# Agency, Firm Growth, and Managerial Turnover

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# 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
  - Without growth: BMPR (2007), DeMarzo and Sannikov (2006), DeMarzo and Fishman (2007)
  - Contractible investment: BMRV (2010), Clementi and Hopenhayn (2006), DeMarzo and Fishman (2007), DeMarzo et al. (2011), Philippon and Sannikov (2011)
  - Non-contractible growth: He (2008)
  - Managerial turnover: Spear and Wang (2005), Inderst and Mueller (2010), Garrett and Pavan (2012).

# Model

- Firm owned by outside investor (principal), and run by a sequence of managers (agents).
- Firm generates stream of risky cashflows $Y_t$ over $t = 1, ..., T$.
  - 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.

# Technology

- 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.

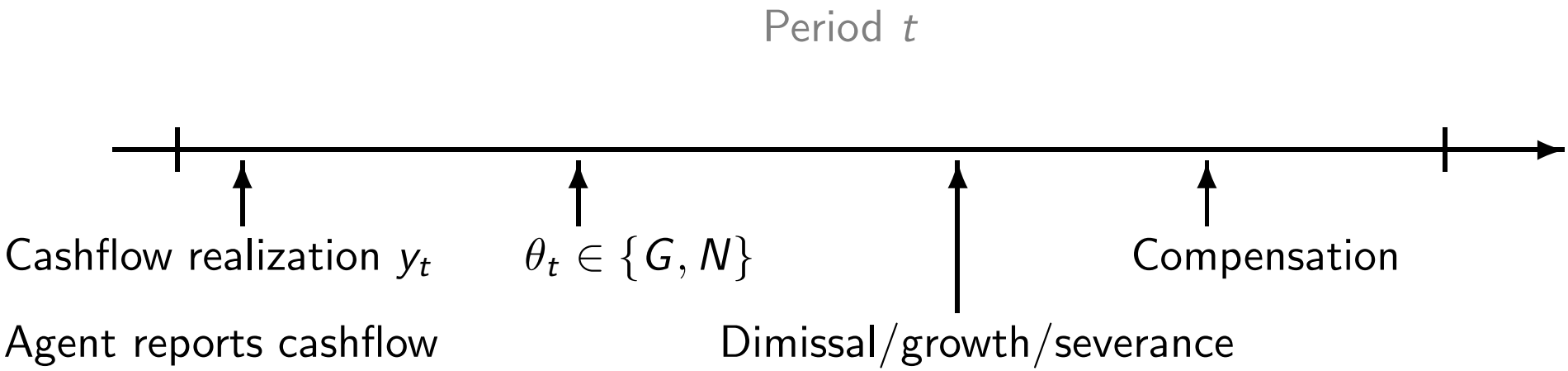
# First best

- 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



# Recursive approach

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

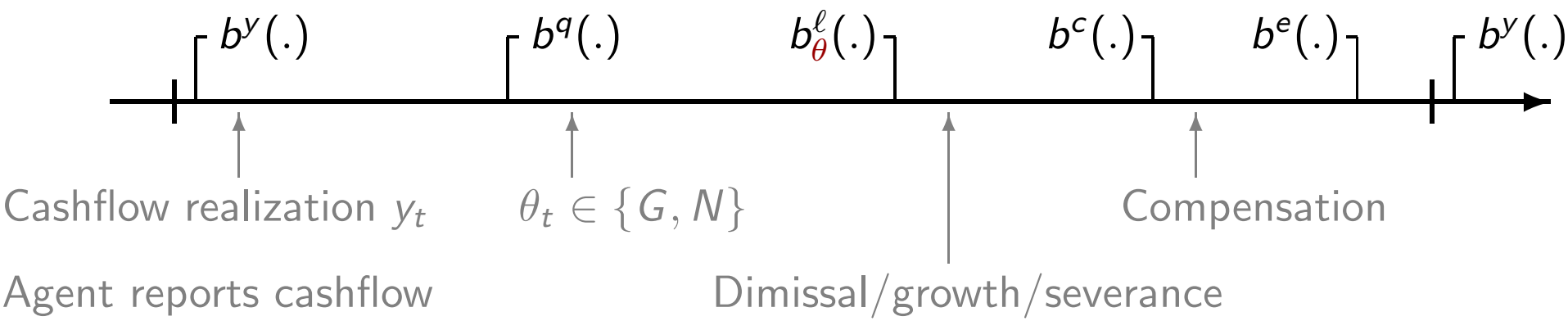
- Let $B(\Phi_t, W_t)$ the principal's value under the optimal contract.

- Homogeneity:

$$B(\Phi, W) = \Phi B(1, w) \equiv \Phi b(w), \qquad \text{for } w \equiv W/\Phi.$$

Key state variable: agent's scale-adjusted expected payoff $w$.

# Intra-period value functions



# 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 $\underline{w}_N$ and $\underline{w}_G$;
  - 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

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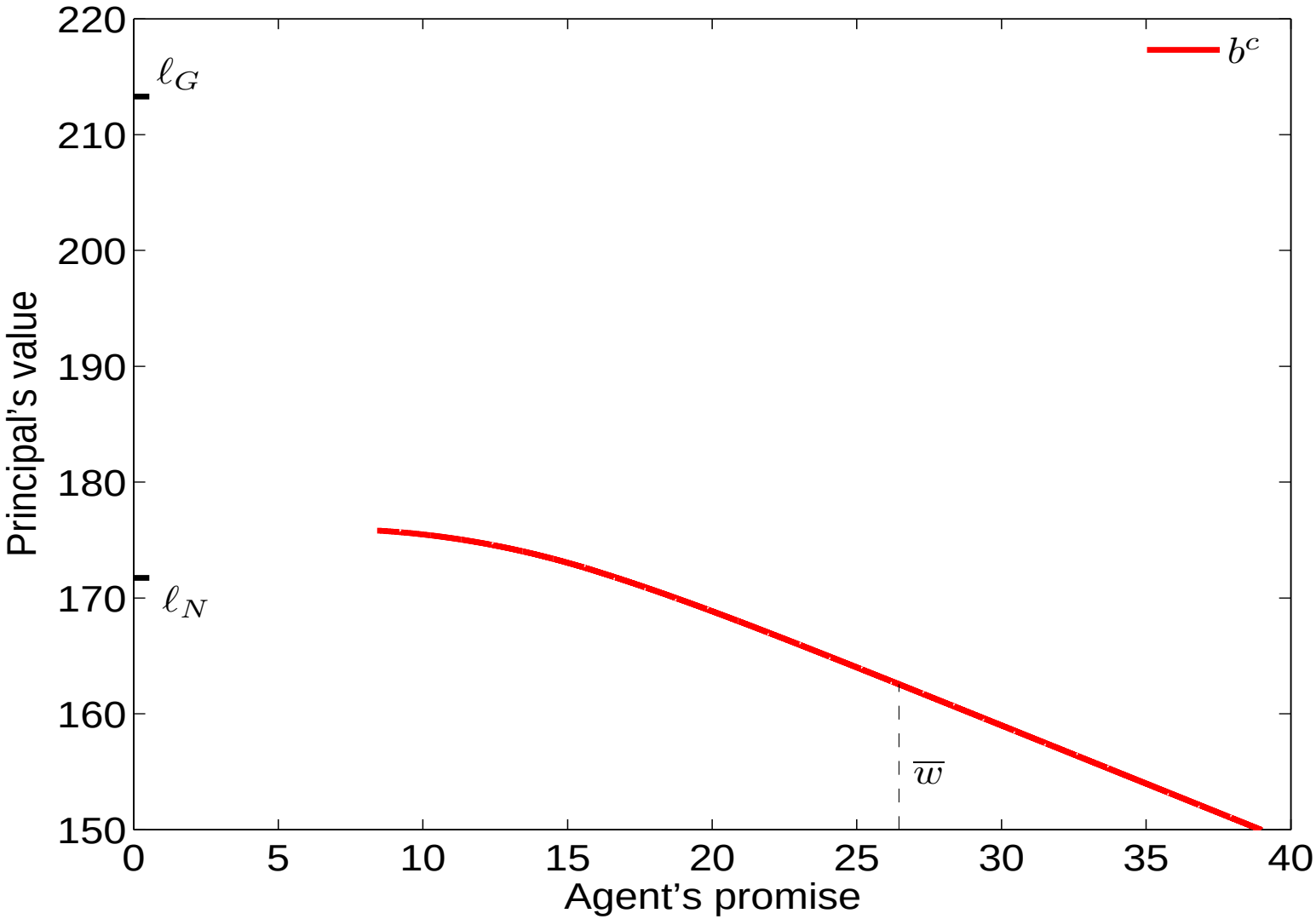
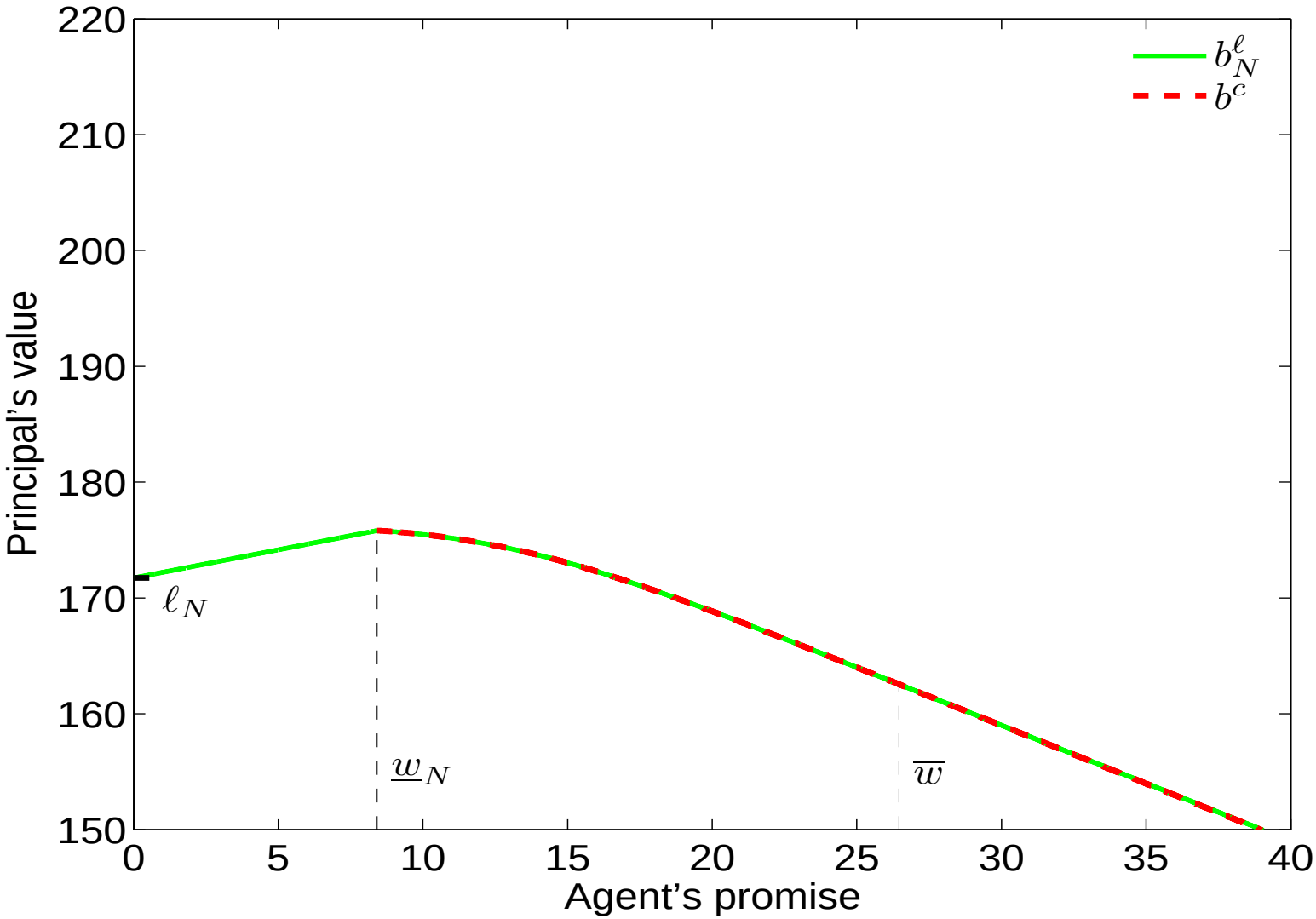
- When a growth opportunity is available

$$\ell_G = e^{-r}(1+\gamma) b^y(w_0) - (\kappa + \chi). \qquad (> \ell_N)$$

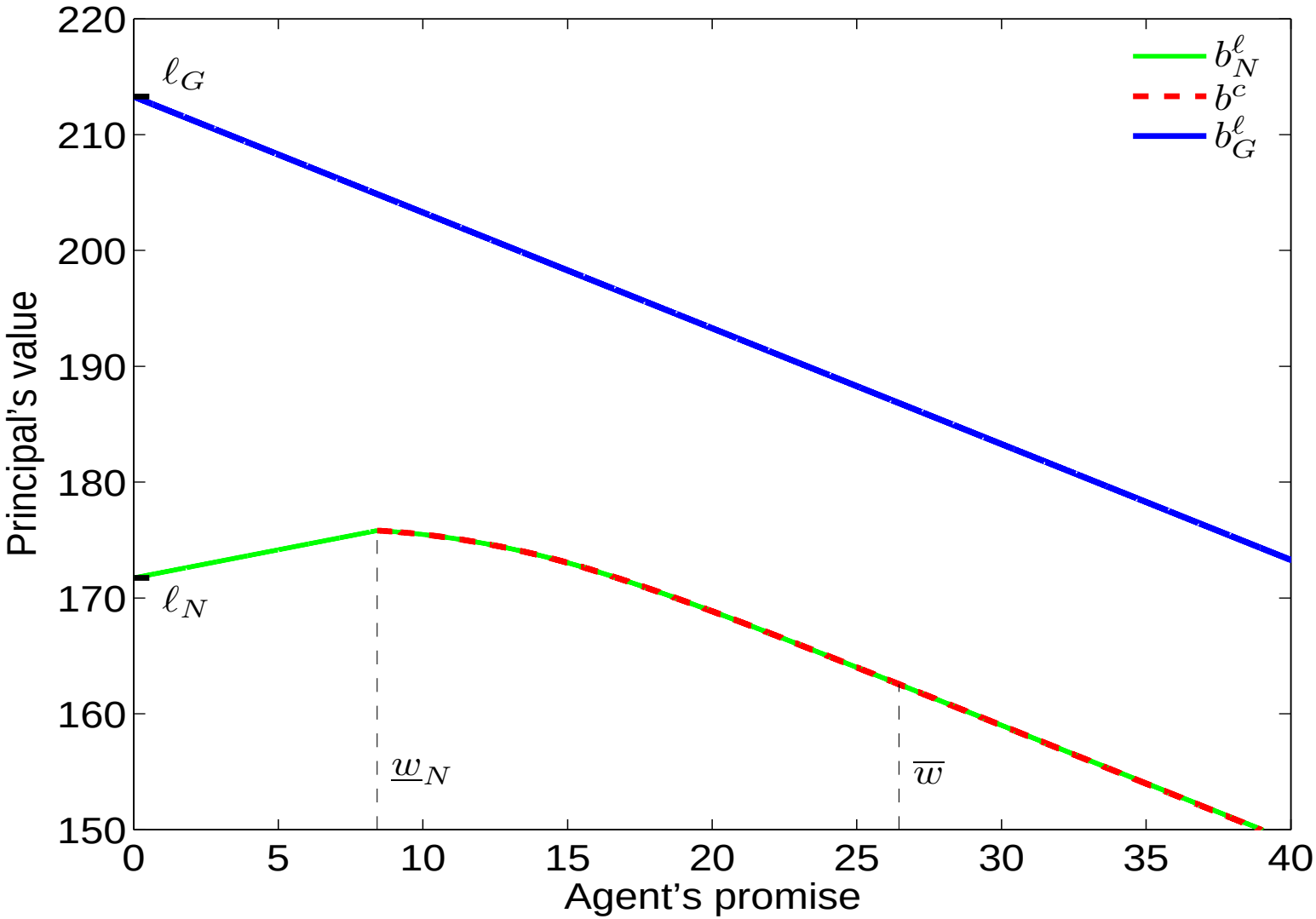
# Replacement decision



# Inefficient turnover



# Efficient turnover — High growth firms



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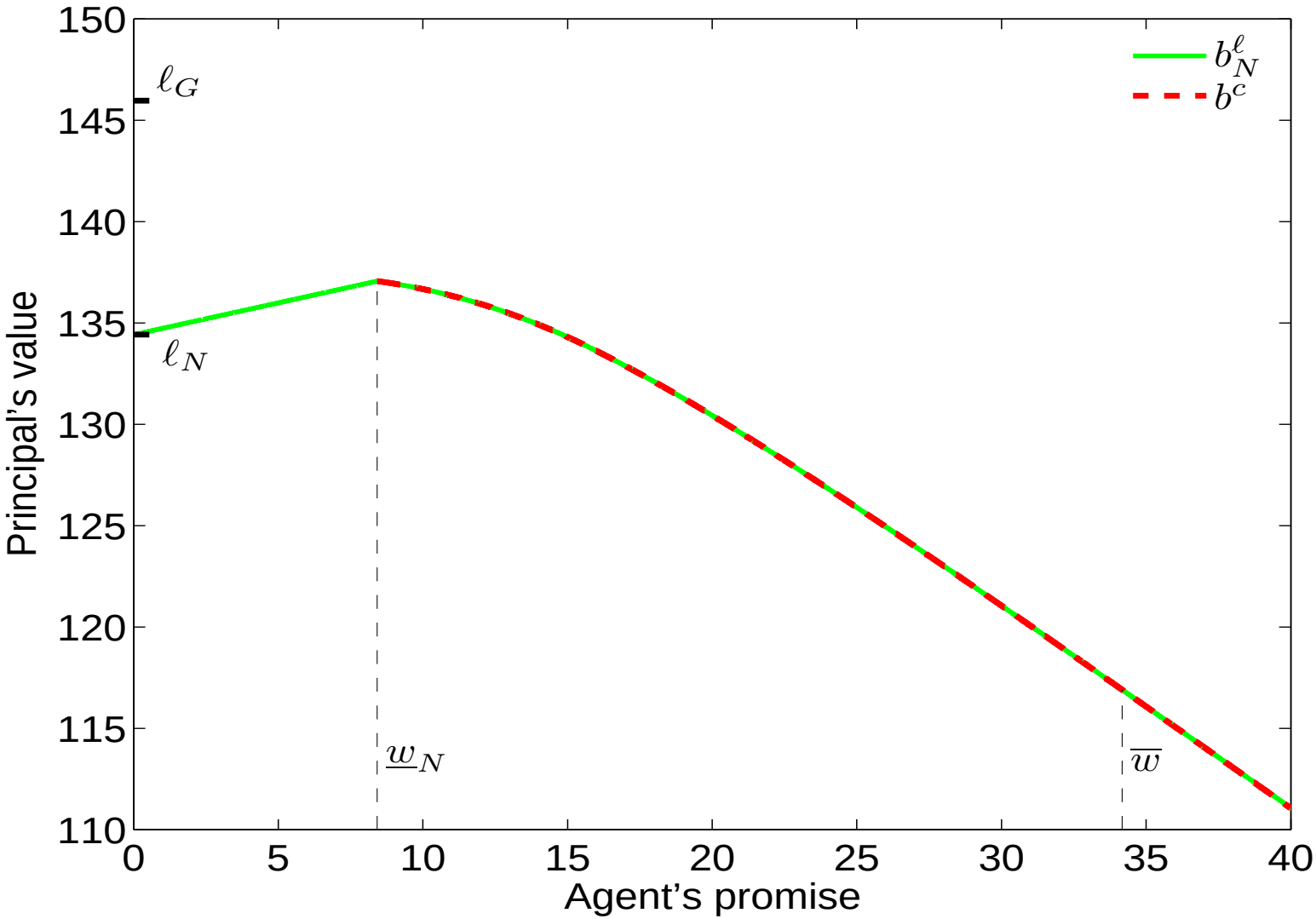

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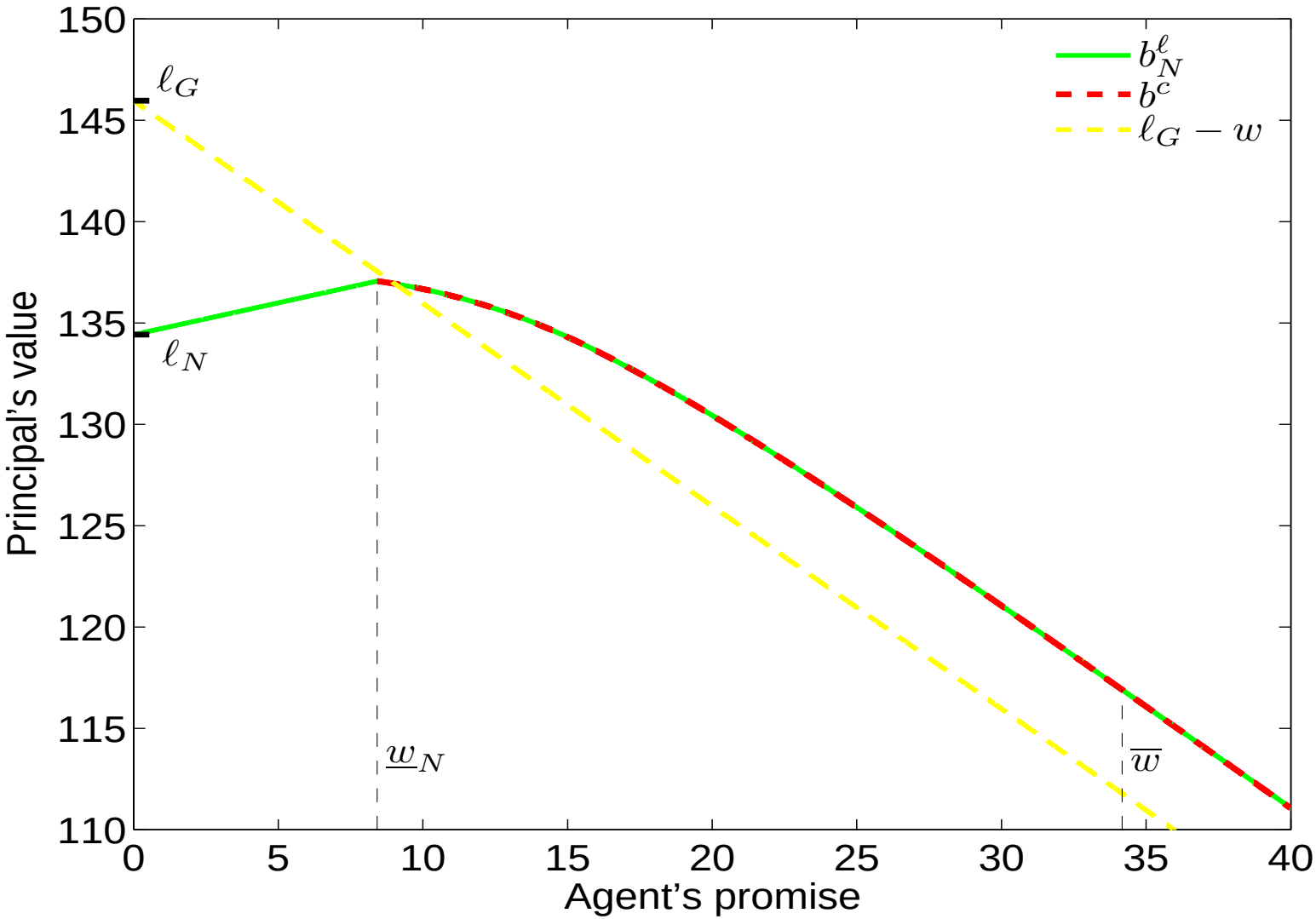

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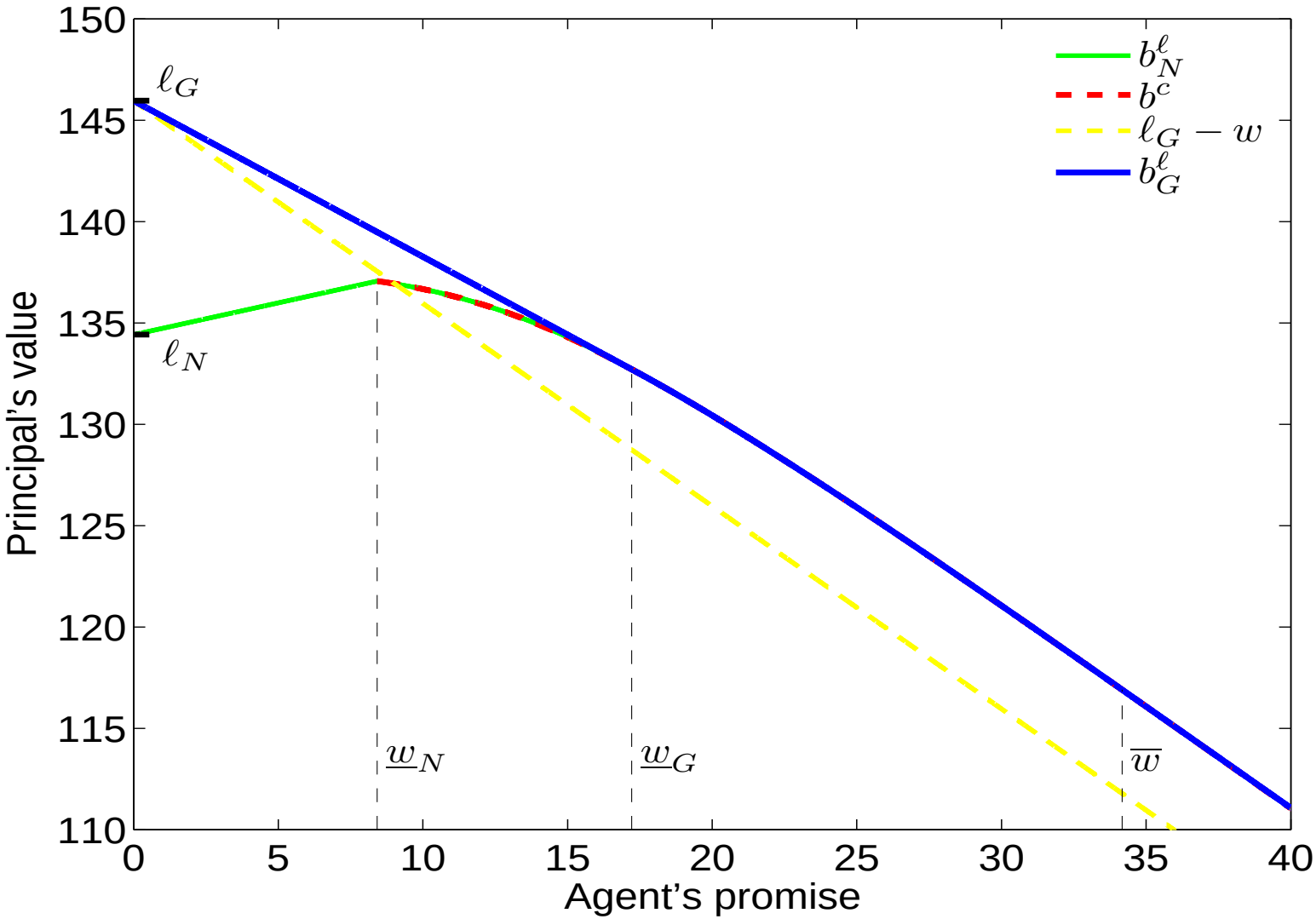


# High growth vs. Low growth firms

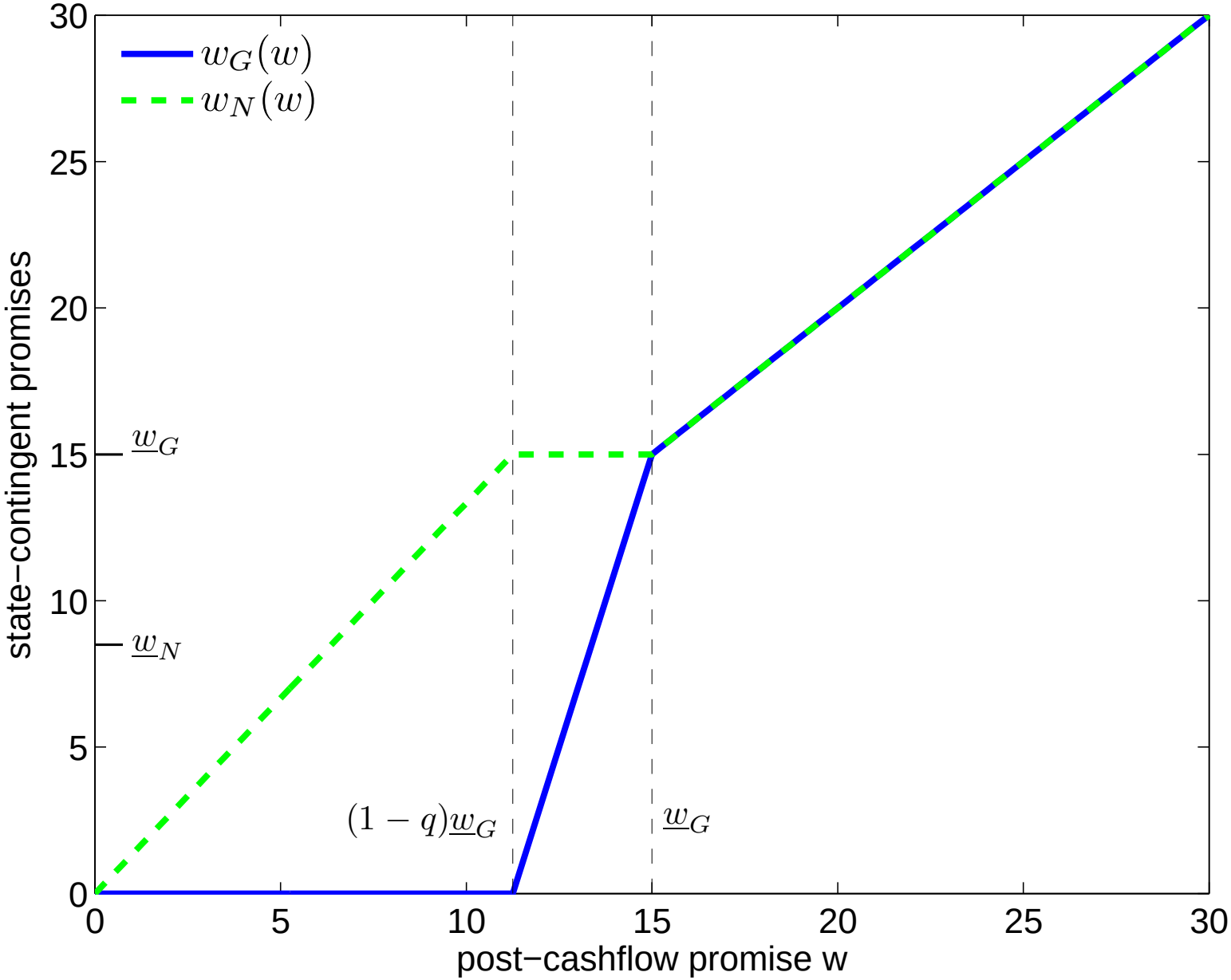
## What does it take for managerial entrenchment not to arise and impede growth?

- 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 $qw_G + (1-q)w_N = w$, 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



# 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

$$w_G = w_N = w.$$

$\Rightarrow$ 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.