BRIBERY, REGULATORS, AND FIRMS: CORRUPTION IN THE S & L INDUSTRY, 1982-89

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ABSTRACT

A bribe is anything, usually money, offered to someone to do something illegal. This paper builds a simple 2-player, 2-sided incomplete information game with bribery as one of its strategic possibilities. The paper then solves the game using all dominant strategies available at equilibrium. There is a nondegenerate subset of the parameter space where all firms in financial difficulty offer bribes to their regulators, and all dishonest regulators accept these bribes. The model is applied to developments in the Savings & Loan industry of the United States, 1982-89.

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by

Roy Gardner and Werner Güth

I. Introduction

A bribe is anything, usually money, offered to a person to do something illegal. Bribery is the act of offering a bribe. Although the definition of bribery allows for any motivation on the part of the person offering the bribe, the most important case is when the illegal act benefits the person offering the bribe. Consider a failing Savings & Loan Association (S&L). If the S&L is technically bankrupt then, according to the law, it should be shut down. When the regulator moves in to shut it down, the S&L offers the regulator cash or other considerations in exchange for not shutting it down. This act benefits the owner of the S&L, since the exposure of bankruptcy means that the owners lose all their capital investment, as well as the opportunity to attract new business.[1] This paper studies bribery which is payoff motivated using the theory of games of incomplete information. Any such study calls for an immediate disclaimer. The analysis does not provide a manual for would-be acceptors or offerers of bribes. Providing such a manual, although possible, conflicts with the notion of a well-ordered society. Rather, we are interested in what influences the likelihood of bribery as a strategy in society. In our view, such an understanding is an important prerequisite for fighting bribery and its undesirable consequences. Bribery corrodes institutions, just as inflation erodes money. Both are social evils, and need to be understood in order to be combatted.

Illegal behavior often requires additional efforts on the part of those being bribed, since they need to hide their acceptance of the bribe and subsequent illegal action. This will not be true in a situation where regulators have discretionary power which they wield according to rather general guidelines. In such a situation, there may even exist a mutual interest between the regulator and the firm being regulated. For the regulator to explore in detail what is socially best requires a serious effort. This effort can be reduced, if not completely eliminated, by strategic use of one's discretionary power at the very same time that one is accepting a bribe. The regulator of a failing S&L has a much easier inspection if he declares the thrift sound on the basis of his bureaucratic judgment, unhindered by the financial facts.

No single game can capture all the relevant aspects of every situation with potential for bribery. Our model contains those aspects which appear to be crucial: incomplete information and signalling. Incomplete information is inevitable in a regulatory setting. The regulator does not have detailed knowledge about the firm it is regulating, nor does the firm have detailed knowledge about the regulator's susceptibility to bribes. However, when signalling moves are available, then information about a player's type may be transmitted by behavior. Such transmissions appear to be important in real world cases of bribery. In the interests of tractability, our model is a two player game, with the players being the regulator and the firm. One should think of this one-on-one interaction as emblematic of the interactions between regulatory institutions and the entire industry.

The paper is organized as follows: section two lays out the simplest incomplete information game in extensive form that is played between the regulator and the firm; section three studies dominant strategy equilibria of this game, and shows the extent to which game equilibrium reveals information; section four applies the model to developments in the Savings and Loan industry of the United States, 1982-89, the period of greatest crisis and corruption; and the conclusion offers suggestions for further research.

II. A Simple Game Model of Bribery

There are two players: player 1, the regulator, and player 2, the firm. All firms in the industry are subject to some form of regulation which can impact their payoffs. Each player can be one of two types. The regulator can either be type 1 (honest) or type 2 (dishonest). A dishonest regulator will accept a large enough bribe. There is a standard size bribe which is large enough to induce a dishonest regulator, but not large enough to induce an honest regulator, to do the firm's bidding. Similarly, there are two types of firms, type 1 (healthy) and type 2 (ailing). A healthy firm will survive without any regulatory favors, while an ailing firm faces the prospect of bankruptcy. Each player knows his own type, but does not know the type of the other player, so that the game is one of 2-sided incomplete information. The incomplete information on each side is represented by a probability distribution. With probability p, the regulator is honest; with probability q, the firm is healthy. Thus, one has the following constellation of type-pairs: (honest regulator, healthy firm) with probability pq; (honest regulator, ailing firm) with probability p(1-q); (dishonest regulator, healthy firm) with probability (1-p)q; and (dishonest regulator, ailing firm) with probability (1-p)(1-q). The following notation will prove convenient. Let ij index player i/type j. Then the pair (ij,kl) represents the type of each player present. For instance, (11,21) represents player 1 type 1 (honest regulator), player 2 type 1 (healthy firm).

The game begins with a random move which assigns types to players according to the above probability distribution. Each player observes his own type, but not that of the other. The regulator goes first, and can either express interest in entertaining a bribe, or lack of interest in entertaining a bribe.[2] Simultaneously, the firm offers a bribe or does not offer a bribe. In the event that the regulator does not express interest in a bribe or the firm does not offer a bribe, the game ends. In the event that the regulator has expressed interest in entertaining a bribe and a bribe has actually been offered, then the regulator automatically accepts the bribe and does the firm the favor it desires. The game ends at this point.

Notice that the game structure allows for play to completely reveal all information held by the players. Suppose that all honest regulators express no interest in a bribe, while all dishonest regulators express interest in a bribe. Then the regulator's action at the beginning of the game reveals its type. Similarly, suppose all healthy firms do not offer bribes, while all ailing firms do offer bribes. Then the firm's action reveals its type. We will be especially interested in game equilibria with the property that they reveal the types of one or both players. An equilibrium which reveals the types of both players will be called 2-sided separating; an equilibrium which reveals the type of one side, 1-sided separating — since it separates one type from the other.

Besides complete separation of the sort described above, partial separation is also possible. For example, suppose some honest regulators and all dishonest regulators express interest in a bribe. Then if the regulator expresses no interest in a bribe, the firm can be sure it is honest, but if the regulator expresses interest in a bribe, the firm cannot be sure whether the regulator is honest or dishonest. A similar situation can occur on the firm side also. Such equilibria are called partially separating, and can occur on either side. Finally, it can be the case that both types do the same thing — for example, all regulators, regardless of type, express interest in a bribe. Such equilibria are called pooling, and reveal no information about a player's type. Table 1 presents the various logically possible information outcomes of signalling play. One of the main goals of the game analysis is to see which, if any, of these outcomes can be sustained as a game equilibrium.

[Table 1 about here]

We now turn to payoffs. There is a standard size bribe B. A regulator of either type accepting a bribe from either type firm receives the payoff B. If an honest regulator shows no interest in a bribe, he receives the payoff F(1); if dishonest, F(2). These represent the utility of resisting temptation for each type of regulator. The type distinction is made clear by the following assumption:

$$F(1) > B > F(2).$$

For a dishonest regulator, taking the bribe is better than resisting temptation, while for an honest regulator, the reverse is true. The benchmark utility of 0 for a regulator of either type is reserved for the situation in which the regulator shows interest in entertaining a bribe but neither type of firm offers one. Such a firm has not resisted temptation, nor has it collected a bribe.

All firms have a standard size capital C. A healthy firm earns a sure rate of return r on its capital, and so receives a payoff equal to rC. Any bribes B offered by a healthy firm must be deducted from rC, so a healthy firm offering a bribe which is accepted gets the payoff rC-B. There is nothing a regulator, honest or dishonest, can do for a healthy firm, but there is something a regulator can do for an ailing firm. First of all, an ailing firm earns no return on its capital. Worse yet, such a firm is in danger of losing all its capital C through bankruptcy. Let q(l) denote the probability that an ailing firm goes bankrupt if it does not receive regulatory help. Then the expected payoff to an ailing firm if no interest is shown in a bribe (or if it offers no bribe) is

$$q(1)(-C) + (1-q(1))(0) = -q(1)C.$$

On the other hand, suppose an ailing firm does offer a bribe which is accepted. Then the favor the regulator does for the firm is expressed as a new, reduced probability of bankruptcy q(2), where

$$0 < q(2) < q(l).$$

At the same time, the ailing firm must pay the standard bribe B. The expected value that results is

$$q(2)(-C) + (l-q(2))(0) - B = -q(2)C-B.$$

Whether an ailing firm prefers to enhance its chances of not going bankrupt by offering a bribe depends on the size of the bribe relative to its capital, B/C, and on how much smaller q(2) is compared to q(l). Thus, in addition to the 2 parameters (p,q) expressing the incomplete information in the game, there are 7 payoff parameters (B,F(l),F(2),C,r,q(l),q(2)). Even this simple bribery game has 9 different parameters in all. A parameter space this rich makes solving a game all the more challenging. It is to the solution of the simplest bribery game that we now turn.

III. Solving the Bribery Game

The best way to follow the solution of the bribery game is to analyze the decision facing each type of each player separately. This is done graphically in Figures 1 and 2. Consider first an honest regulator (Figure la), one for whom resisting temptation is better than accepting a bribe (F(l) > B). This player has two strategies, to show interest in a bribe ("I") and not to show interest in a bribe ("NT"). An honest regulator does not know whether he is regulating a healthy or an ailing firm. In particular, he does not know which type of player 2 is offering ("O") or not offering ("NO") him a bribe. Thus, the regulator faces a vector of strategies, one for each type of firm. The following notation will prove useful. Let NI(11) represent an honest regulator showing no interest; NI(12), a dishonest regulator showing no interest; 1(11), an honest regulator showing interest; and 1(12), a dishonest regulator showing no interest. A similar convention applies to firms. For instance, if healthy firms are offering bribes (0(21)) and ailing firms are not offering bribes (NO(22)), then the regulator faces the vector (O(21),NO(22)). Suppose the regulator shows interest in such a case. With probability q, he is facing a healthy firm, and healthy firms are offering bribes, so his payoff is B. With probability (1-q), he is facing an ailing firm, and ailing firms are not offering bribes, so his payoff is 0. His expected payoff is

$$qB + (l-q)0 = qB,$$

as shown in the matrix in Figure la. By the assumption that F(l) > B, it is clear that not showing interest is a dominant strategy for an honest regulator.

[Figures 1 and 2 about here]

Next, consider a dishonest regulator, one for whom accepting a bribe is better than resisting temptation ($B > F(1)$). This type of regulator's payoffs are shown in Figure 1b. Unlike the honest regulator, this player does not have a dominant strategy, since $B > F(2)$ (so not showing interest does not dominate showing interest) and $F(2) > 0$ (so showing interest does not dominate not showing interest). The dishonest regulator clearly wants to show interest when both types of firms are offering bribes. When at least one type of firm is not offering a bribe, there are four possible cases:

- Case 12/1. $qB > F(2)$, $(1-q)B > F(2)$. This could be the case for instance when q is near 0.5 and $F(2)/B$ is well below 0.5. In this case, the dishonest regulator still wants to show interest.
- Case 12/2. $qB > F(2) > (1-q)B$. This could be the case when q is near 1. In this case, the dishonest regulator only wants to show interest if healthy firms offer bribes.
- Case 12/3. $(1-q)B > F(2) > qB$. This is the mirror image of Case 2. In this case, the dishonest regulator only wants to show interest if ailing firms offer bribes.
- Case 12/4. $F(2) > qB$, $F(2) > (1-q)B$. This is the mirror image of Case 1. In this case, the dishonest regulator does not want to show interest.

Thus, unlike the case for the honest regulator, the dishonest regulator has distinct preferences for showing interest and not showing interest in a bribe, depending on the details of the situation.[3]

We now look at the game from the point of view of the firm. Consider a healthy firm, one which earns rate of return r on its capital C whether or not it gets a regulatory favor. The payoffs for this type of firm are shown in Figure 2a. This type of firm again faces a vector of strategies by the regulator, depending on the type of regulator choosing the strategy. Clearly, this type of player has a dominant strategy (offering a bribe costs something if accepted, but has no benefit) not to offer a bribe. Finally, consider an ailing firm, one which is helped out by a regulatory favor absent paying the bribe. The payoffs for this type of firm are shown in Figure 2b. Here, there are two cases to consider:

- Case 22/1. $-q(1)C > -q(2)C - B$. In this case, the ailing firm prefers to take its chances of going bankrupt unaided rather than bribe the regulator to lessen its chances of going under. Rearranging the above inequality, one has $B/C > q(1) - q(2)$, which has a simple interpretation. The reduction in the probability of bankruptcy, $q(1) - q(2)$, is less than the percentage of capital at risk which is definitely eaten up by the bribe, B/C. The probability effect is small relative to the bribe.

- Case 22/2. $-q(2)C - B > -q(1)C$. In this case, the ailing firm prefers paying the bribe and lessening its chances of going bankrupt rather than going it alone. Now the reduction in the probability of bankruptcy is greater than the capital at risk which is paid in the bribe. The probability effect is large relative to the bribe which makes paying the bribe worthwhile.

A pure strategy vector x for this game is a vector of 4 components specifying the play of each type of regulator and each type of firm. Since each type of each player has two possible pure strategies, there are 2**4 = 16 pure strategy vectors for the bribery game. For instance, one of these is:

x = (I(11),I(12),O(21),O(22)).

At this strategy vector, each type of regulator shows interest in a bribe, and each type of firm offers a bribe. This is one of the four strategy vectors that is completely uninformative. Table 1 lists each of the information outcomes possible using pure strategies, and the pure strategy vectors that realize them. What we are after, of course, is which of these information outcomes can be sustained as a game equilibrium.

The strongest possible equilibrium is an equilibrium in dominant strategies. As we have seen, honest regulators and healthy firms have dominant strategies, namely show no interest in a bribe (NI(ll)) and do not offer a bribe (NO(21)) respectively. We will use these as the strategy components in the game equilibria we select throughout:

x = (NI(ll),-,NO(21),-~).

These restrictions still leave 4 strategy vectors, one for each information outcome, as possible game equilibria. We will now show that for each of the information outcomes, there is a subset of the parameter space where that outcome is sustained by a game equilibrium using all available dominant strategies.

There are eight regions of interest in the parameter space, as shown in Table 2, corresponding to the 4 cases of dishonest regulator and the two cases of ailing firm. We investigate each of these regions in turn:

Regions 12/1, 22/1; 12/2,22/1; 12/3,22/1; 12/4,22/1. In each of these regions, the ailing firm satisfies -q(l)C > -q(2)C-B. Thus, it has a dominant strategy not to offer a bribe, NO(22). The dishonest regulator then faces the vector of dominant strategies

$$x = (NI(ll),—,NO(21),NO(22))$$

to which his best response is not to show interest, NI(12). For these four regions, one has the equilibrium vector

$$x = (NI(11),NI(12),NO(21),NO(22)). \qquad (1)$$

(1) is a pooling equilibrium, which reveals no information. Also, no corruption is manifest at this equilibrium. We call the regime where (1) is the equilibrium selected Honesty.

[Table 2 about here]

In the remaining four regions, the ailing firm has a dominant strategy to offer a bribe, 0(22). The dishonest regulator then faces the vector of dominant strategies

$$x = (NI(11),-,NO(21),O(22)).$$

His best response to this strategy vector depends on the relation of (l-q)B to F(2).

Regions 12/1,22/2; 12/3,22/2. In these two regions (l-q)B > F(2). Since the ailing firm is offering a bribe, the dishonest regulator wants to show interest, 1(12). The equilibrium strategy vector is

$$x = (NI(11),I(12),NO(21),O(22)). \qquad (2)$$

(2) is a fully separating equilibrium: both types of each player behave differently at equilibrium. There is also plenty of opportunities for bribery and corruption,too — whenever a dishonest regulator and an ailing firm play, a bribe is sure to be offered and accepted. We call the regime where (2) is the equilibrium selected Bribery.

Regions 12/2,22/2; 12/4,22/2. In these two regions (l-q)B < F(2). Even though the ailing firm is offering a bribe, the dishonest regulator does not want to show interest in it, NI(12). The equilibrium strategy vector is

$$x = (NI(11), NI(12), NO(21), O(22)) \qquad (3)$$

again restricting players to use dominant strategies. The ailing firm is indifferent between offering and not offering a bribe in (3), since neither type of firm is showing interest. (3) pools the regulators, but separates the firms. We call the regime where (3) is the equilibrium selected Dishonest Firms.

To summarize, there are three equilibrium behavior regimes. In the regime of equilibrium (1), no regulator shows interest in a bribe and no firm offers a bribe. This regime, Honesty, lacks any trace of corruption. In this regime, no information is revealed about either player's type. In the regime of equilibrium (2), dishonest regulators show interest in a bribe and ailing firms offer a bribe. This regime, Bribery, has maximal corruption, with only honest regulators and healthy firms avoiding bribes. Equilibrium behavior perfectly signals type, since only ailing firms offer bribes and only dishonest regulators show interest in them. In the regime of equilibrium (3), no regulators show interest in a bribe, although ailing firms still offer them. In this regime, Dishonest Firms, the equilibrium reveals only the type of firm, not the type of regulator. This regime has a whiff of corruption—the bribes are there, it's just that nobody is interested in accepting them. However, if there get to be enough ailing firms, (1-q) gets large, hence so does (l-q)B), then behavior jumps from this regime to Dishonesty, and the bribe offers get accepted. The regime diagram of Figure 3 illustrates this phenomenon.

[Figure 3 about here]

IV. An Application to the S&L Industry of the United States, 1982-1989

The bribery game has been built in order to model the interactions between firms and regulators in a regulated industry. One industry in the U.S. where regulation is especially important is financial intermediation. The S&L industry has experienced considerable difficulties in recent years. We now take a more detailed look at this industry, in light of our results on bribery and signalling.

Financial intermediaries specializing in home loans had existed in the United States for over a century prior to the financial collapse of 1929-33. Thousands of S&Ls went under during that period. In the ensuing Federal reform of the financial services sector, a system of regional federal banks, the Federal Home Loan Banks, was created, together with a regulatory board, the Federal Home Loan Bank Board (FHLBB), in Washington D.C. S&Ls that joined the federal system were supervised by their regional federal home loan bank. From 1934 on, deposits in member S&Ls were insured by an agency of the federal government, the Federal Savings and Loan Insurance Corporation (FSLIC), up to some maximum amount.[4] Interest rates allowed on deposits, as well as composition of the loan portfolio and ownership features, were set by federal law and regulatory fiat.[5] Moreover, FSLIC conducted regular inspections of member S&Ls to monitor compliance. FSLIC could report institutions not in compliance to FHLBB, which had the authority to seize the assets of these S&Ls. The major asset of the industry (over 75%) was the 30-year, fixed-rate home mortgage. Rising interest rates, innovation in the financial industry (most notably, the money market mutual fund), and the inflation of the late 60s and 70s brought the industry to the verge of collapse. By 1980, industry net worth had gone negative, and the federal government faced the unhappy prospect of paying for the rescue of the entire industry. Rather than a direct bailout, industry spokesmen and lobbyists pleaded for deregulation instead. These pleas were heeded, and the industry was gradually deregulated. The most important dates in the process of deregulation were 1980, when interest rate controls on deposits were removed, and 1982, when portfolio restrictions were relaxed. From that moment on, S&Ls were allowed (1) to offer money market funds, (2) to loan up to 40% of the assets in nonresidential real estate, and (3) to have a single owner.

The intention behind these measures was to make S&Ls more competitive with other financial intermediaries, to stimulate new capital to flow into the industry, and to encourage new investment in commercial real estate, all at no cost to the federal government. These were all good intentions, but flawed in their consequences. Of the over 4,000 S&Ls in the federal system, about 1,000 were ailing (hence, $1-q = 25\%$), had negative capital. Their owners had large incentives to try to hit the jackpot in the real estate market, and thus, turn the S&L around. If an owner did hit the jackpot, he got to keep the winnings; if he didn't, then the federal government got to pay off the depositors. These owners literally had nothing to lose by taking large risks, since essentially all deposits were insured.[6]

The only thing that could possibly prevent this risk-maximizing strategy was closure by the regulators. Although federal law continued to require periodic examinations of S&Ls, the S&L itself actually paid for the examination, and the S&L was not required to report the results of any examination to federal authorities. As Pizzo, Fricker and Muolo put it, "It was then up to the thrift officers to take corrective action or, presumably, to turn themselves in if they had broken the law. This policy resembled requiring a fire marshal to report to Nero that Rome was ablaze" (48).

Since the S&L was paying for the examination anyway, it was perfectly placed to offer a bribe with practically no chance of detection (an important feature of the simple model). Typical forms that bribes took included cash, gifts, or the promise of future employment (the so-called revolving door, where regulators switch jobs to the industry they formerly regulated) in exchange for a fraudulent examination report. Indeed, one S&L, Centennial Savings and Loan, of Guerneville, California, hired no less than seven of its former examiners as employees.[7]

Some ailing S&Ls went to extraordinary lengths to stay open. Several S&Ls accessed their representatives and senators in an attempt to get the regulators off their backs. Two instances of this have been especially heavily publicized. Vernon Savings and Loan of Dallas, Texas, enjoyed unusually good access to then Speaker of the House, Jim Wright. Wright arranged for the chairman of FHLBB to meet with the owner of the thrift for the purpose of giving the thrift a reprieve from closure.[8] The owner of Lincoln Savings and Loan of Irvine, California, Charles Keating, was able to arrange two meetings between the chairman of the FHLBB and five United States Senators (the so-called Keating Five) for a similar purpose.[9]

The following scenario appears to have played out in the S&L industry from 1982 on. (See again the regime diagram in Figure 3.) The industry started out in the regime Honesty in 1982. Deregulation increased the value of keeping an ailing S&L open (an increase in C(q(l)-q(2)) relative to B), pushing the industry into the regime Dishonest Firms. As more and more S&Ls became sick (the odds on hitting the jackpot in commercial real estate were very bad), the industry moved into the regime Bribery. The number of ailing S&Ls had risen to 1,700 (1 - q = 1,700/4,000 = 42%) by 1986. Ailing firms were offering bribes and dishonest agents of the regulators were accepting them. However, it took several years in this regime before the full extent of the industry's ailment was revealed to the public—which revelation one should expect at a revelatory equilibrium. The period under consideration closes in 1989, with the dismantling of the FSLIC (what S&L deposits remain are now insured by the Federal Deposit Insurance Corporation) and the creation of the Resolution Trust Corporation (to liquidate the assets of the seized S&Ls). The ailing firms had ceased to exist, along with part of the regulatory apparatus.

V. Conclusion

This paper has built a simple model of bribery and solved it using all available dominant strategies at equilibrium. Even this simple model appears to shed light on the unfortunate outcomes observed in the Savings and Loan industry of the United States, 1982-89. A more complicated model would be even better. One obvious extension is to repeat the game over time. This would allow for the building of reputations based on information revealed at each repetition. Another extension would be to have both types of firms in difficulty, one more serious than the other. This would remove a good deal of the dominant strategy flavor from the solution of the game. One could also have the signalling stage played sequentially, rather than simultaneously. This would allow one to use equilibrium refinements such as uniform perfection in the analysis. Finally, one have a final stage where, if bribery was present, then those involved might be caught and punished with some positive probability. In an earlier version of this paper (Gardner, Guth, and Ostrom, 1992), we analyze some of these extensions. Although it is exhausting to solve more complicated games for every possible parameter configuration, the regimes outlined above are robust to various extensions of the game studied in this paper.

ENDNOTES

1. This benefit is only temporary, since eventually the information about bankruptcy will come out. In the meantime, however, the public can be an enormous loser, especially those unfortunate enough to make deposits into the S&L.

2. Exactly how this signal is transmitted is culturally dependent. In Egypt, for example, a public official opens a deskdrawer and leaves it open to signal his interest in a bribe. In the United States, a regulator might say to the firm, "Your examination went badly, but perhaps I could help you with it."

3. The lives of the honest person are simple: they always tell the truth. The lives of the dishonest are complex: they are constantly deciding whether to lie or not, and which lie to tell if they do die. Our bribery model reflects this complexity.

4. The original limit was $5,000. This limit had risen by 1982 to $100,000.

5. For example, an S&L had to make most of its loans to residential real estate, and no single individual could own more than 25% of an S&L.

6. The deposit insurance limit of $100,000 applied to an account, not to an account holder. There was no limit on the number of accounts an individual could hold.

7. Centennial was closed by federal authorities in 1985. A subsequent audit turned up $165 million in missing assets. Several officers of the S&L served prison terms for embezzlement.

8. Vernon failed on March 20, 1987. At that time, 96% of all its loans were in default. Wright later resigned from the Speakership of the House in the wake of an ethics probe.

9. Lincoln Savings and Loan eventually failed in 1989, again with over 90% of its loans in default. Keating was sentenced to 10 years in prison for bank fraud, which he is currently serving. All members of the Keating Five received substantial campaign contributions from Keating. One of the five, Senator Cranston of California, was censured by the U.S. Senate for his conduct in this matter.

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TABLE 1

INFORMATION REVEALED BY STRATEGY VECTORS

STRATEGIES	INFORMATION
I(11), NI(12), O(11), NO(12)	Separates Both Sides
I(11), NI(12), NO(11), O(12)	"
NI(11), I(12), O(11), NO(12)	"
NI(11), I(11), NO(12), O(12)	"
I(11), NI(12), O(11), O(12)	Separates Regulators Only
I(11), NI(12), NO(11), NO(12)	"
NI(11), I(12), O(11), O(12)	"
NI(11), I(12), NO(11), NO(12)	"
I(11), I(12), O(21), NO(22)	Separates Firms Only
I(11), I(12), NO(21), O(22)	"
NI(11), NI(12), O(21), NO(22)	"
NI(11), NI(12), NO(21), O(22)	"
I(11), I(12), O(21), 0(22)	No Separation, Either Side
I(11), I(12), NO(21), NO(22)	"
NI(11), NI(12), O(21), O(22)	"
NI(11), NI(12), NO(21), NO(22)	"

TABLE 2

REGIMES

	22/1	22/2
12/1	Honesty	Bribery
12/2	Honesty	Dishonest Firms
12/3	Honesty	Bribery
12/4	Honesty	Dishonest Firms

FIGURE 1

THE GAME AS SEEN BY THE REGULATOR

Figure 1a. Honest

21.22					
		O(21),O(22)	O(21),NO(22)	NO(21),O(22)	NO(21),NO(22)
11	I(11)	B	qB	(1-q)B	0
	NI(11)	F(1)	F(1)	F(1)	F(1)

Figure 1b. Dishonest

21.22					
		O(21),O(22)	O(21),NO(22)	NO(21),O(22)	NO(21),NO(22)
12	I(12)	B	qB	(1-q)B	0
	NI(12)	F(2)	F(2)	F(2)	F(2)

FIGURE 2

THE GAME AS SEEN BY THE FIRM

Figure 2a. Healthy

		11.12			
		I(11),I(12)	I(11),NI(12)	NI(11),I(12)	NI(11),NI(12)
21	O(21)	rC - B	rC - pB	rC - (1-p)B	rC
	NO(21)	rC	rC	rC	rC

Figure 2b. Ailing

		11.12			
		I(11),I(12)	I(11),NI(12)	NI(11),I(12)	NI(11),NI(12)
22	O(22)	-q(2)C - B	p[-q(2) C-B] + (1-p)(-q(1)C	p(-q(11C) + (1-p)(-q(2)C-B	-q(1)C
	NO(22)	-q(1)C	-q(1)C	-q(1)C	-q(1)C

FIGURE 3

REGIME DIAGRAM