Delegated Recruitment and Hiring Distortions

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Motivation

- Between 1991 and 2022, the fraction of American workers who found their job through a recruiter or headhunter rose from 4.9% to 14.3% (Black, Hasan, and Koning 2022).
- Many recruiters use guarantee contracts.
  - If the person they suggest is hired they collect a fee.
  - If the person leaves for any reason during an initial period (usually 90 days), the fee is fully or partially refunded.
- A reasonable contract: employment is easily verifiable, productivity is not.
- But a blunt contract: opens the door for hiring distortions.

Research Question

How does delegated recruitment impact the type of candidates hired, relative to direct recruitment?

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How does $\underbrace{\text{delegated recruitment}}_{\text{equilibrium}}$ impact the type of candidates hired, relative to $\underbrace{\text{direct recruitment}}_{\text{first-best}}$?

Contribution

- **Delegation to an expert.** Che, Dessein, and Kartik 2013; Szalay 2005; Kundu and Nilssen 2020
- **Delegated Info. Acquisition.** Levitt and Snyder 1997; Inderst and Ottaviani 2012; Szalay 2009
- **Delegated Hiring.** Cowgill and Perkowski 2020; Frankel 2021

Table of Contents

Refund Contracts

Equilibrium

Hiring Distortions

Robustness: Information Structure

Robust Failure to Achieve the First-Best

Extensions and Comparative Statics

Refund Contracts

Definition 1

A refund contract consists of a payment to the recruiter if the candidate is suggested ($\alpha \in \mathbb{R}$) and a refund to the firm if the candidate is terminated ($\beta \in \mathbb{R}$).

- These are called guarantees in the recruiting industry.
- A survey by Top Echelon: 96% of recruiters offer some sort of guarantee.
- This arrangement is mentioned in many industry materials (how-to books, company websites, etc.)

Interviews Evidence of Refund Contracts

- **Jacob (Author):** “Do you consider probability of termination, probability of separation or retention when you are considering someone?”
- **Recruiter:** “Yes.”
- **Jacob (Author):** “What is the window you get paid for generally?”
- **Recruiter:** “Generally it is 90 days. We get paid upfront. One of two things happen. We either have the next placement for free or we return the money.”
- **Jacob (Author):** ”And that’s if they leave for what reasons?”
- **Recruiter:** “Any reason.”
- **Jacob (Author):** “Even if the company fires them?”
- **Recruiter:** “Yes.”

A Model Recruiting Agreement from the American Staffing Association

REPLACEMENT GUARANTEE: In the event the employment of a candidate referred to CLIENT under this agreement lasts less than ____ calendar days, and provided that all fees and expenses relating to such referral have been paid, RECRUITING FIRM will attempt to refer a replacement candidate for the same position at no additional charge to CLIENT. RECRUITING FIRM'S obligation under this agreement is limited to attempting to find a replacement candidate. No refund will be made if CLIENT hires a replacement from any source, or if CLIENT is no longer actively seeking to fill the position.

Note that the above language expressly limits the recruiting firm's obligation to referring candidates to fill the same position that was vacated and makes clear that the guarantee only extends to finding a replacement for that position. It does not apply to new or different positions. Nor does it allow the client to fill the position internally, or leave it vacant, and then seek a refund.

Instead of replacement, a refund may be used—either full or prorated—as the following examples provide:

REFUND: In the event the candidate's employment lasts less than ____ calendar days, and if CLIENT notifies RECRUITING FIRM in writing of the termination within ____ days thereafter, RECRUITING FIRM shall refund the fee to CLIENT.

Model

Players

- Risk neutral firm with one position and outside option of 0.
- Risk neutral recruiter with one candidate and outside option of $\bar{u}$.

Candidates and Information

- A candidate is an independent draw of an observed group $i \sim p$ and an unobserved productivity $a \sim Pareto(\bar{a}, k)$.
- Recruiter observes signals $\{x_t\}_{t=1}^{\tau_i}$ where $x_t | a \sim U(0, a)$.
- The firm learns productivity (a) fully after hire.

Model

Contracts

The firm uses only refund contracts, which specify a payment for suggestion (α) and a refund for termination (β).

Timing

1. The firm proposes a contract.
2. The recruiter observes signals and chooses whether to suggest or not.
3. The firm incurs a hiring cost c and fully learns a.
4. The firm chooses whether to retain or terminate the candidate.

Equilibrium

The equilibrium concept we use is sequential equilibrium.

Ex-Post Payoffs

- When a candidate is not suggested:
  - Firm profit is 0
  - Recruiter utility is $\bar{u}$
- When a candidate is suggested:
  - Firm profit is:
  $$-c - \alpha + \mathbb{I}\{\mathit{retained}\} \cdot a + \mathbb{I}\{\mathit{terminated}\} \cdot \beta$$
  - Recruiter utility is:
  $$\alpha - \beta \cdot \mathbb{I}\{\mathit{terminated}\}$$

Model Comments

- c can be either an actual cost of a direct interview or the cost of employing the candidate for a short period.
- Either way, it functions as a learning cost.
- Recruiter is valuable because they have private information not just because they have a candidate.
- To focus on cases where the firm screens out some candidates in the first-best, we assume this sufficient condition:

Assumption

$$\mathbb{E}[a] - c < c \leftrightarrow c > \frac{k}{k-1}$$

The Contract Restriction is Natural

- Signals ($\{x_t\}_{t=1}^{\tau_i}$) and productivity (a) are not contractible because they are private information.
- Candidate group is public, but is legally protected (gender, race, etc.)
- Recruiter rejects the contract when a candidate is not suggested, so a transfer cannot be specified for when a candidate is not suggested.

Bayesian Updating

- After observing τ signals, the posterior distribution of productivity is Pareto:

$$a|\{x_t\}_{t=1}^{\tau} \sim Pareto(\max\{\bar{a}, \{x_t\}_{t=1}^{\tau}\}, \tau + k)$$

- The posterior depends only on the number of signals and the maximum signal.
- If the maximum signal is x_{max}^{τ}, productivity is at least x_{max}^{τ}.
- Posterior expected productivity is:

$$\mathbb{E}[a|\{x_t\}_{t=1}^{\tau}] = \frac{\tau + k}{\tau + k - 1} x_{max}^{\tau}$$

First-Best: No Delegation

- Suppose the firm observed the private signals directly, and does not need to delegate to a recruiter.
- Hiring cost is sunk when productivity is learned. Productivity is weakly positive so a hired candidate is always retained.
- Therefore the firm suggests and hires a candidate if posterior expected productivity exceeds c.

Proposition 1

In the first-best, the firm hires a candidate if $x_{max}^{\tau} \geq x_{\tau}^{FB} := \frac{\tau+k-1}{\tau+k}c$.

Table of Contents

Refund Contracts

Equilibrium

Hiring Distortions

Robustness: Information Structure

Robust Failure to Achieve the First-Best

Extensions and Comparative Statics

The Equilibrium Contract

Theorem 2

The unique equilibrium contract has payments given by:

$$\beta^* = \frac{\mathbb{E}_\tau\left[\frac{\tau}{\tau+k}\right]}{\mathbb{E}_\tau\left[\frac{\tau}{\tau+k-1}\right]} c, \qquad \alpha^* = \bar{u}$$

- Payment for suggestion is exactly outside option.
- Recruiter only suggests candidates which it can **guarantee** are never terminated.
- If there is only one candidate group (no τ heterogeneity) first-best is achieved.

Proof Step 1: Payments are Positive

For any given binary contract, the recruiter suggests a candidate if:

$$\alpha - \beta Pr(a < \beta | x^{\tau}_{max}, \tau_i) \geq \bar{u}$$

For any given group with τ signals this can be written more explicitly as:

$$x^{\tau}_{max} \geq \underbrace{\beta \left(1 - \frac{\bar{u} - \alpha}{\beta}\right)^{\frac{\tau}{\tau+k}}}_{x_{SB}}$$

Proof Step 1: Payments are Positive

We wish to show: $\beta \geq 0$, $\alpha \geq \bar{u}$.

- Suppose $\beta < 0$ in an optimal contract. Then:
  - Firm terminates if $a \geq \beta$. But $\beta < 0$, so no one is terminated.
  - Anticipating, recruiter either suggests everyone (negative profit) or no one (0 profit).
  - Both are dominated by $\alpha' = \bar{u}, \beta' = c$ (positive profit). A contradiction.
- Suppose $\alpha < \bar{u}$. Then:
  - $\beta \geq 0 \implies$ even the best candidates are worse than the outside option because $\alpha - \beta \cdot 0 < \bar{u}$.
  - The recruiter suggests no one, yielding 0 profit.
  - Again dominated by $\alpha' = \bar{u}, \beta' = c$ (positive profit). A contradiction.

Proof Step 2: Full Surplus Extraction

- We show that profit is strictly decreasing in α for all τ, β.
- Total profit is a weighted average of group profit, so $\alpha = \bar{u}$, and:

$$x_{SB} = \beta\left(1 - \frac{\bar{u} - \alpha}{\beta}\right)^{\frac{\tau}{\tau+k}} = \beta$$

  Anyone that is suggested is hired and never terminated.

- Profit for the firm is total surplus (full surplus extraction):

$$\pi = \mathbb{E}[\mathbb{I}\{x^{\tau}_{max} \geq \beta\}(\mathbb{I}\{a \geq \beta\}a + \mathbb{I}\{a \leq \beta\}\beta - c - \alpha)]$$

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&= \mathbb{E}[\mathbb{I}\{x^{\tau}_{max} \geq \beta\}(a + \mathbb{I}\{a \leq \beta\}\beta - c - \alpha)] \\
&= \mathbb{E}[\mathbb{I}\{x^{\tau}_{max} \geq x_{SB}\}(a - c - \bar{u})]
\end{aligned}$$

Step 3: Optimal Refund

- Surplus from group i can be expressed as:

$$\pi_i = \left(\frac{\bar{a}}{\beta}\right)^k \left[\frac{\tau k}{(k-1)(\tau+k-1)}\beta - \frac{c\tau}{\tau+k}\right]$$

- The FOC for group i is:

$$\frac{\partial \pi_i}{\partial \beta} = k\left(\frac{\bar{a}}{\beta}\right)^k \left\{\frac{c}{\beta}\frac{\tau}{\tau+k} - \frac{\tau}{\tau+k-1}\right\}$$

- FOC of total surplus is the expectation of each group's FOC w.r.t. τ:

$$\sum_i p_i \left\{\frac{c}{\beta}\frac{\tau_i}{\tau_i+k} - \frac{\tau_i}{\tau_i+k-1}\right\} = 0 \leftrightarrow \beta^* = \frac{\mathbb{E}\left[\frac{\tau_i}{\tau_i+k}\right]}{\mathbb{E}\left[\frac{\tau_i}{\tau_i+k-1}\right]}c$$

- The SOC is satisfied at β^*. Therefore we have uniqueness.

Table of Contents

Refund Contracts

Equilibrium

Hiring Distortions

Robustness: Information Structure

Robust Failure to Achieve the First-Best

Extensions and Comparative Statics

Artificial Risk Aversion

Definition 3

The cutoff number of signals τ^* is such that

$$\frac{\tau^* + k - 1}{\tau^* + k} c = x^*_{SB} = \beta^*$$

Theorem 4

All groups with more signals than τ^* are hired with higher probability in equilibrium than the first-best, while all groups with fewer signals than τ^* are hired with lower probability.

- The proof shows inductively that β^* is greater than the first-best thresholds for $\tau_i < \tau^*$ and less than the first-best thresholds for $\tau_i > \tau^*$
- Even in the equilibrium contract, recruiter overvalues an additional signal.
- Firm's hiring choices appear artificially risk averse.

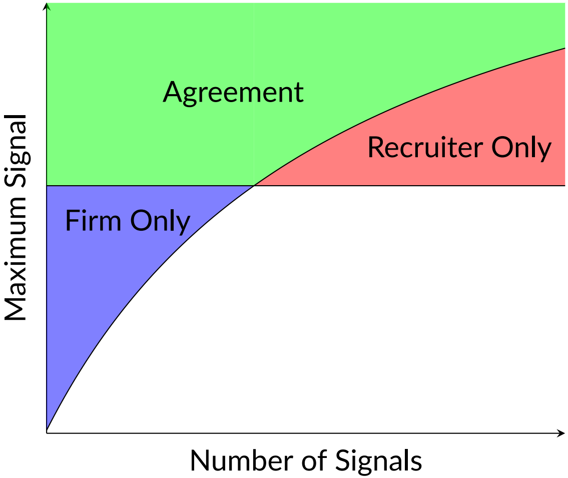
Statistical Discrimination

Corollary 5

A strictly positive share of candidates that are not hired have strictly higher expected productivity than candidates which are hired.

- In the first-best all candidate groups face the same expected productivity bar to be hired.
- In equilibrium groups with many signals face a lower bar and groups with few face a higher bar.
- If we interpret i as a demographic group (race, religion, sex, age), high τ groups are those the recruiter understands better.
- Delegation amplifies the importance of information during hire, generating statistical discrimination.

Hired Candidates in the First-Best vs Equilibrium



Diamonds in the Rough vs. Safe Bets

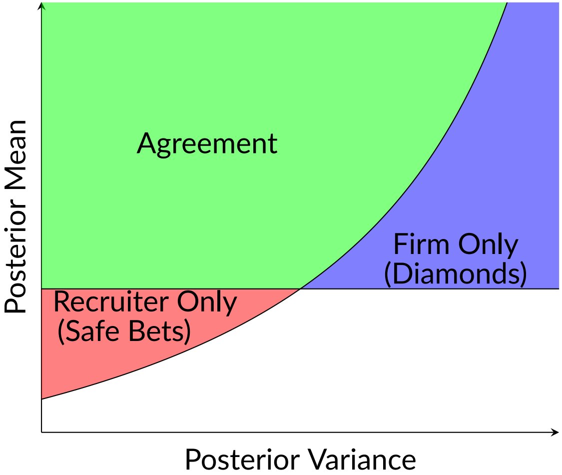


Table of Contents

Refund Contracts

Equilibrium

Hiring Distortions

Robustness: Information Structure

Robust Failure to Achieve the First-Best

Extensions and Comparative Statics

Are Distortions Driven by the Info. Structure?

- Artificial risk aversion is shown under Pareto-uniform info structure.
- But then are distortions knife-edge?
- Our argument:
  - Under many structures there are ranges of contracts with artificial risk aversion.
  - Under Pareto-uniform the unique equilibrium is in this set.

Are Distortions Driven by the Info. Structure?

- The probability a candidate is below a threshold is what the recruiter cares about.
- In the first-best the firm cares about a convex function of productivity.
- Suppose we think about any info. structure as generating a joint distribution of posterior means (μ) and variances (σ).
- Suppose these can be related and ordered:

Definition 6

A space of candidates (μ, σ) is q-lower-tail-risk ordered if

- $F_{(\mu_1,\sigma)}(a)$ first-order-stochastically dominates $F_{(\mu_2,\sigma)}(a)$ for any $(\mu_1 > \mu_2, \sigma)$,
- $F_{(\mu,\sigma_1)}(a)$ second-order-stochastically dominates $F_{(\mu,\sigma_2)}(a)$ for any $(\mu, \sigma_1 < \sigma_2)$, and
- $F_{(\mu,\sigma_1)}(a) \leq F_{(\mu,\sigma_2)}(a)$ for any $(\mu, \sigma_1 < \sigma_2, a \leq F^{-1}_{(\mu,\sigma_2)}(q))$.

Are Distortions Driven by the Info. Structure?

Proposition 2

The firm is risk loving, i.e., in the first-best the firm suggests candidates such that $\mu \geq \tilde{\mu}_{FB}(\sigma)$, where $\tilde{\mu}_{FB}(\sigma)$ is decreasing in σ.

- The firm's ex-post benefit in the first-best is $\max\{a, 0\}$.
- Recall the firm is ex-ante risk neutral.

Are Distortions Driven by the Info. Structure?

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- The firm's ex-post benefit in the first-best is $\max\{a, 0\}$.
- Recall the recruiter is ex-ante risk neutral.

Are Distortions Driven by the Info. Structure?

- Many people (myself included) have an intuition that refund contracts cause risk aversion and this generates distortion.
- This intuition is generic in that for many contracts under many structures it holds.
- But it is not generic in that we do not know if all equilibrium contracts are in the risk averse set.

Are Distortions Driven by the Info. Structure?

- Solving for equilibrium requires understanding the joint distribution of posterior expectations,posterior truncated expectations, and posterior quantiles.
- Under many info. structures this is intractable (normal-normal).
- Under pareto-uniform it is.
- Under pareto-uniform the unique equilibrium contract is in the risk-averse set.

Table of Contents

Refund Contracts

Equilibrium

Hiring Distortions

Robustness: Information Structure

Robust Failure to Achieve the First-Best

Extensions and Comparative Statics

Achieving the First-Best

- We showed that removing information type heterogeneity of candidates restores first-best.
- We will consider 3 other forces:
  - Coarseness of refund contracts
  - Lack of commitment
  - Rent extraction
- All three are NOT pivotal.

Coarse Contracts?

- A refund contract is coarse because it specifies only two payments.
- First-best involves info type-specific hiring thresholds.
- Perhaps these are just geometrically infeasible?
- For more than two groups, yes! But...

Coarse Contracts?

- With two groups, first-best suggestion thresholds are often achievable!
- But we just showed the firm never chooses them. Why?
  - To get first-best, we need to set the upfront payment above the outside option.
  - But then some people hired MUST be terminated.
  - We pay a hiring cost for these and get 0 output.

Lack of Commitment?

Proposition 4

Suppose the firm can choose a threshold a_F and commit to terminate candidates only if $a \leq a_F$ when the contract is proposed. Then:

1. *Profit is weakly higher than in the baseline equilibrium.*
2. *The first-best profit and set of hired and suggested candidates are not achieved.*

- Adding commitment changes the contract but doesn't restore the first-best.
- Achieving first-best requires never terminating anyone that is hired.
- But then the recruiter has no screening incentives!

Rent Extraction?

Proposition 5

Suppose the firm designs three-part contracts, with an additional transfer before the recruiter sees the productivity signals. Then:

1. *Profit is weakly higher than in the baseline equilibrium.*
2. *The first-best profit and set of hired and suggested candidates are not achieved.*

- The firm does extract all rent in the baseline model.
- BUT adding a third payment to take on rent extraction role doesn't achieve first-best.
- Again, achieving first-best requires never terminating anyone that is hired which is never incentive compatible.

Table of Contents

Refund Contracts

Equilibrium

Hiring Distortions

Robustness: Information Structure

Robust Failure to Achieve the First-Best

Extensions and Comparative Statics

Heterogeneous Prior Productivity

Suppose each group also has heterogeneous prior productivity parameter $\bar{a}_i$. Then:

Proposition 1'

In the first-best, the firm hires a candidate if: $x_{max}^{\tau_i} \geq x_i^{FB} := \frac{\tau_i + k - 1}{\tau_i + k} c$.

Theorem 1'

The unique equilibrium contract is a binary refund contract with

$$\beta^* = \frac{\mathbb{E}\left[\frac{\bar{a}_i^k \tau_i}{\tau_i + k}\right]}{\mathbb{E}\left[\frac{\bar{a}_i^k \tau_i}{\tau_i + k - 1}\right]} c, \qquad \alpha^* = \bar{u}$$

- Intuition: The importance of a group depends on its minimum productivity.
- More productive (higher $\bar{a}_i$) groups have greater weight in the contract.

Productivity and Information Spillovers

- First-best: an improvement in $\tau_i, \bar{a}_i, p_i$ for a group have no impact on other groups.
- Equilibrium: β is determined by trading off diamonds and safe bets.
- Therefore changes in the productivity/information available about one group spillover onto others.

Information Spillovers

- Suppose more signals become available for a type i above the threshold $\tau_i > \tau^*$.
- The refund rises because screening becomes more important.
- All other types are hired with lower probability.

Productivity Spillovers

- Suppose the productivity of group i increases ($\uparrow \bar{a}_i$) or the relative size of the group becomes larger ($\uparrow \bar{p}_i, \downarrow p_{-i}$).
- The group becomes more important for profit. If the group is above the threshold (high info. type):
  - The groups' first-best threshold is above initial β^*
  - The firm increases β to better match it.
  - Hiring probability for other groups fall.
- If the group is below the threshold (low info. type):
  - The groups' first-best threshold is below initial β^*.
  - The firm decreases β to better match it.
  - Hiring probability for other groups rises.

Conclusion

- We propose a model of delegated recruitment using refund contracts.
- Refund contracts are common in practice and natural in the model.
- Delegation generates artificial risk aversion and statistical discrimination.
- Heterogeneity in information is pivotal, but rent extraction and commitment are not.
- We show how changes for one candidate group spillover to others in equilibrium.
- Future work should explore this experimentally via two-sided audits.