Fishy Gifts: Bribing with Shame and Guilt
Job Market Paper

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Abstract

The following proposes a psychological mechanism by which the trust vested in fiduciaries (experts with wide unobservable discretion) might be exploited by third parties. The motivation is the $250 billion prescription drug industry, which spends $19 billion per year on marketing to US doctors, mostly on 'gifts' and often with no monitoring for reciprocation. In one incident, a pharmaceutical firm representative closed her presentation to Yale medical residents by handing out $150 medical textbooks and remarking, "one hand washes the other." By the next day, half the textbooks were returned. I model such bribing of fiduciaries as a one shot psychological trust game with double-sided asymmetric information. I show that the 'shame' of acceptance of a possible bribe, rather than being an impediment to bribing, can screen for reciprocating 'guilt' – and that an announcement of the expectation of reciprocation can extend the effect. Current policies to deter reciprocation might aid such screening.

JEL Codes: C71, D82

Keywords: bribery, guilt, shame, gifts, drug firms, doctors, social norms, indirect speech, psychological trust game

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1 Introduction

Several years ago, a pharmaceutical firm representative (Drug Rep) closed her informational presentation to Yale medical residents (doctors in training) by handing out medical textbooks worth $150 and remarking unexpectedly, "one hand washes the other." The next day, half of the residents returned the texts. According to an informal survey by the director of the residency program, those who returned the texts 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 of the gift all along and had discounted the gesture, and hence, would not have been influenced in their prescribing[1].

Concern about 'gifts' to doctors has been growing because of the coincidence of 1) rising expenditure on prescription drugs 2) extraordinary profitability of drug firms not commensurate with 3) pharmaceutical innovation and 4) large expenditures on marketing to doctors – in particular, 'gifts.' (See next section Background of Pharmaceutical Industry Gift Giving for details.) Decisive policy measures have been frustrated by the apparent lack of monitoring for reciprocal prescriptions; Yale, for example, does not release prescribing data to firms[2]. Therefore, gifts cannot be tied to increased prescriptions. 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 in a standard psychological game, where the Doctor felt **guilt**[3] (the product of guilt sensitivity and the expectation for reciprocation) from disappointing the expectations of the Drug Rep, that would not explain the announcement and its effect, returned books. Neither would the mere introduction of **shame (**the product of shame sensitivity and the expectation for reciprocation**),** as in [Tadelis, 2007]. It showed that the threat of merely being observed can deter a bad action. Here, the subsequent prescribing of the doctors was not observable.

In the following, 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 model of illicit contracting with fiduciaries (experts with wide and unobservable discretion) motivated by the Yale incident: 1) performance is unmonitorable 2) offers are veiled and 3) contracts are implemented by announcements of mere beliefs. For such contracting, I identify the crucial trade-off between reciprocation and low acceptance and reciprocation faced by the contracting party, when choosing how much to veil their offer. The model is

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

[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.

predictive, given the correlation between shame and guilt sensitivities.

In this model, 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). 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) give and insinuate 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. In equilibrium, the Doctor's shame anticipates the updated beliefs of observers, including a passive player, the Patient, about his subsequent unobservable reciprocation. Each type of Doctor chooses to reciprocate or not given the bribing Drug Rep's expectation for reciprocation from *his type* and his consequent guilt at disappointing this expectation[5].

The ideal situation for the bribing Drug Rep is when she just gives a gift and all types of Doctors reciprocate (Equilibrium 1). I focus on the cases where some type of Doctor is accepting but not reciprocating, i.e., free-riding.

When there is strong negative correlation between shame and guilt sensitivities, 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* (Equilibrium 3). The value of the gift can be lowered so as to not provide H with the incentive to accept, thus explaining the usual case of drug firm gift giving where no expectation of reciprocation is announced (Equilibrium 2). In contrast, when there is not strong negative correlation a gift alone cannot screen for non-reciprocation. For example, with positive correlation (Equilibrium 3*c*), L, the type who is also the *least* sensitive to shame, and hence, *least* likely to reject, is the *least* sensitive to guilt, and hence, *least likely to reciprocate*. A gift rejected by L would also be rejected by, H, the type who

[4] A significant portion did not suspect that drug firms are out to influence their prescribing with gifts[Kaiser Foundation Survey, 2001]. Drug firms promotional material try to confirm this impression. See their websites (e.g., www.pfizer.com).

[5] We can make the distinction between shame and guilt clearer by contrasting them in a partial pooling equilibrium, where both types of Doctors are accepting, but only H is reciprocating. In this equilibrium, no type of Doctor would feel guilt because beliefs are consistent with actions in equilibrium. Furthermore, 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.

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 $4\neg c$). However, if both types would reciprocate, observers could be sure that "Whoever accepts is reciprocating." H could suffer too much shame from such a belief to want to accept. If instead H had been the free-riding type, as can be the case when there is negative but not highly negative correlation (Equilibrium $3\neg c$), then getting rid of H would merely increase the Drug Rep's profits (Equilibrium 6). However, even if H had been reciprocating (Equilibrium $\bar{3}c$), the Drug Rep could still want to drop H, and switch to L, if it would be more profitable for L to reciprocate, given the trade-off between the two (Equilibrium $5\neg c$).

Assuming that the Drug Rep insinuated rationally, the above results also offer insights into the truthfulness of the doctors' self reports. Those who kept the gift and said that they would not have reciprocated regardless of the Drug Rep's remark were in fact lying in all three cases. Those who had rejected the gift were lying only if Equilibrium $4\neg c$ 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 the most obvious solution has only been used in a handful of hospitals.

3. Surveys of doctors beliefs about what their colleagues *would do*, if they accepted an expensive gift can enlist non-credible shame to deter those *who would have accepted and not reciprocated* from accepting[6].

[Ong, 2008a] simulated aspects of the incentives of the above Yale incident (and situations faced by experts in general) in a controlled laboratory experiment.

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

[6] 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. That support may be unreached, because that type rejected, say H, though the information set which contains that support may be reached, because the other type accepted, say L. Such an unreached belief support may contain non-credible beliefs about what that doctor H *would have done had he accepted.* Where doctors can feel shame from beliefs of others, such non-credible beliefs can lead to non-credible shame and guilt, which can be dispelled by a kind of forward inductive reasoning. This shows that those who kept the books could have been merely more rational than those who rejected them.

research indicates that, like drug firms, loan firms could not monitor for reciprocation in form of recommendations of their products to students, and may also have relied upon psychological factors like guilt and shame to target bribes and 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.

A scandal can function as an announcement of expectations. In [Ong, 2008a], using this model, I also explain how the possibility that the shame of scandals could sort out those who are most trustworthy. That raises the question of how expert professions might 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 $11 billion in 2001, may help screen out people who would damage the reputation of all doctors by cheating their patients. 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 Appendix B.

1.1 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][7] 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

[7] 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].

[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[8] [Fortune 500, 2001-2005]. PhRMA, 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 [Young, 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].

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

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[9]. 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] [10]. (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[11]. 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.

2 The Model

Let $\theta_1 \in \{b, \neg b\}$ denote the Proposer's (he) types, where b stands for bribing and $\neg b$ for not bribing. $\neg b$ likes to give. b only gives in the expectation of reciprocation. Let $\theta_2 \in \{c, \neg c\}$ denote the Responder's (she) types [12] where c stands for 'conscientious' and $\neg c$ stands for 'not conscientious'. $\sigma_{\theta_2} \in R_+$ is the shame aversion of the θ_2 type and $\sigma_c > \sigma_{\neg c}$. A type

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

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

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

[12] It's clear from the 61/16 survey result mentioned [Steinman et. al., 2001] that doctors believe that they are different from their colleagues, i.e., in their minds, there are two types of doctors.

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 $\neg c$ Responder with probability p_2.

2. Each type of Proposer may give a gift $\neg i$ or give and insinuate i or not give $\neg g$[13].

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.

2.1 Responder's Payoff

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

For each type of Responder $\theta_2 \in \{c, \neg c\}$:

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

$$\{(b\neg c, i, a, r), (b\neg c, i, a, \neg r), (bc, i, a, r), (bc, i, a, \neg r)\}$$

μ_1 =probability that the Proposer is the b type.

μ_2 =probability that the Responder is $\neg c$.

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, beliefs otherwise and payoff parameters that are equal to beliefs in equilibrium.

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

$\bar{\rho}(I)$ =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 mean the Responder believes others believe, "whoever accepts reciprocates."

$\rho_{\theta_2}(I)$ =Responder θ_2's belief of observers' belief about θ_2's rate of reciprocating after acceptance. Hence, $\rho_{\theta_2}(I) = 1$ would mean the Responder θ_2 believes others believe "if I accept, I would be expected to reciprocate."

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

$$\bar{\rho}(I) = \rho_{\neg c}(I) \cdot \mu_2 + \rho_c(I) \cdot (1 - \mu_2) \tag{1}$$

The support of $\rho_{\theta_2}(I)$ is represented by dashed 'belief support sets' in the tree. 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. See dashed 'belief support sets' in the tree of Appendix A. How these conditional beliefs work together in each equilibria is spelled out in Table 1 in Summary of Equilibrium Mechanics of Shame and Guilt in section 3.1.2 for more details.

Payoff of Responder after non-acceptance: 0.

Payoff of Responder after he accepts and reciprocates: $v - e - \sigma_{\theta_2}\bar{\rho}(I)$.

Payoff of Responder after he accept and not reciprocates: $v - \mu_1\gamma_{\theta_2}\rho_{\theta_2}(I) - \sigma_{\theta_2}\bar{\rho}(I)$.

2.2 Proposer's Payoff

I assume that the insinuation is free for the b proposer and cares only about material payoffs. Hence, its 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 it is facing, it chooses $\mathbf{i}$ to maximize its expected payoffs:

$$\max_{\mathbf{i}} E(\pi_b(\mathbf{i}, \mathbf{r_i})) = \max_{\mathbf{i}} \{\mu_2(\mathbf{r}_{\neg c\mathbf{i}}R - k) + (1 - \mu_2)(\mathbf{r}_{c\mathbf{i}}R - k)\} \tag{3}$$

The game is uninteresting if the proposer does not give. Clearly, the b proposer will only give if it 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 $\mathbf{r}_{\neg c} = 1$ or $\mathbf{r}_c = 1$, the proposer earns positive profits.

$$R\left(p_2\left(\mathbf{r}_{\neg c}\right) + \left(1 - p_2\right)\left(\mathbf{r}_c\right)\right) > k \tag{4}$$

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.

I assume that the $\neg b$ Proposer likes to give and incurs a cost from insinuating when giving.

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 ρ.

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

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 $\bar{\rho}$ and ρ_{θ_2}.

I will call my equilibrium concept 'psychological weak sequential equilibrium' (PWSE), which is based on the weak sequential equilibrium concept (WSE)[14]. In a WSE, every player maximizes his utility at every information set and beliefs are Bayesian where possible. In each $G \in \Gamma$, each type of Proposer chooses to give $\neg i$ or insinuate and give i, given its belief μ_2 of facing $\neg c$ and expected rates of reciprocating after either type of Responder

[14] 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.

accepts. Each type of Responder $\theta_2 \in \{c, \neg c\}$ decides on acceptance a_{θ_2} or rejection $\neg a_{\theta_2}$, given his shame aversion σ_{θ_2}, belief about the average rate of reciprocation given acceptance $\bar{\rho}$ and the value of the gift v. After acceptance, each type θ_2 of Responder would choose to reciprocate r or not, given his guilt aversion $-\gamma_{\theta_2}$, his cost of reciprocating e and his belief about the Proposer's expectation of θ_2's reciprocation rate ρ_{θ_2}, weighted by the belief μ_1 that he is facing the b type. This defines the WSEs for each G. The PWSEs are what remains of Γ after we throw out every WSEs in which the payoff parameters are not consistent with what they should stand in for every type at every information set on the equilibrium path[15].

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

3.2 Aspects of Equilibria

The regions in all figures represent the parameter ranges for a type's (a point on this σ, γ plane) best responses given beliefs about its response ρ_d and beliefs about the average best response $\bar{\rho}$. The Responder needs to rank four pure strategies $(r, a), (r, \neg a), (\neg r, a)$ and $(\neg r, \neg a)$. Note that the utility of not accepting is always zero, no matter what the Responder would have done had he accepted: $(\neg r, \neg a) \sim (r, \neg a)$. Let these rankings be represented in the following short hand.

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

In the following, I derive aspects of equilibria for a generic $I \in \mathcal{I}$ (after a history in which the Drug Rep either insinuated or not and the Responder accepted) that I use for proving equilibria to avoid repetition in my proofs. From now on, I will speak of the parameters interchangeably with their equilibrium quantity.

[15] 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].

The $(r \succeq \neg a)$ **Condition:** At each information set $I \in \mathcal{I}$ for each type $\theta_2 \in \{c, \neg c\}$, reciprocate is better than reject iff the value of the gift v less the effort cost of reciprocating e less the shame from reciprocating $\sigma_{\theta_2}\bar{\rho}$ is greater than the value of reject.

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

The $(\neg r \succeq \neg a)$ **Condition:** At each information set $I \in \mathcal{I}$ for each type $\theta_2 \in \{c, \neg c\}$, not reciprocate is better than reject iff the value of gift v less the guilt of not reciprocating $\gamma_{\theta_2}\rho_{\theta_2}(I)$ times the probability that the Drug Rep is the bribing type μ_1 less than the shame from accepting $\sigma_{\theta_2}\bar{\rho}$ is greater than the value of reject.

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

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

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

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

The Responder will reciprocate, if he is sensitive enough to guilt (γ_{θ_2} is high) at disappointing the what he believes $\rho_{\theta_2}(I)$ are the Proposer expectations of his own rate of reciprocating $\mathbf{r}$, weighted by the probability μ_1 that he is indeed facing the Drug Rep with this expectation $\neg b$.

The $(r \succeq \neg r, r \succeq \neg a)$ **Condition:** At each information set $I \in \mathcal{I}$ for each type $\theta_2 \in \{c, \neg c\}$, the accept and reciprocate are best condition holds when $(r \succeq \neg a)$ and $(r \succeq \neg r)$ hold jointly.

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

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

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

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

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

Acceptance occurs iff the value of the gift minus the shame from accepting $(v -$

$\sigma_{\theta_2}\bar{\rho}(I)$) is greater than either the cost of reciprocating e or the guilt of not reciprocating $\mu_1\gamma_{\theta_2}\rho_{\theta_2}(I)$.

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 equilibrium 4-6, the b Proposer separates to i. To avoid repetition, I state only what each type of Responder does in the following proposition. The complete strategy profiles are stated in a smaller font.

3.3.1 No Insinuation Equilibria

To shorten my proofs, I characterize off-equilibrium beliefs in the following lemma once and use it repeatedly in my proofs. Since these off-equilibrium beliefs are all the same, I also omit specifying them in the propositions below. Since 'on equilibrium' beliefs 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*

$$((\mathbf{a}_c(s_1) = 1, \mathbf{r}_c(s_1) = 0), (\mathbf{a}_{\neg c}(s_1) = 1, \mathbf{r}_{\neg c}(s_1) = 0)) \tag{8}$$

when $\rho_c(s_1) = \rho_{\neg c}(s_1) = 0$. The b Proposer's payoff will be $-k$.

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

$$(\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0), ((\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 1), (\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 1)), ((\mathbf{a}_c(i) = 1, \mathbf{r}_c(i) = 0), (\mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 0))$$

iff

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

$$\rho_c(\neg i) = \rho_{\neg c}(\neg i) = 1 \tag{10}$$

Proposition 4 (Eq. 2) *There exist equilibria in which the $\neg c$ type of Responder accepts and reciprocates and the c type does not accept. More specifically,*

$$(\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0), ((\mathbf{a}_c(\neg i) = 0, \mathbf{r}_c(\neg i) = 0), (\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 1)), ((\mathbf{a}_c(i) = 1, \mathbf{r}_c(i) = 0), (\mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 0))$$

iff

$$\rho_{\neg c}(\neg i) = 1, \bar{\rho}(\neg i) = 1, v - e \geq \sigma_{\neg c} \text{ and } p_1 \gamma_{\neg c} \geq e \tag{11}$$

$$\rho_c(i) = 0 \text{ and } \rho_{\neg c}(i) = 0 \tag{12}$$

and

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

Proposition 5 (Eq. 3¬c) *There exist equilibria in which both types of Responders accept but only ¬c reciprocates. More specifically,*

$$(\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0), ((\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 0), (\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 1)), ((\mathbf{a}_c(i) = 1, \mathbf{r}_c(i) = 0), (\mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 0))$$

iff

$$v - e \geq \sigma_{\neg c} p_2 \text{ and } p_1\gamma_{\neg c} \geq e \tag{14}$$

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

$$\rho_c(\neg i) = 0, \rho_{\neg c}(\neg i) = 1, \bar{\rho}(\neg i) = p_2 \tag{16}$$

$$\rho_{\neg c}(i) = \rho_{\neg c}(i) = 0 \tag{17}$$

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

$$(\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0), ((\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 1), (\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 0)), ((\mathbf{a}_c(i) = 1, \mathbf{r}_c(i) = 0), (\mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 0))$$

iff

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

$$0 \leq v - \sigma_{\neg c}(1 - p_2) \text{ and } p_1\gamma_{\neg c} < e \tag{19}$$

$$\rho_c(\neg i) = 1, \rho_{\neg c}(\neg i) = 0, \bar{\rho}(\neg i) = (1 - p_2) \tag{20}$$

$$\rho_c(i) = \rho_{\neg c}(i) = 0 \tag{21}$$

Corollary 7 (Eq. $\bar{\mathbf{3}}c$) *Consider Eq. 3c. If $v - e < \sigma_c$, then c only accepted if ¬c 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 $\neg c$ type of Responder accepts and reciprocates and the c type does not accept. More specifically,*

$$(\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0), ((\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 0), (\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 0)), ((\mathbf{a}_c(i) = 0, \mathbf{r}_c(i) = 1), (\mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 1))$$

iff

$$\rho_{\neg c}(i) = 1, \bar{\rho}(i) = 1, v - e \geq \sigma_{\neg c} \text{ and } \gamma_{\neg c} \geq e \tag{22}$$

$$\rho_c(\neg i) = \rho_{\neg c}(\neg i) = 0 \tag{23}$$

and

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

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

$$(\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0), ((\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 0), (\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 0)), ((\mathbf{a}_c(i) = 0, \mathbf{r}_c(i) = 0), (\mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 1))$$

iff

$$\rho_{\neg c}(i) = 1, \bar{\rho}(i) = 1, v - e \geq \sigma_{\neg c} \text{ and } \gamma_{\neg c} \geq e \tag{25}$$

$$\rho_c(\neg i) = 0 \text{ and } \rho_{\neg c}(\neg i) = 0 \tag{26}$$

and

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

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

$$(\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0), ((\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 0), (\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 0)), ((\mathbf{a}_c(i) = 1, \mathbf{r}_c(i) = 1), (\mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 1))$$

iff

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

$$\rho_c(\neg i) = \rho_{\neg c}(\neg i) = 1 \tag{29}$$

Proposition 11 *Suppose that either Eq. 4¬c or Eq. 3c can hold. If the not conscientious types ¬c are numerous enough*

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

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

Proposition 12 *Eq. 3¬c can be eliminated with the Intuitive Criterion. Eq. 5¬c 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 $c : (r \succeq \neg a)$

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

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

The horizontal axis is divided up by the 'reciprocate is better than not reciprocate' or $(r \succeq \neg r)$ condition : $\mu_1 \gamma_c \rho_c \geq e$, 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, $\rho_c \in \{0, 1\}$, when $(r \succeq \neg r)$ is rewritten as $\gamma_c \geq \frac{e}{\mu_1 \rho_c}$, the horizontal boundaries for $\gamma_c \in \left\{0, e, \frac{e}{p_1}, \infty\right\}$.

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

The diagonal is divided by the 'not reciprocate is better than not accept' or $(\neg r \succeq \neg a)$ condition for $c : v - \mu_1\gamma_c\rho_c - \sigma_c\bar{\rho} \geq 0$[16]. This condition, which can be more conveniently written as $\frac{v-\mu_1\gamma_c\rho_c}{\bar{\rho}} \geq \sigma_c$ only matters when not reciprocating is better than reciprocating $(\neg r \succeq r) : \mu_1\gamma_c\rho_c < e$. and c has rejected, i.e., c is in region $\neg a$. There are two possibilities: c accepts or c rejects.

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

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

$$\bar{\rho} = \rho_{\neg c} \cdot \mu_2 + \rho_c \cdot (1 - \mu_2)$$

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

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

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

From this point onwards, I will generally suppress the type index ,e.g., '$\neg c$' in '4$\neg c$' in the separating equilibria so that I might instead index these equilibria by 'a' or 'b' which indicates different off-equilibrium beliefs.

If both c and $\neg c$ 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.

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

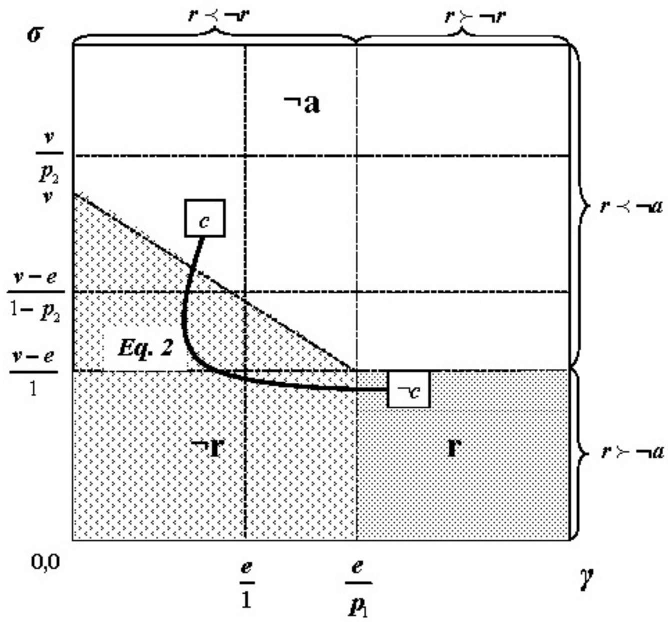


Figure 1: Only $\neg c$ accepts and reciprocates.

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

Main Intuition Guilt is something we might feel about what we do regardless of whether anyone else knows about it. Normally, shame requires observation by others [Tangney, Dearing, 2002] [Tracy et. al., 2007]. But here the shame-laden act of reciprocating is not observable. What is observable is acceptance. In equilibrium, if both types of Responders accept, the Proposer knows only that she faces some type of Responder and the probability with which each type of Responder is reciprocating. The unobservability of the type who accepts, though his prescription rate is known in equilibrium, means that neither type bears their own shame costs of reciprocating fully. Rather, the shame cost of *own reciprocating* is externalized. Each type feels only the average shame when he accepts. Thus, the shame of the action of a type of Responder need not be merely a function of the act itself, accept a, which may be innocuous, but what that act signals about what that type might 'intend' to do – reciprocate r.

The bribing Proposer can increase the guilt of not reciprocating by separating (by insinuating) and making her expectation of reciprocation known. That in turn will increase reciprocation per acceptance. Increased reciprocation per acceptance will impose a shame spillover on all types who accept through the aggregate reciprocation rate. That will increase the cost of acceptance and hence, increase rejection. Using Eq. 3c and 4a, I demonstrate that the Proposer can use insinuation to spur the prescribing of the less conscientious type, who had not been reciprocating, at the cost of imposing a rejection provoking shame spillover on the more conscientious type, who had been reciprocating. Here both types of Responders were sufficiently sensitive to guilt after insinuation to reciprocate, but the conscientious type was too sensitive to shame to have accepted, if the not conscientious type also reciprocated.

In Eq. 3c, the non-reciprocation of the not conscientious type had exerted a shame diluting externality upon the conscientious type. In return, the not conscientious type received a pecuniary externality from the reciprocation of the conscientious type. In the case of drug firm to doctor gift giving, such free-riding is useful both for lightening the reciprocating doctor's shame and for decreasing the odds of an outright ban for the drug firm.

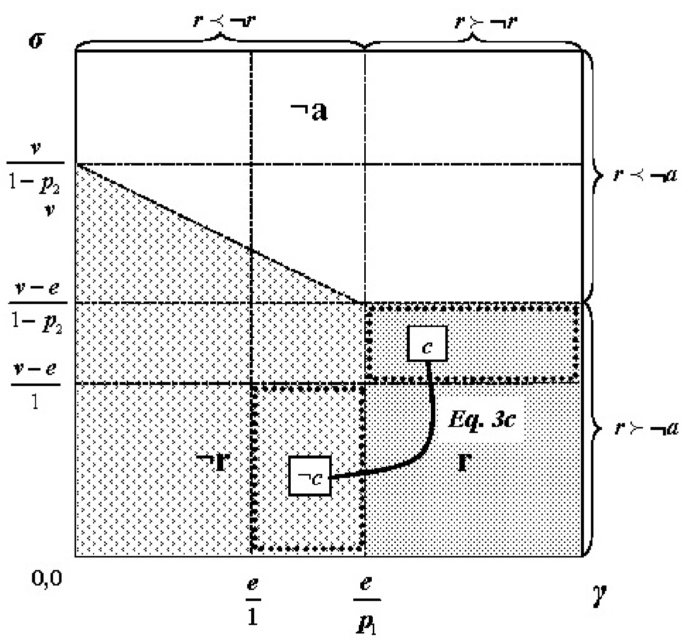


Figure 2: Both accept. Only c reciprocates.

Graphical Analysis In Eq. 3c, the conscientious Responder c, who has high shame and guilt sensitivity, is accepting and reciprocating, while $\neg c$, who has lower shame and guilt sensitivity, is accepting but not reciprocating. In Eq. 4, the same c has rejected, while $\neg c$ has accepted and reciprocated. Eq. 3c has the $\neg c$ type of Responder in region

$\neg r$ and c in region r. Eq. 4 has this same $\neg c$ in region r and c in region $\neg a$. The bribing Proposer b, by separating with an insinuation, increases guilt causing the $\neg c$ Responder with guilt range $e \leq \gamma_{\neg c} \leq \frac{e}{p_1}$ and shame range $0 \leq \sigma_{\neg c} \leq v - e$ (figure 2) to accept and reciprocate. When they do so, they exert a negative externality for their paired type in the guilt range $\frac{e}{p_1} \leq \gamma_c$ and shame range $1 - e \leq \sigma_c \leq \frac{v-e}{1-p_2}$ that causes c 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 $\bar{\rho} = p_2 \rightarrow \bar{\rho} = 1$.

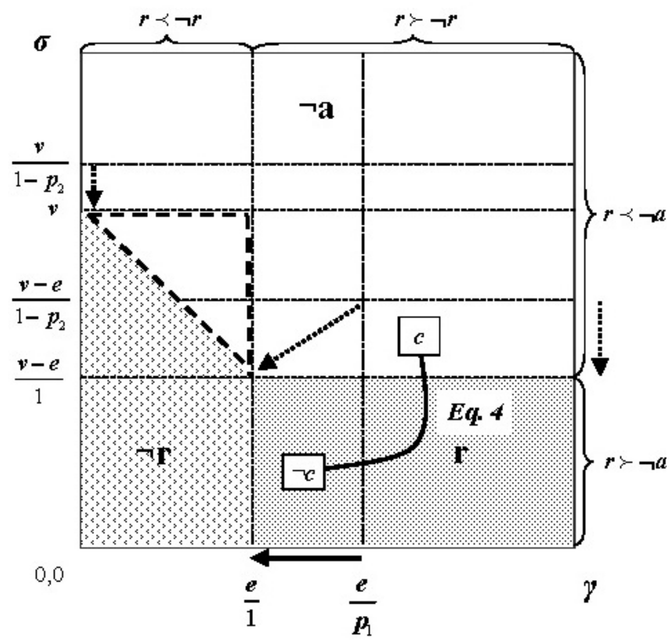


Figure 3: Insinuation. Only $\neg c$ reciprocates.

Eq. $3c$ 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 $\neg c$ type is great enough of the proportion of the Responder population, the non-insinuation equilibria Eq. $3c$ 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 $\neg c$ is a greater proportion of Responders, the $\neg c$ 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 conscientious type but gain the prescriptions of the not conscientious 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. $3\neg c$, insinuation can cause the non-reciprocating type c to not accept, as in Eq. $5\neg c$ of figure 4. When there is positive correlation, as in Eq. $3c$, insinuation can cause the non-reciprocating type to reciprocate, as in Eq. 6 of figure 4.

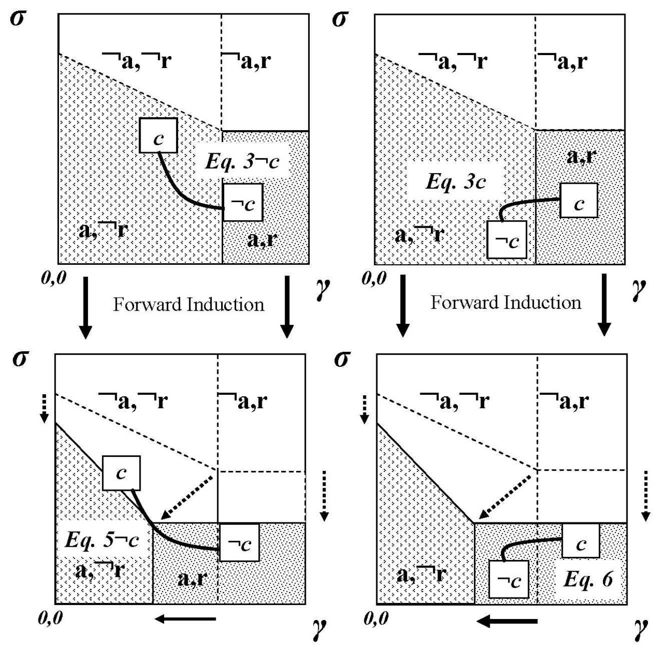


Figure 4: Free-rider rejects or reciprocates.

3.4.5 The Screening Effect of Non-Credible Shame

Main Intuition The separating equilibria of all the separating equilibria show how the Proposer can use the value of the gift and shame spillover of reciprocation to screen for the conscientious type, who either was not sensitive enough to guilt to reciprocate (Eq. 2a and 2b) or did not believe that if 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 rejection 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 conscientious 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 rejected allow for non-credible shame and guilt.

In Eq. 2a and 2b, type c's guilt sensitivity is not sufficient to induce reciprocation since $\gamma_c < \frac{e}{p_1}$. The rejection condition $\neg(a \succeq \neg a)$ is defined as $\min\{e, p_1\gamma_c\rho_c\} > v - \sigma_c\bar{\rho}$.

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

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

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

But, others know that $\gamma_c < \frac{e}{p_1}$. Therefore, cannot expect him to reciprocate. Therefore, he cannot believe that they would expect him to reciprocate upon acceptance. Hence, $\rho_c = 0$. 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 c from accepting: $\sigma_c > v - p_1\gamma_c$, and the shame sensitivity that *should* keep c from accepting: $\sigma_c \geq \frac{v}{p_2}$, is in the shame region $\frac{v}{p_2} \geq \sigma_c \geq v - p_1\gamma_c$ and $e > p_1\gamma_c$. (See dashed triangle marked (2) in figure 5.) If the Proposer insinuates, this region would be $\frac{v}{p_2} \geq \sigma_c \geq v - \gamma_c$ and $e > \gamma_c$.

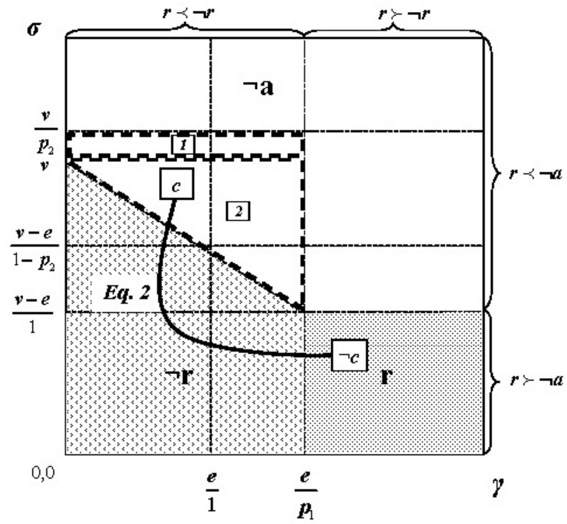


Figure 5: No Insinuation. Only $\neg c$ reciprocates.

In Eq. 2b, c believes that, had he accepted, he was *not expected* to reciprocate $\rho_c = 0$. It was only the raw shame externality of $\neg c$ that kept him from accepting: $0 > v - \sigma_c$. But, then, if he did accept, he should anticipate that the shame should be diluted to $\sigma_c p_2 < \sigma_c$ 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: $\sigma_c \geq \frac{v}{p_2}$. Then, the difference in the shame sensitivity that *would* keep c from accepting $\sigma_c > v$ and the shame sensitivity that *should* keep c from accepting $\sigma_c \geq \frac{v}{p_2}$ is in the shame region $\frac{v}{p_2} \geq \sigma_c \geq v$.(See dashed rectangle marked (1) in region $\gamma_c < \frac{e}{p_1}$ 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[17]. 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:

$$R\left(p_2\left(\mathbf{r}_{\neg c}\right)+\left(1-p_2\right)\left(\mathbf{r}_c\right)\right)>k$$

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

$$u-S\left(p_2\left(\mathbf{r}_{\neg c}\right)+\left(1-p_2\right)\left(\mathbf{r}_c\right)\right)\geq 0$$

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:

$$u-S\left(p_2\left(\mathbf{r}_{\neg c}\right)+\left(1-p_2\right)\left(\mathbf{r}_c\right)\right)<0$$

where in equilibrium where in equlibrium $\rho_{\theta_2}(I)=\mathbf{r}_{\theta_2}$, $\theta_2\in\{\neg c,c\}$ and

$$\bar{\rho}(I)=\rho_{\neg c}(I)\cdot\mu_2+\rho_c(I)\cdot(1-\mu_2) \tag{31}$$

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 [18]as suggested by [Williams, 2008].

[17] [Harris, 2008] describes a recent effort to increase bans in medical schools.

[18] Nearly 60 percent of doctors had considered getting out of medicine because of low morale[Williams, 2008].

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 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[19]. 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 $\neg c$, who did not reciprocate before, to reject, shifting the situation from Eq. 3c to Eq. 2.

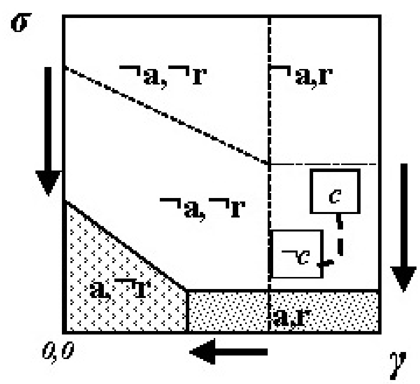


Figure 6: The effect of a gift ceiling.

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,

[19] 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.

reducing the effectiveness of gifts, requiring a larger gift v for the same 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., $\sigma\,(\text{fines}) >> \sigma\,(\text{no fines})$].

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 [Medina, 2006] [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 rejected after insinuation. Counterintutively, regulators could try to decrease the prior belief on the b type of Proposer $\mu_1 = p_1 \to 0$, 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 $p_1 \to 0$.

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., $\rho_{\theta_2} \to 0, \forall \theta_2 \in \{c, \neg c\}$, then the region for acceptance will expand as it's upper bound $\frac{v-e}{\bar{\rho}} \to \infty$, at the same time that the region for not reciprocating r, whose lower bound is defined by $\frac{e}{\mu_1 \rho_{\theta_2}} \to \infty$. 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. $\bar{3}c$, in which $\bar{\rho} = 1 - p_2$ and both types of doctors accept, but only $\neg c$ type reciprocates, policy makers should try to convince everyone that all types of doctors are in fact reciprocating so as to increase $\bar{\rho} \to 1$ to prompt rejection from a majority of doctors. See Eq. $\bar{3}c$.

5 Conclusion

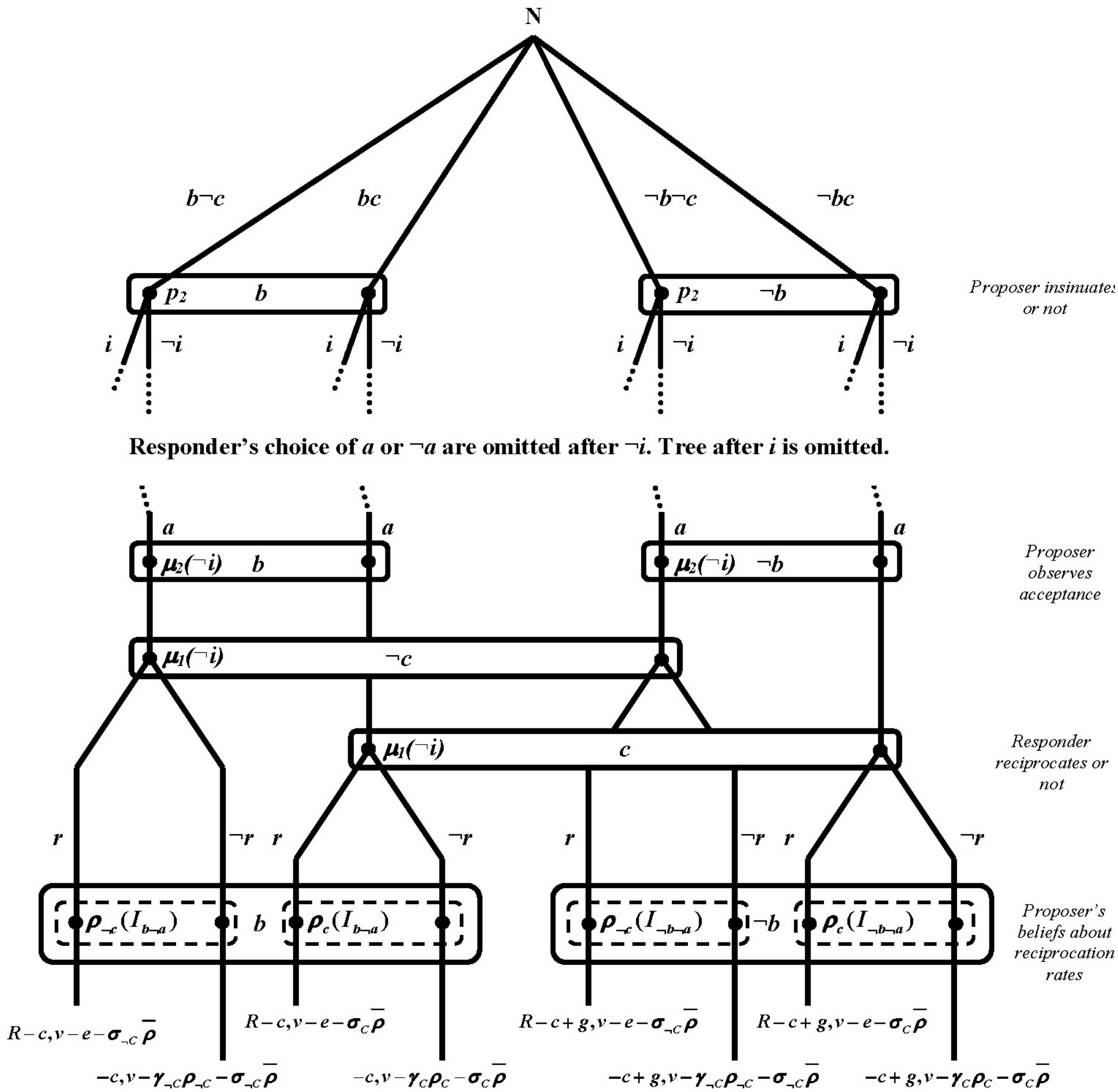
This paper began by introducing the problem of explaining the coincidence of 1) rising cost of prescription drugs 2) drug firm profits that did not seem attributable to pharmaceutical innovation and 3) large expenditures on marketing to doctors – in particular, 'gifts,' occurring in the absence of monitoring 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[20]. I explained the circumstances

[20]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.

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.

6 Appendix A



7 Appendix B

Let $\mathbf{a}_{\theta_2}(i)$ be the rate of acceptance of type $\theta_2 \in \{c, \neg c\}$ after observing giving with insinuation. Similarly, for $\mathbf{a}_{\theta_2}(\neg i)$ but after observing giving only. Since i is dominated for the

$\neg b$, in any equilibrium, $\mathbf{i}_{\neg b} = 0$. Propositions 1-3 are pooling equilibria in which Proposer b does not insinuate. Proposition 4 is a separating equilibrium in which b insinuates.

Recall the consistency condition for a PWSE from (6).

$$\rho_{\theta_2}(I) = \mathbf{r}_{\theta_2}(I), \forall I \in \mathcal{I}, \forall \theta_2 \in \{c, \neg c\} \tag{32}$$

7.0.7 No Insinuation Equilibria

Proof of Lemma 1. For a fixed $s_1 \in \{i, \neg i\}$, given $\rho_c(s_1) = \rho_{\neg c}(s_1) = 0$, then regardless of the value of μ_2,

$$\bar{\rho} = \rho_c(s_1) \cdot \mu_2(s_1) + \rho_{\neg c}(s_1) \cdot (1 - \mu_2(s_1)) = 0$$

Therefore, the acceptance condition $(a \succeq \neg a)$:

$$\min\left\{e, \mu_1(s_1)\gamma_{\theta_2}\rho_{\theta_2}(s_1)\right\} \leq v - \sigma_{\theta_2}\bar{\rho}(s_1), \forall \theta_2 \in \{c, \neg c\}$$

will always be satisfied since it becomes,

$$\min\{e, 0\} \leq v$$

The reciprocate condition $(r \succeq \neg r)$:

$$\mu_1(s_1)\gamma_{\theta_2}\rho_{\theta_2}(s_1) \geq e, \forall \theta_2 \in \{c, \neg c\}$$

is never satisfied since $\rho_{\theta_2}(s_1) = 0, \forall \theta_2 \in \{c, \neg c\}$ regardless of of the value of μ_1. If both Responders accept and neither reciprocate, then the b Proposer's payoff from insinuating from (3) would be

$$\max_{s_1 \in \{i, \neg i\}} E(\pi_b(s_1, \mathbf{r}(s_1))) = \max_{s_1 \in \{i, \neg i\}} \{\mu_2(s_1)(\mathbf{r}_{\neg c}(s_1) \cdot R - k) + (1 - \mu_2(s_1))(\mathbf{r}_c(s_1) \cdot R - k)\} \tag{33}$$

$$= \max_{s_1 \in \{i, \neg i\}} \{\mu_2(s_1)(0 \cdot R - k) + (1 - \mu_2(s_1))(0 \cdot R - k)\} = -k \tag{34}$$

■

Proof of Proposition 2. $(\Rightarrow)$ b Proposer pools to $\neg i$. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. Beliefs are not updated: $\mu_1(\neg i) = p_1$. Both Responders accept and reciprocate: $\mathbf{a}_c(\neg i) = \mathbf{r}_c(\neg i) = \mathbf{a}_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$. Therefore, $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\theta_2}\bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\gamma_{\theta_2}\rho_{\theta_2}(\neg i) \geq e, \forall \theta_2 \in \{c, \neg c\} \tag{35}$$

Consistency (32) requires $\rho_c(\neg i) = \mathbf{r}_c(\neg i) = 1$ and $\rho_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$. Since both types of Responders took the same action, the updated belief of the Proposer that it is facing the c type of Responder is equal to her prior: $\mu_2(\neg i) = p_2$ in

$$\bar{\rho}(\neg i) = \rho_{\neg c}(\neg i) \cdot \mu_2(\neg i) + \rho_c(\neg i) \cdot (1 - \mu_2(\neg i)) = 1$$

from (1). Combined with (35), we get (9) and (10).

($\Leftarrow$)Now suppose that (9) and (10) hold. Since $\rho_c(\neg i) = \rho_{\neg c}(\neg i) = 1$, then

$$\bar{\rho}(\neg i) = \rho_{\neg c}(\neg i) \cdot \mu_2(\neg i) + \rho_c(\neg i) \cdot (1 - \mu_2(\neg i)) = 1$$

Then the condition for both types of Responders to accept and to reciprocate $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\theta_2}\bar{\rho}(\neg i) \text{ and } \mu_1\gamma_{\theta_2}\rho_c(\neg i) \geq e, \forall\theta_2 \in \{c, \neg c\}$$

will be met. Hence, $\mathbf{a}_c(\neg i) = \mathbf{r}_c(\neg i) = \mathbf{a}_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$, if the b Proposers pools to $\neg i$. $\mu_2(\neg i) = p_2$ since the Responders pooled, in which case, $\mu_1(\neg i) = p_1$. b will pool to $\neg i$ because he cannot do better by deviating to i since both types of Responders are reciprocating. Therefore nothing that the Responders do after i will can perturb the equilibrium path. In particular, $\mathbf{a}_c(i) = 1, \mathbf{r}_c(i) = 0, \mathbf{a}_{\neg c}(i) = 1, \mathbf{r}_{\neg c}(i) = 0$ supports the equilibrium. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. ■

Proof of Proposition 3. ($\Rightarrow$) b Proposer pools to $\neg i$. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. Beliefs are not updated: $\mu_1(\neg i) = p_1$. The $\neg c$ Responder accepts and reciprocates: $\mathbf{a}_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$. Then $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\neg c}\bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\gamma_{\neg c}\rho_{\neg c}(\neg i) \geq e \tag{36}$$

Consistency (32) on the equilibrium path requires $\rho_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$. The c Responder does not accept: $\mathbf{a}_c(\neg i) = 0$. The condition for rejection $\neg(a \succeq \neg a)$:

$$\min\{e, \mu_1(\neg i)\gamma_c\rho_c(\neg i)\} > v - \sigma_c\bar{\rho}(\neg i) \tag{37}$$

is met for c. The updated belief of the Proposer that it is facing the $\neg c$ type would be $\mu_2(\neg i) = 1$. Then from (1)

$$\bar{\rho}(\neg i) = \rho_{\neg c}(\neg i) \cdot \mu_2(\neg i) + \rho_c(\neg i) \cdot (1 - \mu_2(\neg i)) \tag{38}$$

$$\bar{\rho}(\neg i) = 1 \cdot 1 + \rho_c(\neg i) \cdot 0 = 1 \tag{39}$$

With (39), (36) becomes the rest of (11)

$$v - e \geq \sigma_{\neg c} \text{ and } p_1 \gamma_{\neg c} \geq e$$

(37) becomes

$$\min \{e, p_1 \gamma_c \rho_c (\neg i)\} > v - \sigma_c \tag{40}$$

After rejection beliefs are arbitrary $\rho_c (\neg i) \in \{0, 1\}$.

Let the Responder believe that had he accepted, he would have been expected to reciprocate $\rho_c (\neg i) = 1$. (40) becomes

$$\min \{e, p_1 \gamma_c\} > v - \sigma_c$$

Again, because what happens after rejection cannot affect the equilibrium path, we can set $p_1 \gamma_c < e$. Hence, $\sigma_c > v - p_1 \gamma_c$. This is $(13a)$.

Alternatively, let the Responder believe that had he accepted, he would not have been expected to reciprocate then $\rho_c (\neg i) = 0$. (40) becomes

$$\min \{e, 0\} > v - \sigma_c$$

Hence, $0 > v - \sigma_c$. This is $(13b)$. We can set $\rho_c (i) = 0$ and $\rho_{\neg c} (i) = 0$ off the equilibrium path. Then, (12) is satisfied.

$(\Leftarrow)$Now, given that (11) and $(13a)$ hold and suppose the b Proposer pools so that $\mu_1 (\neg i) = p_1$. By (11) :

$$\rho_{\neg c} (\neg i) = 1, \bar{\rho} (\neg i) = 1, v - e \geq \sigma_{\neg c} \text{ and } p_1 \gamma_{\neg c} \geq e$$

the acceptance and reciprocation are best condition $(r \succeq \neg r, r \succeq \neg a)$ is met for $\neg c$

$$v - e \geq \sigma_{\neg c} \bar{\rho} (\neg i) \text{ and } \mu_1 (\neg i) \gamma_{\neg c} \rho_{\neg c} (\neg i) \geq e \tag{41}$$

Therefore, $\mathbf{a}_{\neg c} (\neg i) = \mathbf{r}_{\neg c} (\neg i) = 1$.

By $(13a)$: $\rho_c (\neg i) = 1, p_1 \gamma_c < e$, then $\mu_1 (\neg i) \gamma_c \rho_c (\neg i) < e$. Also by $(13a)$: $v - p_1 \gamma_c < \sigma_c$ and therefore

$$\min \{e, p_1 \gamma_c \rho_c\} > v - \sigma_c$$

the reject condition $\neg (a \succeq \neg a)$ is met for c,

$$\min \{e, \mu_1 (\neg i) \gamma_c \rho_c (\neg i)\} > v - \sigma_c \bar{\rho} (\neg i)$$

Therefore, $\mathbf{a}_c(\neg i) = 0$. Off the equilibrium path, we can set $\mathbf{r}_c(\neg i) = 0$. Since by (41) at least one type $\neg c$ reciprocated, by (4) the Proposer will make positive profits after i. By (12): $\rho_c(i) = \rho_{\neg c}(i) = 0$. By Lemma 1, if the b Proposer were to deviate to i, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$.

($\Leftarrow$)Now alternatively, given that (11) and ($13b$) hold and suppose the b Proposer pools so that $\mu_1(\neg i) = p_1$. By (11) :

$$\rho_{\neg c}(\neg i) = 1, \bar{\rho}(\neg i) = 1, v - e \geq \sigma_{\neg c} \text{ and } p_1\gamma_{\neg c} \geq e$$

Therefore, the acceptance and reciprocation are best condition ($r \succeq \neg r, r \succeq \neg a$) is met for $\neg c$

$$v - e \geq \sigma_{\neg c}\bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\gamma_{\neg c}\rho_{\neg c}(\neg i) \geq e$$

Therefore, $\mathbf{a}_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$. By ($13b$) :

$$\rho_c(\neg i) = 0, \sigma_c > v \text{ and } p_1\gamma_c < e.$$

Therefore,

$$\min\{e, 0\} > v - \sigma_c\bar{\rho}(\neg i)$$

The reject condition $\neg(a \succeq \neg a)$:

$$\min\{e, \mu_1(\neg i)\gamma_c\rho_c(\neg i)\} > v - \sigma_c\bar{\rho}(\neg i)$$

for c is met. Therefore, $\mathbf{a}_c(\neg i) = 0$. Off the equilibrium path, we can set $\mathbf{r}_{\neg c}(\neg i) = 0$.

Since at least one type reciprocated after $\neg i$, by (4) the Proposer will make positive profits after $\neg i$. By (12) and Lemma 1, if the b Proposer were to deviate to i, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. ■

Proof of Proposition 4. ($\Rightarrow$) b Proposer pools to $\neg i$. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. Beliefs are not updated: $\mu_1(\neg i) = p_1$. The $\neg c$ Responder accepts and reciprocates: $\mathbf{a}_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$. Therefore, ($r \succeq \neg r, r \succeq \neg a$) :

$$v - e \geq \sigma_{\neg c}\bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\gamma_{\neg c}\rho_{\neg c}(\neg i) \geq e \tag{42}$$

Consistency (32) on the equilibrium path requires $\rho_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 1$.

For c, $\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 0$. The accept ($a \succeq \neg a$) :

$$\min\{e, \mu_1(\neg i)\gamma_c\rho_c(\neg i)\} \leq v - \sigma_c\bar{\rho}(\neg i)$$

condition holds but not the reciprocate condition $(r \succeq \neg r)$:

$$\mu_1(\neg i)\gamma_c \rho_c(\neg i) < e$$

Consistency (32) implies, $\rho_c(\neg i) = \mathbf{r}_c(\neg i) = 0$ and therefore,

$$0 \le v - \sigma_c \bar{\rho}(\neg i) \text{ and } 0 < e \tag{43}$$

To find $\bar{\rho}(\neg i)$, note that since both accepted, the updated belief of the Proposer that it is facing the $\neg c$ type is equal to her prior, $\mu_2(\neg i) = p_2$ in

$$\bar{\rho}(\neg i) = \rho_{\neg c}(\neg i) \cdot \mu_2(\neg i) + \rho_c(\neg i) \cdot (1 - \mu_2(\neg i))$$

by (1). Hence,

$$\bar{\rho}(\neg i) = 1 \cdot p_2 + 0 \cdot (1 - p_2) = p_2$$

The rest of (16) holds. Putting $\bar{\rho}(\neg i) = p_2$ into (42) we have (14) :

$$v - e \ge \sigma_{\neg c} p_2 \text{ and } p_1 \gamma_{\neg c} \ge e$$

Putting $\bar{\rho}(\neg i) = p_2$ into (43) we have (15) :

$$0 \le v - \sigma_c p_2$$

Since insinuation i is off the equilibrium path, beliefs are arbitrary. We can set $\rho_{\neg c}(i) = \rho_c(i) = 0$, which is (17).

($\Leftarrow$)Now, suppose that (14) and (16) hold and the b Proposer pools so that $\mu_1(\neg i) = p_1$. By (14) :

$$v - e \ge \sigma_{\neg c} p_2 \text{ and } p_1 \gamma_{\neg c} \ge e$$

and (16) : $\rho_{\neg c}(\neg i) = 1$. Therefore, $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \ge \sigma_{\neg c} \bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\gamma_{\neg c}\rho_{\neg c}(\neg i) \ge e$$

Thus, $\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 1$.

By (15) : $0 \le v - \sigma_c p_2$ and by (16) : $\rho_c(\neg i) = 0$, it follows that the not reciprocate is better than not accept condition $(\neg r \succeq \neg a)$ is met for c

$$v - \mu_1(\neg i)\gamma_c \rho_c(\neg i) - \sigma_c \bar{\rho}(\neg i) \ge 0$$

Along with $p_1\gamma_c < e$, then $\neg(r \succeq \neg r)$ is met:

$$\mu_1(\neg i)\,\gamma_c\rho_c(\neg i) < e$$

Therefore, $\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 0$.

Since at least one type reciprocated, by (4) the Proposer will make positive profits after $\neg i$. By (17) and Lemma 1, if the b Proposer were to deviate to i, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. ■

Proof of Proposition 5. ($\Rightarrow$) b Proposer pools to $\neg i$. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. Beliefs are not updated: $\mu_1(\neg i) = p_1$. The c Responder accepts and reciprocates: $\mathbf{a}_c(\neg i) = \mathbf{r}_c(\neg i) = 1$. Therefore, $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_c\bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\,\gamma_c\rho_c(\neg i) \geq e \tag{44}$$

Consistency (32) on the equilibrium path requires $\rho_c(\neg i) = \mathbf{r}_c(\neg i) = 1$.

For $\neg c$, $\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 0$. The accept $(a \succeq \neg a)$:

$$\min\{e, \mu_1(\neg i)\,\gamma_{\neg c}\rho_{\neg c}(\neg i)\} \leq v - \sigma_{\neg c}\bar{\rho}(\neg i)$$

condition holds but not the reciprocate condition $(r \succeq \neg r)$:

$$\mu_1(\neg i)\,\gamma_{\neg c}\rho_{\neg c}(\neg i) < e$$

Consistency (32) implies, $\rho_{\neg c}(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 0$ and therefore,

$$0 \leq v - \sigma_{\neg c}\bar{\rho}(\neg i) \text{ and } 0 < e \tag{45}$$

To find $\bar{\rho}(\neg i)$, note that since both accepted, the updated belief of the Proposer that it is facing the $\neg c$ type is equal to her prior, $\mu_2(\neg i) = p_2$ in

$$\bar{\rho}(\neg i) = \rho_{\neg c}(\neg i)\cdot\mu_2(\neg i) + \rho_c(\neg i)\cdot(1 - \mu_2(\neg i))$$

by (1). Hence,

$$\bar{\rho}(\neg i) = 0\cdot p_2 + 1\cdot(1 - p_2) = (1 - p_2)$$

The rest of (20) holds. Putting $\bar{\rho}(\neg i) = (1 - p_2)$ into (44) we have (18) :

$$v - e \geq \sigma_c(1 - p_2) \text{ and } p_1\gamma_c \geq e$$

Putting $\bar{\rho}(\neg i) = (1 - p_2)$ into (45) we have (19) :

$$0 \leq v - \sigma_{\neg c}(1 - p_2)$$

Since insinuation i is off the equilibrium path, beliefs are arbitrary. We can set $\rho_c(i) = \rho_{\neg c}(i) = 0$, which is (21).

($\Leftarrow$)Now, suppose that (18) and (20) hold and the b Proposer pools so that $\mu_1(\neg i) = p_1$. By (18) :

$$v - e \geq \sigma_c(1 - p_2) \text{ and } p_1\gamma_c \geq e$$

and (20) : $\rho_c(\neg i) = 1$, therefore, $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_c\bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\gamma_c\rho_c(\neg i) \geq e$$

Thus, $\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 1$.

By (19) : $0 \leq v - \sigma_{\neg c}(1 - p_2)$ and by (20) : $\rho_{\neg c}(\neg i) = 0$, it follows that the not reciprocate is better than not accept condition $(\neg r \succeq \neg a)$ is met for $\neg c$

$$v - \mu_1(\neg i)\gamma_{\neg c}\rho_{\neg c}(\neg i) - \sigma_{\neg c}\bar{\rho}(\neg i) \geq 0$$

Along with $p_1\gamma_{\neg c} < e$, then $\neg(r \succeq \neg r)$ is met:

$$\mu_1(\neg i)\gamma_{\neg c}\rho_{\neg c}(\neg i) < e$$

Therefore, $\mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 0$.

Since at least one type reciprocated, by (4) the Proposer will make positive profits after $\neg i$. By (21) and Lemma 1, if the b Proposer were to deviate to i, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 0, \mathbf{i}_{\neg b} = 0$. ■

Proof of Corollary 6. Suppose as in Eq. 3c that both types of Responders accept and c reciprocates. But, suppose $\neg c$ also reciprocates. The $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\theta_2}\bar{\rho}(\neg i) \text{ and } \mu_1(\neg i)\gamma_{\theta_2}\rho_{\theta_2}(\neg i) \geq e, \forall\theta_2 \in \{\neg c, c\}$$

condition would have to be met for both. Since both types reciprocate, consistency (32) requires $\rho_c(\neg i) = \rho_{\neg c}(\neg i) = 1$. Therefore, by (1) : $\bar{\rho}(\neg i) = 1$. That would violate $v - e < \sigma_c$.

If say only c accepts and reciprocates, then $\rho_c(\neg i) = 1$ and $\rho_{\neg c}(\neg i) = 0$. Therefore, $\bar{\rho}(\neg i) = 1$, so again, that would violate $v - e < \sigma_c$. ■

7.0.8 Insinuation Equilibrium

Proof of Proposition 7. $(\Rightarrow)$ b Proposer separates by insinuating i. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$. Beliefs are updated: $\mu_1(i) = 1$ and $\mu_1(\neg i) = 0$.

Since $\mathbf{a}_c(\neg i) = \mathbf{a}_{\neg c}(\neg i) = 1$ and $\mathbf{r}_c(\neg i) = \mathbf{r}_{\neg c}(\neg i) = 0$, the condition for reciprocating, given acceptance $(r \succeq \neg r)$:

$$\mu_1(\neg i)\,\gamma_{\theta_2}\rho_{\theta_2}(\neg i) \geq e$$

must not be met. By consistency (32), $\rho_c(\neg i) = \rho_{\neg c}(\neg i) = 0$. Therefore (23) follows.

Since $\mathbf{a}_{\neg c}(i) = 1$ and $\mathbf{r}_{\neg c}(i) = 1$, then the condition for accepting and reciprocating for $\neg c$ $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\neg c}\bar{\rho}(i) \text{ and } \mu_1(i)\,\gamma_{\neg c}\rho_{\neg c}(i) \geq e \tag{46}$$

will be met. Consistency (32) on the equilibrium path requires $\rho_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$.

$\mathbf{a}_c(\neg i) = 0$ and therefore, the updated belief of the Proposer that it is facing the $\neg c$ type given acceptance $\mu_2(i) = 1$. Then from (1)

$$\bar{\rho}(i) = \rho_{\neg c}(i) \cdot \mu_2(i) + \rho_c(i) \cdot (1 - \mu_2(i)) = 1 \tag{47}$$

Substituting into (46) completes (22)

$$v - e \geq \sigma_{\neg c} \text{ and } \gamma_{\neg c} \geq e$$

c does not accept: $\mathbf{a}_c(i) = 0$. Therefore, for c the condition for rejecting must be met $\neg(a \succeq \neg a)$:

$$\min\{e, \mu_1(i)\,\gamma_c\rho_c(i)\} > v - \sigma_c\bar{\rho}(i) \tag{48}$$

Since, after rejection, what would have happened after acceptance is off-equilibrium, beliefs are arbitrary: $\rho_c(i) \in \{0, 1\}$.

Let the Responder believe that had he accepted, he would have been expected to reciprocate then $\rho_c(i) = 1$. (48) with (47) becomes

$$\min\{e, \gamma_c\} > v - \sigma_c$$

Again, because what happens after rejection cannot affect the equilibrium path, we can set $p_1\gamma_c \geq e$. Therefore, $(24a)$

$$\sigma_c > v - e$$

Let the Responder believe that had he accepted, he would have been expected to reciprocate then $\rho_c(i) = 0$. (48) with (47) becomes

$$\min\{e, 0\} > v - \sigma_c$$

Therefore, $(24b)$.

($\Leftarrow$)Now, given that (22), (23) and $(24a)$ are true and suppose the b Proposer separates so that $\mu_1(i) = 1$. By (22):

$$\rho_{\neg c}(i) = 1, \bar{\rho}(i) = 1, v - e \geq \sigma_{\neg c} \text{ and } \gamma_{\neg c} \geq e$$

The acceptance and reciprocation are best condition $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\neg c}\bar{\rho}(i) \text{ and } \mu_1(i)\gamma_{\neg c}\rho_{\neg c}(i) \geq e \tag{49}$$

is met for $\neg c$. Therefore, $\mathbf{a}_{\neg c}(i) = 1$ and $\mathbf{r}_{\neg c}(i) = 1$.

By $(24a)$:

$$\rho_c(i) = 1, \sigma_c > v - e \text{ and } \gamma_c \geq e$$

Therefore

$$\min\{e, \gamma_c\} > v - \sigma_c$$

satisfying the reject condition $\neg(a \succeq \neg a)$ for c

$$\min\{e, \mu_1(i)\gamma_c\rho_c(i)\} > v - \sigma_c\bar{\rho}(i)$$

Thus, $\mathbf{a}_c(i) = 0$ and we can set $\mathbf{r}_c(i) = 1$.

Since by (49) at least one type $\neg c$ reciprocated, by (4) the Proposer will make positive profits after i. By (23) and Lemma 1, if the b Proposer were to deviate to $\neg i$, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$.

Now alternatively, suppose that (22), (23) and $(24b)$ are true and the b Proposer separates so that $\mu_1(i) = 1$. Just as before in (49), the acceptance and reciprocation are best condition $(r \succeq \neg r, r \succeq \neg a)$ is met for $\neg c$: $\mathbf{a}_{\neg c}(i) = 1$ and $\mathbf{r}_{\neg c}(i) = 1$.

By $(24b)$:

$$\rho_c(i) = 0, \sigma_c > v \text{ and } \gamma_c \geq e$$

Thus,

$$\min\{e, 0\} > v - \sigma_c$$

which implies that reject condition $\neg(a \succeq \neg a)$ is met for c

$$\min\{e, \mu_1(i)\gamma_c\rho_c(i)\} > v - \sigma_c\bar{\rho}(i)$$

Therefore, $\mathbf{a}_c(i) = 0$. We can then choose $\mathbf{r}_c(i) = 0$ or 1. Since by at least one type $\neg c$ reciprocated, by (4) the Proposer will make positive profits after i. By (23) and Lemma 1, if the b Proposer were to deviate to $\neg i$, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$. ■

Proof of Proposition 8. ($\Rightarrow$) b Proposer separates by insinuating. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$. Beliefs are updated: $\mu_1(i) = 1$ and $\mu_1(\neg i) = 0$. The $\neg c$ Responder accepts and reciprocates: $\mathbf{a}_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$. Then $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\neg c}\bar{\rho}(i) \text{ and } \mu_1(i)\gamma_{\neg c}\rho_{\neg c}(i) \geq e \tag{50}$$

Consistency (32) on the equilibrium path requires $\rho_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$. The c Responder does not accept: $\mathbf{a}_c(i) = 0$. The condition for rejection $\neg(a \succeq \neg a)$:

$$\min\{e, \mu_1(i)\gamma_c\rho_c(i)\} > v - \sigma_c\bar{\rho}(i) \tag{51}$$

is met for c. The updated belief of the Proposer that it is facing the $\neg c$ type would be $\mu_2(i) = 1$. Then from (1)

$$\bar{\rho}(i) = \rho_{\neg c}(i) \cdot \mu_2(i) + \rho_c(i) \cdot (1 - \mu_2(i)) \tag{52}$$

$$\bar{\rho}(i) = 1 \cdot 1 + \rho_c(i) \cdot 0 = 1 \tag{53}$$

With (53), (50) becomes the rest of (25)

$$v - e \geq \sigma_{\neg c} \text{ and } \gamma_{\neg c} \geq e$$

(51) becomes

$$\min\{e, \gamma_c\rho_c(i)\} > v - \sigma_c \tag{54}$$

After rejection beliefs are arbitrary $\rho_c(i) \in \{0, 1\}$.

Let the Responder believe that had he accepted, he would have been expected to reciprocate $\rho_c(i) = 1$. (54) becomes

$$\min\{e, \gamma_c\} > v - \sigma_c$$

Again, because what happens after rejection cannot affect the equilibrium path, we can set $\gamma_c < e$.Hence, $\sigma_c > v - \gamma_c$. This is $(27a)$.

Alternatively, let the Responder believe that had he accepted, he would not have been expected to reciprocate then $\rho_c(i) = 0$. (54) becomes

$$\min\{e, 0\} > v - \sigma_c$$

Hence, $0 > v - \sigma_c$. This is $(27b)$. We can set $\rho_c(\neg i) = 0$ and $\rho_{\neg c}(\neg i) = 0$ off the equilibrium path. Then, (26) is satisfied.

($\Leftarrow$)Now, given that (25) and $(27a)$ hold and suppose the b Proposer pools so that $\mu_1(i) = 1$ and $\mu_1(\neg i) = 0$. By (25) :

$$\rho_{\neg c}(i) = 1, \bar{\rho}(i) = 1, v - e \geq \sigma_{\neg c} \text{ and } \gamma_{\neg c} \geq e$$

the acceptance and reciprocation are best condition $(r \succeq \neg r, r \succeq \neg a)$ is met for $\neg c$

$$v - e \geq \sigma_{\neg c}\bar{\rho}(i) \text{ and } \mu_1(i)\gamma_{\neg c}\rho_{\neg c}(i) \geq e \tag{55}$$

Therefore, $\mathbf{a}_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$.

By $(27a)$: $\rho_c(i) = 1$, $\gamma_c < e$, then $\mu_1(i)\gamma_c\rho_c(i) < e$. Also by $(27a)$: $v - \gamma_c < \sigma_c$ and

$$\min\{e, \gamma_c\rho_c\} > v - \sigma_c$$

the reject condition $\neg(a \succeq \neg a)$ is met for c,

$$\min\{e, \mu_1(i)\gamma_c\rho_c(i)\} > v - \sigma_c\bar{\rho}(i)$$

Therefore, $\mathbf{a}_c(i) = 0$. Off the equilibrium path, we can set $\mathbf{r}_c(i) = 0$. Since by (55) at least one type $\neg c$ reciprocated, by (4) the Proposer will make positive profits after i. By (26) : $\rho_c(\neg i) = \rho_{\neg c}(\neg i) = 0$ and Lemma 1, if the b Proposer were to deviate to $\neg i$, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$.

($\Leftarrow$)Now alternatively, given that (25) and $(27b)$ hold and suppose the b Proposer separate so that $\mu_1(i) = 1$ and $\mu_1(i) = 0$. By (25) :

$$\rho_{\neg c}(i) = 1, \bar{\rho}(i) = 1, v - e \geq \sigma_{\neg c} \text{ and } \gamma_{\neg c} < e$$

Therefore, the acceptance and reciprocation are best condition $(r \succeq \neg r, r \succeq \neg a)$ is met for

$\neg c$

$$v - e \geq \sigma_{\neg c}\bar{\rho}(i) \text{ and } \mu_1(i)\gamma_{\neg c}\rho_{\neg c}(i) < e \tag{56}$$

Therefore, $\mathbf{a}_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$. By $(27b)$:

$$\rho_c(i) = 0, \sigma_c > v \text{ and } \gamma_c < e.$$

Therefore,

$$\min\{e, 0\} > v - \sigma_c\bar{\rho}(i)$$

The reject condition $\neg(a \succeq \neg a)$:

$$\min\{e, \mu_1(i)\gamma_c\rho_c(i)\} > v - \sigma_c\bar{\rho}(i)$$

for c is met. Therefore, $\mathbf{a}_c(i)$ =0**.** Off the equilibrium path, we can set $\mathbf{r}_{\neg c}(i) = 0$.

Since by (56) at least one type reciprocated after i, by (4) the Proposer will make positive profits after i. By (26) and Lemma 1, if the b Proposer were to deviate to $\neg i$, she would earn $-k < 0$. Hence, she will not deviate. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$. ■

Proof of Proposition 9. ($\Rightarrow$) Proposer separates by insinuating i. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$. Beliefs are updated: $\mu_1(i) = 1$ and $\mu_1(\neg i) = 0$. Both Responders accept and reciprocate: $\mathbf{a}_c(i) = \mathbf{r}_c(i) = \mathbf{a}_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$. Therefore, $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\theta_2}\bar{\rho}(i) \text{ and } \mu_1(i)\gamma_{\theta_2}\rho_{\theta_2}(i) \geq e, \forall\theta_2 \in \{c, \neg c\} \tag{57}$$

Consistency (32) requires $\rho_c(i) = \mathbf{r}_c(i) = 1$ and $\rho_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$. Since both types of Responders took the same action, the updated belief of the Proposer that it is facing the c type of Responder is equal to her prior: $\mu_2(i) = p_2$ in

$$\bar{\rho}(i) = \rho_{\neg c}(i) \cdot \mu_2(i) + \rho_c(i) \cdot (1 - \mu_2(i)) = 1$$

from (1). Combined with (57), we get (28) and (29).

($\Leftarrow$)Now suppose that (28) and (29) hold. Since $\rho_c(i) = \rho_{\neg c}(i) = 1$, then

$$\bar{\rho}(i) = \rho_{\neg c}(i) \cdot \mu_2(i) + \rho_c(i) \cdot (1 - \mu_2(i)) = 1$$

Then the condition for both types of Responders to accept and to reciprocate $(r \succeq \neg r, r \succeq \neg a)$:

$$v - e \geq \sigma_{\theta_2}\bar{\rho}(i) \text{ and } \mu_1\gamma_{\theta_2}\rho_c(i) \geq e, \forall\theta_2 \in \{c, \neg c\}$$

will be met. Hence, $\mathbf{a}_c(i) = \mathbf{r}_c(i) = \mathbf{a}_{\neg c}(i) = \mathbf{r}_{\neg c}(i) = 1$, if the b separates to i, In which case, $\mu_1(i) = 1$ and $\mu_1(\neg i) = 0$. b will separate to i because he cannot do better by deviating to $\neg i$ since both types of Responders are reciprocating. Therefore nothing that the Responders do after $\neg i$ will can perturb the equilibrium path. In particular, $\mathbf{a}_c(\neg i) = 1, \mathbf{r}_c(\neg i) = 0, \mathbf{a}_{\neg c}(\neg i) = 1, \mathbf{r}_{\neg c}(\neg i) = 0$ supports the equilibrium. Thus, $\mathbf{i}_b = 1, \mathbf{i}_{\neg b} = 0$. ■

Proof of Proposition 10. Recall that the Proposer maximizes the following profit function.

$$\max_{s_1 \in \{i, \neg i\}} E(\pi_b(s_1, \mathbf{r}(s_1))) = \max_{s_1 \in \{i, \neg i\}} \{\mu_2(\mathbf{r}_{\neg c}(s_1) R - k) + (1 - \mu_2)(\mathbf{r}_c(s_1) R - k)\}$$

If she preferred Eq. $4\neg c$ in which she insinuated and only $\neg c$ accepted, $\mu_2(i) = 1$ and reciprocated $\mathbf{r}_{\neg c\mathbf{1}} = 1$ to Eq. $3c$ in which both accepted $\mu_2(\neg i) = p_2$ but only c reciprocated $\mathbf{r}_c(\neg i) = 1$ then,

$$R - k > R(1 - p_2) - p_2 k$$

The proportion of $\neg c$ must be above this threshold.

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

Since insinuate is dominated for the $\neg b$ Proposer, upon hearing the insinuating remark, a rational $\neg c$ Responder will infer that he is facing the b Proposer. As required by Eq. $4\neg c$ in (24), if the $\neg c$ Responder believed that he was facing the b Proposer $\mu_1(i) = 1$, he reciprocates. If $\neg c$ were numerous enough as specified by (30), the b Proposer's profit would increase with such a response from the Responder. Therefore, if the Responder would best respond only to those types of Proposer that could make the insinuating remark, that type of Proposer's profits would increase by insinuating. Thus, the equilibrium in which the b Proposer does not insinuate Eq. $3c$ fails the Intuitive Criterion. ■

Proof of Proposition 11. Since insinuate is dominated for the $\neg b$ Proposer, upon hearing the insinuating remark, a rational $\neg c$ Responder will infer that he is facing the b Proposer. As required by Eq. $5\neg c$ in (27), if the c Responder believed that he was facing the b Proposer $\mu_1(i) = 1$, he reciprocates. If the b Proposer were to insinuate with such a response from the Responder, it's profits would increase, since the free rider c would not accept, given that $v - \gamma_c < \sigma_c$. Therefore, if the Responder would best respond only to those types of Proposer that could make the insinuating remark, that type of Proposer's profits would increase by insinuating. Thus, the equilibrium in which the b Proposer does not insinuate Eq. $3\neg c$ fails the Intuitive Criterion. ■

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