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Abstract

The following is a model of psychological contracting with unmonitorable performance, implicit offers, and screening for non-performance by the announcement of the expectation of performance. It is motivated by the $250 billion prescription drug industry, which spends $19 billion per year on marketing to US doctors, mostly on 'gifts', and often, as at Yale, with no monitoring for reciprocation. In one revealing incident, a drug firm representative closed her presentation to Yale medical residents by handing out $150 medical reference books and remarking, "one hand washes the other." By the next day, half the books were returned. I model this with a one shot psychological trust game with negative belief preferences and asymmetric information. I show that the 'shame' of accepting a *possible* bribe can screen for reciprocation inducing 'guilt'. An announcement can extend the effect. Current policies to deter reciprocation might aid such screening. I also discuss applications like vote buying when voting is unobservable and why taxis drivers in Naples announce inflated fares *after* their service is sunk.

JEL Codes: C72, D82, D86, H51, H75, I11, I18, M31, M37, M41

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1 Introduction

Medical professionals, health policy makers, and the public have become increasingly concerned at the coincidence of:

1) rising expenditure on prescription drugs: $64 billion in 1995, $151 billion in 2001 and $252 billion in 2006 [Herper and Kang, 2006] (with an estimated one-quarter of this increase resulting from a shift to the prescribing of more expensive drugs [Dana and Loewenstein, 2003])

2) extraordinary profitability of drug firms not commensurate with innovation: 76% were deemed only "moderately more efficacious" by the US Food and Drug Administration [Dana and Loewenstein, 2003], and

3) large expenditures on marketing to doctors: $18,000-$29,000 [Brennan et. al., 2006] per doctor per year – mostly on 'gifts.'

(See Appendix B: Background on Pharmaceutical Industry Gift Giving for more details.) A revealing incident occurred several years ago at Yale New Haven Hospital. After the pharmaceutical firm representative (Drug Rep) closed her presentation to Yale medical residents (doctors in training) by handing out medical reference books worth $150, she unexpectedly remarked, that "one hand washes the other" (from now on referred to as "insinuation"). By the next day, half the books were returned. According to an informal survey by the Director of the residency program, those who returned the books claimed that they were shocked by the drug rep's quid pro quo offer. The other half claimed that they had known the bribing intent all along, had discounted the gesture, and hence, would not have been influenced in their prescribing[1].

This incident raises several questions of economic interest.

[1]Reported by a former Yale Medical resident Melinda L. Randall.

A) Why are gifts given when they cannot be conditioned on increased prescribing? Yale, for example, does not release prescribing data to drug firms[2].

B) How can an announcement make a good into a bad?

C) Under what conditions would the Drug Rep want to make such an announcement?

I address these questions in a model of psychological contracting where: 1) performance is unmonitorable, 2) offers are veiled (which captures the usual case where gifts are given and nothing is said), and 3) the mere announcement of the expectation of performance (e.g., "one hand washes the other...") can either enforce performance or screen for non-performance. Applied to Yale incident, I show that the shame of accepting a *possible* bribe, rather than being a hindrance to bribing, can in fact be instrumental to making effective bribes.

In this introduction, I will develop my model by ruling out simpler models. Due to unmonitorability, any model of this situation would have to be one shot. But, in a game where the Drug Rep (she) can give a gift, or not, and the Doctor (he) has a choice of reciprocating at some cost, or not, the Doctor would not reciprocate and hence, the Drug Rep would not give. Even if we were to make this a standard psychological game, where the Doctor felt **guilt**[3] (here, the product of guilt sensitivity and the Doctor's belief about the Drug Rep's belief in reciprocation) from disappointing the expectation of the Drug Rep for reciprocation, that would not explain the announcement and its effect – returned books. Similarly, "kindness" as in [Rabin, 1993], could be a motive for reciprocation, but not for rejection. Nor would the mere introduction of **shame (**the product of shame sensitivity and 2nd order expectation for reciprocation**),** as in [Tadelis, 2008], explain the Yale incident. Tadelis showed that the threat of merely being observed can deter a bad action. But here, the subsequent prescribing of the doctors was not observable.

To explain the announcement and rejection, I introduce asymmetric information into a psychological game where negative belief preferences (shame and guilt) are

[2]Private communication with the Director of Pharmacy Services at Yale-New Haven Hospital.

[3]See [Battigalli and Dufwenberg, 2008] for a general model of guilt, and [Charness and Dufwenberg, 2006] and [Fong et. al., 2007] for experimental evidence that guilt can induce reciprocation.

differentially affected by it. There are now two types of Drug Reps, a bribing type, who only gives in the expectation of reciprocation, and a non-bribing type, who likes to give [4]. There are two types of Doctors, a highly shame averse type (H) and a not so highly shame averse type (L). Reciprocation is shameful but unobservable before a passive player, the Patient[5].

The sequence of play is as follows. Nature moves to choose the types of Drug Reps and Doctors facing each other. The Drug Rep can then: 1) give a gift, 2) give and insinuate, and 3) not give, where 2) is more costly for the non-bribing Drug Rep. Each type of Doctor observes the Drug Rep's choice and updates his beliefs on the type of Drug Rep he faces. The Doctor then chooses to accept or reject given the shame of acceptance. Observers update their beliefs on which type of Doctor is accepting. Each type of Doctor chooses to reciprocate or not given his guilt.

Due to asymmetric information about the Drug Rep's type, the Doctor's guilt now depends upon his belief that he is facing the bribing Drug Rep *and* his belief that the bribing Drug Rep is expecting reciprocation from *his type*. Due to unobservability of the shameful act (reciprocation), an otherwise innocuous act, acceptance, is shameful for *everyone* when *anyone* reciprocates. Formally, the shame of acceptance is now the product of each type of Doctor's shame sensitivity and the *type weighted beliefs about beliefs* about the rates of reciprocation of *all types* of Doctors who accept. In other words, shame is here modelled as a function of ex ante beliefs, while guilt is modelled as a function of ex post beliefs[6]. Equilibrium behavior then becomes driven by the interplay between, shame, the public bad among all types who accept, and guilt, the private bad of each who disappoints an expectation for reciprocation from his type[7]. The announcement, which increases guilt at non-reciprocation, in-

[4] As reported in the Yale incident and as shown in surveys [Kaiser Foundation Survey, 2001], a significant portion did not suspect that drug firms are out to influence their prescribing with gifts. Drug firms promotional material try to confirm this impression. See their websites (e.g., www.pfizer.com). Hospitals, including Yale, have instructional interventions for doctors to explain how drug firms may be trying to influence them.

[5] The doctor can be interpreted as feeling shame at acceptance before a passive player, the Patient, or other doctors, or even before the Drug Rep herself.

[6] This is consistent with the psychological and economics literature. See [Tadelis, 2008] and [Tangney, Dearing, 2002].

[7] Thus, in a partial pooling equilibrium, where both types of Doctors are accepting, but only H

creases reciprocation, which increases the ex-ante expectation of reciprocation, which increases the shame of acceptance and hence, *decreases* acceptance. Thus due to the interplay between shame and guilt, the Drug Rep is thus faced with a trade-off between reciprocation per acceptance and acceptance in deciding how much to veil her offer.

The model is predictive given the correlation between shame and guilt sensitivities of the Doctors present. Equilibrium 1 captures the ideal situation for the bribing Drug Rep; when she just gives a gift and all types of Doctors reciprocate. The most interesting cases are when some types of Doctors are accepting but not reciprocating, i.e., free-riding. One such case is where there is strong negative correlation between shame and guilt sensitivities (Equilibrium 3). Then, a gift alone can screen for non-reciprocation. In this case, H, the type who is *most* sensitive to shame, and hence, *most* likely to reject, is *least* sensitive to guilt and hence, *least likely to reciprocate*. To cause this H to reject, the Drug Rep can merely buy a cheaper gift before the game begins (Equilibrium 2). In contrast, when there is not strong negative correlation, a gift alone cannot screen for non-reciprocation. For example, with positive correlation, L, the type who is the *least* sensitive to shame, and hence, *least* likely to reject, is the *least* sensitive to guilt, and hence, *least likely to reciprocate* (Equilibrium $3H$). A gift rejected by L would also be rejected by H, the type who *is most likely to reciprocate*. In some of these cases, the Drug Rep can increase the guilt of L enough by insinuating to cause him to reciprocate (Equilibrium $4L$). However, when observers are sure that whoever accepts is reciprocating, H could be too shamed to accept. If instead H had been free-riding, as can be the case when there is weakly negative correlation (Equilibrium $3L$), the Drug Rep can in some of these cases get rid of H by insinuating

is reciprocating, only the H type can feel guilt in deviating to not reciprocate. However, though L is not reciprocating (and hence, not expected to) he will nonetheless feel the same shame as H at acceptance, because the Patient cannot tell them apart. In other words, shame is a function of the ex-ante belief of reciprocation (because the Patient does not know which type of Doctor is accepting) and guilt is a function of the ex-post belief (because each type of Doctor knows what is expected of him in equilibrium). Thus, in a pooling equilibrium, shame is a public bad among all who accept, but guilt is a private bad for each who does not reciprocate, *when he is expected to reciprocate*. It is the interaction between these two bads that drives the behavior of the Doctors, and ultimately, the behavior of the Drug Rep.

(Equilibrium 6). Furthermore, even if H had been reciprocating (Equilibrium $\bar{3}H$), if the shame externality of L reciprocating would force a trade-off between either H accepting or L accepting, the Drug Rep could still choose L (Equilibrium $5L$).

Assuming that the Drug Rep insinuated rationally in the Yale incident, my results show that those who kept the gift and said that they would not have reciprocated were in fact lying. Those who had rejected the gift were lying only if Equilibrium $4L$ applied.

In the policy section, I show that:

1. Perversely, gift ceilings, gift registries, educational interventions can *help* the Proposer screen for reciprocation because they act like insinuation.

2. Bans on gifts imply off-equilibrium beliefs that shame all doctors, even those who would not have accepted. This helps to explain why bans, the most obvious solution, has been used only in a handful of hospitals.

3. Surveys of doctors beliefs about what their colleagues *would do,* had they accepted an expensive gift, can enlist non-credible shame to deter those *who would have accepted and not reciprocated* from accepting[8].

"Sorting with Shame in the Laboratory" [Ong, 2008a] simulated aspects of the incentives of the above Yale incident in a controlled laboratory experiment and confirmed the prediction that shame can sort.

1.0.1 Other Applications

Beyond the $252 billion US prescription drug market, the $89 billion student loan industry also employed gifts to market loan products to financial aid councilors. Preliminary research indicates that, like drug firms, loan firms could not monitor for reciprocation in the form of recommendations of their products to students, and

[8]The off-equilibrium belief results arise from a novel notion of "belief supports," which contain beliefs about what a type of Doctor *would have done, had he accepted.* Such an unreached belief support may contain non-credible beliefs about what that doctor H *would have done had he accepted.* More details in section 3.4.5.

may also have relied upon psychological factors like guilt and shame to target gifts to get reciprocation. Guilt and shame may have important unobservable influence on the subjective judgments of credit rating and accounting agencies when their consulting arms get lucrative contracts. Reciprocation for bribes in elections are also unobservable. After voters accept the bribe, they can still vote however they like. Shame modulated by insinuation may also be used there to screen for reciprocation.

My model may also help explain more mundane behavior like why taxi drivers in Naples, who have no meters, tell you the price of the ride after you arrive, when their service is sunk. Announcing a high price after arrival would be rational, if those who were less likely to ask for the price before the ride, e.g., out of shame from looking cheap, would also be averse to disappointing the taxi driver after arriving.

A scandal in a fiduciary field can change expectations just like insinuation did in the Yale incident. In [Ong, 2008a], I show how the shame from a scandal may sort out those who are most trustworthy from a fiduciary field, as Enron may have done in accounting. That raises the question of how expert professions might select for trustworthy people and hence, conserve the trust they need to function. Using another variant of this model, I demonstrate in [Ong, 2008b] why the pro bono work among doctors, which amounted to $12 billion in 2001, may help screen out people who would cheat on their patients, and hence damage the reputation of all doctors. I use another variant of this model to capture the phenomena of bundling to avoid shame in consumer products (e.g., the inclusion of political articles with female nudes in Playboy during the 1950s or Biblical themes in nudes in the Renaissance). (See [Ong, 2008c] for details.)

The model is in section 2. I define the equilibrium concept in section 3.1, develop aspects of equilibria in section 3.2 and list propositions proved in section 3.3. See game tree in Appendix A. Proofs are in available upon request.

2 The Model

Let $\theta_1 \in \{B, \neg B\}$ denote the Proposer's (his) types, where B stands for bribing and $\neg B$ for not bribing. B only gives in the expectation of reciprocation. The expectation

of reciprocation is not inferrable from $\neg B$ giving[9]. (See below for more details on payoffs.) $\sigma_{\theta_2} \in R_+$ is the shame aversion of the θ_2 type $\theta_2 \in \{H, L\}$ or Responder (her) where $\sigma_H > \sigma_L$, where H stands for highly shame averse and L stands for not highly shame averse. A type also has a guilt aversion $\gamma_{\theta_2} \in R_+$, which I specify per equilibrium. The presence of a passive observer (the Patient) is reflected in the Responder's heightened shame sensitivity.

The sequence of play is:

1. Nature moves first to choose the B Proposer with probability p_1 and L Responder with probability p_2.

2. Each type of Proposer may give a gift $\neg i$ or give and insinuate i or not give [10].

3. Each type of Responder may accept a or reject $\neg a$

4. If he accepts, he may reciprocate r or not reciprocate $\neg r$, unobserved by the Proposer.

The game tree is in Appendix A. The action is ommitted since nothing interesting happens if the Proposer does not want to give. To avoid introducing further notation in an already complicated model, I will use these action letters a and r also stand for mixed behavioral strategies where appropriate,e.g., when they determine equilibrium beliefs.

2.1 Responder's Payoff

v =value of the gift. e =cost of reciprocation. $v > e \geq 0$.

[9] A casual perusal of drug firm websites will show that drug firm promotion portray drug firms as altruistic, or the least, not just profit maximizing. As late as 2001, 40% of doctors did not realize that drug firms monitored their prescribing patterns [Kaiser Foundation Survey, 2001]. According to [Madhavan et. al., 1997], "physicians *slightly agreed* that pharmaceutical companies give gifts to physicians to influence their prescribing." Thus, it seems plausible that to physicians, there could be an altruistic drug firm, in which case, no expectation of reciprocation can be inferred.

[10] The "not give" option is ommitted from the tree to avoid further clutter. This is no loss because those equilibria without giving are uninteresting.

For each type of Responder $\theta_2 \in \{H, L\}$:

γ_{θ_2} =guilt sensitivity where $\gamma_{\theta_2}(B) > 0$ and $\gamma_{\theta_2}(\neg B) = 0$.

σ_{θ_2} =shame sensitivity where $\sigma_{\theta_2} \geq 0$.

$I \in \mathcal{I}$ is information set of the Proposer (and Patient) after Responder accepts, modelling the Proposer's uncertainty as to which type of Responder accepted and whether that type is reciprocating or not. There are four such information sets, one for each combination of Proposer and her actions: $\mathcal{I} = \{I_{Bi}, I_{B\neg i}, I_{\neg Bi}, I_{\neg B\neg i}\}$. Each of those information sets contain four possible histories, which differ only as to whether a certain type of Responder reciprocated or not[11].

μ_1 =updated belief that the Proposer is the B type given that she gives, gives and insinuates or does not give.

μ_2 =updated belief that the Responder is the L type given observed acceptance.

Since the Responder has preferences over Proposer's beliefs, in equilibrium, he will, in a sense to be defined in the equilibrium concept below, have *beliefs in his utility function.* $\bar{\rho}(I)$ and $\rho_{\theta_2}(I)$ should be interpreted as payoff parameters when in utility functions and beliefs otherwise. They are equal in equilibrium.

$\bar{\rho}(I)$ =Responder's belief about the observer's belief about the rate of reciprocation of whoever is accepting at $I \in \mathcal{I}$. Hence, $\bar{\rho}(I) = 1$ would be the 2nd order belief that "whoever accepts reciprocates."

$\rho_{\theta_2}(I)$ =Responder θ_2's belief of observers' belief about θ_2's rate of reciprocation after acceptance. Hence, $\rho_{\theta_2}(I) = 1$ would be the θ_2's 2nd order belief that "if I accept, I would be expected to reciprocate."

In equilibrium, the average rate of reciprocation conditional on acceptance $\bar{\rho}(I)$ is the μ_2 weighted average of *beliefs about the rate of reciprocation* $\rho_{\theta_2}(I)$ of each type θ_2 conditional on acceptance. The conditional beliefs are used here because I

[11] In I_{bi}, where the bribing Proposer (b) has insinuated (i), for example, the possible histories would be:

$$\{(BL, i, a, r), (BL, i, a, \neg r), (Bc, i, a, r), (Bc, i, a, \neg r)\}$$

assume that Responders care about the beliefs of Proposers only if they accept.

$$\bar{\rho}(I) = \rho_L(I) \cdot \mu_2 + \rho_H(I) \cdot (1 - \mu_2) \tag{1}$$

The support of $\rho_{\theta_2}(I)$ is represented by dashed 'belief support sets' in the tree in Appendix A. The standard information sets which enclose the belief support sets represent the uncertainty of an observer who knows neither which type is accepting, nor whether they are reciprocating.

Payoff of Responder after:

1. non-acceptance: 0.
2. accepting and reciprocateing: $v - e - \sigma_{\theta_2}\bar{\rho}(I)$.
3. accepting and not reciprocating: $v - \mu_1\gamma_{\theta_2}\rho_{\theta_2}(I) - \sigma_{\theta_2}\bar{\rho}(I)$.

2.2 Proposer's Payoff

I assume that insinuation is free for the B Proposer, who cares only about material payoffs. Hence, his payoffs from insinuating or not depends only upon the Responder's consequent acceptance and rate of reciprocation, in which acceptance increases costs by k and reciprocation increases revenue by R. Let $\mathbf{i} \in \{0, 1\}$ be the rate of insinuation for the Proposer and $\mathbf{r_i}$ be the rate of reciprocation for the Responder. The profits for the B Proposer is then:

$$\pi_B(\mathbf{i}, \mathbf{r_i}) = (\mathbf{r_i} \cdot R + (1 - \mathbf{r_i}) \cdot 0 - k) = (\mathbf{r_i}R - k) \tag{2}$$

Since the B Proposer is not sure about which type of Responder she is facing, she chooses $\mathbf{i}$ to maximize her expected payoffs:

$$\max_{\mathbf{i}} E(\pi_B(\mathbf{i}, \mathbf{r_i})) = \max_{\mathbf{i}} \{\mu_2(\mathbf{r}_{L\mathbf{i}}R - k) + (1 - \mu_2)(\mathbf{r}_{H\mathbf{i}}R - k)\} \tag{3}$$

The game is uninteresting if the Proposer does not give. Clearly, the B Proposer will only give if she is making non-negative profits. This requires that, if either type

of Responder accepts, at least one reciprocates; fixing a choice of either $\mathbf{i} = \mathbf{1}$ or $\neg\mathbf{i} = \mathbf{1}$, if $\mathbf{r}_L = 1$ or $\mathbf{r}_H = 1$, the Proposer earns positive profits.

$$R\left(p_2\left(\mathbf{r}_L\right) + \left(1 - p_2\right)\left(\mathbf{r}_H\right)\right) > k \tag{4}$$

3 Equilibrium Analysis

3.1 Psychological Weak Sequential Equilibrium

A psychological Bayesian extensive form game is a collection of Bayesian extensive form games parametrized by $\rho_{\theta_2}, \theta_2 \in \{H, L\}$.

$$\Gamma = \left\langle N, H, \left(\Theta_i\right), \left(p_i\right), \left(u_i\left(\rho_{\theta_2}\right)\right)_{\forall \rho_{\theta_2} \in \{0,1\}, \forall \theta_2 \in \{H,L\}} \right\rangle \tag{5}$$

As in a standard game, N is the set of players, H is the set of histories, Θ_i is the set of types for each player i, p_i is the prior probability distribution of player i over other player's types and u_i is the utility of player i. The key difference here is the use of the utility parameters $\rho_{\theta_2}, \theta_2 \in \{H, L\}$.

In a psychological game, it is as if we could distinguish each a specific value of ρ_{θ_2} for each $\theta_2 \in \{H, L\}$. Within each game, each type of Proposer chooses to give $\neg i$ or insinuate and give i, or not give, given his belief μ_2 of facing L and expected rates of reciprocation after acceptance. In equilibrium, $\mu_2 = \frac{p_2 a_L}{p_2 a_L + (1-p_2)\neg a_H}$, the prior weighted ratio of acceptances. Each type of Responder $\theta_2 \in \{H, L\}$ decides on acceptance a_{θ_2} or non-acceptance $\neg a_{\theta_2}$, given his shame aversion $\sigma_{\theta_2}\bar{\rho}$, the value of the gift v and his anticipated consequent guilt, should he not reciprocate, or his cost of reciprocation e, should he reciprocate. After acceptance, each type θ_2 of Responder would choose to reciprocate r or not, given his guilt aversion $\gamma_{\theta_2}\rho_{\theta_2}$, his cost of reciprocating e, and his belief about the Proposer's expectation of type θ_2's reciprocation rate ρ_{θ_2}. This defines the WSEs for each $G \in \Gamma$. The PWSEs are what remains of the WSEs in Γ after we throw out every WSEs in which the beliefs ρ_{θ_2} are not consistent with the payoff parameter ρ_{θ_2} that they should stand in for, for

every type θ_2 at every information set I on the equilibrium path [12]. In other words, the PWSEs are the restriction of $G \in \Gamma$ such that:

$$\rho_{\theta_2}(I) = \mathbf{r}_{\theta_2}(I), \forall I \in \mathcal{I}, \forall \theta_2 \in \{H, L\} \tag{6}$$

I will call my equilibrium concept 'psychological weak sequential equilibrium' (PWSE), which is based on the weak sequential equilibrium concept (WSE)[13]. In a WSE, every player maximizes his utility at every information set and beliefs are Bayesian where possible.

3.2 Aspects of Equilibria

The Responder needs to rank four pure strategies $(r, a), (r, \neg a), (\neg r, a)$ and $(\neg r, \neg a)$. Let these rankings be represented in the following short hand:

$$\begin{aligned} &(r \succeq \neg r) := (r, a) \succeq (\neg r, a) \\ &(\neg r \succeq \neg a) := (\neg r, a) \succeq (r, \neg a) \text{ and } (\neg r, a) \succeq (\neg r, \neg a) \\ &(r \succeq \neg a) := (r, a) \succeq (r, \neg a) \text{ and } (\neg r, a) \succeq (\neg r, \neg a) \end{aligned} \tag{7}$$

the conditions for which I will derive in the following.

The $(r \succeq \neg a)$ Condition: At each information set $I \in \mathcal{I}$ for each type $\theta_2 \in \{H, L\}$,

[12] A psychological game can be interpreted as a short hand for a larger signaling game. Take Beer Quiche. In a separating equilibrium, player 2 (he) is sure of player 1's type after observing her action. Therefore, player 2's belief about what action would occur in such an equilibrium can only depend upon his prior on each type. Because player 2's beliefs influence player 2's reaction to player 1's signal, player 1's payoffs depends upon player 2's belief about what player 1 will do. Player 1's payoffs are then functions of player 2's beliefs about player 1's actions. Even in the signaling game, the beliefs of player 1 about player 2's beliefs must be consistent with the actual beliefs of player 2, which must be consistent with the payoff parameter that models the effect of those beliefs upon player 1's payoffs. Hence, we have the essentials of a psychological game. Player 1's has induced preferences upon player 2's beliefs. Thus, a psychological game can be interpreted as a short hand for a larger signaling game. This shorthand is useful to manageable model psychological signaling game, which would otherwise be a signaling game built upon a signaling game. See also [Gul and Pesendorfer, 2005].

[13] The established psychological sequential equilibrium concept (See [Battigalli and Dufwenberg, 2008])would preclude a number of interesting and realistic off-equilibrium phenomena (e.g., the screening effect of non-credible shame discussed in section 3.4.5).

reciprocate is better than not accept iff:

$$v - e - \sigma_{\theta_2}\bar{\rho}\left(I\right) \geq 0$$

The $(\neg r \succeq \neg a)$ **Condition:** At each information set $I \in \mathcal{I}$ for each type $\theta_2 \in \{H, L\}$, not reciprocate is better than not accept iff:

$$v - \mu_1\gamma_{\theta_2}\rho_{\theta_2}\left(I\right) - \sigma_{\theta_2}\bar{\rho}\left(I\right) \geq 0$$

The $(r \succeq \neg r)$ **Condition:** At each information set $I \in \mathcal{I}$ for each type $\theta_2 \in \{H, L\}$, reciprocate is better than not reciprocate iff:

$$v - e - \sigma_{\theta_2}\bar{\rho}\left(I\right) \geq v - \sigma_{\theta_2}\bar{\rho}\left(I\right) - \mu_1\gamma_{\theta_2}\rho_{\theta_2}\left(I\right)$$

$$\mu_1\gamma_{\theta_2}\rho_{\theta_2}\left(I\right) \geq e$$

The $(r \succeq \neg r, r \succeq \neg a)$ **Condition:** At each information set $I \in \mathcal{I}$ for each type $\theta_2 \in \{H, L\}$, accept and reciprocate is best iff:

$$v - e \geq \sigma_{\theta_2}\bar{\rho}\left(I\right) \text{ and } \mu_1\gamma_{\theta_2}\rho_{\theta_2}\left(I\right) \geq e$$

The $(a \succeq \neg a)$ **Condition:** At each information set $I \in \mathcal{I}$, for each type $\theta_2 \in \{H, L\}$, accept is better than reject iff:

$$\max\left\{v - e - \sigma_{\theta_2}\bar{\rho}\left(I\right), v - \mu_1\gamma_{\theta_2}\rho_{\theta_2}\left(I\right) - \sigma_{\theta_2}\bar{\rho}\left(I\right)\right\} \geq 0$$

$$\max\left\{-e, -\mu_1\gamma_{\theta_2}\rho_{\theta_2}\left(I\right)\right\} \geq \sigma_{\theta_2}\bar{\rho}\left(I\right) - v$$

$$\min\left\{e, \mu_1\gamma_{\theta_2}\rho_{\theta_2}\left(I\right)\right\} < v - \sigma_{\theta_2}\bar{\rho}\left(I\right)$$

3.3 Characterization of Equilibria

In the following, equilibrium will be abbreviated to "Eq.". Since, I only need distinguish beliefs that are after insinuation i and those that are after non-insinuation $\neg i$, I will only write beliefs as a function of i or $\neg i$ (e.g., write $\rho_{\theta_2}(i)$ for $\rho_{\theta_2}(I_{\theta_1 i}), I_{\theta_1 i} \in \mathcal{I}$, $\theta_1 \in \Theta_1, \theta_2 \in \Theta_2$). In equilibria 1-3, the Proposers pool to $\neg i$. In equilibria 4-6, the B Proposer separates to i. To avoid repetition, I state only what each type of Responder does in the following proposition.

3.3.1 No Insinuation Equilibria

To shorten my proofs, I characterize off-equilibrium beliefs, which are all the same, in the following lemma, which apply to all propositions that follow. Since beliefs on the equilibrium path are true and can be substituted away with their corresponding actions, they too are omitted in the propositions.

Lemma 2 *For a fixed action of the B Proposer $s_1 \in \{i, \neg i\}$, both Responders will accept and not reciprocate*

$$((\mathbf{a}_H(s_1) = 1, \mathbf{r}_H(s_1) = 0), (\mathbf{a}_L(s_1) = 1, \mathbf{r}_L(s_1) = 0)) \tag{8}$$

when $\rho_H(s_1) = \rho_L(s_1) = 0$. The B Proposer's payoff will be $-k$.

Proposition 3 (Eq. 1) *There exist equilibria in which both types of Responders accept and reciprocate iff*

$$v - e \geq \sigma_{\theta_2} \text{ and } p_1 \gamma_{\theta_2} \geq e, \forall \theta_2 \in \{H, L\} \tag{9}$$

$$\rho_H(\neg i) = \rho_L(\neg i) = 1 \tag{10}$$

Proposition 4 (Eq. 2) *There exist equilibria in which the L type of Responder accepts and reciprocates and the H type does not accept iff*

$$\rho_L(\neg i) = 1, \bar{\rho}(\neg i) = 1, v - e \geq \sigma_L \text{ and } p_1 \gamma_L \geq e \tag{11}$$

$$\rho_H(i) = 0 \text{ and } \rho_L(i) = 0 \tag{12}$$

and

$$\left\{ \begin{array}{ll} a) & \rho_H(\neg i) = 1, v - p_1\gamma_H < \sigma_H \text{ and } p_1\gamma_H < e \\ & \text{or} \\ b) & \rho_H(\neg i) = 0, \sigma_H > v \text{ and } p_1\gamma_H < e \end{array} \right\} \tag{13}$$

Proposition 5 (Eq. 3$\neg c$) *There exist equilibria in which both types of Responders accept but only L reciprocates iff*

$$v - e \geq \sigma_L p_2 \text{ and } p_1\gamma_L \geq e \tag{14}$$

$$0 \leq v - \sigma_H p_2 \text{ and } p_1\gamma_H < e \tag{15}$$

$$\rho_H(\neg i) = 0, \rho_L(\neg i) = 1, \bar{\rho}(\neg i) = p_2 \tag{16}$$

$$\rho_L(i) = \rho_L(i) = 0 \tag{17}$$

Proposition 6 (Eq. 3c) *There exist equilibria in which both types of Responders accept but only H reciprocates iff*

$$v - e \geq \sigma_H(1 - p_2) \text{ and } p_1\gamma_H \geq e \tag{18}$$

$$0 \leq v - \sigma_L(1 - p_2) \text{ and } p_1\gamma_L < e \tag{19}$$

$$\rho_H(\neg i) = 1, \rho_L(\neg i) = 0, \bar{\rho}(\neg i) = (1 - p_2) \tag{20}$$

$$\rho_H(i) = \rho_L(i) = 0 \tag{21}$$

Corollary 7 (Eq. $\bar{\mathbf{3}}c$) *Consider Eq. 3H. If $v - e < \sigma_H$, then H only accepted if L also accepted and but did not reciprocate.*

3.3.2 Insinuation Equilibrium

In the following equilibrium, the B Proposer separates from the $\neg B$ Proposer by insinuating i.

Proposition 8 (Eq. 4$\neg c$) *There exist equilibria in which the L type of Responder accepts and reciprocates and the H type does not accept iff*

$$\rho_L(i) = 1, \bar{\rho}(i) = 1, v - e \geq \sigma_L \text{ and } \gamma_L \geq e \tag{22}$$

$$\rho_H(\neg i) = \rho_L(\neg i) = 0 \tag{23}$$

and

$$\left\{ \begin{array}{ll} a) & \rho_H(i) = 1, \sigma_H > v - e \text{ and } \gamma_H \geq e \\ & or \\ b) & \rho_H(i) = 0, \sigma_H > v \text{ and } \gamma_H \geq e \end{array} \right\} \tag{24}$$

Proposition 9 (Eq. 5$\neg c$) *There exist equilibria in which the L type of Responder accepts and reciprocates and the H type does not accept. More specifically iff*

$$\rho_L(i) = 1, \bar{\rho}(i) = 1, v - e \geq \sigma_L \text{ and } \gamma_L \geq e \tag{25}$$

$$\rho_H(\neg i) = 0 \text{ and } \rho_L(\neg i) = 0 \tag{26}$$

and

$$\left\{ \begin{array}{ll} a) & \rho_H(i) = 1, v - \gamma_H < \sigma_H \text{ and } \gamma_H < e \\ & or \\ b) & \rho_H(i) = 0, \sigma_H > v \text{ and } \gamma_H < e \end{array} \right\} \tag{27}$$

Proposition 10 (Eq. 6) *There exist equilibria in which both types of Responders accept and reciprocate. More specifically iff*

$$v - e \geq \sigma_{\theta_2} \text{ and } \gamma_{\theta_2} \geq e, \forall \theta_2 \in \{H, L\} \tag{28}$$

$$\rho_H(\neg i) = \rho_L(\neg i) = 1 \tag{29}$$

Proposition 11 *Suppose that either Eq. 4L or Eq. 3H can hold. If the not highly shame averse type L are numerous enough*

$$p_2 > \frac{k}{(R + k)} \tag{30}$$

the Proposer would prefer the outcome in Eq. 4L. Then, Eq. 3H can be eliminated with the Intuitive Criterion.

Proposition 12 *Eq. 3L can be eliminated with the Intuitive Criterion. Eq. 5L would hold instead.*

3.4 Graphical Analysis of Equilibria

Below, I plot equilibrium on the shame and guilt plain $(\sigma, \gamma) \in R^2_+$. An equilibrium in this plain is a pair of points. Though in fact, we need a graph for each type, if we assume that priors on Responders is $p_2 = \frac{1}{2}$, we can use one graph to represent both types, as I have done below.

3.4.1 Vertical Boundary for $H : (r \succeq \neg a)$

The vertical axis is divided by the 'reciprocate is better than not accept' or $(r \succeq \neg a)$ condition: $v - e \geq \sigma_H \bar{\rho}$, in which $\bar{\rho} = 1 - p_2$ when both are accepting but only H is reciprocating (figure 1), or $\bar{\rho} = 1$, when only the reciprocating type accepts (figure 2). (If both were accepting and only L was reciprocating then, the dividing line would be where $\bar{\rho} = p_2$.) Hence, when $(r \succeq \neg a)$ is rewritten $\frac{v-e}{\bar{\rho}} \geq \sigma_H$: the vertical boundaries for $\sigma_H \in \left\{ \frac{v-e}{1}, \frac{v-e}{1-p_2} \right\}$.

3.4.2 Horizontal Boundary for $H : (r \succeq \neg r)$

The horizontal axis is divided up by the 'reciprocate is better than not reciprocate' or $(r \succeq \neg r)$ condition : $\mu_1 \gamma_H \rho_H \geq e$, in which $\mu_1 (\neg i) = p_1$ in a pooling equilibrium (figure 2) and $\mu_1 (i) = 1$ and $\mu_1 (\neg i) = 0$ in a separating equilibrium (figure 3). Since, $\rho_H \in \{0, 1\}$, when $(r \succeq \neg r)$ is rewritten as $\gamma_H \geq \frac{e}{\mu_1 \rho_H}$, the horizontal boundaries for $\gamma_H \in \left\{ 0, e, \frac{e}{p_1}, \infty \right\}$.

3.4.3 Diagonal Boundary for $H : (\neg r \succeq \neg a)$

The diagonal is divided by the 'not reciprocate is better than not accept' or $(\neg r \succeq \neg a)$ condition for $H : v - \mu_1\gamma_H\rho_H - \sigma_H\bar{\rho} \geq 0$[14]. This condition, which can be more conveniently written as $\frac{v-\mu_1\gamma_H\rho_H}{\bar{\rho}} \geq \sigma_H$ only matters when not reciprocating is better than reciprocating $(\neg r \succeq r) : \mu_1\gamma_H\rho_H < e$ and H has not accepted, i.e., H is in region $\neg a$. There are two possibilities: H accepts or not.

- Should H have accepted and not reciprocated, consistency 6 would require that $\rho_H = \mathbf{r}_H = 0$. Thus, from the perspective of the H Responder who has accepted and not reciprocated, the shame σ_H boundary for accepting would be defined by $\frac{v}{\bar{\rho}} \geq \sigma_H$ in which $\bar{\rho} = p_2$. (Not shown in any figure.)

- Should H not have accepted, then beliefs about H's rate of reciprocation *had he accepted* are not constrained $\rho_H \in \{0, 1\}$. Recall from 1 that

$$\bar{\rho} = \rho_L \cdot \mu_2 + \rho_H \cdot (1 - \mu_2)$$

  - Suppose that H believes that had he accepted, he would have been expected to reciprocate, then $\rho_H = 1$ and $\frac{v-\mu_1\gamma_H}{\bar{\rho}} \geq \sigma_H$, in which $\bar{\rho} = 1 \cdot 1 + 0 \cdot 1 = 1$.
  - If on the other hand, H believes that had he accepted, he would not have been expected to reciprocate, then $\rho_H = 0$ and $\frac{v}{\bar{\rho}} \geq \sigma_H$, in which $\bar{\rho} = 1 \cdot 1 + 0 \cdot 0 = 1$.

Hence, when $(\neg r \succeq \neg a)$ is rewritten as $\frac{v-\mu_1\gamma_H\rho_H}{\bar{\rho}} \geq \sigma_H$, the possible diagonal boundaries are $(\sigma_H, \gamma_H) \in \left\{(\sigma_H, \gamma_H) : \sigma_H = \frac{v}{p_2} \text{ or } v - \mu_1\gamma_H - \sigma_H = 0\right\}$.

The diagonal for L is comparable except that $\bar{\rho} = 1 - p_2$ when both accept and H reciprocates, but L does not reciprocate. (See figure 2.)

From this point onwards, I will generally suppress the type index ,e.g., 'L' in '4 L' in the " so that I might instead index these equilibria by 'a' or 'b' which indicates

[14] If H is considering $\neg r \succeq \neg a$ then, by the positive profit condition 4 and consistency 6, $\neg c$ must be accepting and reciprocating: $\rho_{\neg c} = \mathbf{r}_{\neg c} = 1$.

different off-equilibrium beliefs,e.g., 4a or 4b.

If both H and L have high enough guilt sensitivity to reciprocate, then the Proposer only has to choose a gift v that will cause them to accept. This is the situation in Eq. 1 (not figured). If however, one type is not sensitive enough to guilt, and guilt and shame are negatively correlated, the Proposer can choose a gift that only the less shame sensitive type would accept. This is the situation Eq. 2 in figure 1.

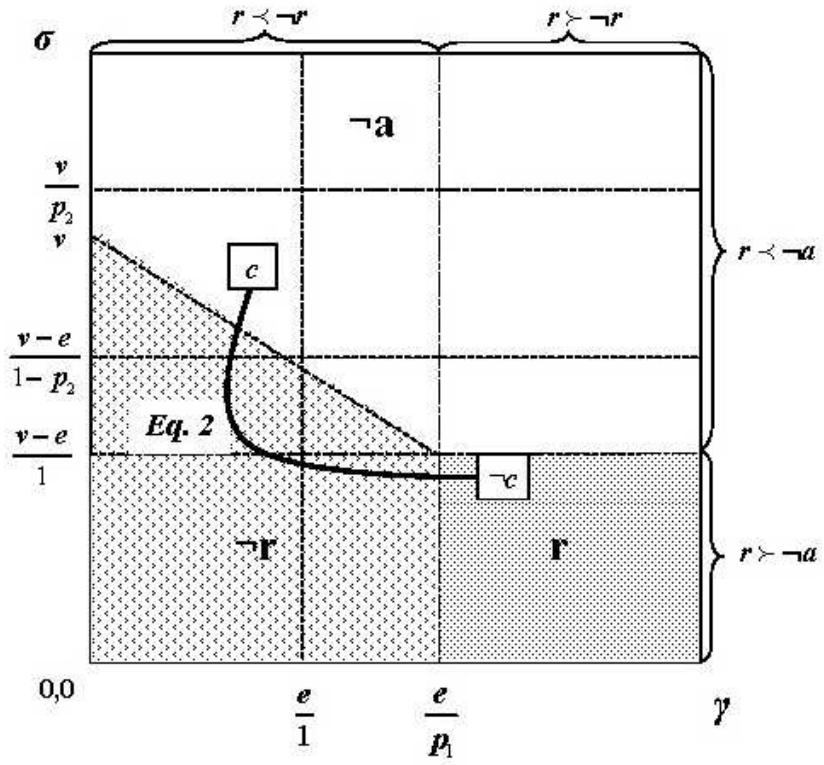


Figure 1: Only $\neg c$ accepts and reciprocates.

However, if guilt and shame are positively correlated, we may have the situation in Eq. 3 in figure 2.

3.4.4 Screening With Shame Spillovers

In Eq. $3H$, the highly shame averse Responder H, who has high shame and guilt sensitivity, is accepting and reciprocating, while L, who has lower shame and guilt sensitivity, is accepting but not reciprocating. In Eq. 4, the same H has not accepted, while L has accepted and reciprocated. Eq. $3H$ has the L type of Responder in region $\neg r$ and H in region r. Eq. 4 has this same L in region r and H in region $\neg a$. The bribing Proposer B, by separating with an insinuation, increases guilt causing the L Responder with guilt range $e \leq \gamma_L \leq \frac{e}{p_1}$ and shame range $0 \leq \sigma_L \leq v - e$ (figure 2) to accept and reciprocate.

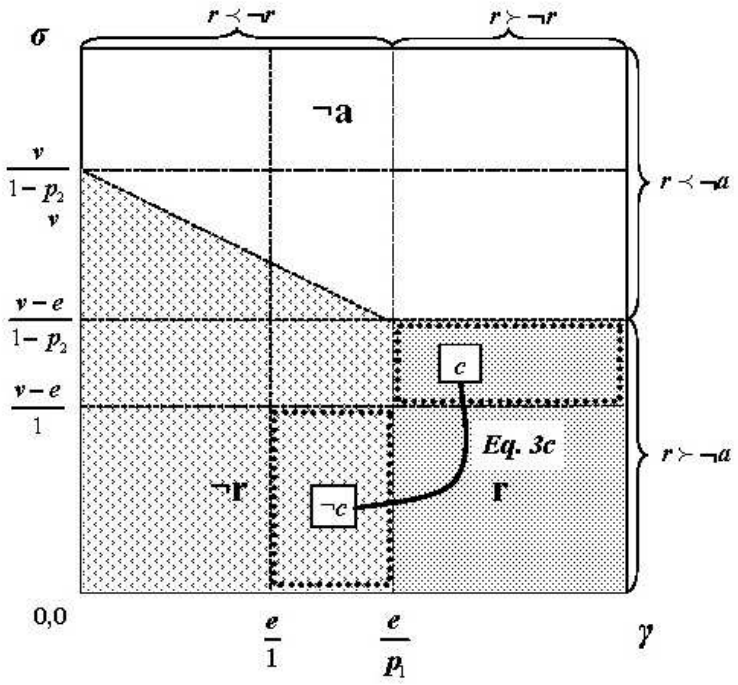


Figure 2: Both accept. Only c reciprocates.

When they do so, they exert a negative externality for their paired type in the guilt range $\frac{e}{p_1} \leq \gamma_H$ and shame range $1 - e \leq \sigma_H \leq \frac{v-e}{1-p_2}$ that causes H to not accept

(figure 3). The solid arrow in figure 3 indicates the *necessary* marginal increase in the r region which occurs when insinuation separates: $\mu_1(\neg i) = p_1 \rightarrow \mu_1(i) = 1$. The dotted arrows indicate the *possible* changes in the boundaries after an insinuation, driven by changes in the value of $\bar{\rho} = p_2 \rightarrow \bar{\rho} = 1$.

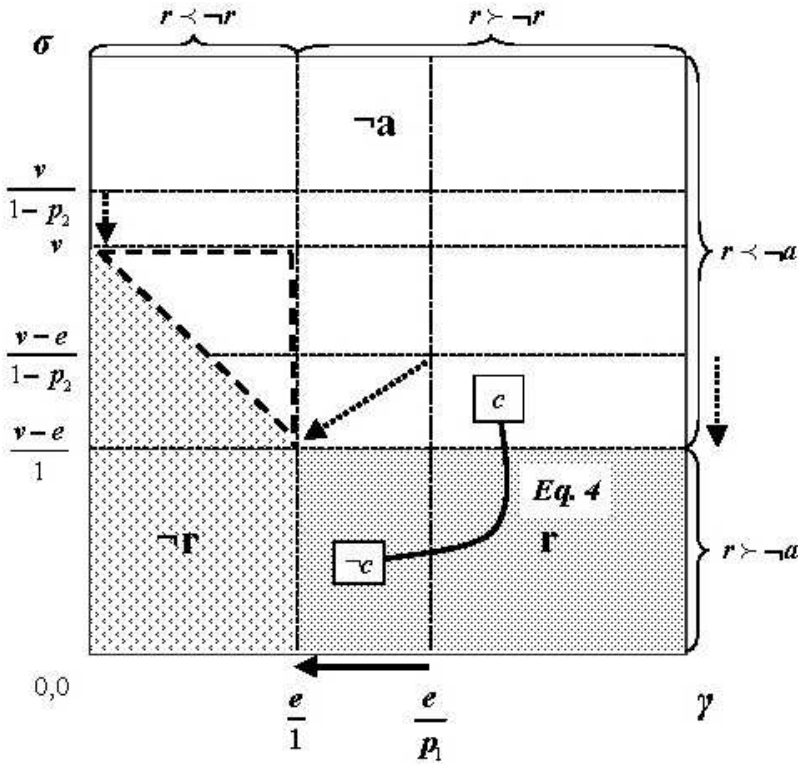


Figure 3: Insinuation. Only $\neg c$ reciprocates.

Eq. $3H$ was maintained by the Proposer's belief that, should there be an insinuation, the Responder will infer he is facing the $\neg B$ Proposer and hence accept and not reciprocate. Proposition 7 establishes that if the L type is great enough of the proportion of the Responder population, the non-insinuation equilibria Eq. $3H$ will fail the Intuitive Criterion. Upon observing insinuation, Responders can infer that they are facing the B Proposer, since insinuate is dominated for $\neg B$. When L is

a greater proportion of Responders, the L Responder's best response of reciprocate would be sufficient to make the B Proposer deviate to reciprocate. The prediction for this set of parameters would then be, the Proposer will insinuate. She will lose the prescriptions of the highly shame averse type but gain the prescriptions of the not highly shame averse type. This is what the Proposer in the Yale incident could have been trying to achieve with her insinuation.

When there is negative correlation between guilt and shame, as in Eq. $3L$, insinuation can cause the non-reciprocating type H to not accept, as in Eq. $5L$ of figure 4. When there is positive correlation, as in Eq. $3H$, insinuation can cause the non-reciprocating type to reciprocate, as in Eq. 6 of figure 4.

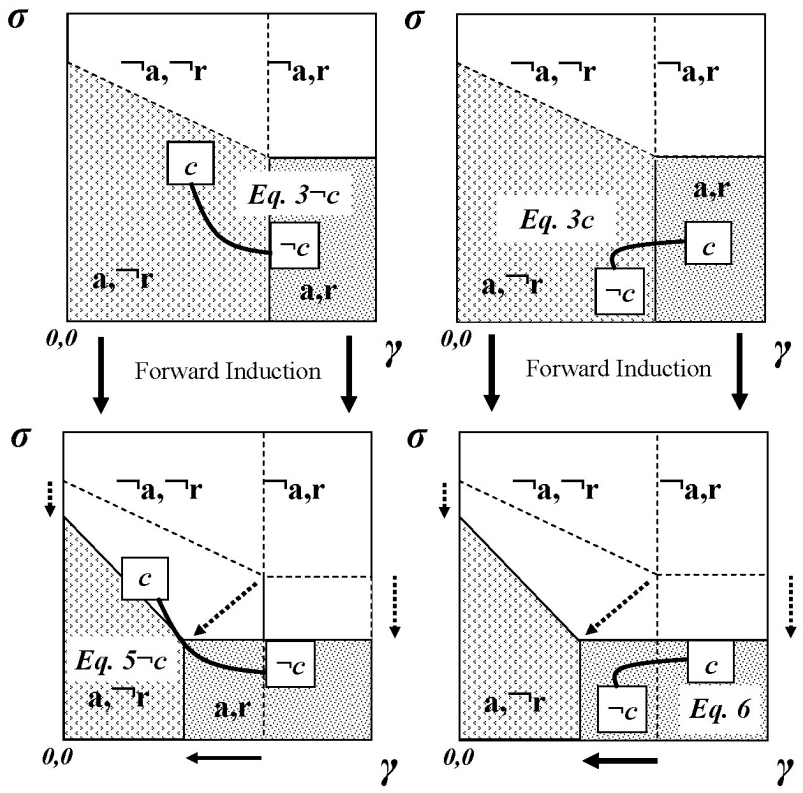


Figure 4: Free-rider rejects or reciprocates.

3.4.5 The Screening Effect of Non-Credible Shame

Main Intuition In all of the separating equilibria, the Proposer can use the value of the gift and the shame spillover of reciprocation to screen for the highly shame averse type, who either was not sensitive enough to guilt to reciprocate (Eq. 2a and 2b), or did not believe that he was expected to reciprocate (Eq. 4b). Shame, however, is a visceral emotion. One would expect that people may not always react rationally to the possibility of it and that may be important for predicting behavior.

In my model, unobservable reciprocation occurs *after* observable acceptance. This dynamic structure allows a Responder to reject based upon the shame attending on *beliefs* (about others beliefs) about what he *would have done*, *had he accepted*. The difference between his beliefs and what he actually would have done can capture non-acceptance from an overestimation of shame. For some range of shame sensitivities in Eq. 2 and 4b, only the belief 'whoever accepts reciprocates' would have been sufficient to deter acceptance. But in those equilibria, had the highly shame averse type of Responder accepted, he would not have reciprocated. His guilt would not have been sufficient. In rejecting, the Responder did not take into account the diminution of the aggregate reciprocation rate of all who accept from his own non-reciprocating acceptance. This outcome models the possibility that those who rejected in the Yale incident may not have taken into account the diminution of the shame of acceptance, *as a result of their own acceptance.* In contrast, those who accepted may have foreseen the possibility, as they themselves suggested.

Graphical Analysis More formally, recall that in dynamic games, off-equilibrium beliefs need not be consistent with histories after an actual deviation. Such beliefs allow for the possibility of incredible threats. In signaling games, the off-equilibrium beliefs themselves that an observer best responds to need not be credible. These beliefs can be eliminated by forward induction arguments like the Intuitive Criterion of [Cho and Kreps, 1987]. The key difference in psychological games is that the signallers' own preferences depend directly upon the observer's beliefs (or his beliefs about them). These beliefs and their effect upon the signallers preferences can also be credible or not. They too may not withstand a forward induction argument. In the separating equilibria of this game, the off-equilibrium beliefs of the player who not accepted allow for non-credible shame and guilt.

In Eq. 2a and 2b, type H's guilt sensitivity is not sufficient to induce reciprocation since $\gamma_H < \frac{e}{p_1}$. The non-acceptance condition $\neg(a \succeq \neg a)$ is defined as $\min\{e, p_1\gamma_H\rho_H\} > v - \sigma_H\bar{\rho}$.

In order for H to reject in Eq. 2a, he must believe

1. 'If I accept, I will be expected to reciprocate.' $\rho_H = 1$ and that others believe,

2. 'whoever accepts reciprocates' $\bar{\rho} = 1$.

But, others know that $\gamma_H < \frac{e}{p_1}$. Therefore, cannot expect him to reciprocate. Therefore, he cannot believe that they would expect him to reciprocate upon acceptance. Hence, $\rho_H = 0$. But, if they did not believe that he would reciprocate, they could only believe that 'whoever accepts *might* reciprocate' $\bar{\rho} < 1$. Thus, the difference in the shame sensitivity that *would* keep H from accepting: $\sigma_H > v - p_1\gamma_H$, and the shame sensitivity that *should* keep H from accepting: $\sigma_H \geq \frac{v}{p_2}$, is in the shame region $\frac{v}{p_2} \geq \sigma_H \geq v - p_1\gamma_H$ and $e > p_1\gamma_H$. (See dashed triangle marked (2) in figure 5.) If the Proposer insinuates, this region would be $\frac{v}{p_2} \geq \sigma_H \geq v - \gamma_H$ and $e > \gamma_H$.

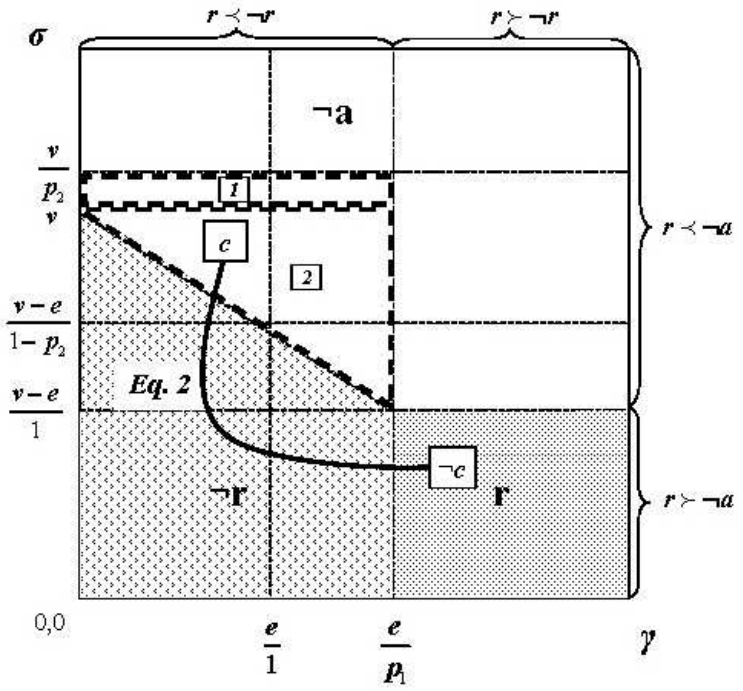


Figure 5: No Insinuation. Only ¬c reciprocates.

In Eq. 2b, H believes that, had he accepted, he was *not expected* to reciprocate $\rho_H = 0$. It was only the raw shame externality of L that kept him from accepting:

$0 > v - \sigma_H$. But, then, if he did accept, he should anticipate that the shame should be diluted to $\sigma_H p_2 < \sigma_H$ by his own diminution of it, since he would not reciprocate. For him to reject then, when he anticipated this dilution, his shame sensitivity would have to be very high: $\sigma_H \geq \frac{v}{p_2}$. Then, the difference in the shame sensitivity that *would* keep H from accepting $\sigma_H > v$ and the shame sensitivity that *should* keep H from accepting $\sigma_H \geq \frac{v}{p_2}$ is in the shame region $\frac{v}{p_2} \geq \sigma_H \geq v$.(See dashed rectangle marked (1) in region $\gamma_H < \frac{e}{p_1}$ in figure 5.)

4 Discussion

To my knowledge, the literature on bribery does not consider the use of shame or guilt and does not acknowledge the psychological significance of non-monetary bribes. Just to fix ideas, I assume the low rationality case discussed in section 3.4.4. It is assumed below that a first best policy would redirect resources used for bribery into R & D, eliminate the health and monetary costs of distortionary prescribing, without imposing psychological costs upon doctors.

4.1 Policy Implications

4.1.1 Bans

Surprisingly, only a handful of medical schools restrict drug rep to doctor gift giving[15]. The rational for the reluctance to ban can be seen in my model by introducing the regulator as a third player who would either need to allow the Drug Rep to give or who can reject for both types of doctors. In the former case, the regulator in effect gives to the doctor. In the latter case, the regulator in effect rejects for the doctor. In either case, we can convert the drug firm's profits from bribing:

$$R\left(p_2\left(\mathbf{r}_L\right) + \left(1 - p_2\right)\left(\mathbf{r}_H\right)\right) > k$$

[15] "Group Urges Ban on Medical Giveaways." (Harris, Gardiner, New York Times, April 28, 2008) describes a recent effort to increase bans in medical schools.

into a social utility constraint that must also be met for giving to occur:

$$u - S\left(p_2\left(\mathbf{r}_L\right) + \left(1 - p_2\right)\left(\mathbf{r}_H\right)\right) \geq 0$$

in which u is the social utility of permitting gifts and S is the sensitivity to distorted prescribing. Suppose that the regulator bans. Given a ban, doctors could infer that the regulator believed that the rate of reciprocation would have made the ban worthwhile:

$$u - S\left(p_2\left(\mathbf{r}_L\right) + \left(1 - p_2\right)\left(\mathbf{r}_H\right)\right) < 0$$

where in equilibrium where in equlibrium $\rho_{\theta_2}\left(I\right) = \mathbf{r}_{\theta_2}$, $\theta_2 \in \{L, H\}$ and

$$\bar{\rho}\left(I\right) = \rho_L\left(I\right) \cdot \mu_2 + \rho_H\left(I\right) \cdot \left(1 - \mu_2\right) \tag{31}$$

In other words, the regulator must have believed that the aggregate rate of reciprocation would have been too high if it had not banned: $\frac{u}{S} < \bar{\rho}$. But, unlike Eq. 2 where shame could be avoided by rejecting, when the regulator bans, all doctors suffer shame through the implied $\bar{\rho}$; all doctors would have suffered from the belief that they would have reciprocated enough to warrant a ban. A persistent and unavoidable insult to the integrity of their profession might deter entry of qualified people into a specific hospital, or in the health care industry in general [16].

4.1.2 Gift Ceilings

Gift ceilings, like a ban, would expand the area the non-acceptance areas marked $\neg a$ in all figures and hence, increase the area of off-equilibrium beliefs, with the same effect as a ban of imposing non-credible shame on all doctors, though doctors can now separate by not accepting below the gift ceiling. Instead of feeling completely untrusted, doctors would feel untrusted above the gift ceiling $\bar{v}$. However, because gift ceilings allow for some acceptance for $v \leq \bar{v}$, they could shift the situation away from Eq. 1 to Eq. 2 or 4, thus reducing reciprocation by reducing acceptance. In

[16] Nearly 60 percent of doctors had considered getting out of medicine because of low morale (Williams, Alex, "The Falling-Down Professions," New York Times, January 6, 2008).

the figure 6, as $\bar{v} \to 0$, the diagonal region $\neg r$ and the horizontal region $r \succeq \neg a$, whose upper bound is $\frac{\bar{v}-e}{\bar{\rho}}$ on the σ axis would both shift towards the origin[17]. As a consequence, the region where doctors would accept and not reciprocate $\neg r$ would shrink, which would cut the firm's costs, increasing the marginal effectiveness of bribing. The gift ceiling then could have the perverse consequence of making bribery more effective by forcing the low guilt high shame type L, who did not reciprocate before, to reject, shifting the situation from Eq. $3H$ to Eq. 2.

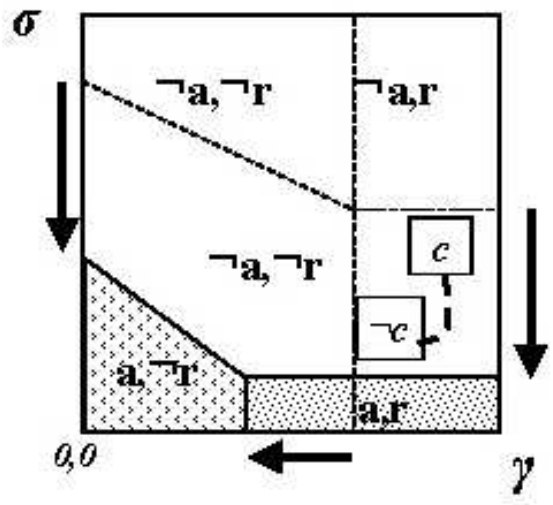


Figure 6: The effect of a gift ceiling.

4.1.3 Fines

$\sigma\bar{\rho}$ can also include the effects of pencuniary punishments for acceptance contingent upon beliefs about subsequent intended actions, if $\hat{\rho} = \bar{\rho} + fines$ or if fines are a function of $\bar{\rho}$, $\hat{\sigma} = (\sigma + fines)$. $\frac{v-e}{\bar{\rho}} > \frac{v-e}{\hat{\rho}}$ implies that the r regions in all figures would shrink, reducing the effectiveness of gifts, requiring a larger gift v for the same

[17]This analysis must be circumscribed by the fact that shame $\sigma\bar{\rho}$ and guilt $\gamma\rho_{\theta_2}$ are likely only separable into a constant sensitivity component and a belief component within a narrow range of v. Conceivably, these sensitivities could also be a function of v. Even supposing that they were constant though, the effect of a gift ceiling would still be hard to predict.

acceptance rate. This higher σ would have a similar effect as a lower gift ceiling. The purely psychological effect of shame will be even more pronounced if fines signal greater disapprobation [i.e., σ (fines) $>>$ σ (no fines)].

4.1.4 Gift Registries

Gift registries, which record all gifts over a certain amount (e.g., \$50), have been legislated in a number of states[18] [Ross et. al., 2007]. If preferences over beliefs are monotonic on the number of people who have them, then gift registries amount to increasing σ, the sensitivity to shame. Increasing σ amounts to decreasing v via a gift ceiling with the same consequences. The effectiveness of gift registries is even more difficult to assess because firms' are not forthcoming with data, claiming that these are trade secrets.

4.1.5 Educational Interventions Affecting σ, μ_1

An initial study demonstrated that education as to the 'true' motives of firms and the social costs of accepting gifts can indeed cut acceptance [Randall et. al., 2005]. But if educational interventions did this by increasing σ for all guilt types, it would have the same effect as a ceiling on gift value. But, if an educational intervention increases doctor's belief of facing the bribing Drug Rep, that would have the same effect as the Drug Rep always insinuating and hence, increasing $\mu_1(\neg i) = p_1$ to $\mu_1(i) = 1$. Such an educational intervention could result in *more* influenced prescriptions by making it more profitable. This fact was shown in Proposition 10, in which insinuation switched reciprocation from the less populous Responder to the more populous, while eliminating free-riding. It was also shown in Proposition 11, in which the free-rider did not accept after insinuation. Counterintutively, regulators could try to decrease the prior belief on the B type of Proposer $\mu_1 = p_1 \rightarrow 0$, e.g., by promoting the idea that all firms are actually non-bribing. If that worked, guilt in non-reciprocation would go down, which would eventually result in less giving with a bribing intention. See the shift of the guilt boundary of region r in figure 6 as defined by $\frac{e}{p_1}$ as $p_1 \rightarrow 0$.

[18] Medina, Jennifer, "Drug Lobbying Kills Gift Disclosure Bill," New York Times, June 29, 2006.

4.1.6 Targeting ρ_{θ_2}, $\bar{\rho}$ Through The Gift Giving Convention

Some hospitals require drug firms to give gifts only through a department representative, who in turn would give to doctors. In an iterated version of my model: the interposition of an intermediary would weaken the mutual knowledge of the expectation of reciprocation, because it would undermine the forward induction procedure for inferring beliefs about reciprocation. The Drug Rep cannot expect reciprocation from the department rep, if he/she were not a doctor. The department rep, who does not gain from reciprocation, certainly would not be giving in expectation of reciprocation from the doctor. As an alternative, a hospital could target conventions and redirect shame and guilt by finding a worthy charity that doctors would feel *even more guilty* not donating gifts to, so that the Drug Rep would cease to expect reciprocation.

If doctors uniformly believed that nothing was expected of their type, i.e., $\rho_{\theta_2} \rightarrow 0, \forall \theta_2 \in \{H, L\}$, then the region for acceptance will expand as it's upper bound $\frac{v-e}{\bar{\rho}} \rightarrow \infty$, at the same time that the region for not reciprocating r, whose lower bound is defined by $\frac{e}{\mu_1 \rho_{\theta_2}} \rightarrow \infty$. Doctors will be more likely to accept though they would feel less guilt in not reciprocating, resulting in decreased distortionary prescribing without demoralizing doctors. Contrariwise, should the situation be described by Eq. $\bar{3}H$, in which $\bar{\rho} = 1 - p_2$ and both types of doctors accept, but only $\neg H$ type reciprocates, policy makers should try to convince everyone that all types of doctors are in fact reciprocating so as to increase $\bar{\rho} \rightarrow 1$ to prompt rejection from a majority of doctors. See Eq. $\bar{3}H$.

5 Conclusion

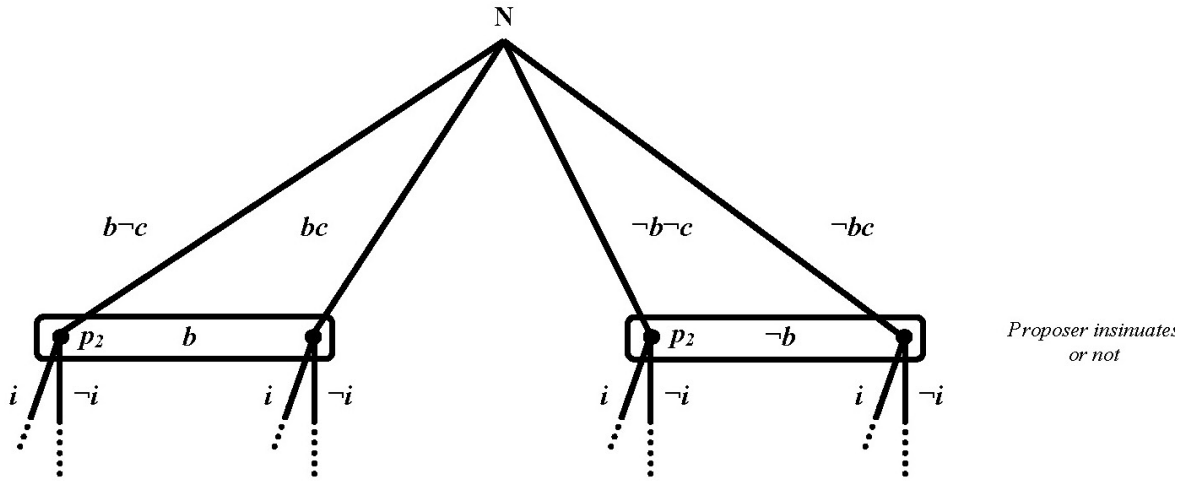
This paper began by introducing the problem of explaining the coincidence of 1) rising cost of prescription drugs 2) drug firm profits that did not seem attributable to pharmaceutical innovation and 3) large expenditures on marketing to doctors – in particular, 'gifts,' occurring in the absence of monitoring and enforcement of a quid pro quo relationship. I have posited a psychological mechanism by which

reciprocation may be induced in equilibrium, even in the absence of monitoring. I used a now fairly well established fact that guilt (See [Charness and Dufwenberg, 2006] for example.) could cause reciprocation for gifts to show in a psychological trust game how 1) unobserved reciprocation could give rise to a shame spillover at acceptance that could screen for low guilt 2) the effect of the spillover could magnified and fine tuned with insinuation, and 3) off-equilibrium beliefs could screen for reciprocation through non-credible shame, if doctors are not highly rational. The Yale incident illustrated these ideas. In it, the Drug Rep had to consider the trade-off between being direct or indirect in her bribing intent. Directness provokes the guilt that would lead to greater reciprocation, given acceptance. But directness increased the anticipation of reciprocation and hence, the shame of acceptance[19]. I explained the circumstances in which the Drug Rep could use that shame to screen for reciprocating guilt, and how current policies to deter reciprocation could either make bribing more effective or impose unacceptable shame spillovers upon all doctors.

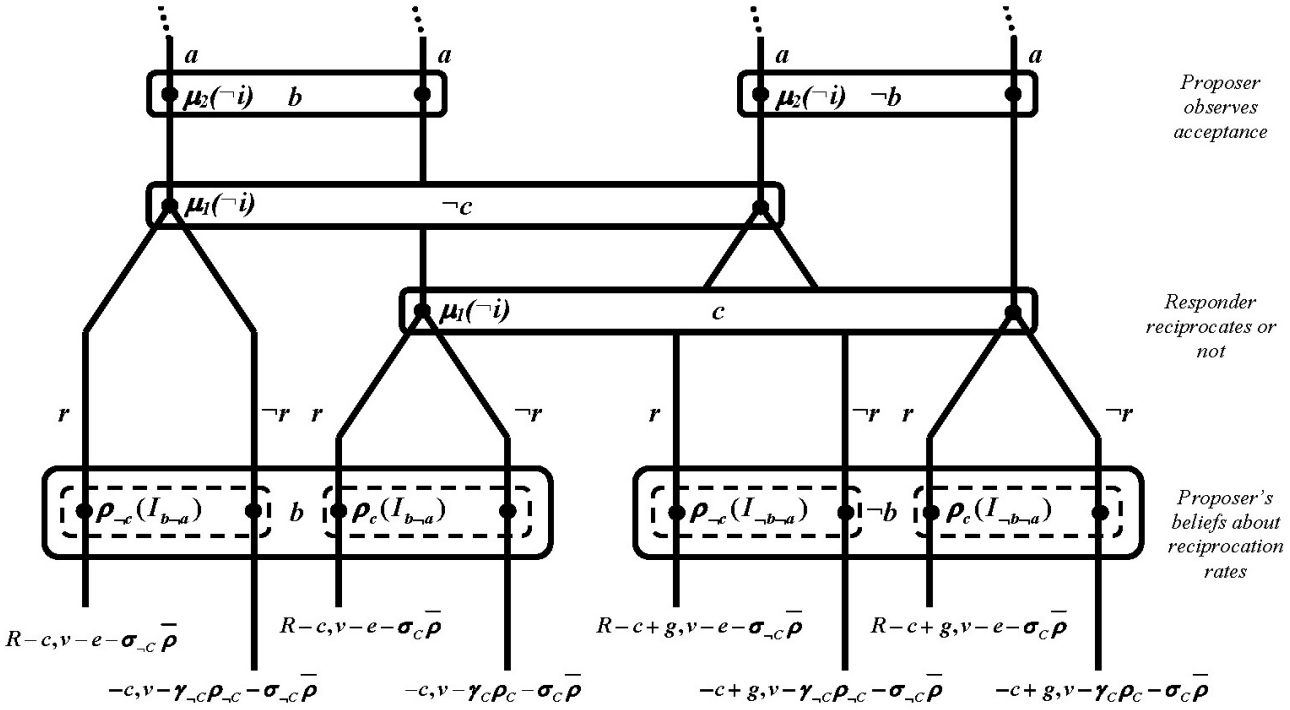
Doctors are experts. Expertise opens the client to expert relationship to exploitation by third parties. The client cannot tell if the expert is acting in their best interest for the same reason that the client needs the expert's help. Hence, clients need to trust the experts they go to. Hence also, experts must be averse to the appearance of betraying their client's trust and therefore, anything approaching explicit contracting to betray that trust. Gifts are a way for third parties to camouflage such contracting However, third parties face an incentive problem similar to that which they may try to exploit; Expertise also makes the experts actions unobservable to the third party. Contracts on those actions are therefore unenforceable – by the usual means. Third parties need to trust their experts even to betray the trust of others.

[19]This trade-off between directness and indirectness may also explain why cash gifts are generally not used with doctors. They are too direct. Everyone who would accept would reciprocate. *Because of that*, no one would accept.

6 Appendix A



Responder's choice of a or $\neg a$ are omitted after $\neg i$. Tree after i is omitted.



7 Appendix B: Background on Pharmaceutical Industry Gift Giving

Medical professionals, health policy makers, and the general public have become increasingly concerned about the effects of pharmaceutical company gifts to doctors in the face of costs that have risen disproportionately to measures of efficacy. These gifts range from free drug samples to items unrelated to the products manufactured by the company, such as expensive dinners, exotic vacation packages only tangentially related to short conferences or even large payments for very undemanding "consulting work". Gifts constitute a significant part of the $19 billion[Brennan et. al., 2006][20] spent on marketing to 650,000 prescribing US doctors – including the salaries of 85,000 pharmaceutical firm representatives who visit an average of 10 doctors per day. At the same time, patient spending on prescription medications has more than doubled between 1995-2001 from $64 billion to $154.5 billion in 2001, with an estimated one-quarter of this increase resulting from a shift among medical professionals to the prescribing of more expensive drugs [Dana and Loewenstein, 2003]. This figure is on its way to double again and totaled $252 billion in 2006 [Herper and Kang, 2006].

Increased costs could be due to better medicine. In 2000, the average price of these "new" drugs was nearly twice the average price of existing drugs prescribed for the same symptoms. But, according to [Dana and Loewenstein, 2003], the US Food and Drug Administration judged 76% of all approved new drugs between 1989 to 2000 to be only moderately more efficacious than existing treatments, many being a modification of an older product with the same ingredients. Not surprisingly, pharmaceutical firms are among the most profitable[21] [Fortune 500, 2001-2005]. PhRMA,

[20] Half is spent on free samples, which according to [Adair and Holmgren, 2005] shift doctor prescriptions habit by 10%. Doctors are also less critical of the appropriateness of a drug when giving out free samples [Morgan et. al., 2006]. As pointed out by a psychiatry blogger, firms may be feeding doctors desire to be heroes in the eyes of their patients with free samples [Carlat, 2007]. Other initial evidence that free samples do have a significant impact on prescribing are in [Chew et. al., 2000].

[21] "From 1995 to 2002, pharmaceutical manufacturers were the nation's most profitable industry. They ranked 3rd in 2003 and 2004, 5th in 2005, and in 2006 they ranked 2nd, with profits (return

the drug industry trade group, claims that this extraordinary profitability is due to extraordinary risks taken, as indicated by their posted R&D expenditures. Drug firms have been highly secretive about the specifics of their R&D spending data. One study argued that marketing dwarfs R&D spending by three fold [Public Citizen, 2001].

Doctors rarely acknowledge the influence of promotions on their prescribing. A number of studies, however, have established a positive relationship between prescription drug promotion and sales. There is also a consensus in the literature that doctors who report relying more on advertisements prescribe more heavily, more expensively, less generically, less appropriately and often adopt new drugs more quickly, leading to more side effects [Norris et. al., 2005]. The bias in self assessment as to the effects of promotion is illustrated dramatically in one study in which, after returning from all-expenses paid trips to educational symposia in resort locations, doctors reported that their prescribing would not be increased. Their tracked subsequent prescribing, however, attested to a significant increase [Orlowski and Wateska, 1992].

What exactly these gifts do is a topic of much debate. Drug firms have been monitoring physician prescribing imperfectly since 1950 through various sampling techniques[Greene, 2007]. Beginning in the 1990s, they were able to purchase physician level data. One major data provider to pharmaceutical firms, IMS Health, collects information on 70% of all prescriptions filled in community pharmacies [Steinbrook, 2006] and had revenues over $2.7 billion in 2007. Since 2005, the AMA has received $44 million/year from licensing physician data (the AMA Masterfile) which contains physician profiles for 900,000 physicians that can be used with pharmacy prescriptions data to construct physician prescribing profiles [Greene, 2007]. However, even as late as 2001, four in 10 physicians did not realize that drug industry representatives had information about their prescribing practices[Kaiser Foundation Survey, 2001].

Drug firms claim that gifts are incidental to their motive to persuade and are used merely to improve doctor attitude towards information presented to them[22].

on revenues) of 19.6% compared to 6.3% for all Fortune 500 firms."[Kaiser Foundation, 2007]

[22]A record $875 million fine against one firm for kickbacks and lavish gifts to get doctors to

Doctors themselves admit that gifts increase the likelihood of their attendance at drug firm presentations. In one survey however, 67% of faculty and 77% of residents believed accepting gifts could influence prescribing, especially if gifts greater than $100 were involved [Madhavan et. al., 1997]. In another, 61% of physicians thought that their prescribing would be unaffected by expensive gifts like textbooks, but only 16% thought their colleagues would be similarly unaffected [Steinman et. al., 2001] [23]. (From now on, this will be referred to as the "61/16 survey.") Furthermore, doctors' assessment as to whether they are affected by gifts negatively correlates with the amount and frequency of gifts they accept [Wazana, 2000].

There has been little or no state or federal sanctions of the amount or type of gifts that a doctor can accept. The American Medical Association and PhRMA have both formally *recommended* that doctors not accept gifts outside of textbooks with retail value greater than $100 and no more than *eight* at a time[24]. Most doctors are not aware of even these guidelines and enforcement is unheard of. Perhaps under the pressure of public uproar and the threat of regulation, many pharmaceutical firms adopted a similar code for themselves in 2002, and apparently to some effect. A new code going into effect in January 2009 prohibits distribution of noneducational items to healthcare professionals including small gifts, such as pens, notepads, mugs, and similar "reminder items" with company or product logos on them, even if they are practice-related[Hosansky (2008)]. The effects of these measures are yet to be seen.

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prescribe more of its drugs shows that what drug firms provide is not always just information [Raw, 2002]. Note, that crucially, the advertising and bribing motives for gifts are not mutually exclusive.

[23]The discrepancy between influence on self and influence on most other physicians is corroborated by [Madhavan et. al., 1997].

[24]The AMA has been criticized for conflict of interest for accepting $600,000 from drug firms to formulate and promote this policy.

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