Extrinsic Rewards and Intrinsic Motives: Standard and Behavioral Approaches to Agency and Labor Markets

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Introduction

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  that are working their way into labor economics.

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- ▶ Our paper considers applications from behavioral economics that are working their way into labor economics.
- ▶ Our focus—almost exclusively—is on behavioral aspects of *agency.*
- ▶ In most cases, the contribution from behavioral economics comes in the form of *nonstandard preferences* (e.g., social preferences).

2. Agency and Extrinsic Rewards
3. Extrinsic Rewards and Dual-Purpose Incentives
4. Behavioral Approaches to Agency and Motivation
5. Intrinsic Motives and Dual-Purpose Incentives

2.1. A Simple Agency Problem
2.2. Agency Matters

Section 2 sets up a very basic agency problem that serves as the basis for further development for the rest of the paper. We then proceed to apply that model in three key applications:

▶ CEO Compensation (One Principal and One Agent)

▶ Personnel Policies (One Principal and Several Agents)

▶ Involuntary Unemployment and Market Segmentation (Many Principals and Many Agents Interacting in a Market)

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▶ A *principal* has a payoff is given by

$$g(e) - w,$$

where e is effort and w is the wage.

▶ An *agent* has utility given by

$$w - e,$$

and is willing to work for the principal if $w - e \geq v$.

▶ The principal has only a noisy signal of effort,

$$x = e + \epsilon,$$

where ϵ is drawn from density f (with c.d.f. given by F).

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Principal Agent Interaction:

- ▶ The principal announces the policy of paying w_0 if x is less than some cut-off, $\bar{x}$, and $w_0 + b$ if x is greater than $\bar{x}$.

- ▶ The agent decides whether to accept the job, and if she does, takes hidden action e.

- ▶ Nature plays x (observed performance).

- ▶ Given x, the firm pays the agreed-upon wage.

The Principal's Solution Process:

- ▶ Figure out the agent's "best response."

- ▶ Account for the "participation constraint." Then choose the cut-off $\bar{x}$, base wage w_0, and bonus b.

Point For Future Reference:

- ▶ There might also be a "limited liability constraint."

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▶ The agent's "best response" is to maximize

$$w_0 F(\bar{x} - e) + (w_0 + b)\left[1 - F(\bar{x} - e)\right] - e, \qquad (1)$$

which leads to the best response, $\hat{e}$, that solves

$$bf(\bar{x} - \hat{e}) - 1 = 0. \qquad (2)$$

▶ Principal maximizes

$$g(\hat{e}(b)) - [v + \hat{e}(b)].$$

The first order condition to the principal's profit maximization
problem is

$$[g'(\hat{e}(b^*)) - 1]\hat{e}'(b^*) = 0.$$

Given that $\hat{e}'(b) > 0$ for any best response, we have

$$g'(e^*) = 1.$$

▶ The outcome is efficient.

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CEO Compensation (One Agent)

▶ The CEO make a big contribution firm profitability. Our agency model tells us that high "effort" is important here, so the extrinsic reward should be high here.

▶ Limited liability likely applies. So absolute pay could be very high.

▶ The simple agency model can be applied to explain CEO compensation (Gayle and Miller, forthcoming).

▶ There appears to be a great deal of dysfunction in CEO pay (Hall and Liebman, 1998, Heron and Lie, 2009, etc.)

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Personnel Policies (Many Agents)

- Suppose there are many workers. Let $g(e^i)$ be the individual contribution to an organization.

- Suppose the principal sets up a "tournament" in which workers are ordered by performance, and fraction P of the lowest-performing workers earn w_0 while fraction $(1 - P)$ are "promoted" and earn $w_1 > w_0$.

- There is a Bayesian equilibrium in which all workers supply the same effort. Agents infer $\tilde{x}$ from the environment. The "best response" solves

$$(w_1 - w_0)f(\tilde{x} - \hat{e}^i) - 1 = 0. \qquad (3)$$

Notice that this is exactly the same as equation (2)! The outcome is efficient.

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Personnel Policies (Many Agents)

The tournament here (essentially Malcomson, 1984) shows how a simple agency model predicts:

▶ wage structures in organizations are often "hierarchical," with workers falling into distinct pay grades,

▶ that often workers in high-paid positions are promoted from within,

▶ that wages typically rise with seniority (by more than productivity), and

▶ that the variance of wages increases with seniority.

A major contributions of agency theory to labor economics: explaining firm wage policies and clarifying the contribution that personnel practices make to shaping the wage structure. See Lazear (1996), Prendergast (1999), Malcomson (1998), Gibbons (1998), and Oyer and Schaefer (forthcoming).

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How Good is Agency Theory ?

▶ Many studies show *incentives work,* pretty much as predicted by agency theory: Lazear (2000), Kahn and Sherer (1990), Jacob (2003), work by Groves and McMillan and co-authors on incentives and productivity in Chinese industry, etc.

▶ But many studies that show *incentives work* do so in cases in which incentives are poorly designed! Oyer (1998), Courty and Marschke (2004), Gaynor, Rebitzer and Taylor (2004), Levitt and Jacob (2003), etc.

An additional point to ponder: The minimalist agency approach to personnel practices has an "irrelevance of *ex post* inequality." The compensation structure might better be termed "pay for luck" than "pay for performance."

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Unemployment and Labor Market Segmentation (Many Principals and Agents)

Take the baseline agency model, and now add these elements:

- The game is repeated (indefinitely), with a discount rate ρ.
- Limited liability in invoked via an assumption that the only penalty the principal can impose is to dismiss the worker.

Now in our model, in each round:

- The principal offers wage w.
- The agent chooses effort e.
- Nature plays x according to the distribution $f(\ )$.
- The firm pays w, and continues the game if $x > \bar{x}$.

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Unemployment and Labor Market Segmentation (Many Principals and Agents)

▶ The agent's "best response," $\hat{e}$, takes a familiar form:

$$\frac{[V(\hat{e}) - V^u]}{1 + \rho} f(\bar{x} - \hat{e}) - 1 = 0, \qquad (4)$$

where $[V(\hat{e}) - V^u]$ is the value of the job.

When the principal chooses optimal w^* and $\bar{x}$,

▶ $g'(e^*) = 1$, as in our previous examples, and

▶ the optimal wage is

$$w^* = e^* + \frac{\rho V^u}{1 + \rho} + \frac{\phi(z^*)}{\phi'(z^*)} \sigma,$$

where z^* is a *standardized* random variable, $z^* = (\bar{x}^* - e^*)/\sigma$, and $\phi(\ )$ is the *standardized p.d.f.*

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Unemployment and Labor Market Segmentation (Many Principals and Agents)

▶ Unemployment (Shapiro and Stiglitz, 1984): If w^E is the equilibrium wage, equilibrium unemployment, u^E, solves

$$w^E = e^* + \frac{1}{\phi(z^*)} \left(\rho + \frac{F^*}{u^E} \right) \sigma.$$

▶ Labor Market Segmentation (Bulow and Summers, 1986): Firms pay

$$w = A + B\sigma,$$

where $A > 0$ and $B > 0$ are independent of σ. "Information rents" can vary across firms and industries, as σ varies.

Evidence: Krueger and Summers (1988) and many other papers on inter-industry wage differences, Cappelli and Chauvin (1991), Nagin, Rebitzer, Sanders, and Taylor (2002), etc.

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3.1. High Wages as a Signal of Firm Fitness
3.2. The Rat Race
3.3. Multi-Tasking

Compensation policies are often asked to do "double duty."
In Lazear's (2000) study of compensation practices at Safelite, a
windshield installation company, an explicit piece rate system

▶ provided an *incentive* to work harder, and

▶ had a *selection* effect, drawing workers who liked the
   income-effort tradeoffs inherent in the piece rate system.

There are many examples. We give three here.

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Ritter and Taylor (1994): *Firms* have an unobservable characteristic, "firm fitness."

- ▶ Worker motivation depends on the job *having value*—by a worker-posted bond, efficiency wages, or a combination.
- ▶ A *separating* equilibrium exists in which high-fitness firms signal their fitness by paying wages that provide rents.
- ▶ This equilibrium satisfies the Cho-Kreps "intuitive criterion."
- ▶ Efficiency wages arise without resorting to an assumption of *limited liability*.

See also Allen and Gale (1992) and Spier (1992).

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Akerlof (1976): *Workers* have an unobserved characteristic, an "inclination to work hard."

▶ An *adverse selection* equilibrium emerges in which some workers over-work as a means of credibly establishing a hard-to-observe trait (inclination toward hard work).

See Landers, Rebitzer and Taylor (1996) on "rat races" in law firms, and Gicheva (2009) on overwork early in one's career.

See Acemoglu, Kremer, and Mian (2008) for a model in which "career concerns" can motivate excessive and misguided signaling by primary school teachers (teaching to the test).

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3.1. High Wages as a Signal of Firm Fitness
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Holmström and Milgrom (1991) establish a number of insightful and surprising results when workers can allocate effort along more than one dimension. An example:

▶ Agent utility is $w - \frac{1}{2}(e_1 + e_2 - e_B)^2$, with e_B being "bliss." Participation requires $u \geq v$ at the "best response."

▶ The principal observes a noisy measure of e_1 but *not* of e_2. Value of effort is $g(e_1, e_2)$.

▶ Let's try $g(e_1, e_2) = a_1 e_1 + a_2 e_2$. Then

$$g(e_1, e_2) - w = \begin{cases} a_1 e_B + \frac{1}{2} a_1^2 - v & \text{if incentives are used, and} \\ a_2 e_B - v & \text{if effort is directed to } e_2. \end{cases}$$

▶ Let's try $g(e_1, e_2) = e_1 e_2$. The principal *never* uses an explicit incentive, but asks the worker to supply $e_1 = e_2 = \frac{e_B}{2}$.

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4.3. Professional Norms
4.4. Identity/Miscommunication

We next introduce of elements intended to shore up the psychological foundation of agency models.

▶ "Theories in behavioral economics ... strive for generality—e.g., by adding only one or two parameters to standard models. Particular parameter values then often reduce the behavioral model to the standard one, and the behavioral model can be pitted against the standard model by estimating parameter values. Once parameter values are pinned down, the behavioral model can be applied just as widely as the standard one" (Camerer and Loewenstein, 2004).

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When it comes to material well-being, people dislike being low on the totem pole (Frank, 1984, 1985). This idea suggests including "asymmetric inequality aversion" into utility functions.

- ▶ Utility is decreasing in the income of relatively-wealthier individuals (Fehr and Schmidt, 1999).
- ▶ Note: This psychological characterization is "stripped down." Attributions also matter.
- ▶ **Example 1.** The "Tournament Model." Let utility now be

$$\text{utility} = \begin{cases} w_0 + b - \delta_W b - e & \text{for "winners," and} \\ w_0 - \delta_L b - e & \text{for "losers,"} \end{cases}$$

  with $\delta_L > \delta_W \geq 0$.

- ▶ The solution has $g'(e^{**}) > 1$, instead of $g'(e^*) = 1$, so we have a second-best effort level, $e^{**} < e^*$.
- ▶ See Encinosa, Gaynor and Rebitzer (2007) on incentives in medical partnerships.

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- ▶ **Example 2.** The "Multi-Tasking Model." Recall the example in which agent utility is $w - \frac{1}{2}(e_1 + e_2 - e_B)^2$. Assume effort along one dimension cannot be monitored.

- ▶ If principal's payoff is $e_1 e_2$, the best the principal can do is pay a fixed wage w and ask for effort allocation $e_1 = e_2 = \frac{e_B}{2}$.

- ▶ Now suppose that the agent is inequality averse, in comparison to the *principal's* income, π. So for the agent, utility is

$$w - \frac{1}{2}(e_1 + e_2 - e_B)^2 - \delta(\pi - w), \;\; \text{if} \;\; w < \pi,$$

where $\delta > 0$. The principal now must use "rent sharing." Reducing wages leads the agent to "even the score."

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In a seminal paper, Fehr and Schmidt (1999) show:

▶ Inequality aversion can "explain" the Ultimatum Game (at least simple versions).

▶ Egalitarian rent sharing is eroded by "competition." See Fischbacher, Fong, and Fehr (2008).

▶ The key is the ability to exercise retribution: " ... fairness plays a smaller role in most markets for goods than in labor markets. This follows from the fact that, in addition to the rejection of low wage offers, workers have some discretion over their work effort" Fehr and Schmidt (1999).

Bewley (1998) finds that worker retribution is a concern to employers. Remarkable studies by Krueger and Mas (2004) and Mas (2006, 2008) provide more evidence. See also Nagin, *et al.* (2002).

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Fehr and Schmidt argue that equity concerns constrain firm behavior because of behavioral features. The first cousin of this idea is Akerlof's behavioral model of "gift exchange:" Decent people, so the reasoning might go, respond to kindness with kindness.

▶ Related Theory: Rabin (1993), Charness and Rabin (2002).

▶ Laboratory Experiments: Charness and Rabin (2002). Many papers involving Fehr and co-authors.

▶ Experiments in the Field: DellaVigna (2009) has a nice discussion of field experiments, including Gneezy and List (2006), List (2006), and recent working papers by Kube, Maréchal, and Puppe (2008).

"Peer effects" matter also for work norms. See Falk and Ichino (2006) and Mas and Moretti (2008).

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Does "gift exchange" matter in labor markets?

- ▶ Falk, Fehr and Zehnder (2006) investigate whether minimum wage laws influence the perceived fairness of wage offers.

- ▶ Akerlof and Yellen (1990) show how gift exchange can lead to unemployment.

- ▶ Does wage rigidity arise in these models?

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The principal agency problem takes on a special importance in professions like law and medicine. In Gaynor, Rebitzer and Taylor (2004) we take as given the idea that doctors care about patients.

▶ A physician with n patients dislikes deviations from best practices m_B. Utility is

$$w + \sum_{i=1}^{n} \mu_i d(m_i - m_B^i),$$

where $d(\ )$ is convex and has a maximum at 0, and $\mu_i \geq 0$.

▶ An HMO offers a bonus b if $\sum_{i=1}^{n} m_i < \bar{m}$, a "target." The probability of earning b is $F(\bar{m} - \sum m_i)$.

▶ If $d(\ ) = -\frac{1}{2}(m_i - m_B^i)^2$, best responses solve

$$\hat{m}_i(b) = m_i^B - \frac{b}{\mu_i} f(\bar{m} - \sum m_i).$$

The bonus system worked (Gaynor, *et al.*, 2004).

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Observations:

▶ If the doctor does not have "favoritism," the HMO's policies can lead to roughly efficient outcomes.

▶ Problems arise if relative incentives vary across treatments or patients. It is likely that norms can be undermined.

▶ Additional problems arise when there is "conflict of interest." See Dana and Lowenstein (2003) and Moore and Lowenstein (2004).

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Identity

"The term *identity* is used to describe a person's social category—a person is a man or a woman, a black or a white, a manager or a worker. The term identity is also used to describe a person's self-image. It captures how people feel about themselves, as well as how those feeling depend upon their actions. In a model of utility, then, a person's identity describes gains and losses in utility from behavior that conforms or departs from the norms for particular social categories in particular situations. ... In our conception, utility functions can change, because norms of appropriate and inappropriate behavior differ across space and time" (Akerlof and Kranton, 2005).

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Gender Identity

Can identity models generate falsifiable hypotheses? A template–recent work on *gender.*

- ▶ Women are less likely than men to initiate negotiation (Small, Gelfand, Babcock, and Bettman, 2007).
- ▶ Women do less well than men when negotiating for *themselves*, but better when negotiating for *others* (Bowles, Babcock, and McGinn, 2006). Women avoid *self promotion.*
- ▶ Women fare less well than men in tournament style incentives, and tend to shy away from them (Gneezy, Niederle, and Rustichini, 2003, and Niederle and Vesterlund, 2007).
- ▶ *Gender identity,* in short, matters. But why? How much is due to expectations of a "kinder, gentler image"? See Bowles, Babcock, and Lai (2006) on *backlash.*
- ▶ What are implications for organizations and labor markets?

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Miscommunication Between Racial Groups

Lang (1986) has a nice paper on the role of *race* in the workplace environment—a "language theory of discrimination."

▶ Ritter and Taylor (forthcoming) apply the idea by assuming $\sigma^B > \sigma^W$. If all firms pay efficiency wages, wages are the same for blacks and whites, but,

$$e^* + \frac{1}{\phi(z^*)} \left(\rho + \frac{F^*}{u^B} \right) \sigma^B = e^* + \frac{1}{\phi(z^*)} \left(\rho + \frac{F^*}{u^W} \right) \sigma^W,$$

where u^B is for black workers and u^W is the for white workers.

▶ Evidence: Neal (2006), Grogger (2009), Ritter and Taylor (2009).

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5.1. Pay and Selection on Dedication
5.2. Social Preferences and Conformism
5.3. Whom Do You Want to Impress?

Our last section looks at intrinsic motives—including the possibility that extrinsic incentives can undermine intrinsic motives.

Many psychologists believe this idea. See, e.g., the extensive work of Deci.

Economists are familiar with work by Frey. Gneezy and Rustichini (2000) have a nice example. See also Fehr and Falk (2002).

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Many jobs are a "vocation." Heyes (2005) has a simple model:

- ▶ There are L qualified nurses, in two categories:
- ▶ Proportion π of nurses are "dedicated." They provide value q_H. Utility is $w + m$.
- ▶ For proportion $1 - \pi$, nursing is a "job." Value produced is $q_L < q_H$. Utility is w.
- ▶ Reservation wages r are drawn from a log concave density, $f(r)$. The *quantity* of nursing labor supplied is

$$\tilde{L}(w) = [\pi F(w + m) + (1 - \pi)F(w)]L,$$

and the average *quality* is of nursing care is

$$\tilde{q}(w) = \theta(w)q_H + [1 - \theta(w)]q_L,$$

where $\theta(w)$ is declining in the wage.

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In Taylor (2007), I show that a monopolistic National Health Service (NHS) will set the wage inefficiently low.

► Some organizations that care about dedication require "vows of poverty." Volunteer or *pro bono* work might sometimes be optimal.

If the labor market is perfectly competitive, the equilibrium wage will be inefficiently *high* and the dedication level too *low.*

► "If you were a falsely convicted death-row inmate, would you rather rely on an organization that reviews cases using *pro bono* attorney services, or on legal services purchased on the competitive market?"

Related work: Delfgaauw and Dur (2007, 2008), Besley and Ghatak (2005), and Prendergast (2007).

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Sliwka (2007) has a "social preference framework" model with three types of agents:

▶ *Steadfast agents*, who are "strictly selfish,"

▶ *steadfast agents*, who are "fair" (care about others' well-being), and

▶ *conformists*, whose inclination toward fairness depends the values of those around them. This last group behaves like the majority.

A principal who understands that his workforce is comprised predominantly of "fair agents" can sometimes use compensation policies as a credible *signal* to agents, inducing "conformists" to play "fair."

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An Example.

- ▶ Principal profit is $\pi = e - w(e)$, agent's effort minus compensation, $w(e)$.
- ▶ Effort is observed. Let extrinsic incentive be $w(e) = w_0 + \beta e$.
- ▶ Agent preferences:

$$\text{utility} = \begin{cases} w(e) - e^2/2 & \text{for a steadfast selfish agent, and} \\ w(e) - e^2/2 + \mu\pi & \text{for a steadfast fair agent.} \end{cases}$$

- ▶ Solving for the best responses, we find

$$\hat{e}(\beta) = \begin{cases} \beta & \text{for a steadfast selfish agent, and} \\ (1-\mu)\beta + \mu & \text{for a steadfast fair agent.} \end{cases}$$

- ▶ $\hat{e}$ is increasing in β for both types, but it is cheaper to motivate fair agents.
- ▶ There is a *separating equilibrium* with high w_0 and low β (to signal conformists). Sliwka says this is "trust as a signal of a social norm."

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- ▶ In Sliwka's model, monetary incentives "crowd out" intrinsic motivation.

- ▶ If a firm moves from a "high trust" low-powered incentive scheme to a "low trust" high-powered incentive scheme, the norm shifts, and this undermines the intrinsic portion of workers' motives.

- ▶ Sliwka develops his theory further by looking at employee self-selection.

- ▶ There is evidence on norms—the key behavioral underpinning of the Sliwka model: Fisman and Miguel (2007), Ichino and Maggi (2000), Mas and Moretti (2009), Bandiera, Barankay, and Rasul (2005, 2009), etc.

- ▶ Fischer and Huddart (2008) discuss the role of endogenous social norms on organizational design.

- ▶ "Crowding out" in the real world?

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Impressing the Principal

Ellingsen and Johannesson (2008) present a model that, like Sliwka's, relies on social preferences.

- ▶ Like Sliwka's, their model opens up the possibility that extrinsic incentives can undermine valuable intrinsic motivations.
- ▶ The behavioral foundations, though, are quite different.
- ▶ Both principals and agents differ in their degree of selfishness.
- ▶ Everyone dislikes appearing to be selfish, *especially in the eyes of others who are not selfish.*
- ▶ There is a *separating equilibrium* (satisfying the Cho-Kreps intuitive criterion) in which an unselfish principal signals that he is unselfish by being generous.
- ▶ The value of being known as unselfish is that an unselfish agent will be generous in return.

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Impressing the Agent

Bénabou and Tirole (2003). A principal seeks to motivate an
agent to provide effort toward a task that will create value W (if
"success") or 0 (if "failure").

- ▶ The agent can set $e = 0$ or 1. If 0, we have "failure."
- ▶ If $e = 1$, we have success with probability θ, giving the agent
  intrinsic value V. The cost of effort is c.
- ▶ The principal pays bonus $b < W$ for "success." If perfectly
  informed, an agent would choose $e = 1$ if

$$\theta(V + b) \geq c.$$

- ▶ The principal observes c and announces b. The agent only
  observes b plus a private signal σ. The agent's sets $e = 1$ if

$$\theta(V + b) \geq \mathrm{E}[c|\sigma, b].$$

- ▶ A high bonus b is "bad news"–is de-motivating.

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Impressing Others

Bénabou and Tirole (2006) have a model in which people have varying levels of *altruism* and *greed*.

- ▶ People would like to be known as altruistic.

- ▶ People would like to be known as *not* being greedy.

- ▶ This can lead to "crowding out" of intrinsic motivation. If you offer high pay for a job, you deprive the agent of the opportunity to signal that he is altruistic.

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Impressing One's Own Self

Bénabou and Tirole (2006) have an "identity" interpretation of
their model. The reasoning goes as follows:

- I want to view *myself* as altruistic.

- I want to view *myself* as *not* being greedy.

- This can lead to "crowding out" of intrinsic motivation: "If
  you offer me high pay, you deprive me of the opportunity to
  reinforce my identity."

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Evidence on Crowding Out

- Lots of evidence discussed in Fehr and Falk (2002).
- Work by Frey.
- Work in psychology.

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Conclusions

We're still thinking about this.
Ideas are appreciated.