Aversion to Risky Hires in a Model of Delegated Recruiting

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Motivation

- Ability is not perfectly observed prior to hire.
- Certifications, education, etc. have two primary effects:
  1. Increase ability.
  2. Signaling: reduce the variance of beliefs around true ability.
- Empirically, hires from outside are usually horizontal, and compared to internal hires they have stronger education and experience credentials (Devaro et. al. 2019).
- Also empirically, poaching drives moves up the job ladder, and this poaching shuts down during recessions. One main pathway for poaching is through a recruiter.
- Anecdotally, I know at least two individuals who are quite skilled in their respective fields, but have non-traditional (high variance) resumes. They are struggling to move up the job ladder, and receive little attention from recruiters. Why?

Motivation - Interviews

I interviewed 3 recruiters regarding their compensation and practices.
Two key insights emerged:

1. Most recruiters across industries are paid according to a standard **bonus contract**, where they receive a fixed percentage of their suggested applicant's salary if the applicant is hired and is not fired and does not quit for some number of months.
2. Recruiters prefer "less risky" hires - they are not willing to trade the option value of a risky choice if there is a chance the person will not "fit" the company.

Key Economic Force

- Recruitment is a delegated task, and the most common bonus-type contract seems to produce a **misalignment** between the recruiter and the firm.
- The firm keeps residual profits from an employee (beyond the market expectation), and as a result there is some option value to a risky hire.
- The recruiter has no such incentive, and only cares about maximizing the probability that a hire stays.
- This may be driving the reluctance of recruiters to recruit risky hires, and it may also be why external hires tend to be less risky: they are more likely to be found using recruiters.

Literature

Four strands:

- **Delegated Search:** Ulbricht (2016), Foucart (2020), Lewis (2012)
- **Delegated Choice:** Armstrong and Vickers (2009), Frankel (2014), Frankel (2016)
- **Labor search and matching models with heterogeneity:**
  1. One dimension: Postel-Vinay and Robin (2002), Moscarini (2003), **Lazear (1998)**
  2. Multidimensional: Lindenlaub and Postel Vinay (2017)
- **Labor Market Intermediaries (Empirical):** Barrios (2019), Hoffman et. al. (2017)

Contributions

1. Two-dimensional sequential delegated search.
2. First model of the delegation problem applied to recruiters specifically where objects have two dimensions.
3. Incorporate real-world contract shape within model, rather than specifying utility as random variables linked by correlation.

Environment

The Players

1. One risk-neutral firm which wishes to hire a worker.
2. One risk-neutral recruiter operating a search technology.
3. The worker is not a player.

The Game

1. Firm proposes a contract consisting of upfront payment α, and a bonus β contingent on whether the worker remains at the firm.
2. The recruiter accepts or rejects the contract.
3. The recruiter sequentially searches for a worker and proposes one worker to the firm.
4. Ability (a) realizes and the worker exogenously separates from the firm if $a < 0$.
5. The contract realizes.

Search Process

Workers

1. A worker is ex-ante described by (μ, σ).
2. Conditional on (μ, σ) ability a is distributed $N(\mu, \sigma^2)$.

Search Process

1. Search is sequential in the style of McCall 1970.
2. Recruiter takes i.i.d. draws of (μ, σ) with joint distribution G.
3. Search has unit cost c.

Payoffs

- Firm ex-post profit is: $(a - \beta)\mathbb{I}\{a \geq 0\} - \alpha$
- Recruiter utility is $\alpha + \beta\mathbb{I}\{a \geq 0\}$ less the search costs.

Intuitive Example

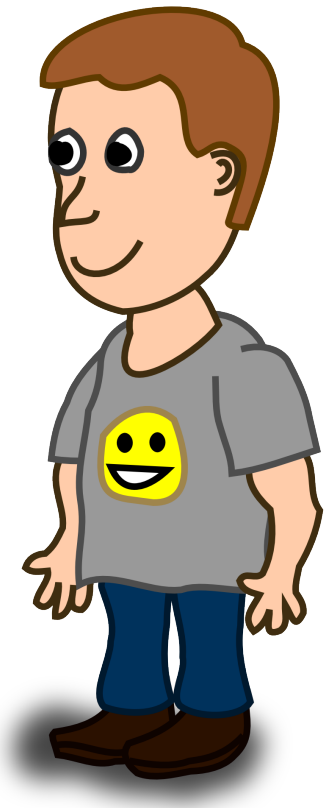


Figure: Mr. Self-Taught

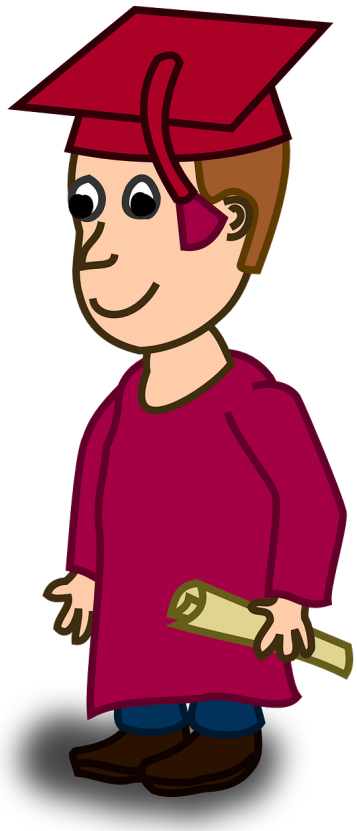


Figure: Mr. Ivy League

Comments

- (μ, σ): interpret as applicant's resume or LinkedIn profile, where μ captures "best guess" and σ is a measure of precision.
- The form of the contract is based on the bonus structure that seems to be common.
- No assumptions about the joint distribution of (μ, σ).
- Will consider only firm-proposing Perfect Bayesian Nash Equilibrium (second-best) and the benchmark where the firm performs search directly (first-best).
- We will be concerned with the payment (β) and **acceptance regions.**

Visualizing Misalignment

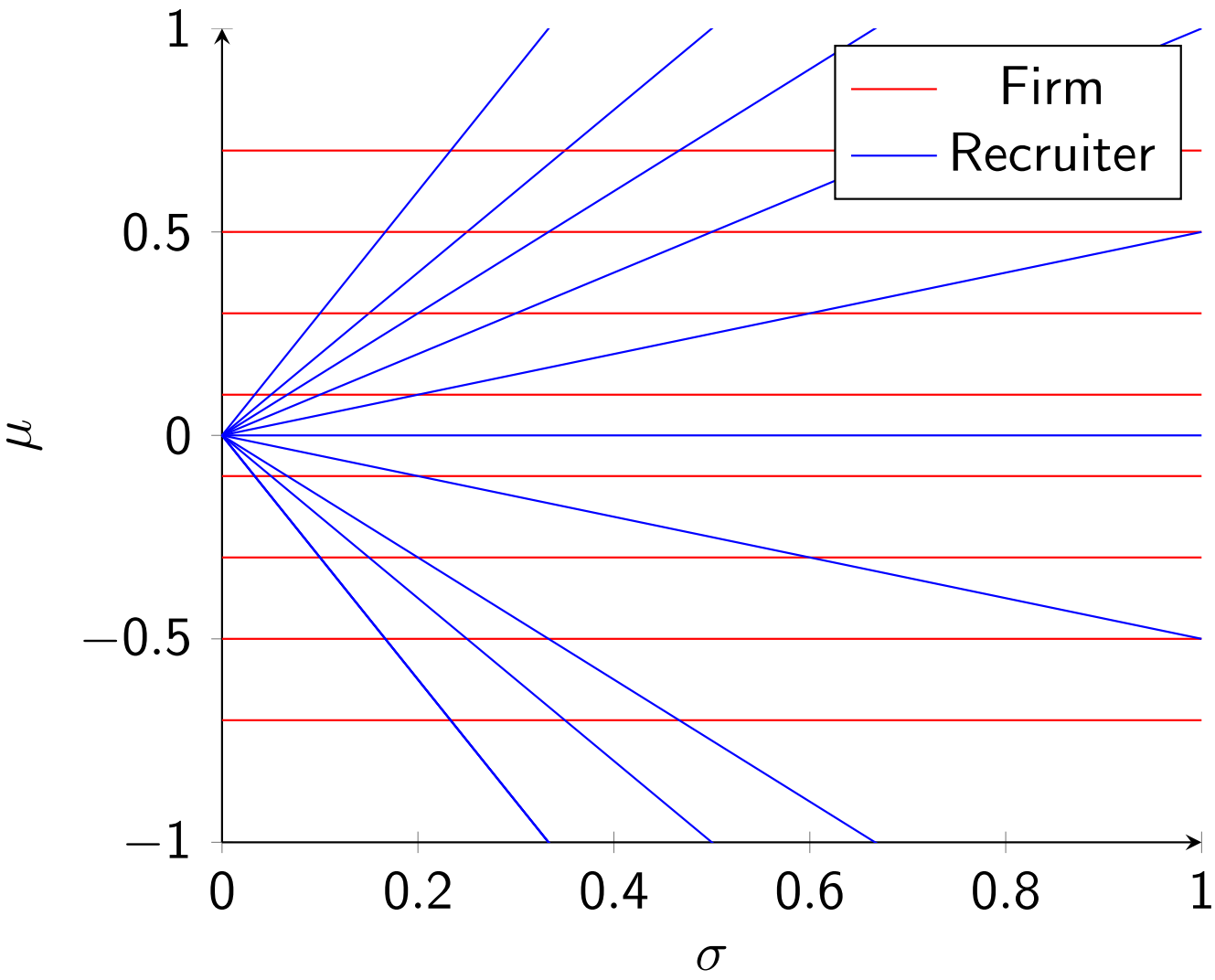


Figure: Indifference Curves

Two Concepts

Definition 1

An acceptance region, denoted $\mathcal{D}_i$ is the set of (μ, σ) pairs in the support which entity i would select if they operated the search technology.

Acceptance Regions

Lemma 2

In the first-best benchmark, where the firm operates the search technology directly, the acceptance region is given by:

$$\mathcal{D}_F = \{\mu, \sigma | \mu \geq \mu^*\}$$

where μ^* *solves:* $c = \int_{\mu \geq \mu^*} (1 - G_\mu(\mu)) d\mu$

Acceptance Regions

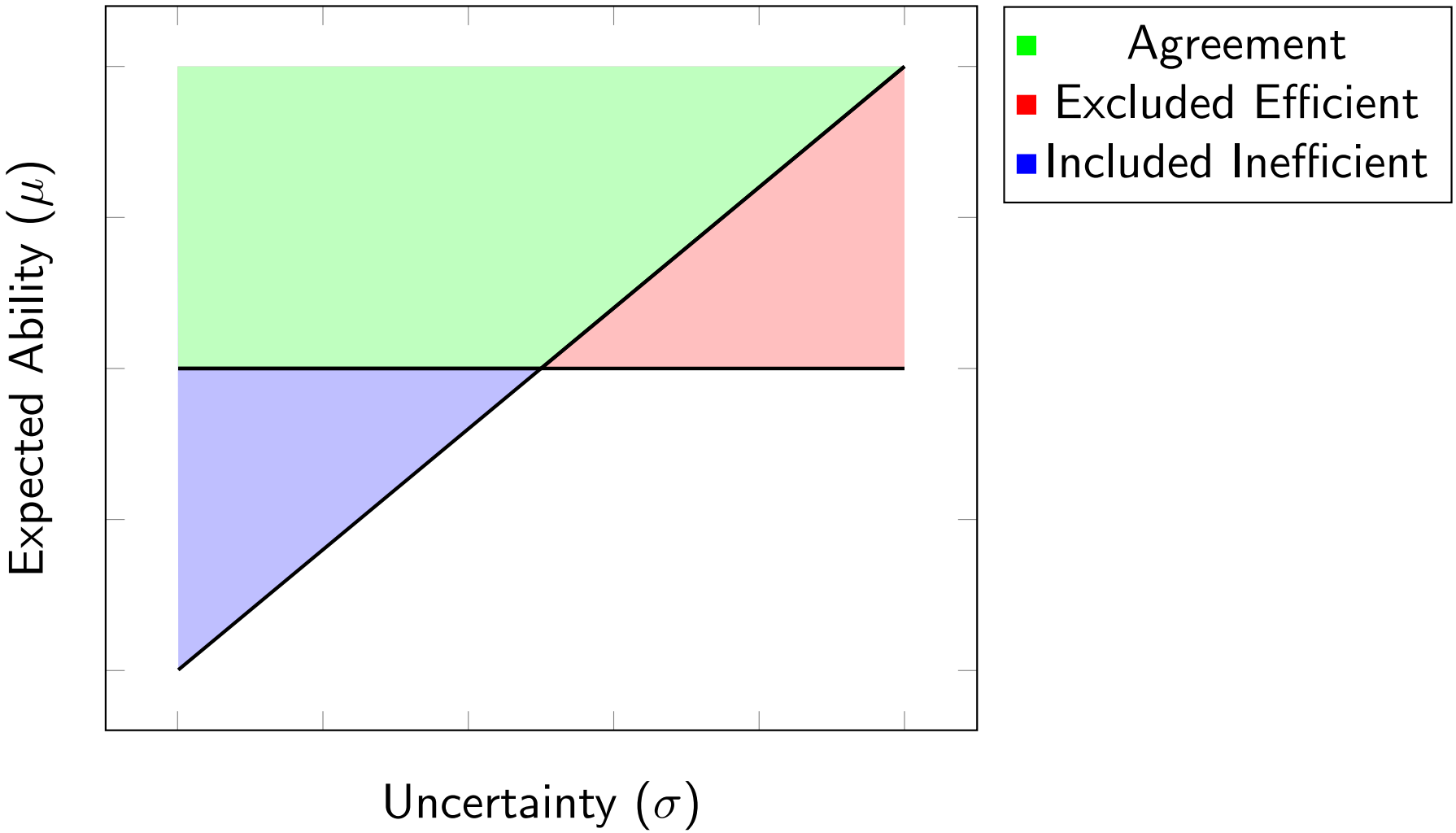
Lemma 3

Given β, define $M(u)$ as the CDF of $u = \beta\Phi\left(\frac{\mu}{\sigma}\right)$. In any incentive compatible contract, the recruiter's acceptance region is given by:

$$\mathcal{D}_R = \{\mu, \sigma | \mu/\sigma \geq \Phi^{-1}\left(\frac{u^*}{\beta}\right)\}$$

where u^* solves: $c = \int_{u \geq u^*}(1 - M(u))du$

Visualizing Acceptance Regions: $\mu > 0$



Uncertainty of Hires

Proposition 1

If μ and σ are independent, $\sigma|\sigma \in \mathcal{D}_F$ first-order stochastically dominates $\sigma|\sigma \in \mathcal{D}_R$.

Uncertainty of Hires

Proposition 2

Suppose μ, σ are positively affiliated and $\mu, \mu/\sigma$ are negatively affiliated. Then the recruiter acceptance region is the full support of μ, σ. Further, $\sigma|\sigma \in \mathcal{D}_F$ first-order stochastically dominates $\sigma|\sigma \in \mathcal{D}_R$.

Intuition from Both Propositions: The recruiter will tend to over select "safe-bets" and under-select "high-potential risks." The relationship between $\mu, \mu/\sigma$ is key to the problem.

Remark: Both cases are rather unrealistic. In reality, it is likely that $Cov(\mu, \sigma) < 0$.

Parametric Assumption

Assumption 1

The joint CDF of $(\mu, \mu/\sigma)$ *is given by:*

$$H_{\mu,\mu/\sigma}(x,y) = (1 - e^{-\lambda_1 x})(1 - e^{-\lambda_2 y})[1 + \rho e^{-\lambda_1 x - \lambda_2 y}]$$

where we require: $c \leq 1/\lambda_1$.

1. Can think of μ/σ as standardized expected ability.
2. Marginals are exponential.
3. ρ controls correlation, or "alignment" between firm and recruiter objectives.
4. Restriction on λ_1 is so that the problem is not trivial.
5. Developed by Gumbel in the 1950s.

First-Best

Proposition 3

Under Assumption 1, the first-best acceptance region is given by:

$$\mathcal{D}_F = \{\mu, \sigma | \mu \geq \mu^*\}$$

where μ^* has the closed-form solution:

$$\mu^* := -\frac{log(c\lambda_1)}{\lambda_1}$$

Equilibrium

Proposition 4

Under Assumption 1, the firm's problem has a unique solution with the following characteristics.

1. **Acceptance Region:**

$$\mathcal{D}_R = \{\mu, \sigma | \mu/\sigma \geq x^*\}$$

2. **Bonus Payment β:**

$$\beta = c\left\{e^{\lambda_2^2/2}[1 - \Phi(x^* + \lambda_2)]\right\}^{-1}$$

$$x^* := \begin{cases} \frac{1}{2\lambda_2} log\left(\frac{\rho\lambda_2}{2\lambda_1 c}\right) & if \ \frac{\rho\lambda_2}{2\lambda_1 c} > 1 \\ 0 \ else \end{cases}$$

Agency Loss/Alignment

Theorem 4

Under Assumption 1, firm-recruiter agency loss (alignment) falls (increases) with ρ, in the sense that:

1. *Expected surplus (profit) increases.*
2. *Bonus payment β increases.*
3. *Expected number of searches increases.*

Intuition: ρ in a sense measures how good of an instrument the bonus contract is. When it is high, there is in a sense a strong negative correlation between μ, σ.

Application: In industries where good job applicants (high μ) also tend to have precise signals of ability (low σ), delegation to recruiters should be more prevalent.

Acceptance Regions

Theorem 5

Under Assumption 1, when ρ increases:

1. *The* **Recruiter Acceptance Region** *decreases in probability.*
2. *The* **Agreement Region** *increases in probability.*
3. *The* **Included Inefficient Region** *decreases in probability.*
4. *The* **Excluded Efficient Region** *decreases in probability.*

Intuition: As alignment rises, the recruiter responds by becoming more selective (searching "harder"). Additionally, the set of mutually acceptable candidates rises, because the recruiter finds more "risky bets" acceptable and finds more "safe bets" unacceptable.

The End