The Evolution of Motivation

Tim Besley and Maitreesh Ghatak

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Motivation

- Departures from Homo Economicus assumption - increasing willingness to study the implications of non-pecuniary motivation in the discipline (Benabou-Tirole, 2003, 2006; Fehr-Schmidt, 1999, Fehr-Falk, 2002, Besley-Ghatak, 2005, Akerlof-Kranton, 2010).
- Existing analyses take a given distribution of motivation.
- Then derive different contracts/organizational forms reflecting selection and incentives (see Besley and Ghatak, Annual Review 2018 for an overview of the literature)

Motivation

- We ask the question: where does non-pecuniary motivation come from and how does the distribution of motivation evolve in the long run?
- Does the use of incentives crowd out non-pecuniary motivation in the long run?
  - Does a bonus culture favor selfishness and lead to the decline of intrinsic motivation?

Motivation

- Where does motivation come from?
  - biology;
  - socialization.
- If it is socialization, then can we incorporate endogenous motivation into economic models?
- But then we need to be precise about:
  - the form that motivation takes;
  - the way that organizations respond to motivation;
  - how this translates into a dynamic process.

Motivation

- The key question we ask is, if some agents are driven partly by non-pecuniary motivation, while others have standard preferences of selfish economic agents, can the former type survive in the long-run, when
  - a profit-maximizing firm will use incentive schemes anticipating a certain distribution of types of agents;
  - the distribution of types evolves based on fitness advantage according to agents' payoffs.

This Presentation

- Builds a canonical model of the evolution of motivation.
- Some agents are willing to put in more effort (for the same bonus) in firms which produce output in a particular way such as respecting environmental goals or treating their clients better.
- Take a single profit-maximizing firm and restrict firms to offer the same contract for the same work (only pooling, no separating contracts).
- Motivation is endogenous due to socialization of workers within a firm.

Wider Debate

- How does the market system socialize?
- How does the system of rewards in society shape the kinds of people who emerge?
- Do profit incentives create people who are more like homo economicus?
  - e.g. Sandel's critique of the market economy?

Related Literature

- Mission Motivation:
  - Besley and Ghatak (2005), Akerlof and Kranton (2010), Benabou and Tirole (2003, 2006).
- Socialization and Cultural Evolution:
  - Bisin and Verdier (2023) for a survey on recent literature.
- We focus on how mission motivation of workers evolves within a firm and how this interacts with the incentive contracts offered by the firms.

Workplace Socialization

- There is an extensive literature on workplace socialization.
- According to Van Maanen and Schein (1979): "organizational socialization refers ... to the fashion-in which an individual is taught and learns what behaviors and perspectives are customary and desirable within the work setting as well as what ones are not." (page 4)
- From the start, organizational psychologists have emphasized the importance of group dynamics in shaping cultural change (see Schein, 1965).

The Core Model

- Consider a firm that operates in isolation of others.
  - Turnover is then purely due to death or illness. In this world, the outside option of an existing worker is not to work for the firm and engage in an activity that yields an expected return normalized at 0.
- An organization comprises a continuum of agents indexed $i \in [0, 1]$ each of which is one of two types $\tau \in \{m, s\}$.
  - m stands for "motivated" and s standards for "selfish".
- Firms cannot observe worker type and offers the same contract
- Let $\mu \in [0, 1]$ be the fraction of motivated workers.

Production Technology

- Each agent put in a unit of effort $e \in \{0, 1\}$. Let individual output be $x(e)$ where $x(0) = 0$ for all $i \in [0, 1]$ and

$$x(1) = \begin{cases} 1 & \text{with probability } p \\ 0 & \text{with probability } 1 - p. \end{cases}$$

- Let λ be the proportion of agents in the organization who set $e = 1$
- Expected *total* output of the firm then is $X(\lambda) = \lambda p$.
- The firm earns a revenue of y per unit of output net of costs of non-labour inputs.

Preferences and Motivation

- Effort choice is subject to moral hazard, there is limited liability, and all parties are risk-neutral
- Output x is verifiable
- Focus on wage contracts that have a flat wage component $\omega \geq 0$ and a bonus component $\beta \in [0, y]$ for high output.
- Both types of workers incur a disutility of effort from $e = 1$, denoted by $\psi \in \left[0, \bar{\psi}\right]$. Each worker receives an idiosyncratic draw each period with density $f(\cdot)$.

Preferences and Motivation

- Creating mission motivation is costly to the firm and takes the form of an initial investment each period.
- a discrete action $\sigma \in \{0, 1\}$; the cost of mission choice is $c\sigma$.

Utility function of agents that is linear in private consumption c and cost of effort:

- Conditional on choosing $e = 1$, motivated and selfish workers receive a potential non-pecuniary payoff $v_\tau(\sigma)$ that partly offsets the disutility of effort.

$$U^\tau(c, e) \equiv c + e\left[v_\tau(\sigma) - \psi\right], \quad \tau \in \{s, m\}$$

Preferences and Motivation

- For selfish agents, $v_s(\sigma) = 0$ for $\sigma \in \{0, 1\}$.
- For motivated agents,

$$v_m(\sigma) = \begin{cases} \theta & \sigma = 1 \\ -\varepsilon & \text{otherwise.} \end{cases}$$

  - Motivated agents get a non-pecuniary payoff of θ if they agree with the mission of the firm. However, they also get disutility ε if the firm ignores their mission preference.
  - This gives them some potential payoff disadvantage in some situations
  - Selfish agents get no non-pecuniary payoff

Contracts and Optimal Effort

- Optimal choice of effort for an agent with disutility draw ψ accordingly solves:

$$\hat{e} = \arg \max_{e \in \{0,1\}} \left\{ e \left[\beta p + v_\tau \left(\sigma \right) - \psi \right] \right\}.$$

- This defines a cutoff level for ψ below which an agent chooses $e = 1$ defined by

$$\hat{\psi}_\tau \left(\beta, \sigma \right) = \begin{cases} \beta p + v_\tau \left(\sigma \right) & \tau = m \\ \beta p & \tau = s. \end{cases}$$

- Average effort is
$\hat{\lambda} \left(\sigma, \mu, \beta \right) \equiv \mu F \left(\beta p + v_m \left(\sigma \right) \right) + \left(1 - \mu \right) F \left(\beta p \right).$

Organizational Objectives and Design

- Incentives are determined by profit maximization:

$$\hat{\Pi}(\mu,\sigma) = \max_{\{\omega,\beta\}} \left\{ [y-\beta]\,\hat{\lambda}(\sigma,\mu,\beta)\,p \right\} - \omega.$$

- It is optimal to set the fixed wage as low as as possible, i.e. $\omega_\sigma(\mu) = 0$.
- The first-order condition for the choice of β is

$$\frac{1}{y-\beta_\sigma(\mu)} = \frac{1}{\hat{\lambda}(\sigma,\mu,\beta)} \frac{\partial \hat{\lambda}(\sigma,\mu,\beta)}{\partial \beta}.$$

- The optimal decision of the firm regarding the choice of β involves balancing the marginal cost of providing incentives in terms of lower net profits against the incentive benefits from rewarding agents more for high output.

Organizational Objectives and Design

Assumption 1: We make the following assumption:
(i) $F(\psi)$ *is a log concave distribution*;
(ii) $\lambda = \mu F(\beta p + v) + (1-\mu)F(\beta p)$ *is log concave in* β;
(iii) $F'(0)$ *is bounded;*
(iv) $\theta < h^{-1}(\frac{1}{py})$, *where* $h(\psi) = \frac{F'(\psi)}{F(\psi)}$.

Organizational Objectives and Design

Lemma 1: *Suppose Assumption 1 holds. Then* $\beta_0(\mu), \beta_1(\mu) > 0$ *for all* $\mu \in [0,1]$ *and* $\beta_0(\mu)$ *is increasing in* μ*. Also,* $\beta_1(\mu)$ *is decreasing in* μ *and* θ*.*

Proposition 1: *When the firm chooses a pro-social mission* $(\sigma = 1)$ *incentives are flatter, i.e.,* $0 < \hat{\beta}_1(\mu) < \hat{\beta}_0(\mu)$.

- Agent motivation and financial incentives are substitutes and so using bonuses is less attractive, all else equal, in a world of motivated agents, paralleling one of the main results in Besley and Ghatak (2005).
- This is despite the cost in terms of lower effort of low types

Organizational Objectives and Design

- The mission choice of the firm solves:

$$\hat{\sigma}(\mu) = \max_{\sigma \in \{0,1\}} \hat{\Pi}(\mu, \sigma) - c\sigma.$$

- The firm will only choose to create an environment which motivates workers when there is a sufficient increase in profit from doing so.

Socialization

- The expected payoff for an agent of type τ is:

$$Y^{\tau}(\mu) = F\left(p\beta_{\hat{\sigma}(\mu)}(\mu) + v_{\tau}(\hat{\sigma}(\mu))\right) p\beta_{\hat{\sigma}(\mu)}(\mu), \; \tau = m, s$$

- Socialization depends on the material fitness advantage of motivated type defined as

$$\Delta(\mu) = Y^{m}(\mu) - Y^{s}(\mu).$$

- The evolutionary dynamics is "Darwinian" in the sense that the increase in the proportion of motivated agents is driven by their fitness advantage.

$$\mu_{t+1} - \mu_t = Q(\mu_t, \Delta(\mu_t)).$$

Socialization

- A fraction ρ of the workers who are replaced each period.
- All newly hires are assumed to be selfish but can be socialized on arrival by being mentored randomly by an existing worker.
- If matched with a motivated agent (with probability μ_t), the new hire will directly become motivated if $\Delta(\mu_t) + \eta \geq 0$.
  - η is a mean-zero, symmetrically distributed idiosyncratic shock with c.d.f. $G(\cdot)$ and $G(0) = \frac{1}{2}$.
  - The conditional probability of direct socialization is simply $G(\Delta(\mu_t))$.
- If such direct socialization fails, the new recruit may still be indirectly socialized by observing and learning from other workers.
  - Assuming a linear relation with μ_t, the probability of indirect socialization is $[1 - G(\Delta(\mu_t))]\mu_t$.

Socialization

- If matched with a selfish worker (with probability $1-\mu_t$), the new hire can be socialized into being selfish if $\Delta(\mu_t)+\eta \leq 0$.
- The new hire can indirectly become motivated depending on the aggregate fraction of motivated agents (μ_t).
  - The resulting probability of becoming motivated is therefore $G(\Delta(\mu_t))\,\mu_t$.
- Hence the following the equation of motion for the share of motivated types:

$$\mu_{t+1}-\mu_t=\rho\mu_t(1-\mu_t)\left[2G(\Delta(\mu_t))-1\right].$$

Timing

1. At the beginning of each period, an organization inherits a fraction of motivated workers μ_t.
2. The firm chooses organizational form $\sigma \in \{0, 1\}$.
3. Workers are offered contracts.
4. Agents choose their effort level.
5. Output and payoffs are realized.
6. A fraction ρ of workers are replaced and new workers are socialized.

Steady States

- A steady state, denoted by μ^*, requires three conditions to hold simultaneously relating to organizational form (σ) and expected total output (X):

$$\text{(i) } \sigma^* = \hat{\sigma}\left(\mu^*\right), \quad \text{(ii) } X^* = X\left(\hat{\lambda}\left(\sigma^*, \mu^*\right)\right)$$

$$\text{(iii) } \mu^*\left(1-\mu^*\right)\left[2G\left(\Delta\left(\mu^*\right)\right)-1\right] = 0.$$

- We focus on *stable* steady states.

Core Results (I): Mission Choice

Proposition 2: *Expected output $\hat{\lambda}(\sigma, \mu, \beta_1(\sigma))$ is higher under $\sigma = 1$ compared to $\sigma = 0$ when incentives are set optimally.*

- Intuitively this is because the firm has to cover the cost of being mission oriented which only happens if this induces more effort and hence higher output.
- If the firm is able to elicit the same effort for a lower bonus pay, as bonuses are chosen optimally, it will never cut it to the point where effort is lower

Core Results (I): Mission Choice

Assumption 2: We make the following assumption:

$$p[F\left(p\hat{\beta}_1(1)+\theta\right)\left[y-\hat{\beta}_1(1)\right]-F\left(p\hat{\beta}_0(1)-\varepsilon\right)\left[y-\hat{\beta}_0(1)\right]]>c$$

- This always holds if c is small enough.

Proposition 3: Suppose that Assumption 2 holds, then there exists $\tilde{\mu}$ such that the firm uses pro-social motivation if and only if $\mu \geq \tilde{\mu}$.

- Firms will become mission-oriented in order to motivate their workers when there are sufficiently many motivated workers (assuming it is cheap enough to do so)
- Even if it was costless, with most workers being selfish, it is not profit-maximizing choosing the mission

Core Results (II): Multiple Steady States

- Observe the material fitness can be written as

$$\Delta(\mu) = \begin{cases} \left[F\left(p\beta_1(\mu)+\theta\right) - F\left(p\beta_1(\mu)\right)\right] p\beta_1(\mu) > 0 & \mu \geq \tilde{\mu} \\ \left[F\left(p\beta_0(\mu)-\varepsilon\right) - F\left(p\beta_0(\mu)\right)\right] p\beta_0(\mu) < 0 & \text{otherwise.} \end{cases}$$

- This implies that which type has a fitness advantage depends on whether the organization chooses to be mission-oriented.
- Note that for all $\mu \in [0,1]$, $\Delta(\mu)$ is therefore strictly positive or negative which rules out the possibility of an interior steady state.

Core Results (II): Multiple Steady States

Proposition 4: For all $\mu_0 \geq \tilde{\mu}$, the organization converges to a stable steady state where $\mu = 1$ in the long run. Otherwise, the only stable steady state has $\mu = 0$.

- The evolutionary path is pinned down directly by the organizational choice which itself depends on the initial condition μ_0.
- If the starting value of μ is high enough, then the organization will choose a mission to suit motivated agents, which creates an efficiency advantage to economizes on monetary incentives.
- The converse is true when the organization begins with a low value of μ.

Extension (I): Motivated Founders

- If $\mu_0 = 0$ is the natural initial condition, then it would seem unlikely to be able to get to a motivated steady state.
- Having mission-oriented founders who are willing to sacrifice profits for wider goals would lead to motivated steady state.
- Consider a founder with a preference for $\sigma = 1$, i.e. who gets utility $\Theta > c$ from choosing this. Suppose that Θ is large enough such that $\hat{\Pi}(0,1) > \hat{\Pi}(0,0)$, where

$$\begin{aligned} \hat{\Pi}(0,1) &= \max_{\beta \geq 0} \{[y-\beta]\, pF(p\beta) + \Theta - c\} \\ \hat{\Pi}(0,0) &= \max_{\beta \geq 0} \{[y-\beta]\, pF(p\beta)\}. \end{aligned}$$

- This implies that the steady state at $\mu^* = 0$ is no longer stable.

Extension (I): Motivated Founders

Proposition 5: Suppose that the founder is motivated, then the unique stable steady state when the founder is in charge is $\mu = 1$.

- We do not require that there is a permanently motivated founder in charge.
- Even after the founder is no directly involved in the firm, this can shape the future trajectory of an organization as long as at the point of his departure from the organization, $\mu > \tilde{\mu}$.

Extension (II): Regulation

Proposition 6: Suppose that there is a regulation that sets $\sigma = 1$ then the unique stable steady state while the regulation is in place is $\mu = 1$.

- Suppose that regulation forces a firm to pick a specific mission such as mandating a green technology.
- In the near term with $\mu = 0$, such regulation is surely efficiency reducing.
- However this suggests an intriguing possibility that having a firm which becomes greener can actually lead workers to value this stance and that this could enhance worker motivation, mitigating the efficiency loss in firms.
- This creates an argument for creating regulation strategically to effect cultural change.

Extension (III): Competition

- Consider how productivity shocks (i.e. an increase in y) influence whether firms become mission-orientated.
- Note that

$$(y - \beta_1(\mu))\,\hat{\lambda}(1, \mu, \beta_1(\mu)) - c - (y - \beta_0(\mu))\,\hat{\lambda}(0, \mu, \beta_0(\mu))$$

  is increasing in y as average effort is higher when firms invest in a mission.
- Therefore, there is a greater chance that firms will become mission oriented in a world where financial returns are higher.
- This could be because of higher productivity per worker or because there is less competition.
- There maybe a trade-off between greater competition and being mission oriented all else equal.

Extension (IV): Welfare

- Define welfare as the total surplus in the firm, i.e. the sum of profits and worker utility.
- It is the following in the two steady states: if $\mu = 1$

$$\int_0^{p\hat{\beta}_1(1)+\theta} [py + \theta - \psi] \, dF(\psi) - c$$

and if $\mu = 0$

$$\int_0^{p\hat{\beta}_0(0)} [py - \psi] \, dF(\psi) \, .$$

Proposition 7: Under Assumption 2, motivated steady state ($\mu = 1$) delivers higher welfare than selfish steady state ($\mu = 0$) if and only if c is small enough:

$$[py + \theta] F\left(p\hat{\beta}_1(1) + \theta\right) - pyF\left(p\hat{\beta}_0(0)\right) - \int_{p\hat{\beta}_0(0)}^{p\hat{\beta}_1(1)+\theta} \psi dF(\psi) \geq c$$

Concluding Remarks

- We put forward a framework for studying the evolution of motivation alongside the reward structures in organizations.
- Organizations can harness non-pecuniary motivations even when the goal of the organization is profit-maximization.
- But this holds only when μ is sufficiently high, i.e. a natural threshold effect.
- The paper fits into a wider agenda which appreciates that the profit motive has wider consequences for the culture of societies.