the market approaches zero, the odds of hiring a *high* with a separating contract also approaches zero. (A14) converges to $p^L v\big((1-s)D_H - f\big) + (1-p^L)v\big((1-s)D_L - f\big)$, which is (A13), the expected utility to a client who hires a *low*. Since the pooling contract has the same contingent fee but a higher fixed fee than the separating contract, only the separating contract will be offered. [36]

Since we are interested in the average quality of attorneys, it is useful to know what parameters of the market affect the choice between separating and pooling contracts, as pooling contracts allow *lows* to serve clients. Without knowing the risk-preferences of clients, we cannot derive an exact expression for the contingent fee cap that would cause clients to offer a separating contract instead of a pooling contract. We can, however, determine how a change in a parameter of the market (proportion of types, probability of winning, etc.) changes the cap that would cause clients to switch.

The risk-averse clients prefer contracts with greater contingent fees to those with the same expected value but greater fixed fees. If they were risk-neutral, we could explicitly define a contingent fee cap, $\bar{s}$, at which a client would switch from offering a contract that pools types to one in which the highs are screened. Since an increase in risk-aversion would lower the cap at which a client would switch from pooling to separating, by solving as if the clients were risk-neutral, we can calculate a closed form lower bound on the point at which a client would switch from pooling to separating.

Define $\bar{s}_{switch}$, as the point at which a risk-neutral client would be indifferent between pooling and screening. For any cap below $\bar{s}_{switch}$, the separating contract is offered and high-quality attorneys are

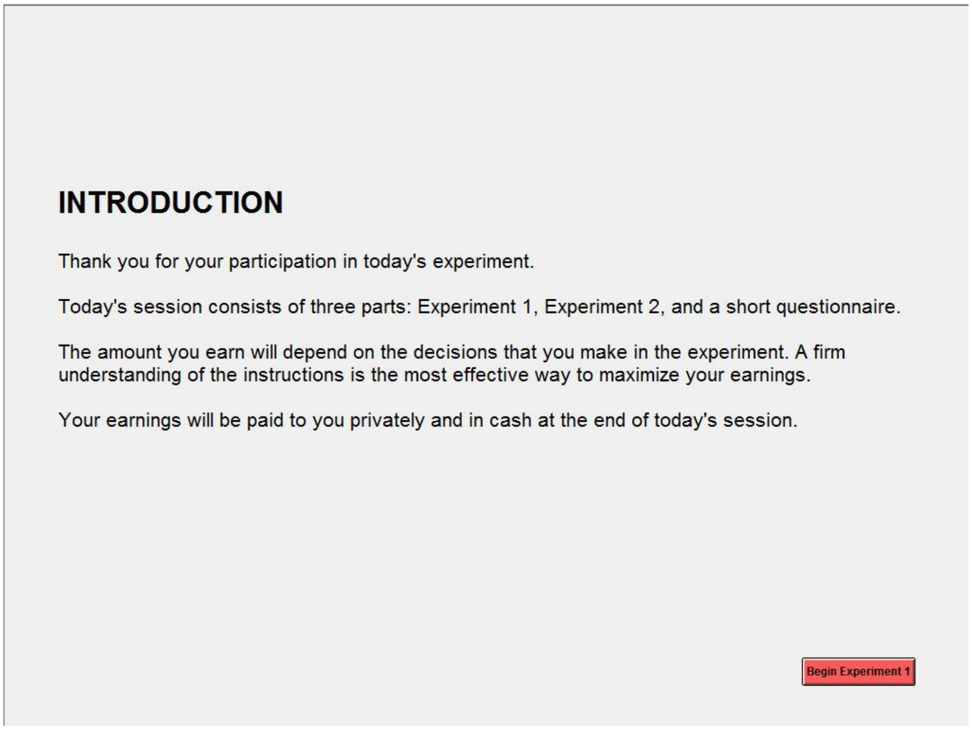
[36] For z sufficiently close to 1, the optimal contract depends on the characteristics of the attorneys and how risk-averse the client is. If the opportunity costs and probability of winning of the two types are such that a client would choose the *low* if ability were observable, the separating contract would be offered. This could happen if a client was sufficiently risk-averse or if the break-even contract for the *high* was sufficiently expensive.

screened. The single-crossing of the iso-profit lines of attorneys ensure this point is unique for any set of parameters.

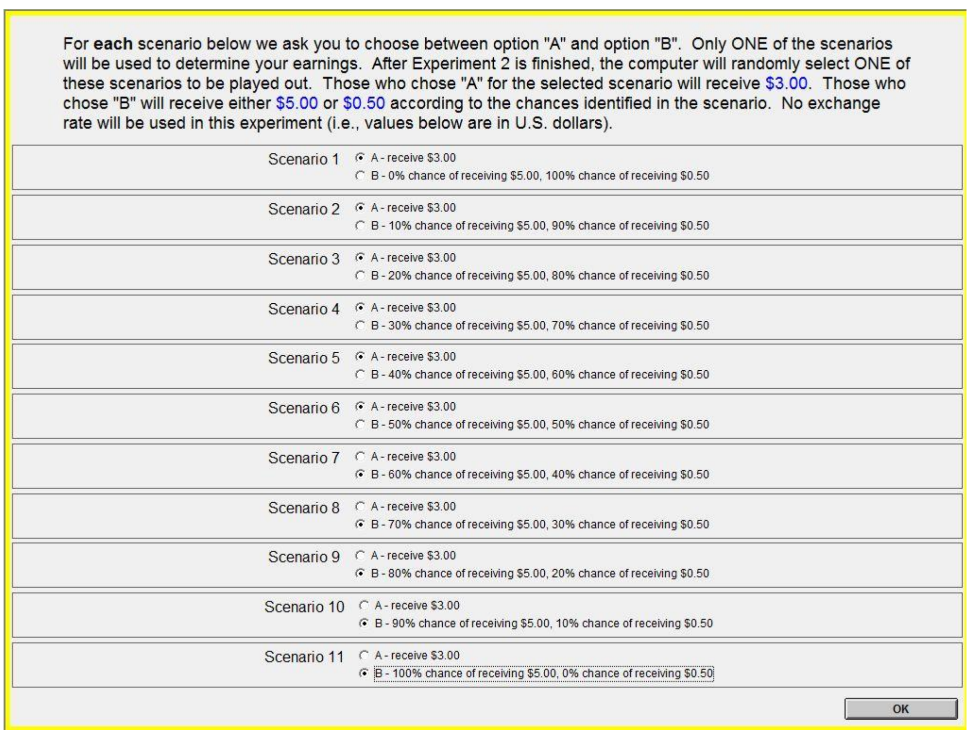
$$\bar{s}_{switch} = \frac{(c_H - c_L) - z(p_H - p_L)(D_H - D_L)}{(1 - z)(p_H - p_L)(D_H - D_L)} \qquad (A15)$$

If $\bar{s}_{switch} < 0$, clients will pool types for any cap if they are unable to screen the lows. Increasing the opportunity cost of a high-quality attorney, the probability of a high-ability attorney winning, the high damage award, or the proportion of highs in the market makes pooling more attractive and lowers the switching point. Meanwhile, increasing the opportunity cost of a low-quality attorney, the probability of a low-quality attorney winning, or the low damage award makes pooling less attractive and raises the switching point.

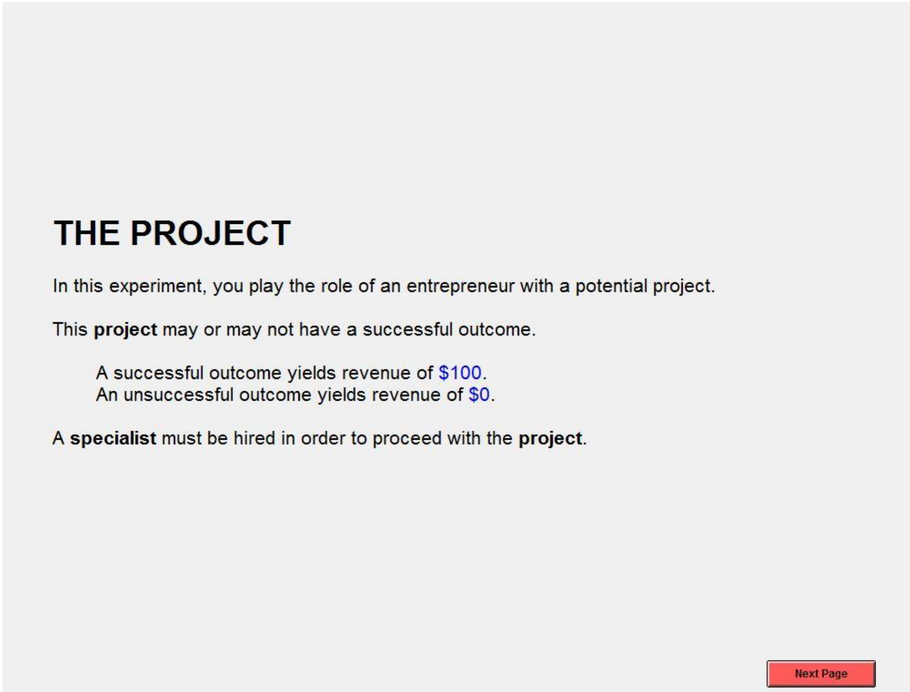
Appendix F: Instructions for Attorney Compensation Experiment



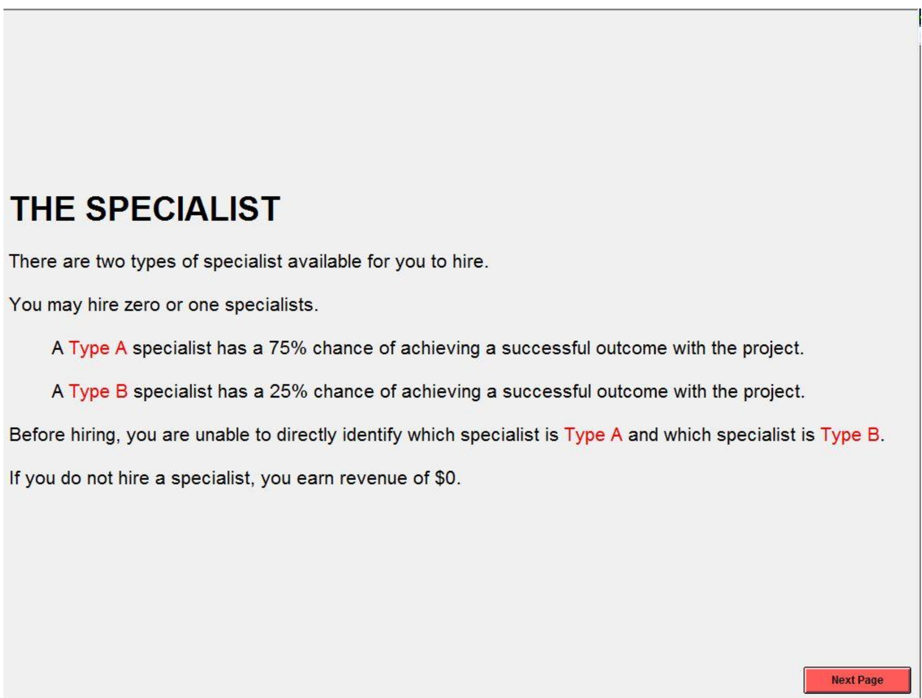
Introduction screen



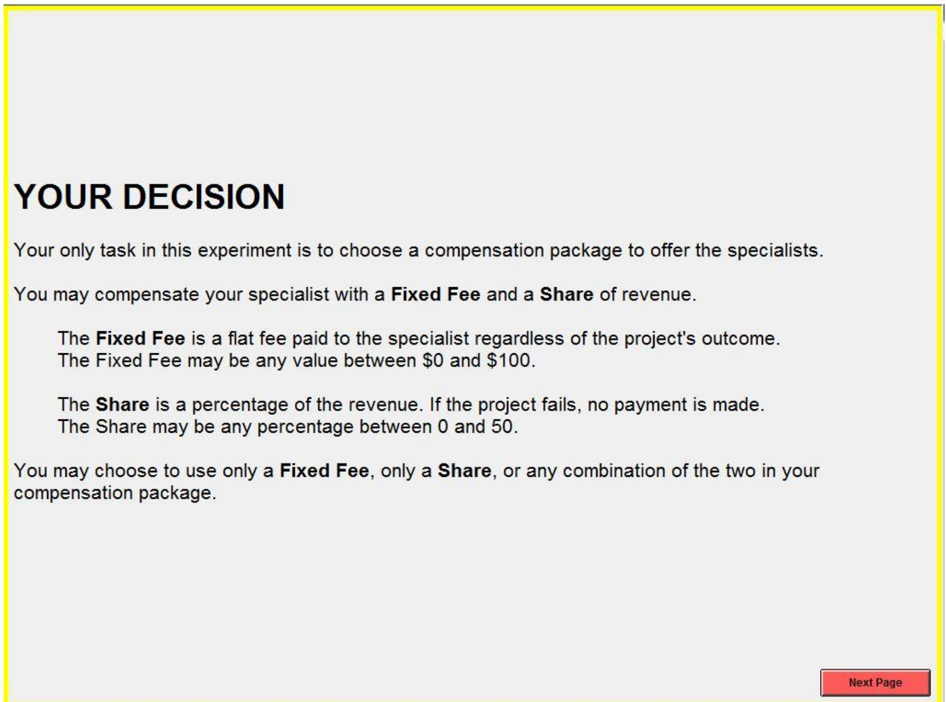
Risk elicitation mechanism



Description of the case.

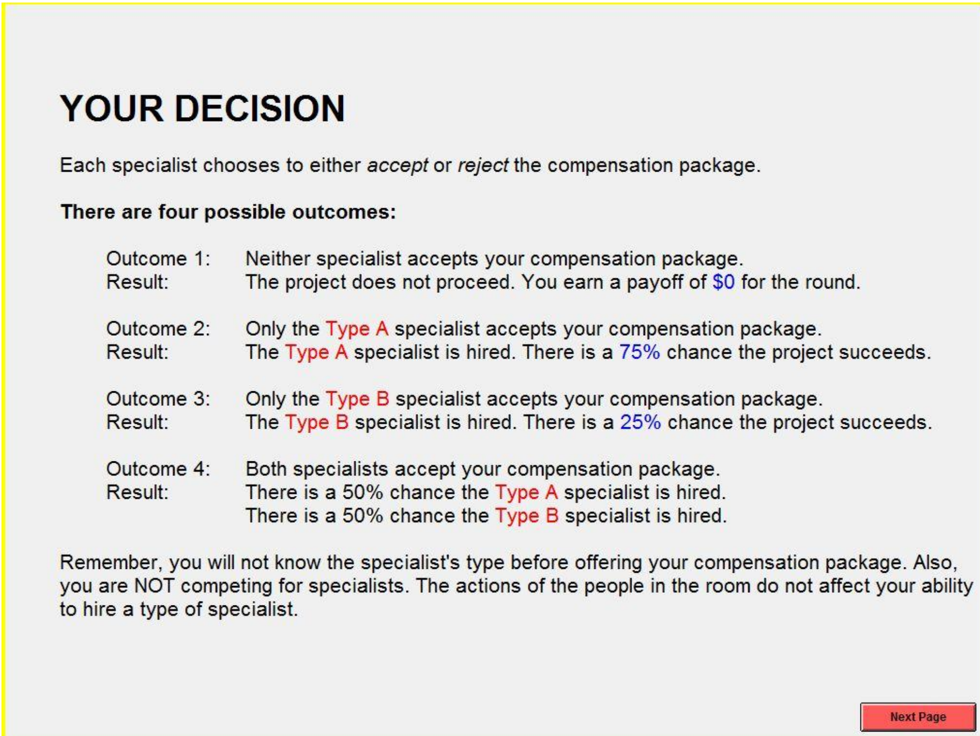


Description of the attorneys.

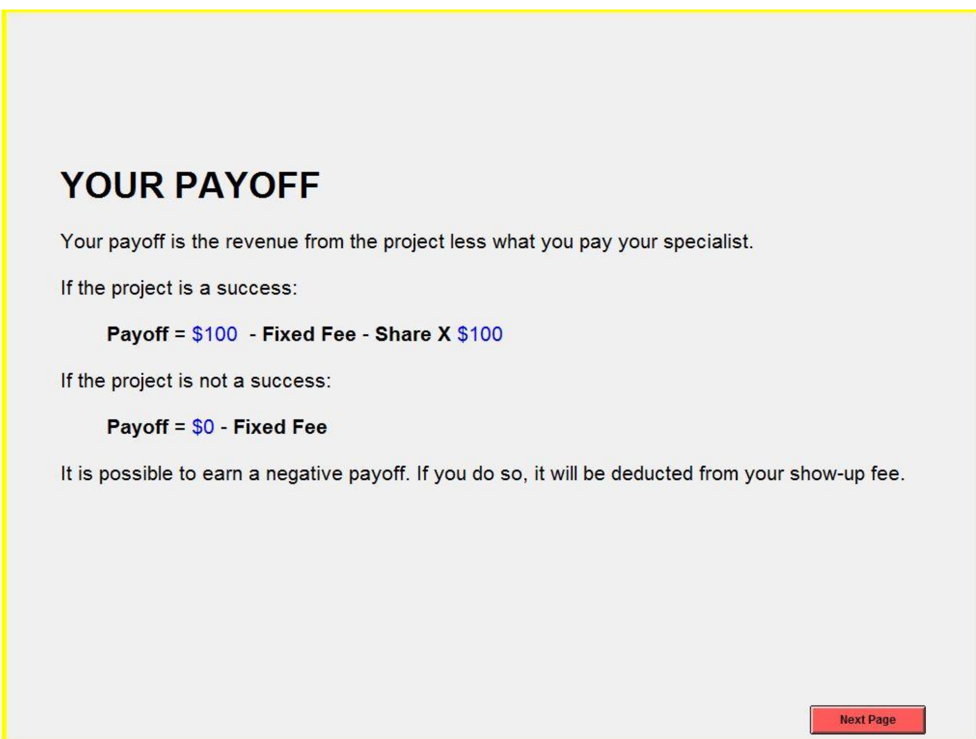


Description of the Contract.

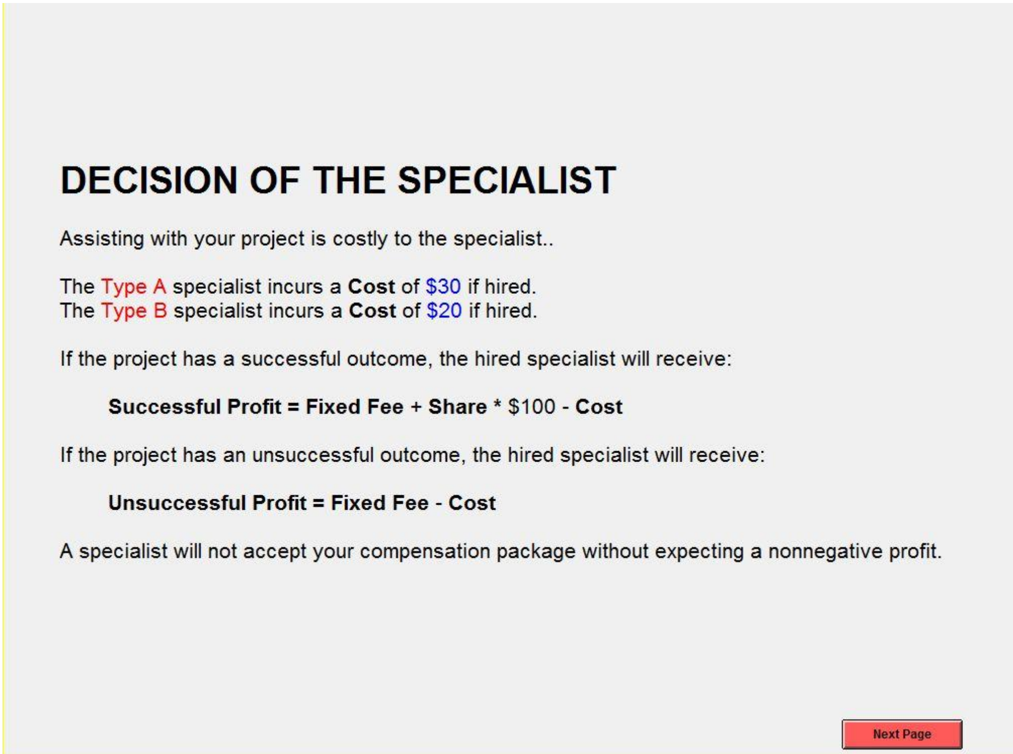
This is from the Cap50 treatment. In the Cap25 and Cap100 treatments, the seventh line would read "The Share may be any percentage between 0 and 25" or "… 0 and 100" respectively.



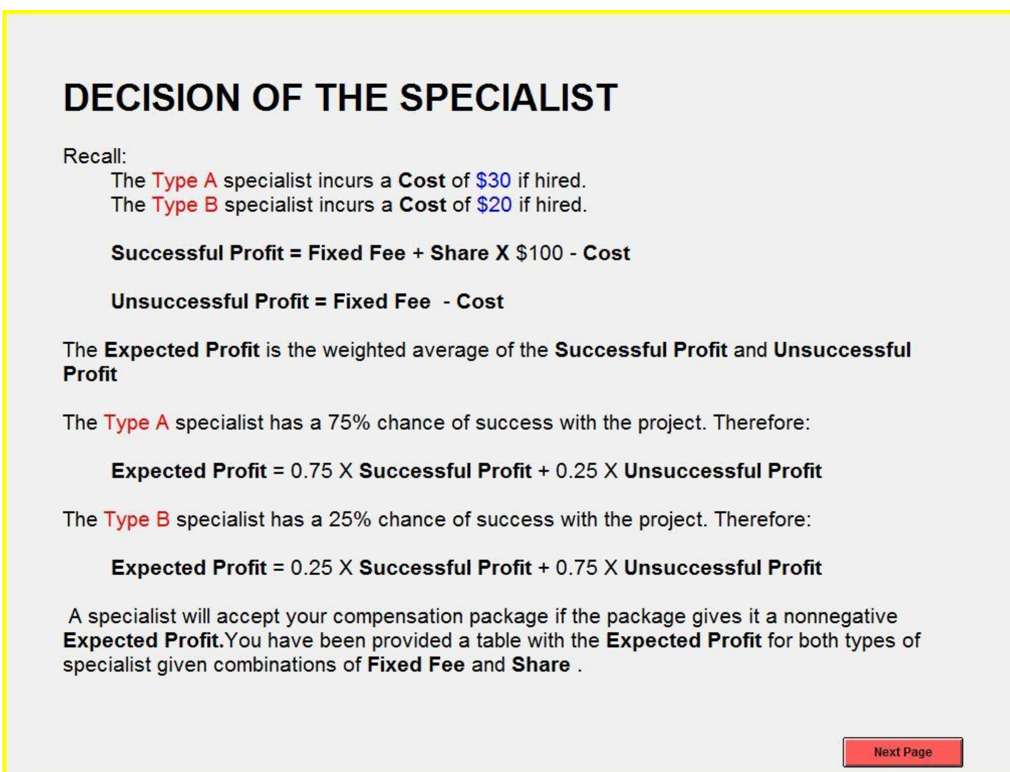
Description of the possible outcomes.



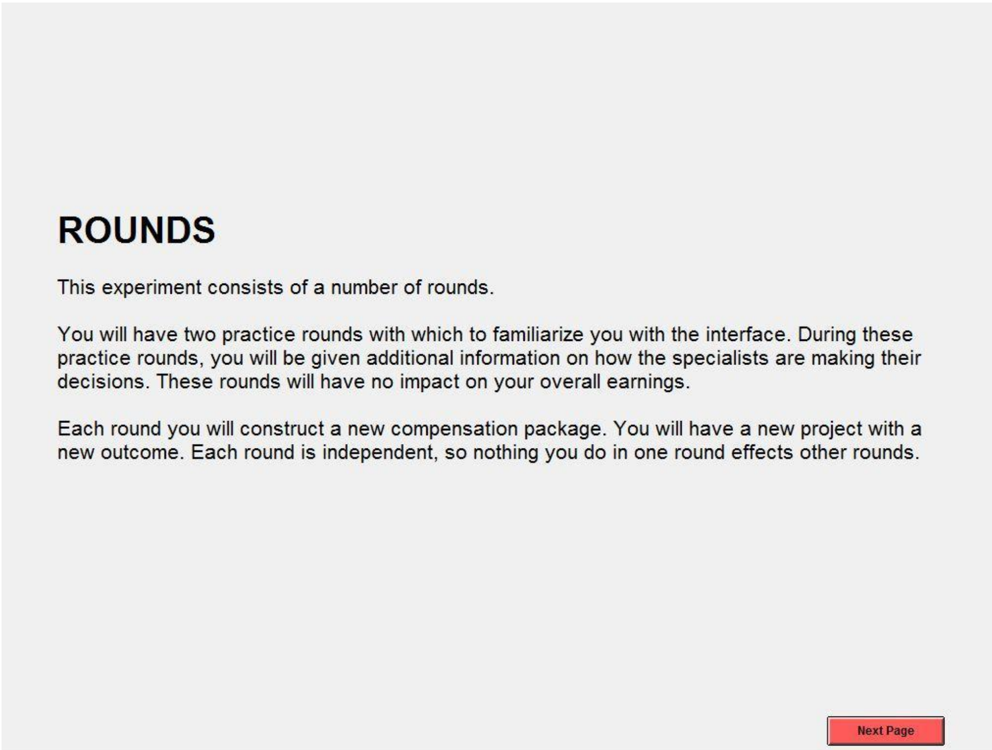
Description of the payoff to the client.



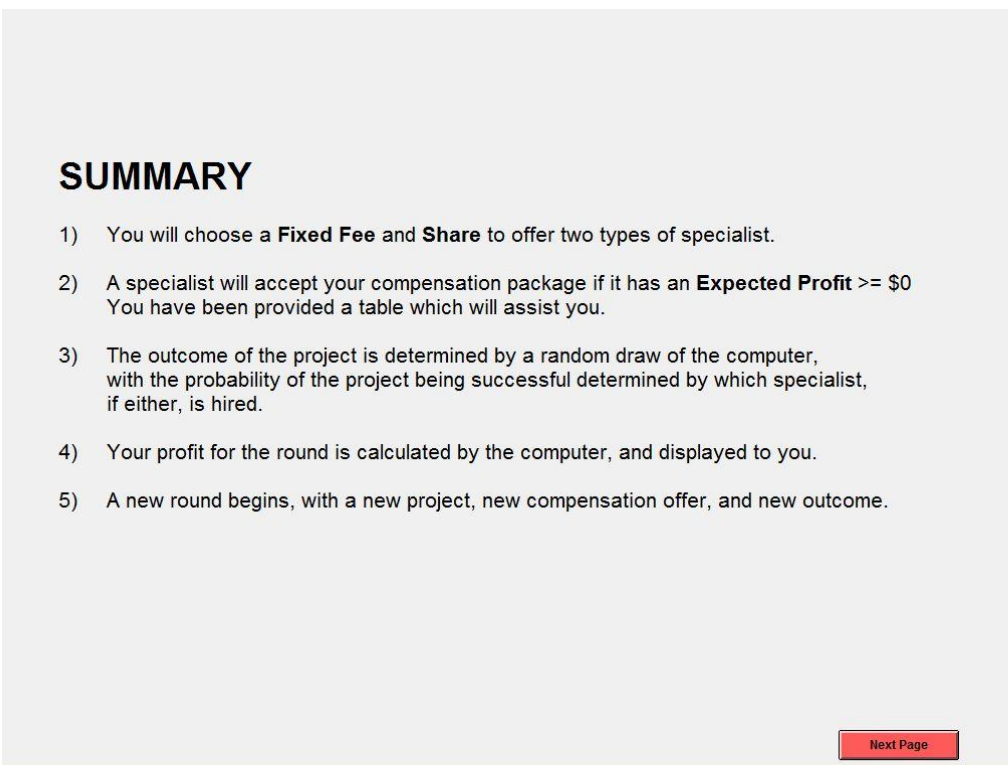
Description of how attorneys choose to accept or reject the contract.



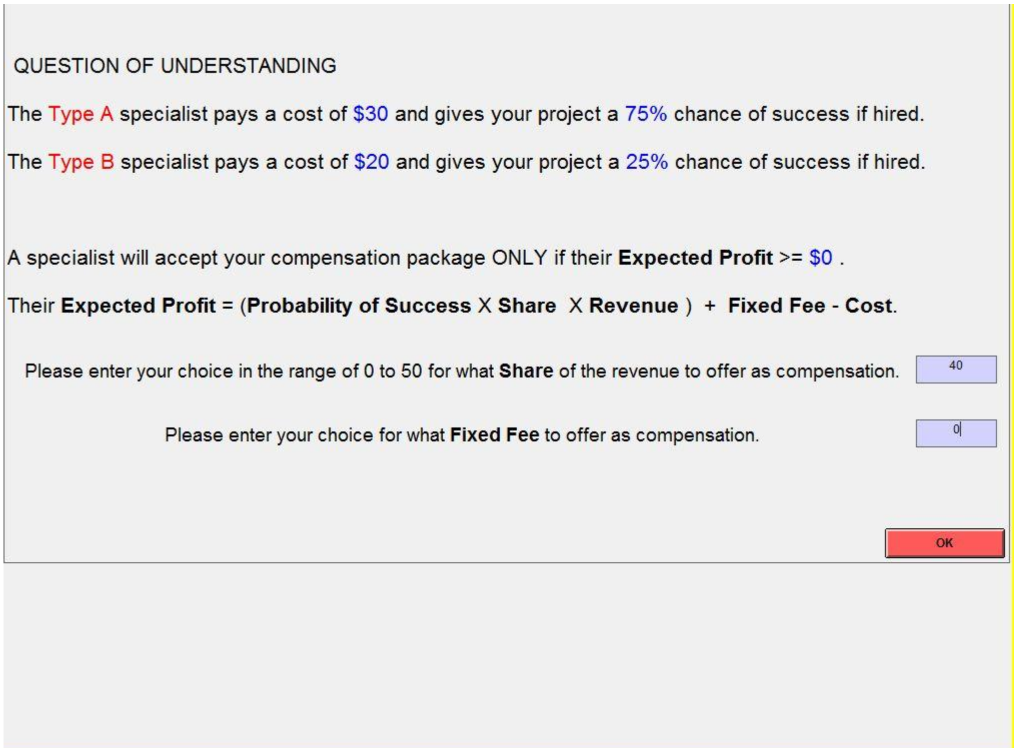
Additional descriptions of the attorney decision.



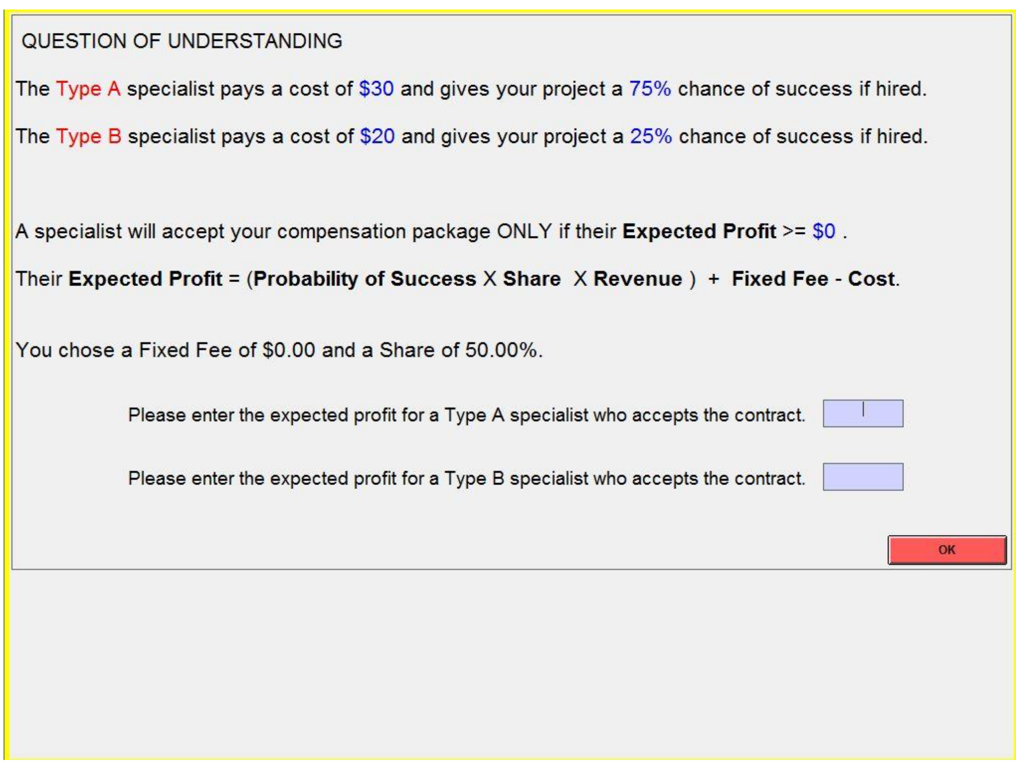
Description of rounds.



Summary of game



Subjects create their own example problem for the next screen



Questions about expected profit that must be answered.

THIS IS A PRACTICE PERIOD

The Type A specialist pays a cost of $30 and gives your project a 75% chance of success if hired.

The Type B specialist pays a cost of $20 and gives your project a 25% chance of success if hired.

A specialist will accept your compensation package ONLY if their **Expected Profit** >= $0 .
Their **Expected Profit** = (**Probability of Success** X **Share** X **Revenue**) + **Fixed Fee** - **Cost**.

Please enter what **Share** of the revenue to offer. (Min: 0, Max: 50)

Please enter what **Fixed Fee** to offer. (Min $0, Max $100)

OK

Practice round input screen (Cap50)

THIS IS A PRACTICE PERIOD

The Type A specialist accepted your compensation package.

The project was a success!

Your earnings for the round are $50.00

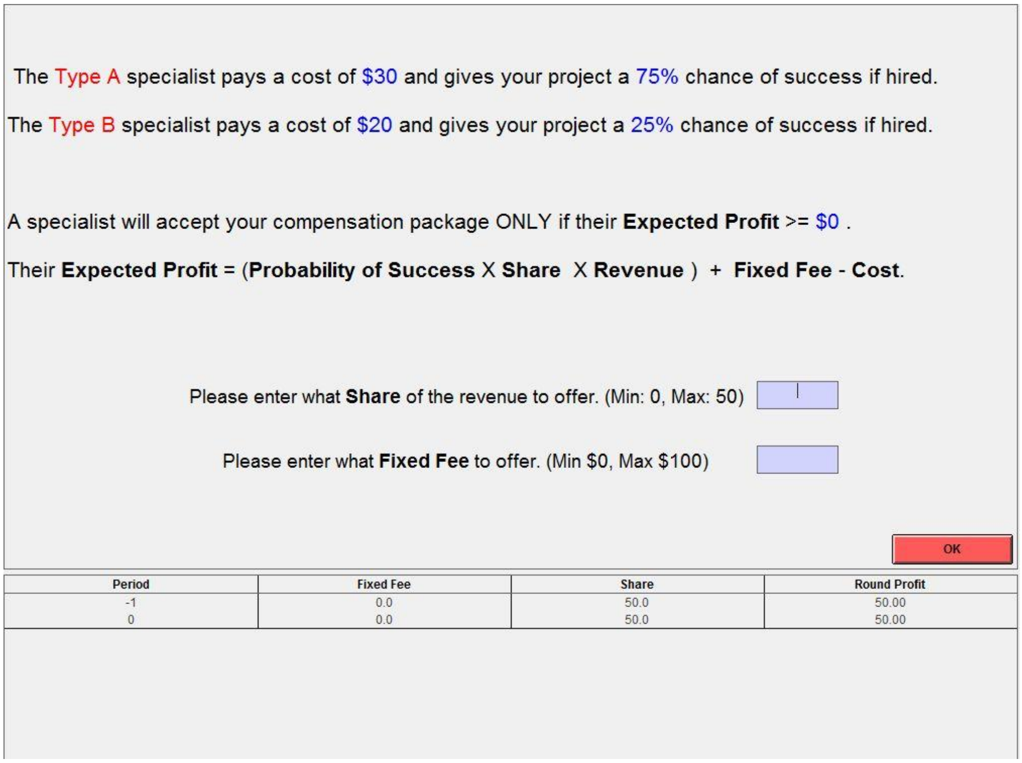
Your choice of **Fixed Fee** was $0.00 and your choice of **Revenue Share** was 50.00%

Specialist **Expected Profit** = **Probability of Success** X **Share** X $100 + **Fixed Fee** - **Cost**.

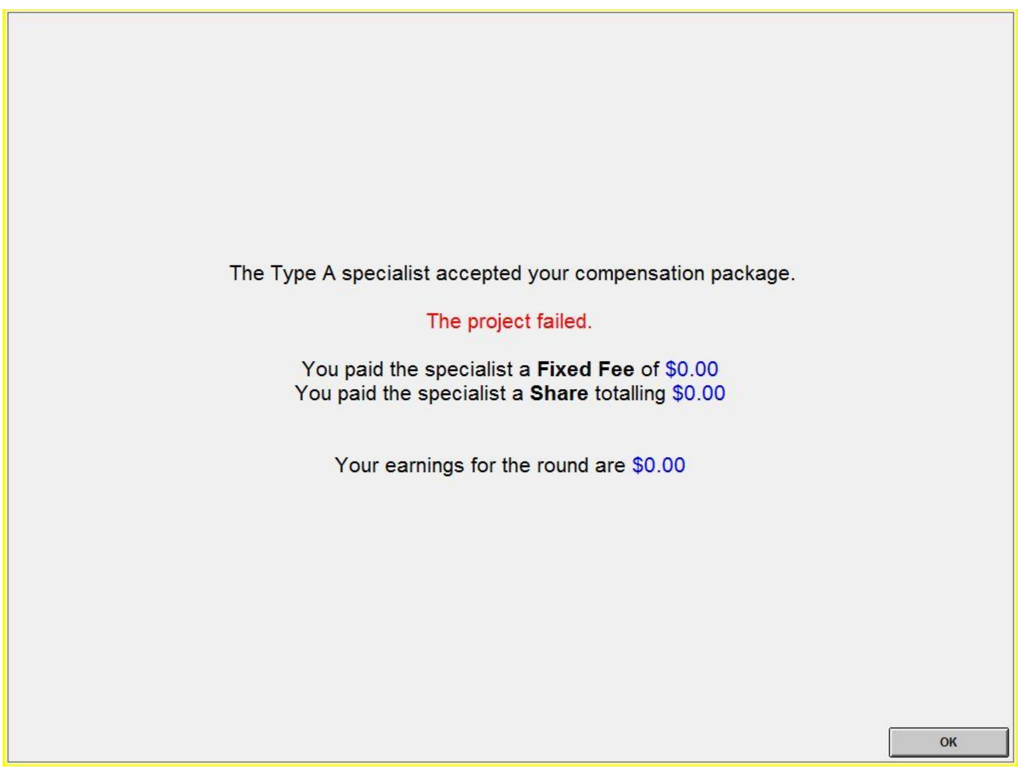
	Type A	Type B	You
Profit with Successful Outcome	0.50 X $100.00 + $0.00 - $30.00 = $20.00	0.50 X $100.00 + $0.00 - $20.00 = $30.00	(1 - 0.50) X $100.00 - $0.00 = $50.00
Profit with Unsuccessful Outcome	$0.00 - $30.00 = $-30.00	$0.00 - $20.00 = $-20.00	$0.00 - $0.00 = $0.00
Expected Profit	0.75 X 0.50 X $100.00+ $0.00 - $30.00 = $7.50	0.25 X 0.50 X $100.0 + $0.00 - $20.00 = $-7.50	

OK

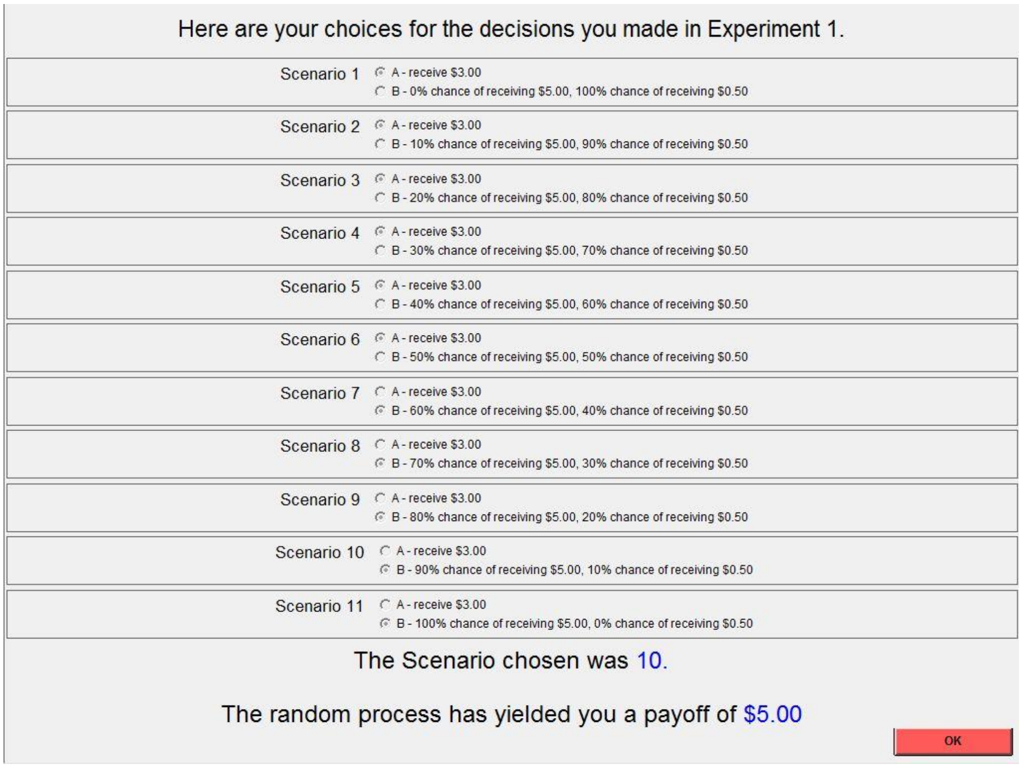
Results for the practice round.



Decision screen (Cap50 treatment)



Example results screen (project failed)



Here are your choices for the decisions you made in Experiment 1.

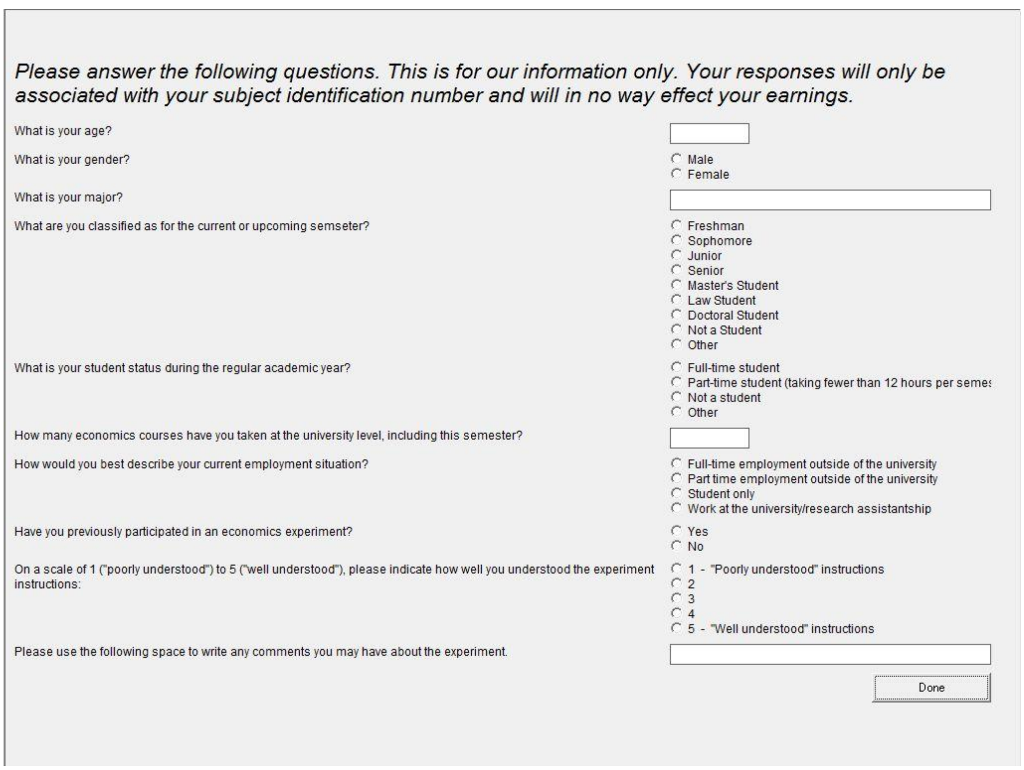
Scenario 1	A - receive $3.00 B - 0% chance of receiving $5.00, 100% chance of receiving $0.50
Scenario 2	A - receive $3.00 B - 10% chance of receiving $5.00, 90% chance of receiving $0.50
Scenario 3	A - receive $3.00 B - 20% chance of receiving $5.00, 80% chance of receiving $0.50
Scenario 4	A - receive $3.00 B - 30% chance of receiving $5.00, 70% chance of receiving $0.50
Scenario 5	A - receive $3.00 B - 40% chance of receiving $5.00, 60% chance of receiving $0.50
Scenario 6	A - receive $3.00 B - 50% chance of receiving $5.00, 50% chance of receiving $0.50
Scenario 7	A - receive $3.00 B - 60% chance of receiving $5.00, 40% chance of receiving $0.50
Scenario 8	A - receive $3.00 B - 70% chance of receiving $5.00, 30% chance of receiving $0.50
Scenario 9	A - receive $3.00 B - 80% chance of receiving $5.00, 20% chance of receiving $0.50
Scenario 10	A - receive $3.00 B - 90% chance of receiving $5.00, 10% chance of receiving $0.50
Scenario 11	A - receive $3.00 B - 100% chance of receiving $5.00, 0% chance of receiving $0.50

The Scenario chosen was 10.

The random process has yielded you a payoff of $5.00

OK

Results of risk-elicitation mechanism.



Please answer the following questions. This is for our information only. Your responses will only be associated with your subject identification number and will in no way effect your earnings.

What is your age?	
What is your gender?	Male Female
What is your major?	
What are you classified as for the current or upcoming semseter?	Freshman Sophomore Junior Senior Master's Student Law Student Doctoral Student Not a Student Other
What is your student status during the regular academic year?	Full-time student Part-time student (taking fewer than 12 hours per semes Not a student Other
How many economics courses have you taken at the university level, including this semester?	
How would you best describe your current employment situation?	Full-time employment outside of the university Part time employment outside of the university Student only Work at the university/research assistantship
Have you previously participated in an economics experiment?	Yes No
On a scale of 1 ("poorly understood") to 5 ("well understood"), please indicate how well you understood the experiment instructions:	1 - "Poorly understood" instructions 2 3 4 5 - "Well understood" instructions
Please use the following space to write any comments you may have about the experiment.	

Done

Questionnaire

Appendix G: Payoff Tables for Attorney Compensation Experiment

TYPE A - 75% chance of success

		SHARE OF REVENUE										
		0.0%	2.5%	5.0%	7.5%	10.0%	12.5%	15.0%	17.5%	20.0%	22.5%	25.0%
	$0.00	($30.00)	($28.13)	($26.25)	($24.38)	($22.50)	($20.63)	($18.75)	($16.88)	($15.00)	($13.13)	($11.25)
	$4.00	($26.00)	($24.13)	($22.25)	($20.38)	($18.50)	($16.63)	($14.75)	($12.88)	($11.00)	($9.13)	($7.25)
FIXED	$8.00	($22.00)	($20.13)	($18.25)	($16.38)	($14.50)	($12.63)	($10.75)	($8.88)	($7.00)	($5.13)	($3.25)
FEE	$12.00	($18.00)	($16.13)	($14.25)	($12.38)	($10.50)	($8.63)	($6.75)	($4.88)	($3.00)	($1.13)	$0.75
	$16.00	($14.00)	($12.13)	($10.25)	($8.38)	($6.50)	($4.63)	($2.75)	($0.88)	$1.00	$2.88	$4.75
	$20.00	($10.00)	($8.13)	($6.25)	($4.38)	($2.50)	($0.63)	$1.25	$3.13	$5.00	$6.88	$8.75
	$24.00	($6.00)	($4.13)	($2.25)	($0.38)	$1.50	$3.38	$5.25	$7.13	$9.00	$10.88	$12.75
	$28.00	($2.00)	($0.13)	$1.75	$3.63	$5.50	$7.38	$9.25	$11.13	$13.00	$14.88	$16.75
	$32.00	$2.00	$3.88	$5.75	$7.63	$9.50	$11.38	$13.25	$15.13	$17.00	$18.88	$20.75
	$36.00	$6.00	$7.88	$9.75	$11.63	$13.50	$15.38	$17.25	$19.13	$21.00	$22.88	$24.75
	$40.00	$10.00	$11.88	$13.75	$15.63	$17.50	$19.38	$21.25	$23.13	$25.00	$26.88	$28.75
	$44.00	$14.00	$15.88	$17.75	$19.63	$21.50	$23.38	$25.25	$27.13	$29.00	$30.88	$32.75
	$48.00	$18.00	$19.88	$21.75	$23.63	$25.50	$27.38	$29.25	$31.13	$33.00	$34.88	$36.75
	$52.00	$22.00	$23.88	$25.75	$27.63	$29.50	$31.38	$33.25	$35.13	$37.00	$38.88	$40.75
	$56.00	$26.00	$27.88	$29.75	$31.63	$33.50	$35.38	$37.25	$39.13	$41.00	$42.88	$44.75
	$60.00	$30.00	$31.88	$33.75	$35.63	$37.50	$39.38	$41.25	$43.13	$45.00	$46.88	$48.75
	$64.00	$34.00	$35.88	$37.75	$39.63	$41.50	$43.38	$45.25	$47.13	$49.00	$50.88	$52.75
	$68.00	$38.00	$39.88	$41.75	$43.63	$45.50	$47.38	$49.25	$51.13	$53.00	$54.88	$56.75
	$72.00	$42.00	$43.88	$45.75	$47.63	$49.50	$51.38	$53.25	$55.13	$57.00	$58.88	$60.75
	$76.00	$46.00	$47.88	$49.75	$51.63	$53.50	$55.38	$57.25	$59.13	$61.00	$62.88	$64.75
	$80.00	$50.00	$51.88	$53.75	$55.63	$57.50	$59.38	$61.25	$63.13	$65.00	$66.88	$68.75
	$84.00	$54.00	$55.88	$57.75	$59.63	$61.50	$63.38	$65.25	$67.13	$69.00	$70.88	$72.75
	$88.00	$58.00	$59.88	$61.75	$63.63	$65.50	$67.38	$69.25	$71.13	$73.00	$74.88	$76.75
	$92.00	$62.00	$63.88	$65.75	$67.63	$69.50	$71.38	$73.25	$75.13	$77.00	$78.88	$80.75
	$96.00	$66.00	$67.88	$69.75	$71.63	$73.50	$75.38	$77.25	$79.13	$81.00	$82.88	$84.75
	$100.00	$70.00	$71.88	$73.75	$75.63	$77.50	$79.38	$81.25	$83.13	$85.00	$86.88	$88.75

This chart provides you with the **expected profit** for the **Type A** specialist. This chart does **NOT** present your earnings

Type A attorney expected profit. Cap25 treatment.

TYPE B - 25% chance of success

		SHARE OF REVENUE										
		0.0%	2.5%	5.0%	7.5%	10.0%	12.5%	15.0%	17.5%	20.0%	22.5%	25.0%
	$0.00	($20.00)	($19.38)	($18.75)	($18.13)	($17.50)	($16.88)	($16.25)	($15.63)	($15.00)	($14.38)	($13.75)
	$4.00	($16.00)	($15.38)	($14.75)	($14.13)	($13.50)	($12.88)	($12.25)	($11.63)	($11.00)	($10.38)	($9.75)
	$8.00	($12.00)	($11.38)	($10.75)	($10.13)	($9.50)	($8.88)	($8.25)	($7.63)	($7.00)	($6.38)	($5.75)
	$12.00	($8.00)	($7.38)	($6.75)	($6.13)	($5.50)	($4.88)	($4.25)	($3.63)	($3.00)	($2.38)	($1.75)
	$16.00	($4.00)	($3.38)	($2.75)	($2.13)	($1.50)	($0.88)	($0.25)	$0.38	$1.00	$1.63	$2.25
	$20.00	$0.00	$0.63	$1.25	$1.88	$2.50	$3.13	$3.75	$4.38	$5.00	$5.63	$6.25
	$24.00	$4.00	$4.63	$5.25	$5.88	$6.50	$7.13	$7.75	$8.38	$9.00	$9.63	$10.25
	$28.00	$8.00	$8.63	$9.25	$9.88	$10.50	$11.13	$11.75	$12.38	$13.00	$13.63	$14.25
	$32.00	$12.00	$12.63	$13.25	$13.88	$14.50	$15.13	$15.75	$16.38	$17.00	$17.63	$18.25
FIXED	$36.00	$16.00	$16.63	$17.25	$17.88	$18.50	$19.13	$19.75	$20.38	$21.00	$21.63	$22.25
FEE	$40.00	$20.00	$20.63	$21.25	$21.88	$22.50	$23.13	$23.75	$24.38	$25.00	$25.63	$26.25
	$44.00	$24.00	$24.63	$25.25	$25.88	$26.50	$27.13	$27.75	$28.38	$29.00	$29.63	$30.25
	$48.00	$28.00	$28.63	$29.25	$29.88	$30.50	$31.13	$31.75	$32.38	$33.00	$33.63	$34.25
	$52.00	$32.00	$32.63	$33.25	$33.88	$34.50	$35.13	$35.75	$36.38	$37.00	$37.63	$38.25
	$56.00	$36.00	$36.63	$37.25	$37.88	$38.50	$39.13	$39.75	$40.38	$41.00	$41.63	$42.25
	$60.00	$40.00	$40.63	$41.25	$41.88	$42.50	$43.13	$43.75	$44.38	$45.00	$45.63	$46.25
	$64.00	$44.00	$44.63	$45.25	$45.88	$46.50	$47.13	$47.75	$48.38	$49.00	$49.63	$50.25
	$68.00	$48.00	$48.63	$49.25	$49.88	$50.50	$51.13	$51.75	$52.38	$53.00	$53.63	$54.25
	$72.00	$52.00	$52.63	$53.25	$53.88	$54.50	$55.13	$55.75	$56.38	$57.00	$57.63	$58.25
	$76.00	$56.00	$56.63	$57.25	$57.88	$58.50	$59.13	$59.75	$60.38	$61.00	$61.63	$62.25
	$80.00	$60.00	$60.63	$61.25	$61.88	$62.50	$63.13	$63.75	$64.38	$65.00	$65.63	$66.25
	$84.00	$64.00	$64.63	$65.25	$65.88	$66.50	$67.13	$67.75	$68.38	$69.00	$69.63	$70.25
	$88.00	$68.00	$68.63	$69.25	$69.88	$70.50	$71.13	$71.75	$72.38	$73.00	$73.63	$74.25
	$92.00	$72.00	$72.63	$73.25	$73.88	$74.50	$75.13	$75.75	$76.38	$77.00	$77.63	$78.25
	$96.00	$76.00	$76.63	$77.25	$77.88	$78.50	$79.13	$79.75	$80.38	$81.00	$81.63	$82.25
	$100.00	$80.00	$80.63	$81.25	$81.88	$82.50	$83.13	$83.75	$84.38	$85.00	$85.63	$86.25

This chart provides you with the **expected profit** for the **Type B** specialist. This chart does **NOT** present your earnings

Type B attorney expected profit. Cap25 treatment.

TYPE A - 75% chance of success												
	SHARE OF REVENUE											
		0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%
	$0.00	($30.00)	($26.25)	($22.50)	($18.75)	($15.00)	($11.25)	($7.50)	($3.75)	$0.00	$3.75	$7.50
	$4.00	($26.00)	($22.25)	($18.50)	($14.75)	($11.00)	($7.25)	($3.50)	$0.25	$4.00	$7.75	$11.50
FIXED	**$8.00**	($22.00)	($18.25)	($14.50)	($10.75)	($7.00)	($3.25)	$0.50	$4.25	$8.00	$11.75	$15.50
FEE	**$12.00**	($18.00)	($14.25)	($10.50)	($6.75)	($3.00)	$0.75	$4.50	$8.25	$12.00	$15.75	$19.50
	$16.00	($14.00)	($10.25)	($6.50)	($2.75)	$1.00	$4.75	$8.50	$12.25	$16.00	$19.75	$23.50
	$20.00	($10.00)	($6.25)	($2.50)	$1.25	$5.00	$8.75	$12.50	$16.25	$20.00	$23.75	$27.50
	$24.00	($6.00)	($2.25)	$1.50	$5.25	$9.00	$12.75	$16.50	$20.25	$24.00	$27.75	$31.50
	$28.00	($2.00)	$1.75	$5.50	$9.25	$13.00	$16.75	$20.50	$24.25	$28.00	$31.75	$35.50
	$32.00	$2.00	$5.75	$9.50	$13.25	$17.00	$20.75	$24.50	$28.25	$32.00	$35.75	$39.50
	$36.00	$6.00	$9.75	$13.50	$17.25	$21.00	$24.75	$28.50	$32.25	$36.00	$39.75	$43.50
	$40.00	$10.00	$13.75	$17.50	$21.25	$25.00	$28.75	$32.50	$36.25	$40.00	$43.75	$47.50
	$44.00	$14.00	$17.75	$21.50	$25.25	$29.00	$32.75	$36.50	$40.25	$44.00	$47.75	$51.50
	$48.00	$18.00	$21.75	$25.50	$29.25	$33.00	$36.75	$40.50	$44.25	$48.00	$51.75	$55.50
	$52.00	$22.00	$25.75	$29.50	$33.25	$37.00	$40.75	$44.50	$48.25	$52.00	$55.75	$59.50
	$56.00	$26.00	$29.75	$33.50	$37.25	$41.00	$44.75	$48.50	$52.25	$56.00	$59.75	$63.50
	$60.00	$30.00	$33.75	$37.50	$41.25	$45.00	$48.75	$52.50	$56.25	$60.00	$63.75	$67.50
	$64.00	$34.00	$37.75	$41.50	$45.25	$49.00	$52.75	$56.50	$60.25	$64.00	$67.75	$71.50
	$68.00	$38.00	$41.75	$45.50	$49.25	$53.00	$56.75	$60.50	$64.25	$68.00	$71.75	$75.50
	$72.00	$42.00	$45.75	$49.50	$53.25	$57.00	$60.75	$64.50	$68.25	$72.00	$75.75	$79.50
	$76.00	$46.00	$49.75	$53.50	$57.25	$61.00	$64.75	$68.50	$72.25	$76.00	$79.75	$83.50
	$80.00	$50.00	$53.75	$57.50	$61.25	$65.00	$68.75	$72.50	$76.25	$80.00	$83.75	$87.50
	$84.00	$54.00	$57.75	$61.50	$65.25	$69.00	$72.75	$76.50	$80.25	$84.00	$87.75	$91.50
	$88.00	$58.00	$61.75	$65.50	$69.25	$73.00	$76.75	$80.50	$84.25	$88.00	$91.75	$95.50
	$92.00	$62.00	$65.75	$69.50	$73.25	$77.00	$80.75	$84.50	$88.25	$92.00	$95.75	$99.50
	$96.00	$66.00	$69.75	$73.50	$77.25	$81.00	$84.75	$88.50	$92.25	$96.00	$99.75	$103.50
	$100.00	$70.00	$73.75	$77.50	$81.25	$85.00	$88.75	$92.50	$96.25	$100.00	$103.75	$107.50

This chart provides you with the **expected profit** for the **Type A** specialist. This chart does **NOT** present your earnings

Type A attorney expected profit. Cap50 treatment.

TYPE B - 25% chance of success												
				SHARE OF REVENUE								
		0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%
	$0.00	($20.00)	($18.75)	($17.50)	($16.25)	($15.00)	($13.75)	($12.50)	($11.25)	($10.00)	($8.75)	($7.50)
	$4.00	($16.00)	($14.75)	($13.50)	($12.25)	($11.00)	($9.75)	($8.50)	($7.25)	($6.00)	($4.75)	($3.50)
	$8.00	($12.00)	($10.75)	($9.50)	($8.25)	($7.00)	($5.75)	($4.50)	($3.25)	($2.00)	($0.75)	$0.50
	$12.00	($8.00)	($6.75)	($5.50)	($4.25)	($3.00)	($1.75)	($0.50)	$0.75	$2.00	$3.25	$4.50
	$16.00	($4.00)	($2.75)	($1.50)	($0.25)	$1.00	$2.25	$3.50	$4.75	$6.00	$7.25	$8.50
	$20.00	$0.00	$1.25	$2.50	$3.75	$5.00	$6.25	$7.50	$8.75	$10.00	$11.25	$12.50
	$24.00	$4.00	$5.25	$6.50	$7.75	$9.00	$10.25	$11.50	$12.75	$14.00	$15.25	$16.50
	$28.00	$8.00	$9.25	$10.50	$11.75	$13.00	$14.25	$15.50	$16.75	$18.00	$19.25	$20.50
	$32.00	$12.00	$13.25	$14.50	$15.75	$17.00	$18.25	$19.50	$20.75	$22.00	$23.25	$24.50
FIXED	**$36.00**	$16.00	$17.25	$18.50	$19.75	$21.00	$22.25	$23.50	$24.75	$26.00	$27.25	$28.50
FEE	**$40.00**	$20.00	$21.25	$22.50	$23.75	$25.00	$26.25	$27.50	$28.75	$30.00	$31.25	$32.50
	$44.00	$24.00	$25.25	$26.50	$27.75	$29.00	$30.25	$31.50	$32.75	$34.00	$35.25	$36.50
	$48.00	$28.00	$29.25	$30.50	$31.75	$33.00	$34.25	$35.50	$36.75	$38.00	$39.25	$40.50
	$52.00	$32.00	$33.25	$34.50	$35.75	$37.00	$38.25	$39.50	$40.75	$42.00	$43.25	$44.50
	$56.00	$36.00	$37.25	$38.50	$39.75	$41.00	$42.25	$43.50	$44.75	$46.00	$47.25	$48.50
	$60.00	$40.00	$41.25	$42.50	$43.75	$45.00	$46.25	$47.50	$48.75	$50.00	$51.25	$52.50
	$64.00	$44.00	$45.25	$46.50	$47.75	$49.00	$50.25	$51.50	$52.75	$54.00	$55.25	$56.50
	$68.00	$48.00	$49.25	$50.50	$51.75	$53.00	$54.25	$55.50	$56.75	$58.00	$59.25	$60.50
	$72.00	$52.00	$53.25	$54.50	$55.75	$57.00	$58.25	$59.50	$60.75	$62.00	$63.25	$64.50
	$76.00	$56.00	$57.25	$58.50	$59.75	$61.00	$62.25	$63.50	$64.75	$66.00	$67.25	$68.50
	$80.00	$60.00	$61.25	$62.50	$63.75	$65.00	$66.25	$67.50	$68.75	$70.00	$71.25	$72.50
	$84.00	$64.00	$65.25	$66.50	$67.75	$69.00	$70.25	$71.50	$72.75	$74.00	$75.25	$76.50
	$88.00	$68.00	$69.25	$70.50	$71.75	$73.00	$74.25	$75.50	$76.75	$78.00	$79.25	$80.50
	$92.00	$72.00	$73.25	$74.50	$75.75	$77.00	$78.25	$79.50	$80.75	$82.00	$83.25	$84.50
	$96.00	$76.00	$77.25	$78.50	$79.75	$81.00	$82.25	$83.50	$84.75	$86.00	$87.25	$88.50
	$100.00	$80.00	$81.25	$82.50	$83.75	$85.00	$86.25	$87.50	$88.75	$90.00	$91.25	$92.50

This chart provides you with the **expected profit** for the **Type B** specialist. This chart does **NOT** present your earnings

Type B attorney expected profit. Cap50 treatment.

TYPE A - 75% chance of success

		SHARE OF REVENUE																				
		0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%	80.0%	85.0%	90.0%	95.0%	100.0%
	$0.00	($30.00)	($26.25)	($22.50)	($18.75)	($15.00)	($11.25)	($7.50)	($3.75)	$0.00	$3.75	$7.50	$11.25	$15.00	$18.75	$22.50	$26.25	$30.00	$33.75	$37.50	$41.25	$45.00
	$4.00	($26.00)	($22.25)	($18.50)	($14.75)	($11.00)	($7.25)	($3.50)	$0.25	$4.00	$7.75	$11.50	$15.25	$19.00	$22.75	$26.50	$30.25	$34.00	$37.75	$41.50	$45.25	$49.00
FIXED	**$8.00**	($22.00)	($18.25)	($14.50)	($10.75)	($7.00)	($3.25)	$0.50	$4.25	$8.00	$11.75	$15.50	$19.25	$23.00	$26.75	$30.50	$34.25	$38.00	$41.75	$45.50	$49.25	$53.00
FEE	**$12.00**	($18.00)	($14.25)	($10.50)	($6.75)	($3.00)	$0.75	$4.50	$8.25	$12.00	$15.75	$19.50	$23.25	$27.00	$30.75	$34.50	$38.25	$42.00	$45.75	$49.50	$53.25	$57.00
	$16.00	($14.00)	($10.25)	($6.50)	($2.75)	$1.00	$4.75	$8.50	$12.25	$16.00	$19.75	$23.50	$27.25	$31.00	$34.75	$38.50	$42.25	$46.00	$49.75	$53.50	$57.25	$61.00
	$20.00	($10.00)	($6.25)	($2.50)	$1.25	$5.00	$8.75	$12.50	$16.25	$20.00	$23.75	$27.50	$31.25	$35.00	$38.75	$42.50	$46.25	$50.00	$53.75	$57.50	$61.25	$65.00
	$24.00	($6.00)	($2.25)	$1.50	$5.25	$9.00	$12.75	$16.50	$20.25	$24.00	$27.75	$31.50	$35.25	$39.00	$42.75	$46.50	$50.25	$54.00	$57.75	$61.50	$65.25	$69.00
	$28.00	($2.00)	$1.75	$5.50	$9.25	$13.00	$16.75	$20.50	$24.25	$28.00	$31.75	$35.50	$39.25	$43.00	$46.75	$50.50	$54.25	$58.00	$61.75	$65.50	$69.25	$73.00
	$32.00	$2.00	$5.75	$9.50	$13.25	$17.00	$20.75	$24.50	$28.25	$32.00	$35.75	$39.50	$43.25	$47.00	$50.75	$54.50	$58.25	$62.00	$65.75	$69.50	$73.25	$77.00
	$36.00	$6.00	$9.75	$13.50	$17.25	$21.00	$24.75	$28.50	$32.25	$36.00	$39.75	$43.50	$47.25	$51.00	$54.75	$58.50	$62.25	$66.00	$69.75	$73.50	$77.25	$81.00
	$40.00	$10.00	$13.75	$17.50	$21.25	$25.00	$28.75	$32.50	$36.25	$40.00	$43.75	$47.50	$51.25	$55.00	$58.75	$62.50	$66.25	$70.00	$73.75	$77.50	$81.25	$85.00
	$44.00	$14.00	$17.75	$21.50	$25.25	$29.00	$32.75	$36.50	$40.25	$44.00	$47.75	$51.50	$55.25	$59.00	$62.75	$66.50	$70.25	$74.00	$77.75	$81.50	$85.25	$89.00
	$48.00	$18.00	$21.75	$25.50	$29.25	$33.00	$36.75	$40.50	$44.25	$48.00	$51.75	$55.50	$59.25	$63.00	$66.75	$70.50	$74.25	$78.00	$81.75	$85.50	$89.25	$93.00
	$52.00	$22.00	$25.75	$29.50	$33.25	$37.00	$40.75	$44.50	$48.25	$52.00	$55.75	$59.50	$63.25	$67.00	$70.75	$74.50	$78.25	$82.00	$85.75	$89.50	$93.25	$97.00
	$56.00	$26.00	$29.75	$33.50	$37.25	$41.00	$44.75	$48.50	$52.25	$56.00	$59.75	$63.50	$67.25	$71.00	$74.75	$78.50	$82.25	$86.00	$89.75	$93.50	$97.25	$101.00
	$60.00	$30.00	$33.75	$37.50	$41.25	$45.00	$48.75	$52.50	$56.25	$60.00	$63.75	$67.50	$71.25	$75.00	$78.75	$82.50	$86.25	$90.00	$93.75	$97.50	$101.25	$105.00
	$64.00	$34.00	$37.75	$41.50	$45.25	$49.00	$52.75	$56.50	$60.25	$64.00	$67.75	$71.50	$75.25	$79.00	$82.75	$86.50	$90.25	$94.00	$97.75	$101.50	$105.25	$109.00
	$68.00	$38.00	$41.75	$45.50	$49.25	$53.00	$56.75	$60.50	$64.25	$68.00	$71.75	$75.50	$79.25	$83.00	$86.75	$90.50	$94.25	$98.00	$101.75	$105.50	$109.25	$113.00
	$72.00	$42.00	$45.75	$49.50	$53.25	$57.00	$60.75	$64.50	$68.25	$72.00	$75.75	$79.50	$83.25	$87.00	$90.75	$94.50	$98.25	$102.00	$105.75	$109.50	$113.25	$117.00
	$76.00	$46.00	$49.75	$53.50	$57.25	$61.00	$64.75	$68.50	$72.25	$76.00	$79.75	$83.50	$87.25	$91.00	$94.75	$98.50	$102.25	$106.00	$109.75	$113.50	$117.25	$121.00
	$80.00	$50.00	$53.75	$57.50	$61.25	$65.00	$68.75	$72.50	$76.25	$80.00	$83.75	$87.50	$91.25	$95.00	$98.75	$102.50	$106.25	$110.00	$113.75	$117.50	$121.25	$125.00
	$84.00	$54.00	$57.75	$61.50	$65.25	$69.00	$72.75	$76.50	$80.25	$84.00	$87.75	$91.50	$95.25	$99.00	$102.75	$106.50	$110.25	$114.00	$117.75	$121.50	$125.25	$129.00
	$88.00	$58.00	$61.75	$65.50	$69.25	$73.00	$76.75	$80.50	$84.25	$88.00	$91.75	$95.50	$99.25	$103.00	$106.75	$110.50	$114.25	$118.00	$121.75	$125.50	$129.25	$133.00
	$92.00	$62.00	$65.75	$69.50	$73.25	$77.00	$80.75	$84.50	$88.25	$92.00	$95.75	$99.50	$103.25	$107.00	$110.75	$114.50	$118.25	$122.00	$125.75	$129.50	$133.25	$137.00
	$96.00	$66.00	$69.75	$73.50	$77.25	$81.00	$84.75	$88.50	$92.25	$96.00	$99.75	$103.50	$107.25	$111.00	$114.75	$118.50	$122.25	$126.00	$129.75	$133.50	$137.25	$141.00
	$100.00	$70.00	$73.75	$77.50	$81.25	$85.00	$88.75	$92.50	$96.25	$100.00	$103.75	$107.50	$111.25	$115.00	$118.75	$122.50	$126.25	$130.00	$133.75	$137.50	$141.25	$145.00

This chart provides you with the **expected profit** for the **Type A** specialist. This chart does **NOT** present your earnings

Type A attorney expected profit. Cap100 treatment.

TYPE B - 25% chance of success

		SHARE OF REVENUE																				
		0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%	80.0%	85.0%	90.0%	95.0%	100.0%
	$0.00	($20.00)	($18.75)	($17.50)	($16.25)	($15.00)	($13.75)	($12.50)	($11.25)	($10.00)	($8.75)	($7.50)	($6.25)	($5.00)	($3.75)	($2.50)	($1.25)	$0.00	$1.25	$2.50	$3.75	$5.00
	$4.00	($16.00)	($14.75)	($13.50)	($12.25)	($11.00)	($9.75)	($8.50)	($7.25)	($6.00)	($4.75)	($3.50)	($2.25)	($1.00)	$0.25	$1.50	$2.75	$4.00	$5.25	$6.50	$7.75	$9.00
	$8.00	($12.00)	($10.75)	($9.50)	($8.25)	($7.00)	($5.75)	($4.50)	($3.25)	($2.00)	($0.75)	$0.50	$1.75	$3.00	$4.25	$5.50	$6.75	$8.00	$9.25	$10.50	$11.75	$13.00
	$12.00	($8.00)	($6.75)	($5.50)	($4.25)	($3.00)	($1.75)	($0.50)	$0.75	$2.00	$3.25	$4.50	$5.75	$7.00	$8.25	$9.50	$10.75	$12.00	$13.25	$14.50	$15.75	$17.00
	$16.00	($4.00)	($2.75)	($1.50)	($0.25)	$1.00	$2.25	$3.50	$4.75	$6.00	$7.25	$8.50	$9.75	$11.00	$12.25	$13.50	$14.75	$16.00	$17.25	$18.50	$19.75	$21.00
	$20.00	$0.00	$1.25	$2.50	$3.75	$5.00	$6.25	$7.50	$8.75	$10.00	$11.25	$12.50	$13.75	$15.00	$16.25	$17.50	$18.75	$20.00	$21.25	$22.50	$23.75	$25.00
	$24.00	$4.00	$5.25	$6.50	$7.75	$9.00	$10.25	$11.50	$12.75	$14.00	$15.25	$16.50	$17.75	$19.00	$20.25	$21.50	$22.75	$24.00	$25.25	$26.50	$27.75	$29.00
	$28.00	$8.00	$9.25	$10.50	$11.75	$13.00	$14.25	$15.50	$16.75	$18.00	$19.25	$20.50	$21.75	$23.00	$24.25	$25.50	$26.75	$28.00	$29.25	$30.50	$31.75	$33.00
	$32.00	$12.00	$13.25	$14.50	$15.75	$17.00	$18.25	$19.50	$20.75	$22.00	$23.25	$24.50	$25.75	$27.00	$28.25	$29.50	$30.75	$32.00	$33.25	$34.50	$35.75	$37.00
FIXED	**$36.00**	$16.00	$17.25	$18.50	$19.75	$21.00	$22.25	$23.50	$24.75	$26.00	$27.25	$28.50	$29.75	$31.00	$32.25	$33.50	$34.75	$36.00	$37.25	$38.50	$39.75	$41.00
FEE	**$40.00**	$20.00	$21.25	$22.50	$23.75	$25.00	$26.25	$27.50	$28.75	$30.00	$31.25	$32.50	$33.75	$35.00	$36.25	$37.50	$38.75	$40.00	$41.25	$42.50	$43.75	$45.00
	$44.00	$24.00	$25.25	$26.50	$27.75	$29.00	$30.25	$31.50	$32.75	$34.00	$35.25	$36.50	$37.75	$39.00	$40.25	$41.50	$42.75	$44.00	$45.25	$46.50	$47.75	$49.00
	$48.00	$28.00	$29.25	$30.50	$31.75	$33.00	$34.25	$35.50	$36.75	$38.00	$39.25	$40.50	$41.75	$43.00	$44.25	$45.50	$46.75	$48.00	$49.25	$50.50	$51.75	$53.00
	$52.00	$32.00	$33.25	$34.50	$35.75	$37.00	$38.25	$39.50	$40.75	$42.00	$43.25	$44.50	$45.75	$47.00	$48.25	$49.50	$50.75	$52.00	$53.25	$54.50	$55.75	$57.00
	$56.00	$36.00	$37.25	$38.50	$39.75	$41.00	$42.25	$43.50	$44.75	$46.00	$47.25	$48.50	$49.75	$51.00	$52.25	$53.50	$54.75	$56.00	$57.25	$58.50	$59.75	$61.00
	$60.00	$40.00	$41.25	$42.50	$43.75	$45.00	$46.25	$47.50	$48.75	$50.00	$51.25	$52.50	$53.75	$55.00	$56.25	$57.50	$58.75	$60.00	$61.25	$62.50	$63.75	$65.00
	$64.00	$44.00	$45.25	$46.50	$47.75	$49.00	$50.25	$51.50	$52.75	$54.00	$55.25	$56.50	$57.75	$59.00	$60.25	$61.50	$62.75	$64.00	$65.25	$66.50	$67.75	$69.00
	$68.00	$48.00	$49.25	$50.50	$51.75	$53.00	$54.25	$55.50	$56.75	$58.00	$59.25	$60.50	$61.75	$63.00	$64.25	$65.50	$66.75	$68.00	$69.25	$70.50	$71.75	$73.00
	$72.00	$52.00	$53.25	$54.50	$55.75	$57.00	$58.25	$59.50	$60.75	$62.00	$63.25	$64.50	$65.75	$67.00	$68.25	$69.50	$70.75	$72.00	$73.25	$74.50	$75.75	$77.00
	$76.00	$56.00	$57.25	$58.50	$59.75	$61.00	$62.25	$63.50	$64.75	$66.00	$67.25	$68.50	$69.75	$71.00	$72.25	$73.50	$74.75	$76.00	$77.25	$78.50	$79.75	$81.00
	$80.00	$60.00	$61.25	$62.50	$63.75	$65.00	$66.25	$67.50	$68.75	$70.00	$71.25	$72.50	$73.75	$75.00	$76.25	$77.50	$78.75	$80.00	$81.25	$82.50	$83.75	$85.00
	$84.00	$64.00	$65.25	$66.50	$67.75	$69.00	$70.25	$71.50	$72.75	$74.00	$75.25	$76.50	$77.75	$79.00	$80.25	$81.50	$82.75	$84.00	$85.25	$86.50	$87.75	$89.00
	$88.00	$68.00	$69.25	$70.50	$71.75	$73.00	$74.25	$75.50	$76.75	$78.00	$79.25	$80.50	$81.75	$83.00	$84.25	$85.50	$86.75	$88.00	$89.25	$90.50	$91.75	$93.00
	$92.00	$72.00	$73.25	$74.50	$75.75	$77.00	$78.25	$79.50	$80.75	$82.00	$83.25	$84.50	$85.75	$87.00	$88.25	$89.50	$90.75	$92.00	$93.25	$94.50	$95.75	$97.00
	$96.00	$76.00	$77.25	$78.50	$79.75	$81.00	$82.25	$83.50	$84.75	$86.00	$87.25	$88.50	$89.75	$91.00	$92.25	$93.50	$94.75	$96.00	$97.25	$98.50	$99.75	$101.00
	$100.00	$80.00	$81.25	$82.50	$83.75	$85.00	$86.25	$87.50	$88.75	$90.00	$91.25	$92.50	$93.75	$95.00	$96.25	$97.50	$98.75	$100.00	$101.25	$102.50	$103.75	$105.00

This chart provides you with the **expected profit** for the **Type B** specialist. This chart does **NOT** present your earnings

Type B attorney expected profit. Cap100 treatment.

VITA

Stephen James Cotten was born in Dallas, TX on April 06, 1982. He was raised in Franklin, TN and graduated from Battle Ground Academy in 1999. He received his Bachelor of Science in Computer Science, Mathematics, and History from Vanderbilt University in 2003. He received his M.A. in Economics from the University of Tennessee at Knoxville in 2006 and his Ph.D. in Economics from the same in 2009. Stephen will be joining the faculty of the University of Houston – Clear Lake as Assistant Professor of Economics in August 2009.