Acceptance Deadlines and Job Offer Design

Changying Li

Shandong University

Xin Zhao

University of International Business and Economics

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Motivation

- Why does employer set deadline for job candidate to consider its offer?
- Conflicting interests over timing of making acceptance decision
  - candidate prefers to hold on to offer
  - employer prefers candidate to make quick decision
- Why employer does not always require immediate decision?

Objectives

- Simple model illustrating employer's trade-offs in setting acceptance deadline under incomplete-info environment
- Optimal deadline and its relation to recruiting environments
- Optimal offer design by choosing deadlines and *monetary incentives*

Setup

Players

- Employer wants to recruit particular job candidate to fill open slot
- Employer (she): standard offer features $r \in (0,1]$
- Candidate (he): quality is represented by $v > 0$
- Both r and v are common knowledge

Payoffs

- Employer's matching payoff is v
- Candidate's matching payoff is r
- They are risk neutral and do not discount future

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Employer

- Believes $\bar{r}$ has CDF $H(\cdot)$ on $[0,1]$
- Outside option has quality $v_o < v$, which is public info
- Disappearing with rate $\delta > 0$ at each time $t \geq 0$
- Always accepting employer's offer upon receipt

Preview of Results

Fixed Employment Terms in Employer's Offer:

- Optimal deadline is *increasing* in candidate's market prospects, while *decreasing* in quality of employer's outside option
- Offers with extreme deadlines are more likely to arise when candidate always holds on to offer until deadline
- Allowing deadline extension benefits *both* employer *and* candidate

Variable Monetary Incentives in Employer's Offer:

- Optimal offer design is implementable as "bonus-for-early-acceptance" (BFEA) mechanism
- Different BFEA mechanisms adopted in practice reflect level of competition faced by employer

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  - $p_{\bar{t}}$ is decreasing in $\bar{t}$: more pessimistic on outside option if waiting longer
  - with higher $\bar{r}$, candidate needs more time to wait for outside option

Acceptance Deadline: Trade-offs

Assumption

The candidate declines the offer immediately if he will *not* accept the offer even *no* alternative offer on reaching the acceptance deadline.

- Employer's payoff is

$$H(r)\cdot v+(H(\bar{r}(\bar{t}))-H(r))\cdot V_E(\bar{t})+(1-H(\bar{r}(\bar{t})))\cdot v_o,$$

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- Trade-offs when increasing $\bar{t}$:

  Benefit: increasing chance to recruit candidate with higher $\bar{r}$

  Cost: candidate with lower $\bar{r}$ has more time to explore outside option,
  – less likely to accept employer's offer
  – outside option of employer is less likely to be available

Optimal Acceptance Deadline

- Define $\bar{t}^1$ as the shortest deadline for candidate with $\bar{r} = 1$ to accept offer
- Optimal deadline can be any $\bar{t} \in [0, \bar{t}^1]$:

  Exploding offer: $\bar{t} = 0$

  Open offer: $\bar{t} = \bar{t}^1$

Acceptance Deadline: Comparative Statics

- Only candidates with $\bar{r} > r$ care about deadline, we define for $\bar{r} > r$,

$$\hat{H}(\bar{r}) = \frac{H(\bar{r}) - H(r)}{1 - H(r)}$$

Proposition

For the optimal deadline $\bar{t}^*$ maximizing the expected payoff of the employer:

1. for H and H' with $H(r) = H'(r)$, if $\hat{H}'$ dominates $\hat{H}$ in terms of the *likelihood ratio* for $\bar{r} > r$, then $\bar{t}^*$ is weakly higher under $\hat{H}'$ than under $\hat{H}$;
2. $\bar{t}^*$ is weakly decreasing in the outside option v_o of the employer.

Candidate Behavior and Optimal Deadline

Assumption

Suppose the candidate always holds on to the offer until the deadline even if he will never accept it.

Observation

If the employer optimally extends exploding offer (or, open offer) when the candidate immediately rejects an undesirable offer, then she must optimally extend exploding offer (or, open offer) when the candidate always holds on to the offer, but not vice versa.

Re-negotiation of Deadline

- Should employer commit to deadline?

Proposition

Regardless of how the candidate responds to the offer, allowing candidate to ask for a deadline extension upon reaching the initial deadline makes employer weakly better off *ex ante*.

Remarks:

- Allowing only *one* request for deadline extension
- Starting with exploding offer ensures same payoff as with commitment
- Extending deadline is *ex post* optimal for employer when v_o disappears

Job Offer Design

- Allowing employer to include monetary incentives $\tau \geq 0$ in offer

$$u_E(v,\tau) = v - \tau, \quad u_C(r,\tau) = r + \tau$$

- *Single Crossing*: Time is more valuable to candidate with higher $\bar{r}$
- With two recruiting devices $(\bar{t},\tau)$, screening is possible
- *Revelation Principle*: We focus on *direct incentive feasible* mechanisms

Optimal Design

Proposition

For any $r < p_0$, the optimal offer design is characterized by two cutoff values, $\bar{r}_m$ and $\bar{r}_M$, with $r \leq \bar{r}_m \leq \bar{r}_M p_0 < p_0$, and

$$\bar{r}_m \cdot (1 - p_0) = \int_{\bar{r}_m}^{\bar{r}_M} (1 - F(\bar{t}(\bar{r}))) p_0 d\bar{r}.$$

1. If $\bar{r} \leq \bar{r}_m$, the candidate receives exploding offer with $r + \tau(\bar{r}) = \bar{r}_m$, and accepts it immediately;
2. If $\bar{r} > \bar{r}_M$ (when $\bar{r}_M < 1$), he receives exploding offer with $\tau(\bar{r}) = 0$, and rejects it immediately;
3. If $\bar{r} \in (\bar{r}_m, \bar{r}_M]$, he receives an offer with $\bar{t}(\bar{r}) > 0$ and $\tau(\bar{r}) \geq 0$, with $\bar{t}(\bar{r})$ being increasing in $\bar{r}$.

Optimal Design: Discussion

Corollary

The optimal offer design $(\bar{t}, \tau)$ with $\bar{r}_m$ and $\bar{r}_M$ can be implemented using a "bonus-for-early-acceptance" (BFEA) mechanism $(\bar{T}^*, \beta^*)$ where

- Expiration date: $\bar{T}^* = \bar{t}(\bar{r}_M)$;
- Bonus rule: $\beta^*(t) = \tau(\bar{t}^{-1}(t))$, where, for $t \leq \bar{T}^*$,

$$\bar{t}^{-1}(t) = \inf\{\bar{r} : \bar{t}(\bar{r}) \geq t\}.$$

- Candidates with better outside options accept offer later with lower bonuses, or never accept
- BFEA mechanisms have been applied in practice
  - law school graduates (Roth & Xing, 1994)
  - consulting professionals (Lippman & Mamer, 2012)
  - management students (Neale & Bazerman, 1991)

Optimal Design: $\delta = 0$ vs. $\delta > 0$

Proposition

1. If $\delta = 0$:
   - Exploding offer with positive bonus, or
   - BFEA mechanism with positive bonus at $t = 0$; 0 bonus for any delay
2. If $\delta > 0$, under mild conditions:
   - BFEA mechanism with positive bonus at $t = 0$, which is strictly decreasing over time until offer expires at $\bar{T}^*$

- In some real-world markets, firms provide positive bonus only for almost immediate acceptance; bonus jumps to 0 if there is some delay

  $\Rightarrow$ consistent with case $\delta = 0$
- In some other markets, bonuses provided by firms decrease by certain amount each week or every day

  $\Rightarrow$ consistent with case $\delta > 0$

Relation to Literature

- Acceptance deadlines of offers with complete info
    - Tang et al. (2009), Zorc & Tsetlin (2020), Hu & Tang (2020), Lippman & Mamer (2012)
- Discrimination based on response timing
    - Armstrong & Zhou (2016), Chang (2021)
    - Gale & Holmes (1993), Dana (1998), Nocke et al. (2011), Möller & Watanabe (2010, 2016), Karle & Möller (2019), Ceschi & Möller (2022)
- Unraveling (early contracting) in labor market
    - *instability of matching*: Roth (1984, 1991), Mongell & Roth (1991), Roth & Xing (1994), Kagel & Roth (2000)
    - *risk aversion*: Li & Rosen (1998), Li & Suen (2000), Suen (2000)
- Bargaining with deadlines
    - Hendricks et al. (1988), Ponsati (1995), Damiano et al. (2012)
    - Ma & Manove (1993), Fershtman & Seidmann (1993), Yildiz (2004), Sandholm & Vulkan (1999), Özyurt (2023)