Agency, Firm Growth, and Managerial Turnover

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Second International Moscow Finance Conference
ICEF, November 2012
Motivation: Firm growth and managerial change

- Firm growth sometimes involves major changes.
  - In technology/ product market/ organization/ ownership structure.

- The incumbent manager may not have the skills that are needed to implement value-enhancing transformations of the firm.

- A change of management is sometimes required to create value.
  - We bring this idea into a dynamic moral hazard model of the firm.
This paper

- We analyze:
  - how growth prospects affect incentive provision;
  - how agency problem affects realized firm growth.

- We introduce exogenous, stochastic growth opportunities in a standard dynamic moral hazard model.

- Baseline assumption: taking up a growth opportunity entails a change of management.

- Extension: the firm can either grow with the incumbent or with a new manager, possibly at different costs.
Main results from the baseline model

- **Turnover**: to provide incentives or to grow.
  - Turnover rate increases with the severity of moral hazard, and with the likelihood of growth opportunities.

- **Compensation**: optimal scheme can be implemented with a system of deferred compensation credit and bonuses.
  - Compensation is more front-loaded when the agency problem is less severe, and when growth opportunities are more frequent.
  - Role for severance pay depends on the contractibility of growth opportunities.

- **Realized growth**: depends both on exogenous growth potential and severity of moral hazard.
  - Valuable growth opportunities may be forsaken following periods of good performance.

- **Inefficiency**: Each contract is designed ignoring its impact on future managers.
Related literature

- Managerial economics
  - Penrose (1959), Roberts (2004)

- Matching between executives and firm characteristics
  - Gabaix & Landier (2008), Pan (2010), Eisfeldt & Kuhnen (2012)

- Evidence on growth-induced turnover
  - Murphy and Zimmerman (1993), Kaplan et al. (2009), Jenter and Lewellen (2012)

- Dynamic agency literature
  - Non-contractible growth: He (2008)
Model

- Firm owned by outside investor (principal), and run by a sequence of managers (agents).

- Firm generates stream of risky cashflows $Y_t$ over $t = 1, \ldots, T$.
  - We will focus on the stationary limit as $T \to \infty$.

- The manager can underreport cashflows.
  - He gets $\lambda \leq 1$ per unit of diverted cashflow.

- Principal and agents are risk neutral.
  - Discount rates $r$ and $\rho > r$, respectively.
Cashflows proportional to the current scale of the firm

\[ Y_t = \Phi_t y_t. \]

Scaled cashflows \( \{y_t\} \) i.i.d., \( \mathbb{E}(y_t) = \mu. \)

Stochastic arrival of growth opportunities.
  - Each period, with probability \( q \) the firm gets an opportunity to increase its scale \( \Phi \) by a factor \( (1 + \gamma) \).
  - Proportional cost \( \chi \geq 0 \).

Growth opportunities are observable, verifiable and contractible.
  - Notation: \( \theta = G \) if growth opportunity available, otherwise \( \theta = N \).
Managerial replacement

- In every period, the incumbent manager can be fired and replaced by a new one.
  - Proportional replacement cost $\kappa > 0$.
  - Manager’s continuation value upon dismissal normalized to zero.

- Firm must change its management in order to grow.
  - We relax this assumption in the extension.

- One possible interpretation of growth opportunities:
  - With probability $q$, the firm finds a new manager who could generate a permanent increase in productivity.
First best

- Retain manager when $\theta = N$.
  - $\kappa > 0 \rightarrow$ termination is inefficient.

- Replace and grow when $\theta = G$.
  - We assume growth-cum-replacement is efficient.
Second-best contracting

- **Sequence of contracts:** A new contract is established each time a new manager is hired.

- **Standard assumptions:**
  - Investor has deep pockets, agents have limited liability.
  - Full commitment.
  - No private saving by the agent.
Intra-period timing

Cashflow realization $y_t$

Agent reports cashflow

$\theta_t \in \{G, N\}$

Dismissal/growth/severance

Compensation
Recursive approach

- History up to time $t$ summarized by
  - Firm scale $\Phi_t$;
  - Agent’s expected discounted payoff $W_t$.

- Let $B(\Phi_t, W_t)$ the principal’s value under the optimal contract.

- Homogeneity:

\[ B(\Phi, W) = \Phi B(1, w) \equiv \Phi b(w), \quad \text{for } w \equiv W/\Phi. \]

Key state variable: agent’s scale-adjusted expected payoff $w$. 
Intra-period value functions

Cashflow realization $y_t$

Agent reports cashflow

$\theta_t \in \{G, N\}$

Dimissal/growth/severance

Compensation

$by(.)$  $bq(.)$  $b^\ell(\cdot)$  $bc(.)$  $be(.)$  $by(.)$
Preview of the optimal contract

- The agent’s “promise” $w$ is adjusted in response to
  - Cashflow shocks;
  - Growth opportunity realizations.

- Three threshold values:
  - Dismissal thresholds $w_N$ and $w_G$;
  - Bonus threshold $\overline{w}$.
Cashflow sensitivity

- Adjustment of agent’s promise to cashflow realization:

\[ \tilde{w}(y) = w + \lambda(y - \mu). \]

This guarantees that the agent reports cashflows truthfully.

- Limited liability constraint \( \tilde{w}(y) \geq 0 \) requires \( w \geq \lambda(\mu - y_{\text{min}}) \).
  - An agent cannot start a period with a promise that is too small.
  - This will lead to inefficient replacement after poor performance.
On-the-job compensation

- Simple tradeoff between present vs. deferred compensation.
  - Benefit from deferred compensation: avoid inefficient turnover;
  - Cost of deferred compensation: agent is more impatient.

- This tradeoff pins down the bonus threshold \( \overline{w} \).
  - When the agent’s promise \( w \) at the compensation stage is above \( \overline{w} \), he receives \( w - \overline{w} \).
  - In line with the use of performance milestones and bonuses documented by Murphy (2001).

- Bonus threshold is decreasing with respect to \( q \).
  - Increasing \( q \) is like making the agent more impatient.
Principal’s continuation values upon replacement
Principal’s continuation values upon replacement

- In the absence of a growth opportunity

\[ \ell_N = e^{-r} b^y (w_0) - \kappa. \]
Principal’s continuation values upon replacement

- In the absence of a growth opportunity

\[ \ell_N = e^{-r} b^y(w_0) - \kappa. \]

- When a growth opportunity is available

\[ \ell_G = e^{-r}(1 + \gamma)b^y(w_0) - (\kappa + \chi). \quad (> \ell_N) \]
Replacement decision

The graph shows the relationship between the Agent's promise and the Principal's value. The graph plots two functions: $\ell_G$ and $\ell_N$. The function $\ell_G$ is represented by the line $b^c$.

- $\ell_G$ reaches a maximum value of approximately 220 at an Agent's promise of around 10.
- $\ell_N$ starts at a higher value and decreases as the Agent's promise increases, approaching a value of approximately 150 at the maximum Agent's promise.

The point $\bar{w}$ on the graph indicates a specific value of the Agent's promise where the Principal's values intersect.
Inefficient turnover

\[ \text{Agent's promise} \]

\[ \text{Principal's value} \]

\[ b^\ell_N \]

\[ b^c \]

\[ w_N \]

\[ \ell_N \]

\[ w \]
Efficient turnover — High growth firms
Efficient turnover — Low growth firms

\[ \ell_N, \ell_G \]

Agent's promise vs. Principal's value

- Green line: \( b^\ell_N \)
- Red line: \( b^c \)

Critical points:
- \( w_N \)
- \( w \)
Efficient turnover — Low growth firms

![Graph showing the relationship between the agent's promise and the principal's value.]
Efficient turnover — Low growth firms

![Graph showing principal's value and agent's promise]
High growth vs. Low growth firms
What does it take for managerial entrenchment not to arise and impede growth?

- High growth firms have a steady flow of good opportunities for expanding and improving productivity (high $q$ and $\gamma$).

- They manage transitions well (low $\kappa$ and $\chi$).

- They keep agency problems under control (low $\lambda$).
  - Better monitoring can resolve the entrenchment problem.
Adjustment in response to growth opportunity realization

- For a given post-cashflow promise $w$, the contract specifies contingent continuation promises $w_G$ and $w_N$.
  - Must satisfy $q w_G + (1 - q) w_N = w$, and $w_G, w_N \geq 0$.

- High growth firms set $w_G = 0$ and $w_N = w/(1 - q)$.
  - Better reduce the probability of inefficient turnover than give cash to a departing agent.
  - Corollary: High growth firms pay zero severance.

- In low growth firms, the choice of $(w_G, w_N)$ affects both the probability of inefficient and efficient turnover.
Growth-contingent promises in low growth firms

\[ (1 - q)w_G \]

\[ w_G(w) \]

\[ w_N(w) \]
When growth opportunities are non-contractible

- When the manager privately observes the arrival of growth opportunities, positive severance can arise.

- Truth telling requires

  \[ w_G \geq w_N. \]

  The principal optimally sets

  \[ w_G = w_N = w. \]

⇒ High growth firms give severance pay upon growth \( s_G(w) = w. \)

  - Severance indexed on past performance.
  - Potential explanation for the finding of Yermack (2006), who documents widespread use of severance for departing CEOs.
Takeaways

- **Managerial turnover.**
  - Used to provide incentives or to grow.

- **Managerial compensation.**
  - More front-loading when growth-induced turnover is more likely.
  - Severance: not used, unless if required to incentivize manager to reveal private information about arrival of growth opportunity.

- **Firm growth.**
  - Firms may pass up value-enhancing opportunities after periods of good performance.
  - Better monitoring can alleviate the entrenchment problem.

- **Another inefficiency.**
  - The design of each contract ignores its impact on future managers.