

Overconfidence, Compensation Contracts, and Capital Budgeting

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Background and Overview

- Psychology: Individuals tend to be
 - *overconfident*, i.e., they believe their knowledge is more precise than it actually is;
 - *optimistic*, i.e., they believe outcomes favorable to themselves to be more likely than they actually are.

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 - Capital markets: yes, no, maybe,...
 - Firms (or internal capital markets):
 - Irrationality more likely to have permanent effects, since these effects are more difficult to arbitrage.
 - Firms seem content with overconfident CEOs. [Malmendier & Tate, 2005; Ben-David, Graham & Harvey, 2007; Sautner & Weber, 2006]
 - Labor markets:
 - Biased workers may be attractive assets.
 - Bidding for their services has unclear effects on welfare.

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Background and Overview (cont'd)

- Agency problems.
 - Risk-taking. [Treynor & Black, 1976]
 - Stockholders hold a diversified portfolio of firms, but firm managers do not hold diversified portfolios of employers.
 - As a result, stockholders are less concerned about the risk of a new project than the manager.
 - Moral hazard. [Jensen & Meckling, 1976]
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Related Literature

- Misalignment of incentives between managers and shareholders:
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 - own skill bias: Langer & Roth (1975), Taylor & Brown (1988).
 - precision bias: Fischhoff et al. (1977), and Alpert & Raiffa (1982).
- Overconfidence and corporate finance:
 - Roll (1986), Heaton (2002), Malmendier & Tate (2005, 2007), Goel & Thakor (2007), Adrian & Westerfield (2007).
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Model: The Firm

- One period. An all-equity firm starts with \$1 in cash.
- A risky project becomes available at the start of the period.
 - The project costs \$1 to undertake.
 - Its end-of-period payoff is $\tilde{v} = \begin{cases} \sigma, & \text{prob. } \phi \\ 0, & \text{prob. } 1 - \phi. \end{cases}$
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- Assumptions:
 - Discount rate is zero.
 - NPV of risky project = $\sigma\phi - 1 < 0$.
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 - Need managerial skill and risk-taking to undertake a project.
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- The potential value from the risky project comes from the possibility of a skilled manager acquiring information about it.

- Signal: $\tilde{s} = \begin{cases} \tilde{v}, & \text{prob. } a \\ \tilde{\eta}, & \text{prob. } 1 - a. \end{cases}$

- $\tilde{\eta}$ is independent noise, with the same distribution as \tilde{v} .
- \tilde{v} is learned more often when $a \in [0, \frac{1}{2}]$ is large (i.e., high ability of the manager).
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- He thinks that his ability is $a + b \geq a$, where $b \in [0, \frac{1}{2}]$.

- Biased updating:

$$\hat{\Pr}\{\tilde{v} = \sigma \mid \tilde{s} = \sigma\} = \phi + (a + b)(1 - \phi) \equiv \hat{\phi}_U > \phi,$$

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- $\uparrow b \rightarrow \hat{\phi}_U \uparrow$ and $\hat{\phi}_D \downarrow$ (too much weight on information).

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Model: Manager's Risk Aversion and Compensation

- Compensation contract: $\{0, \delta_M, \delta_M + \delta_H\}$ for $\{0, 1, \sigma\}$.
 - Zero in low state: Investment policy affects compensation risk (bankruptcy, firing, reputation, etc.).
 - Interpretation of contract $\{\delta_M, \delta_H\}$.
 - Flat wage δ_M : paid as long as the firm operates (and not fired).
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Outcome	Manager's compensation	Manager's utility
Low (failed project, fired)	0	0
Medium (play it safe)	δ_M	δ_M
High (successful project)	$\delta_M + \delta_H$	$\delta_M + (1 - r)\delta_H$

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- Unbiased updating:

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- Value maximized (first-best) if undertake when expected CF exceeds initial investment of \$1. [Real option: McDonald & Siegel, 1986]
 - When $\tilde{s} = 0$, never undertake the risky project, as $\sigma\phi_D < \sigma\phi < 1$.
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The Manager's Investment Decisions

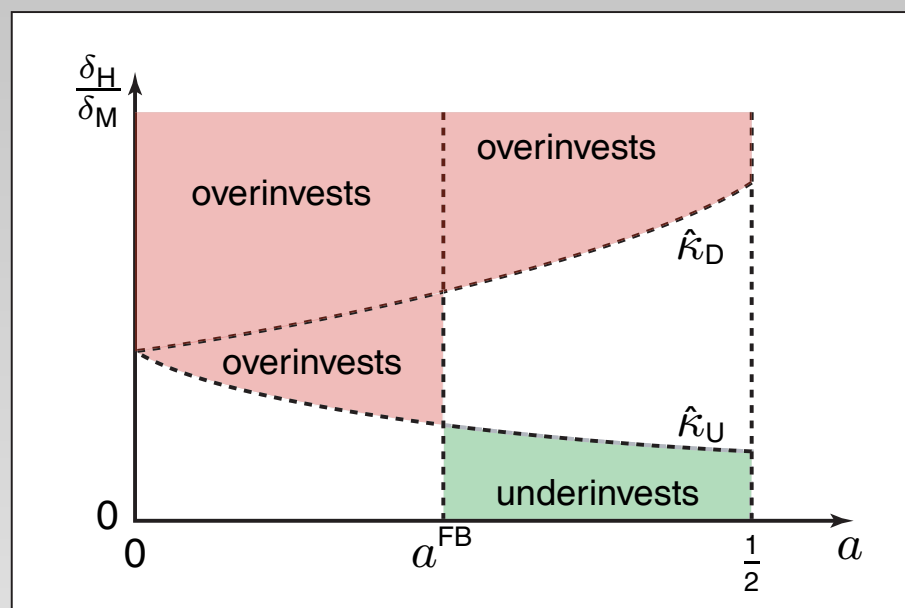
- After a good signal.
 - Undertake: $\hat{E} [\tilde{u} \mid \tilde{s} = \sigma] = \hat{\phi}_U [\delta_M + (1 - r)\delta_H] + (1 - \hat{\phi}_U)(0)$.
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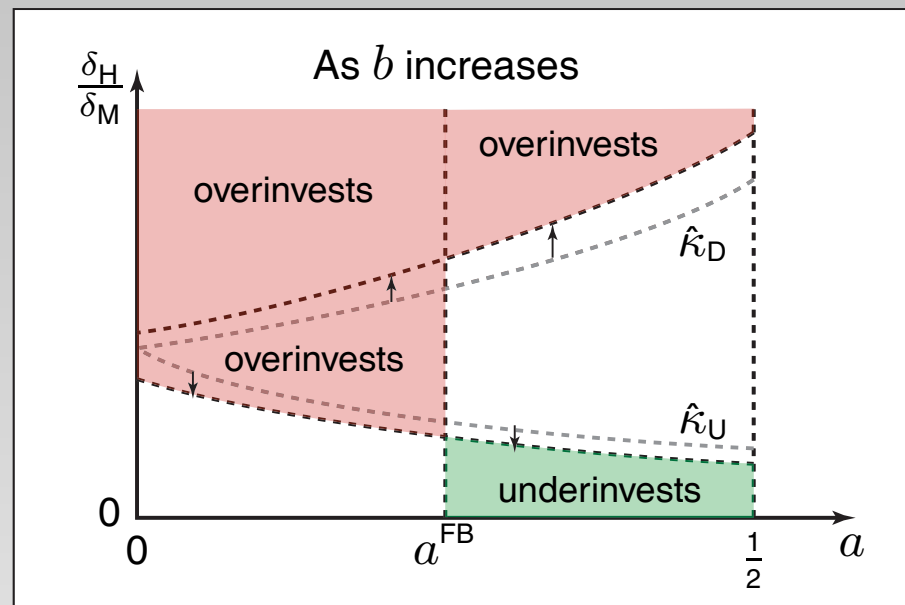
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- From now on, assume that $a > a^{\text{FB}}$.
- **Incentive compatibility:** invest with $\tilde{s} = \sigma$, drop with $\tilde{s} = 0$.

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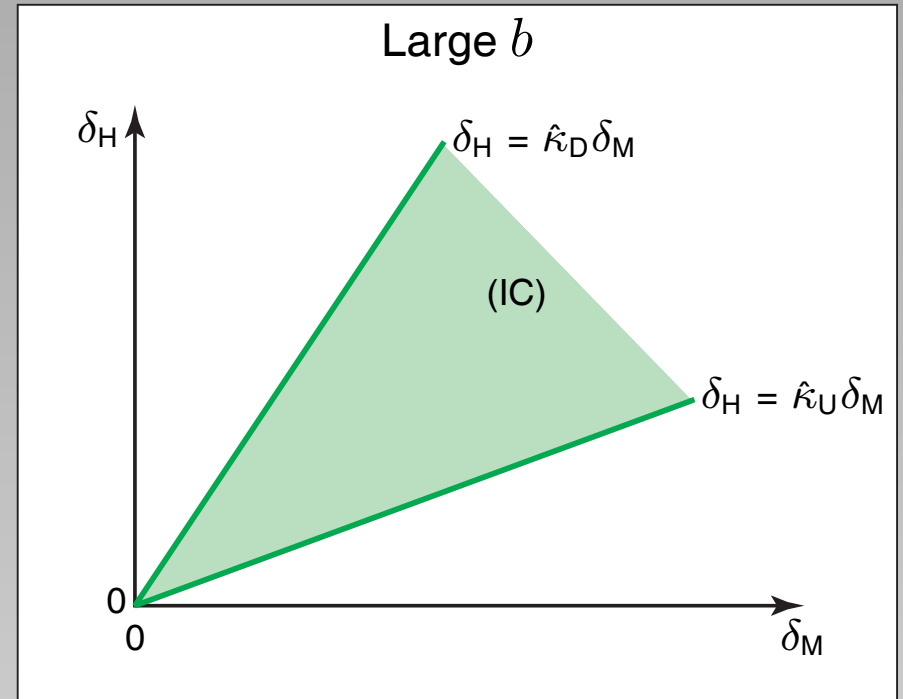
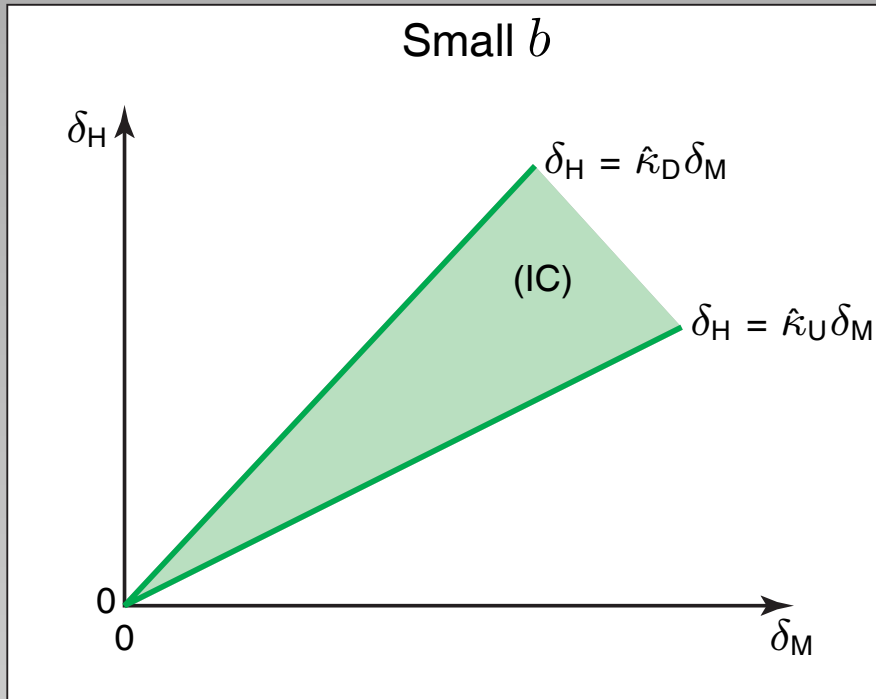
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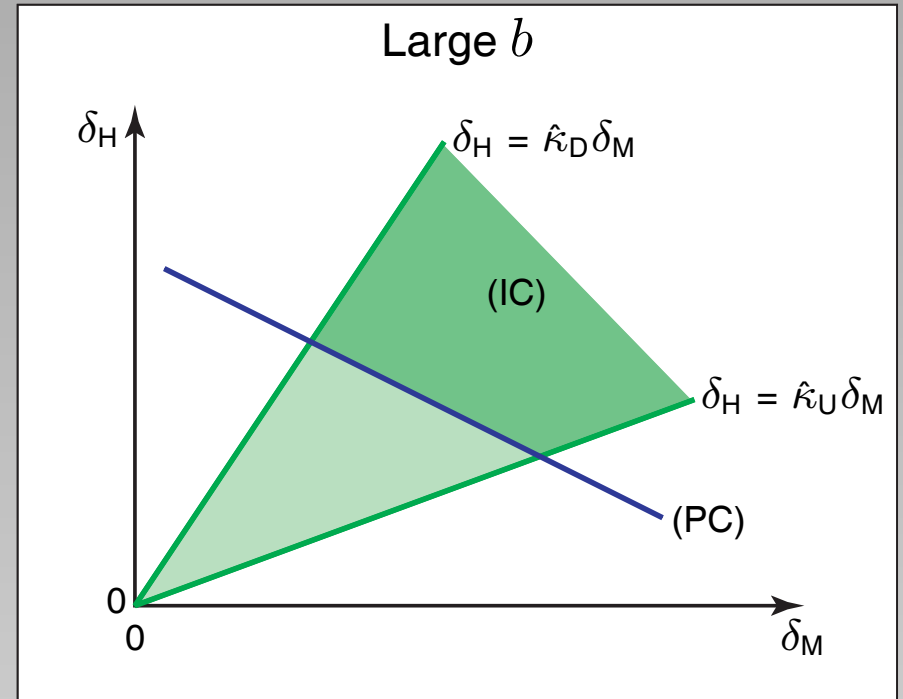
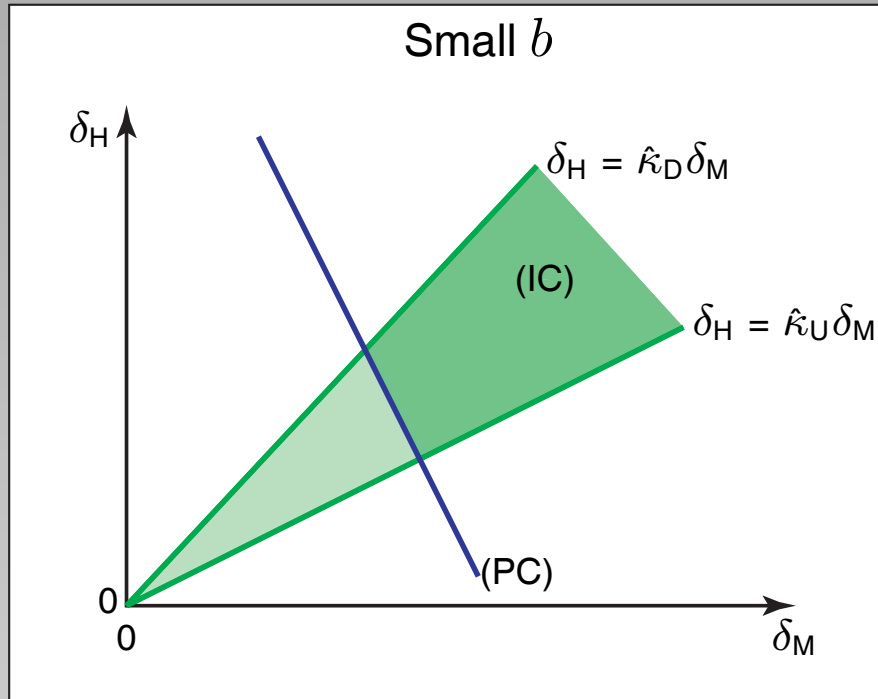
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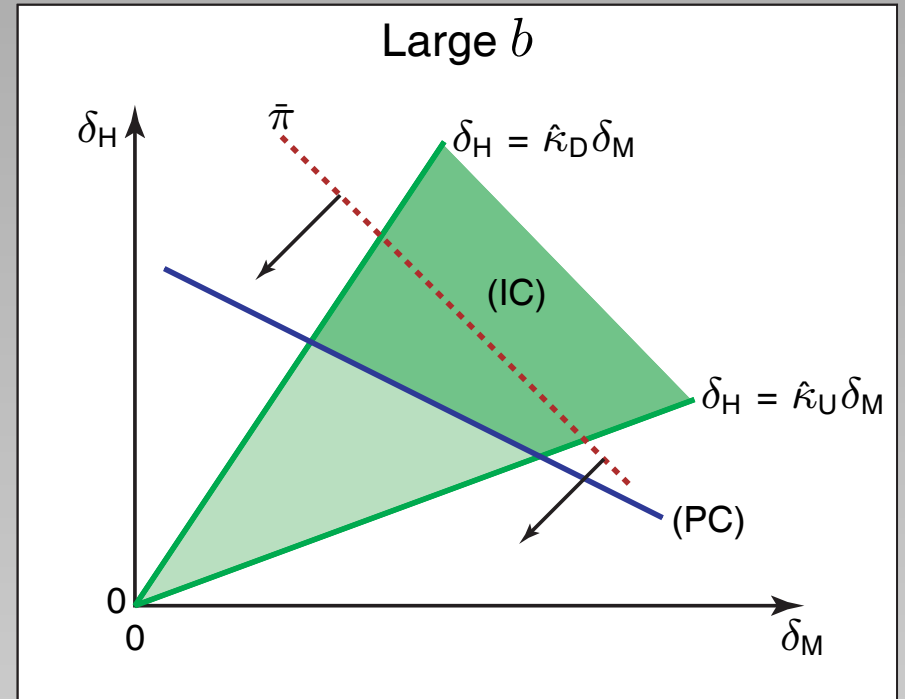
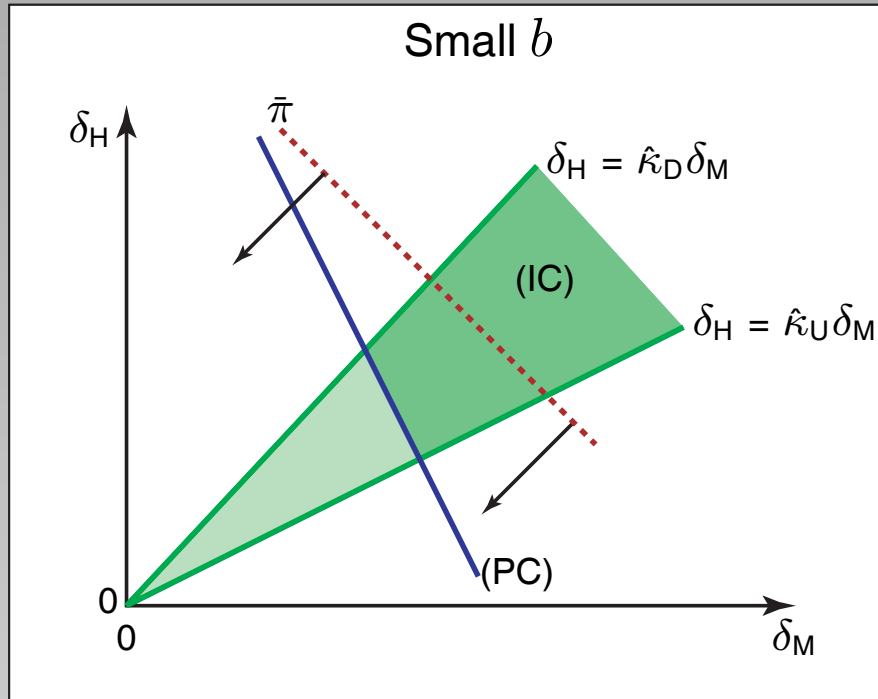
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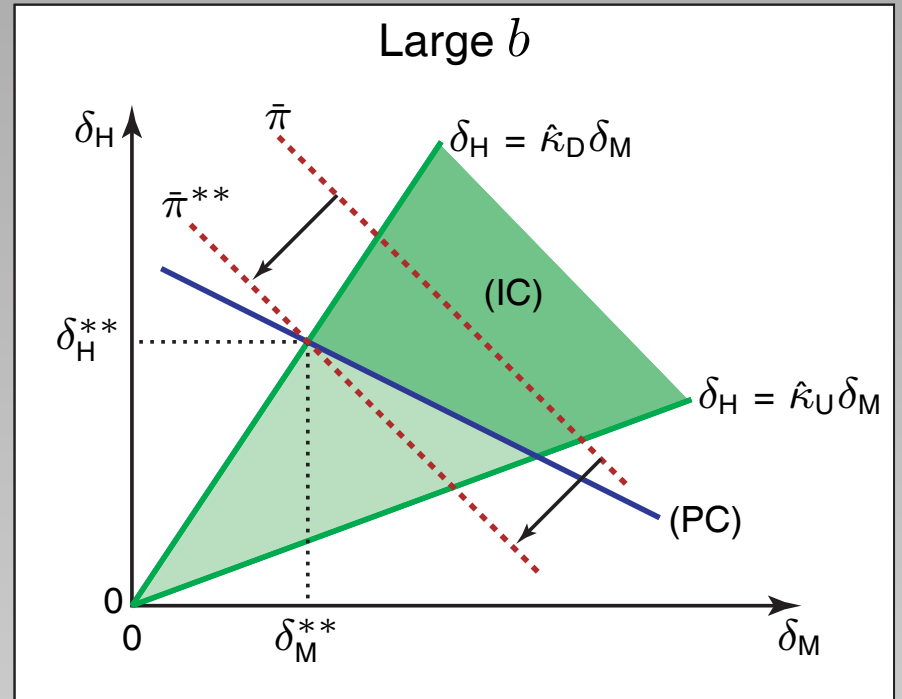
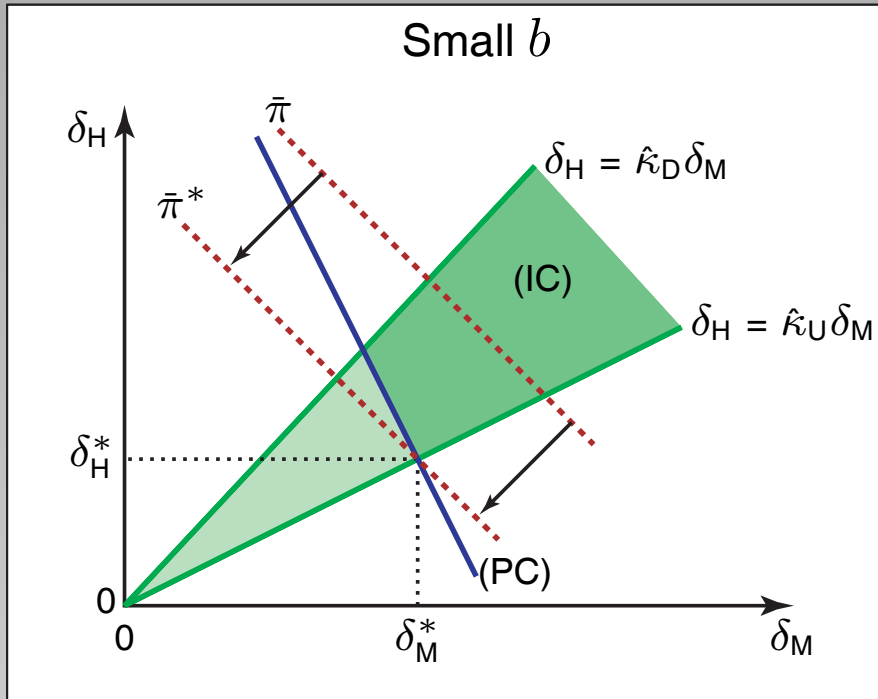
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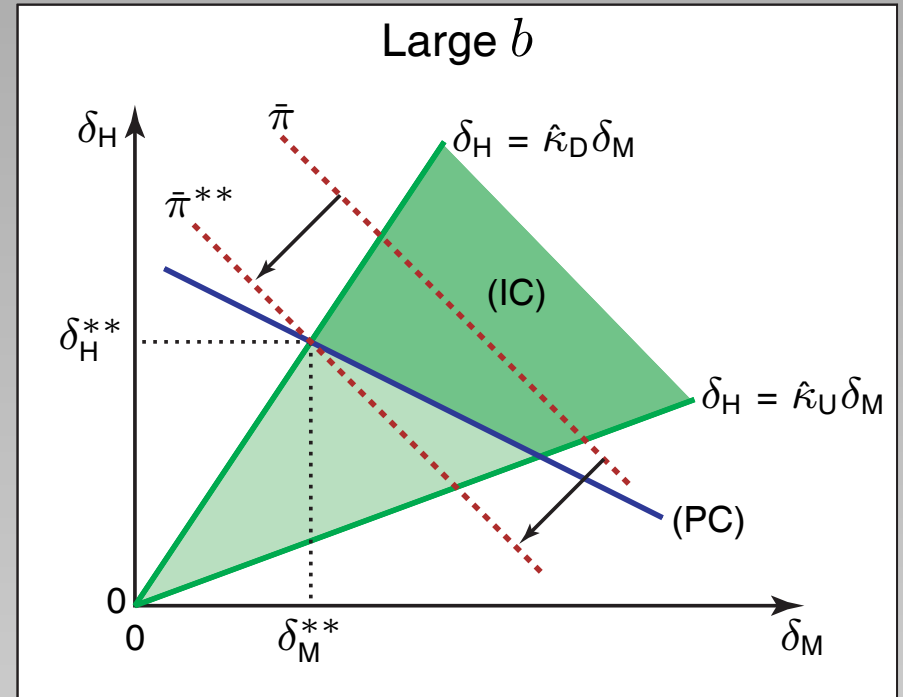
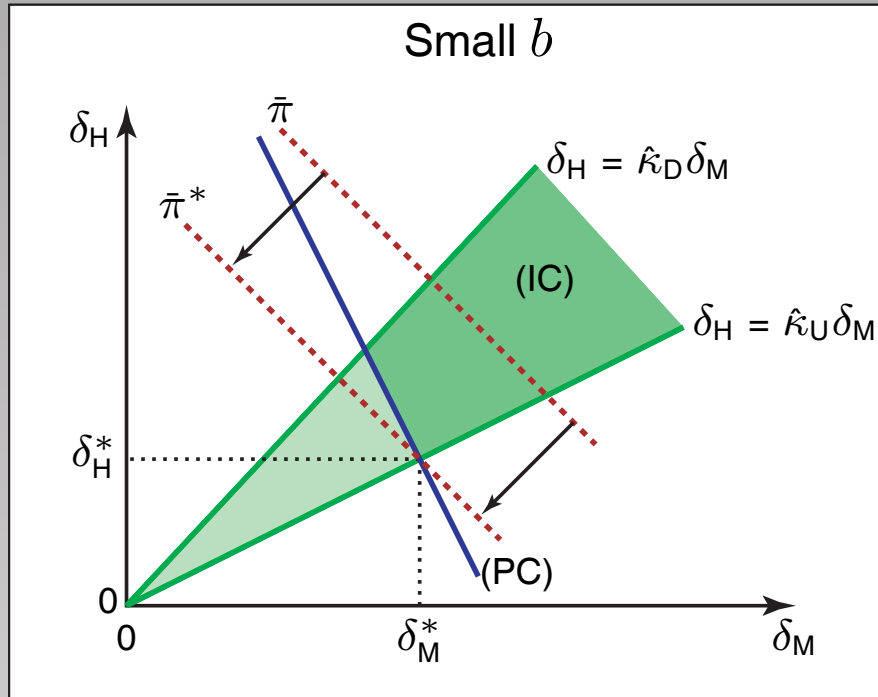
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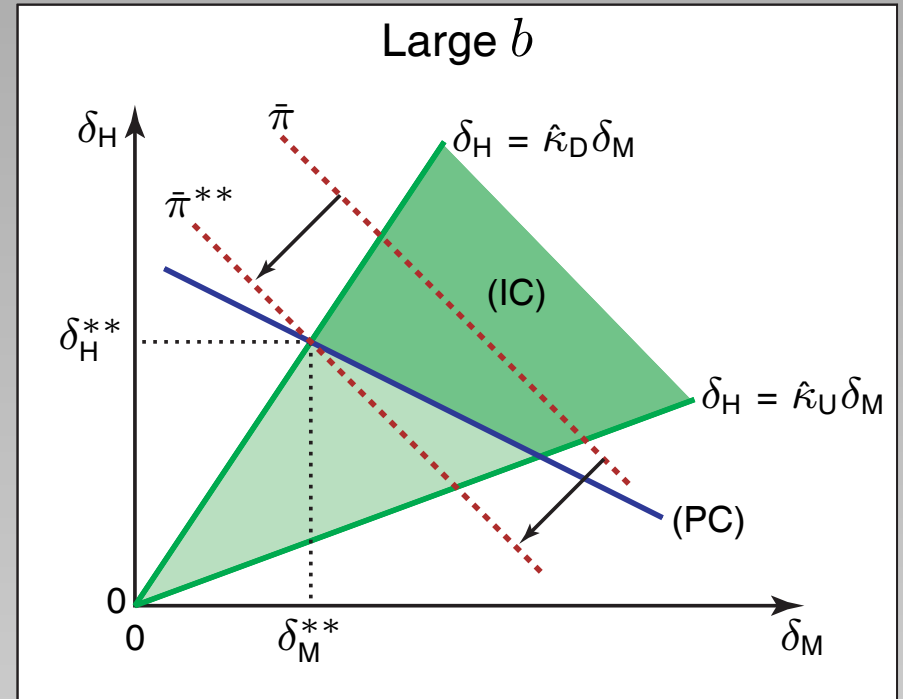
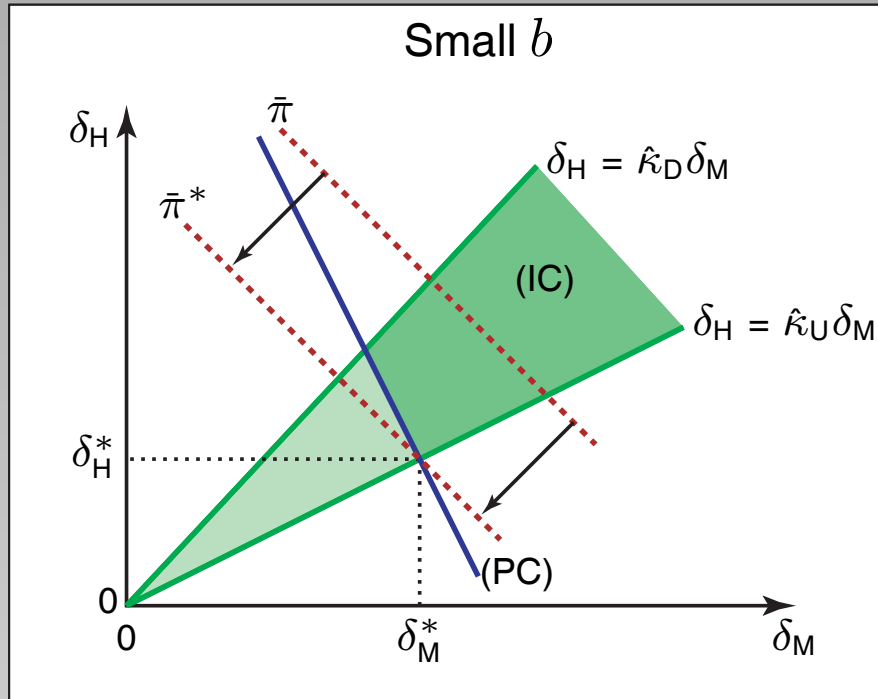


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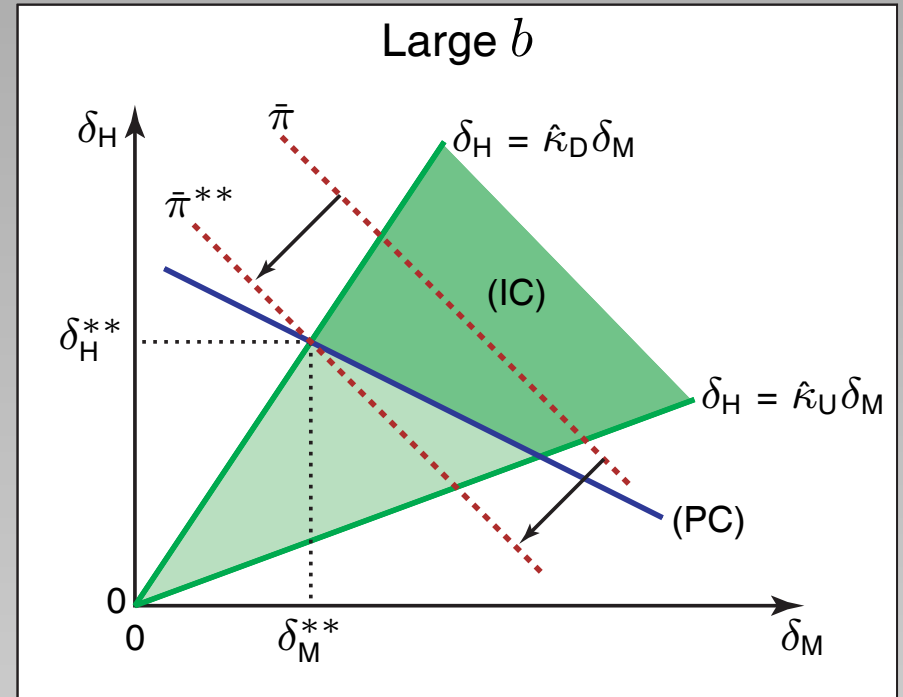
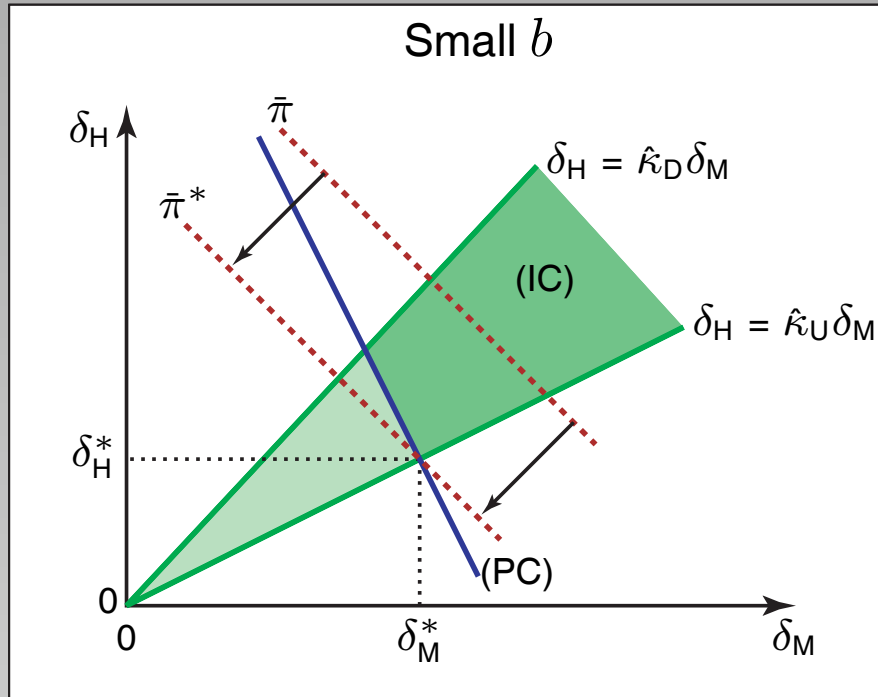
- Small b : $\delta_M^* = \bar{u}$, $\delta_H^* = \frac{(1-\hat{\phi}_U)\bar{u}}{\hat{\phi}_U(1-r)}$.
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 - Less convexity as b increases.

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The Firm's Problem (cont'd)



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- Some predictions.
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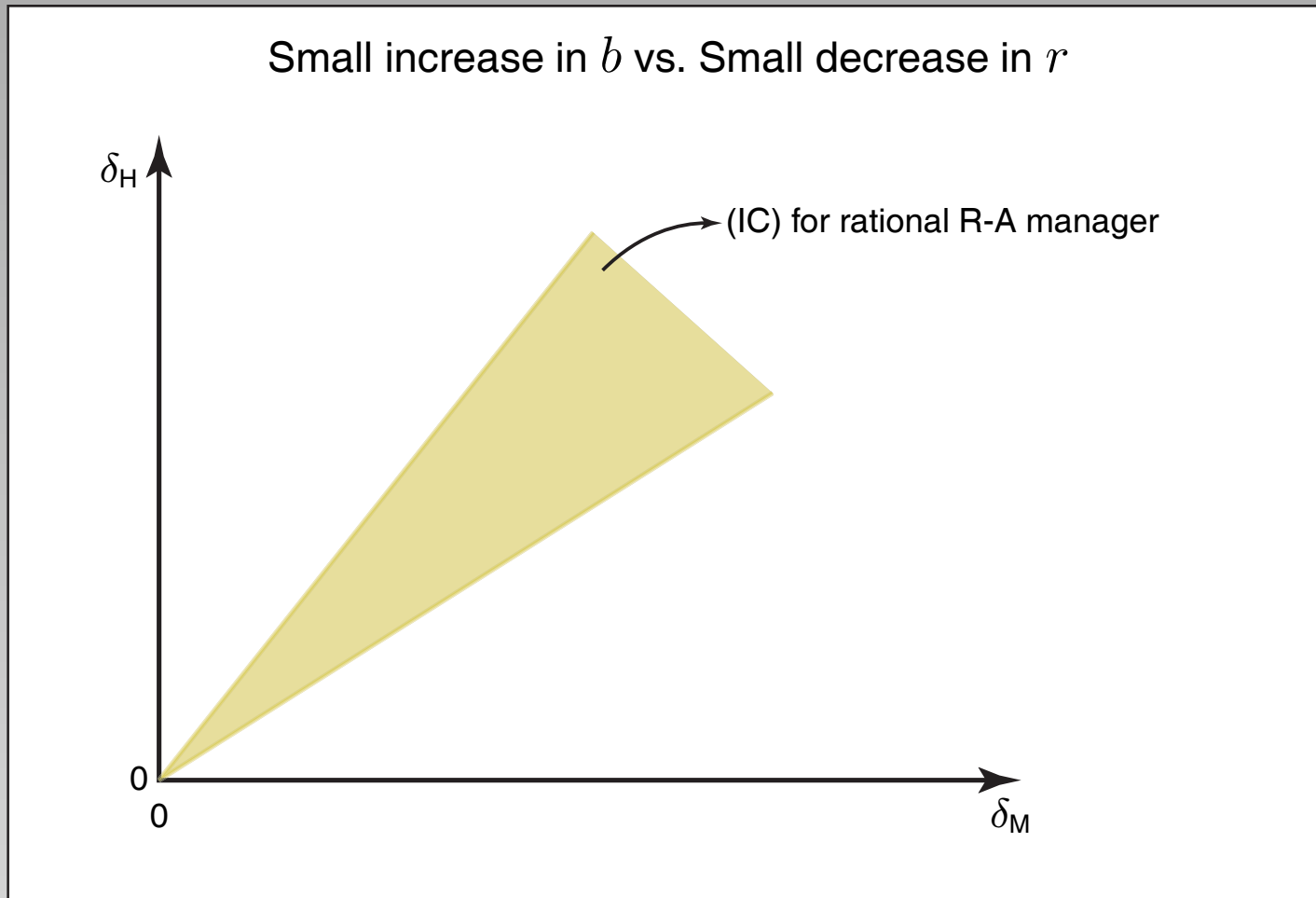
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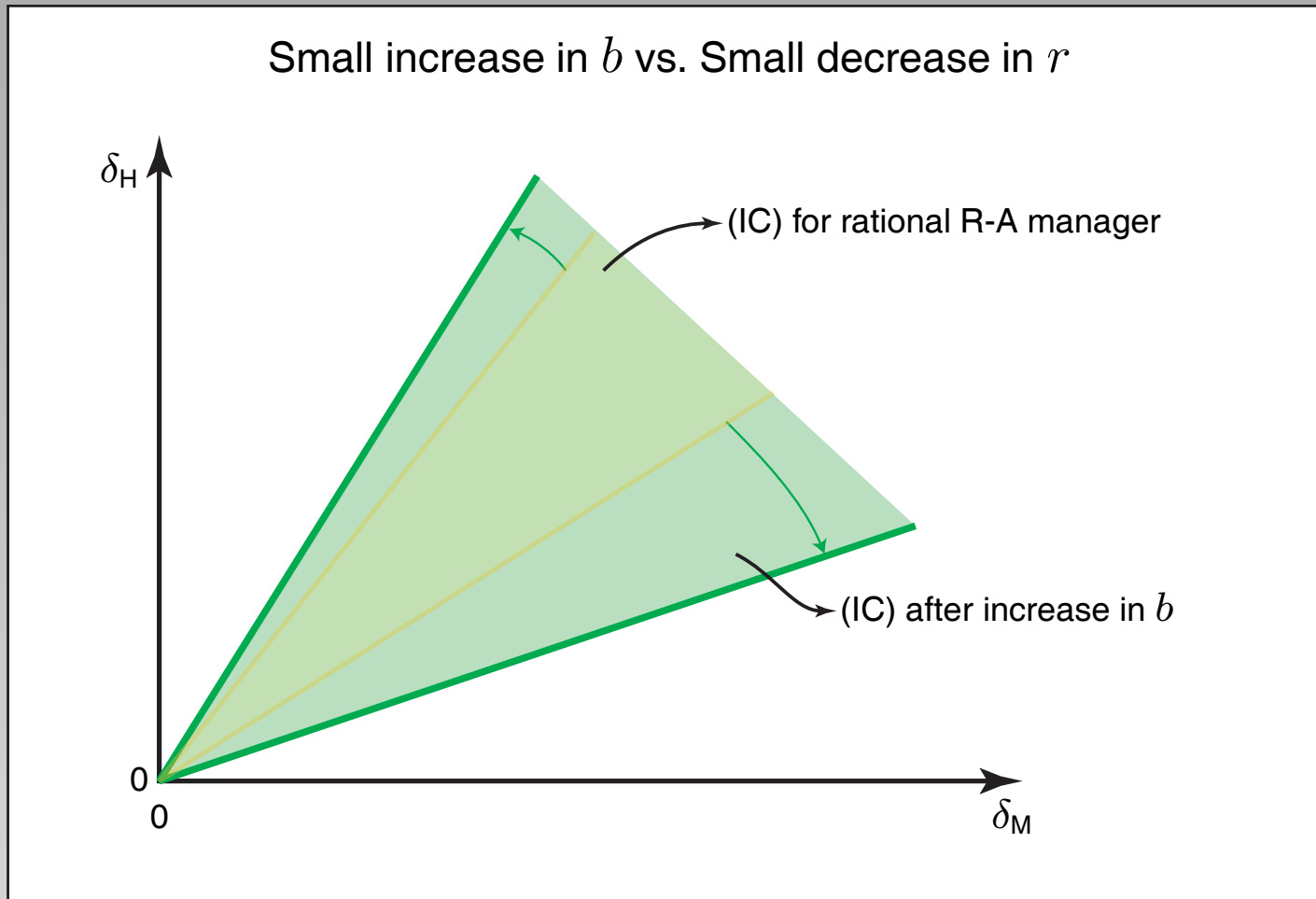
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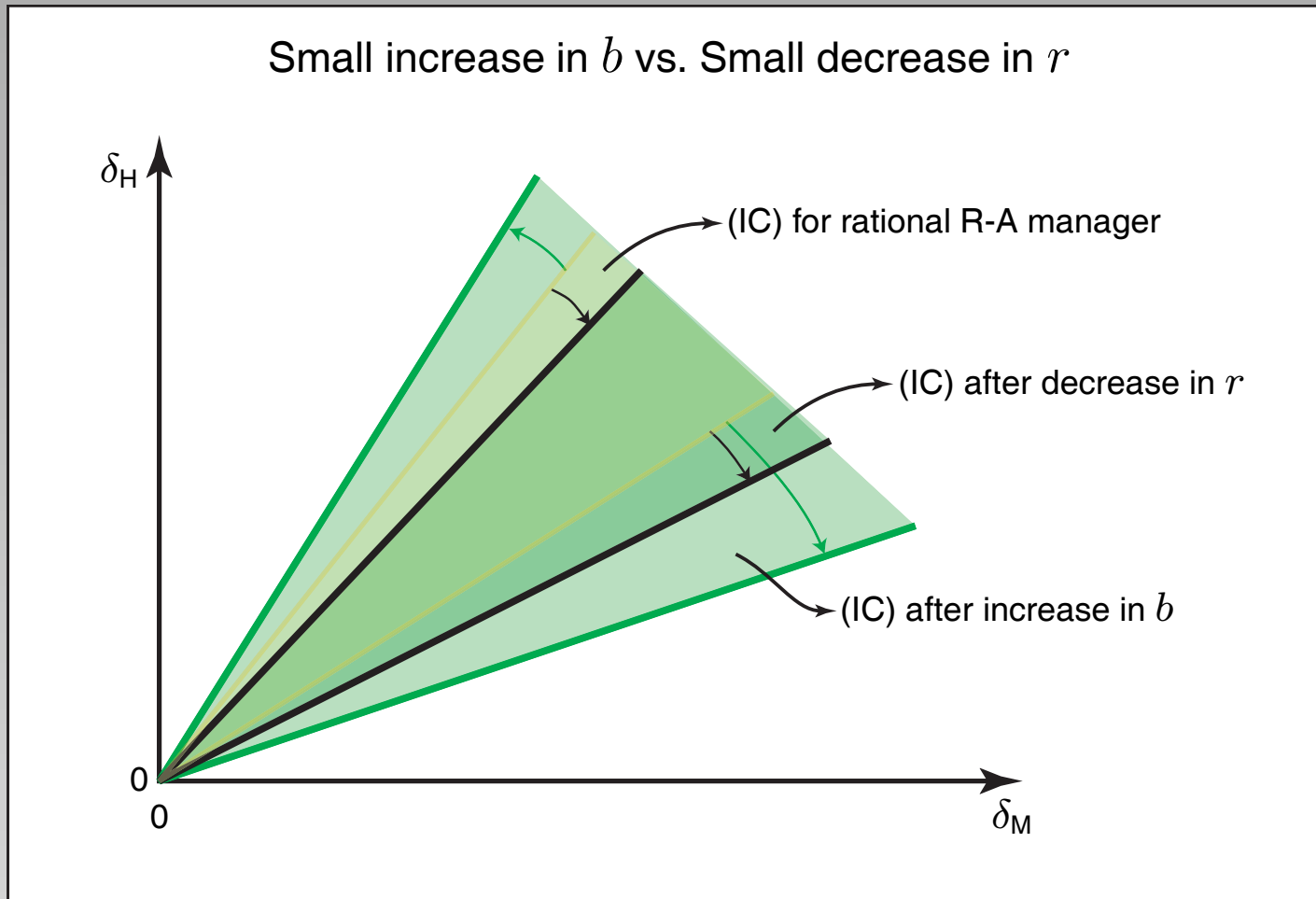
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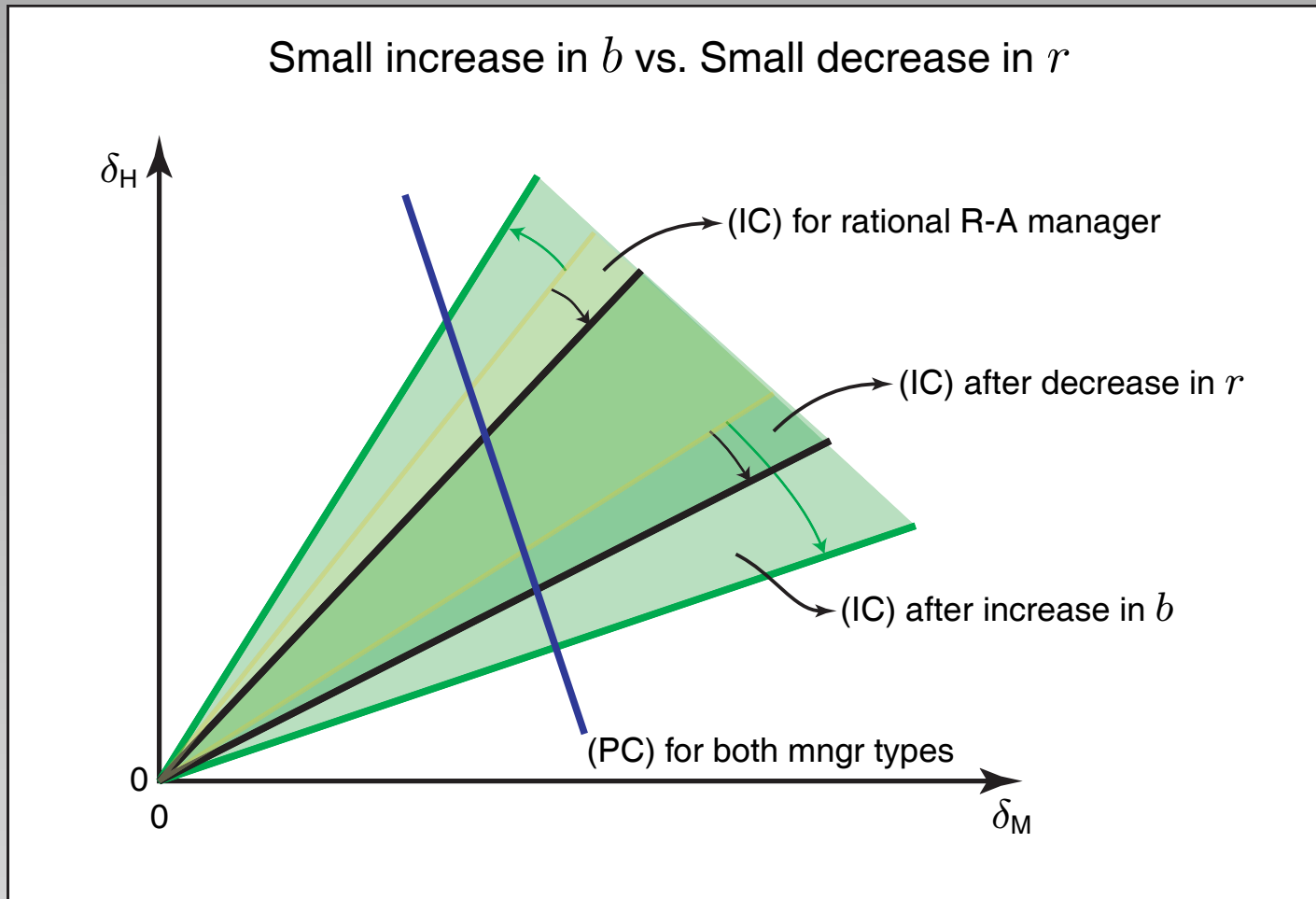
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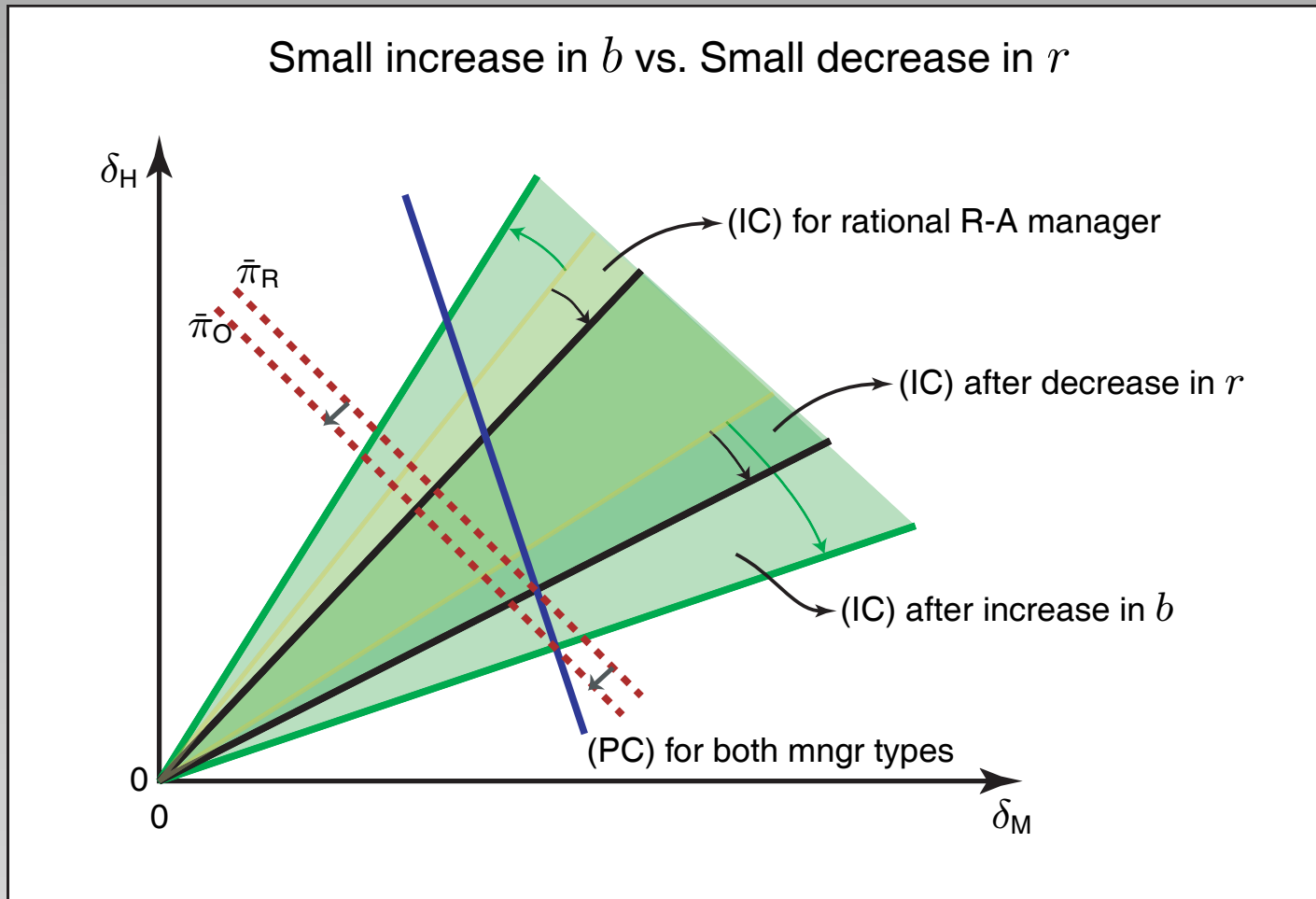
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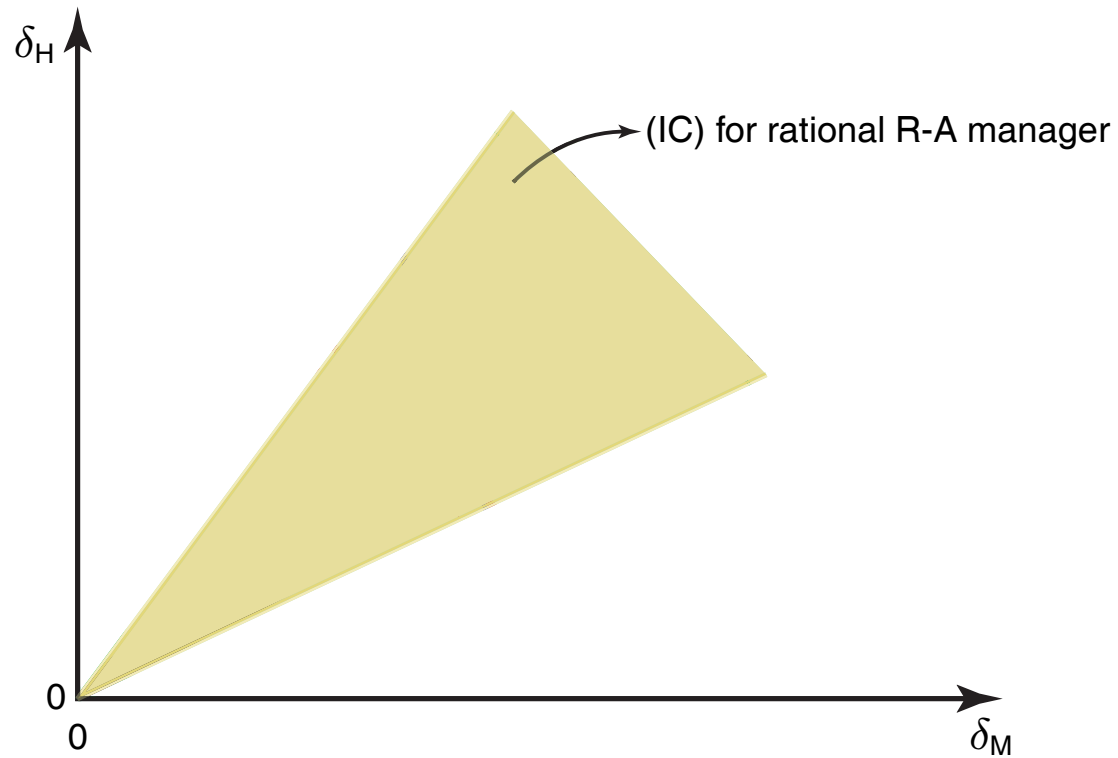


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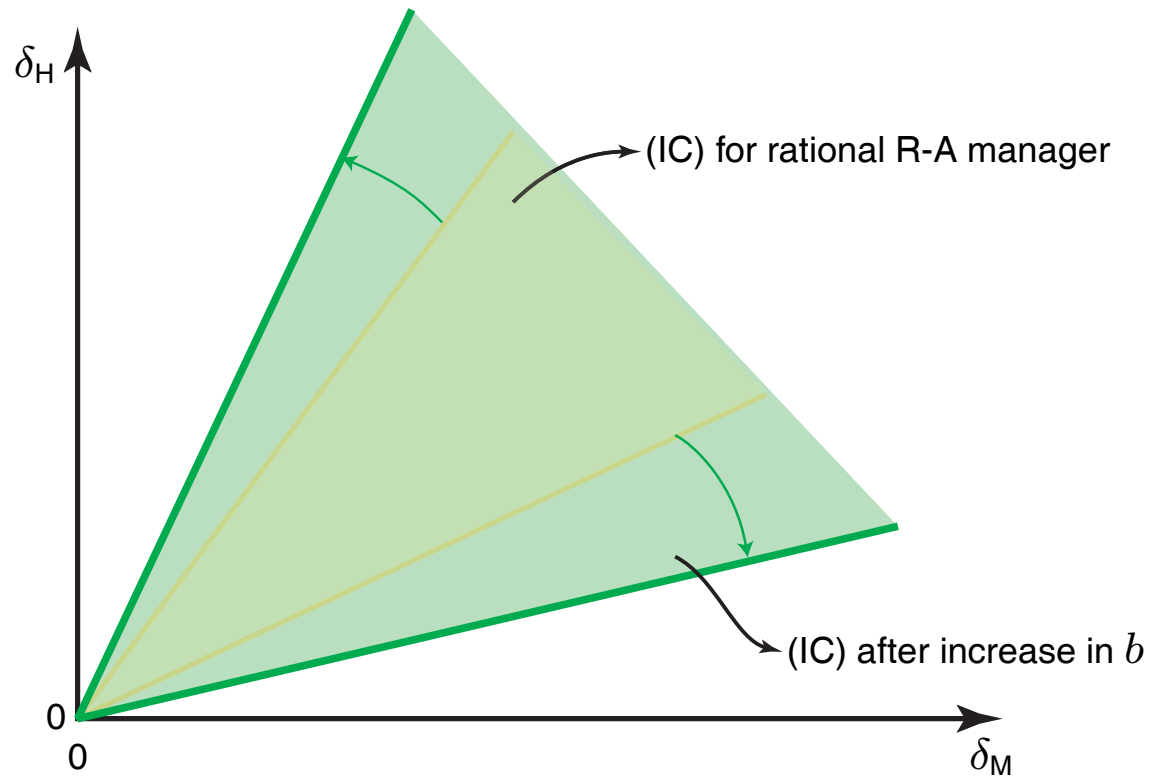
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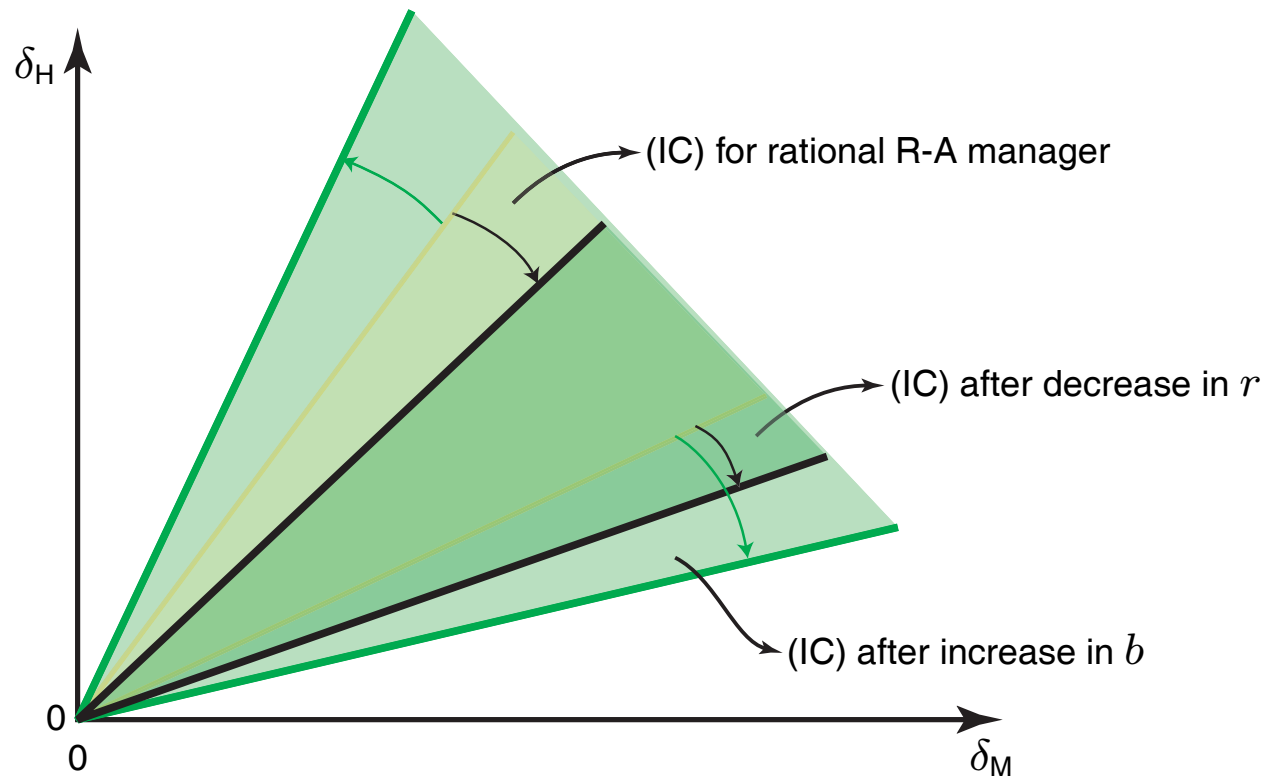
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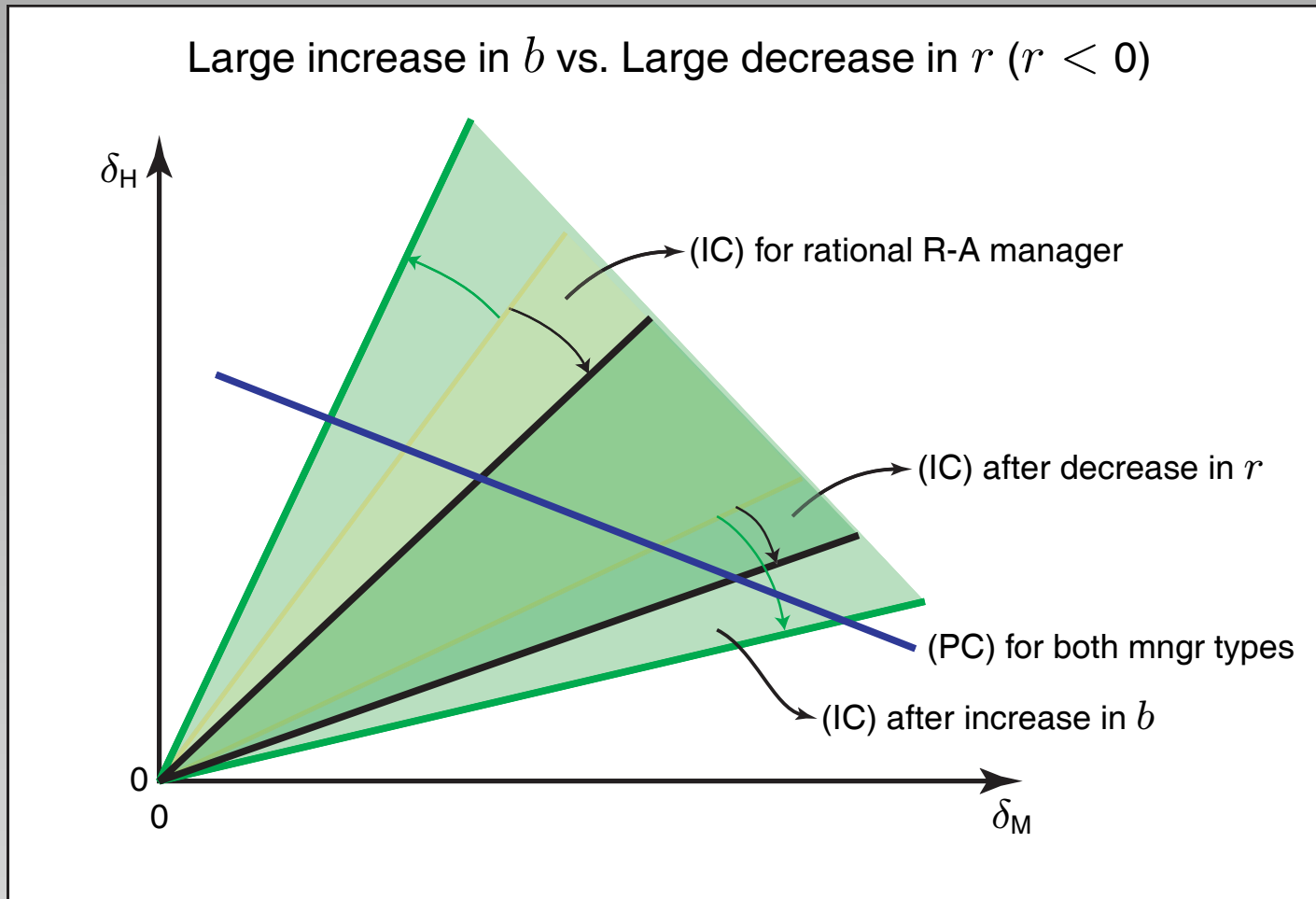


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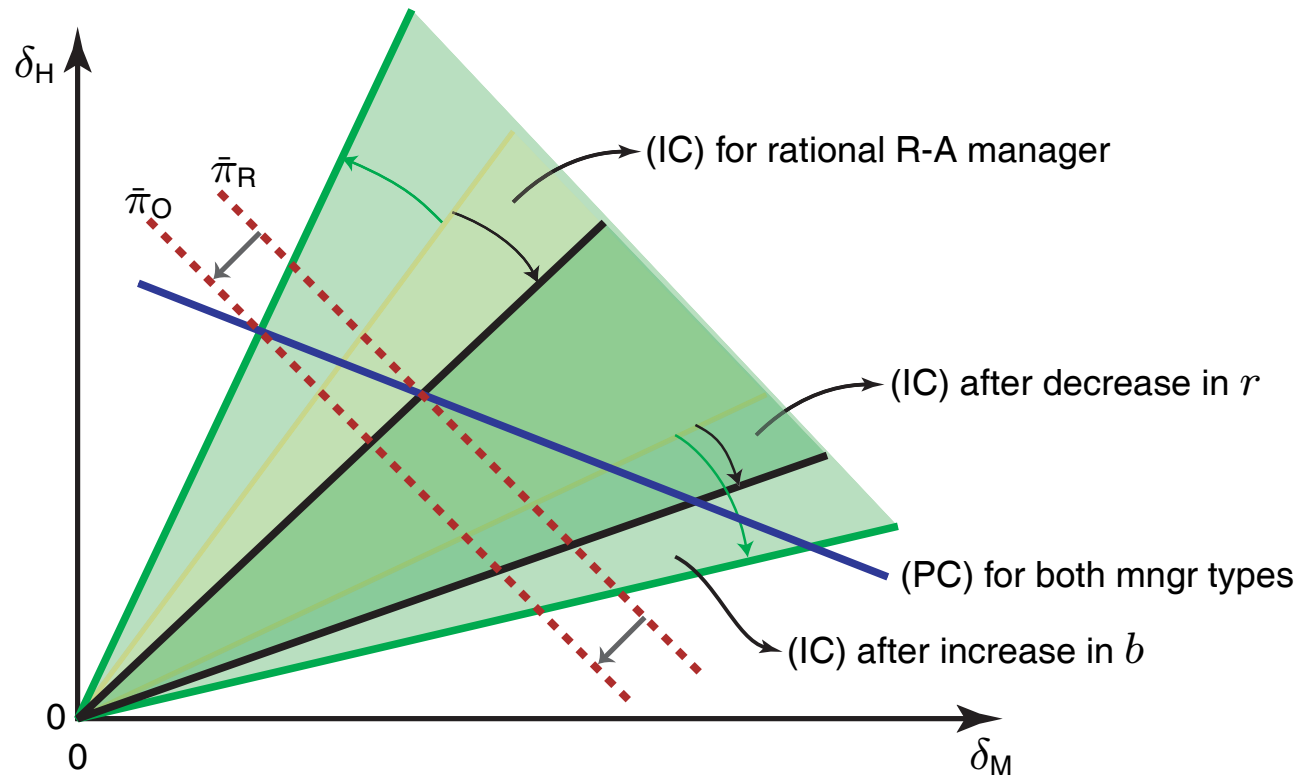


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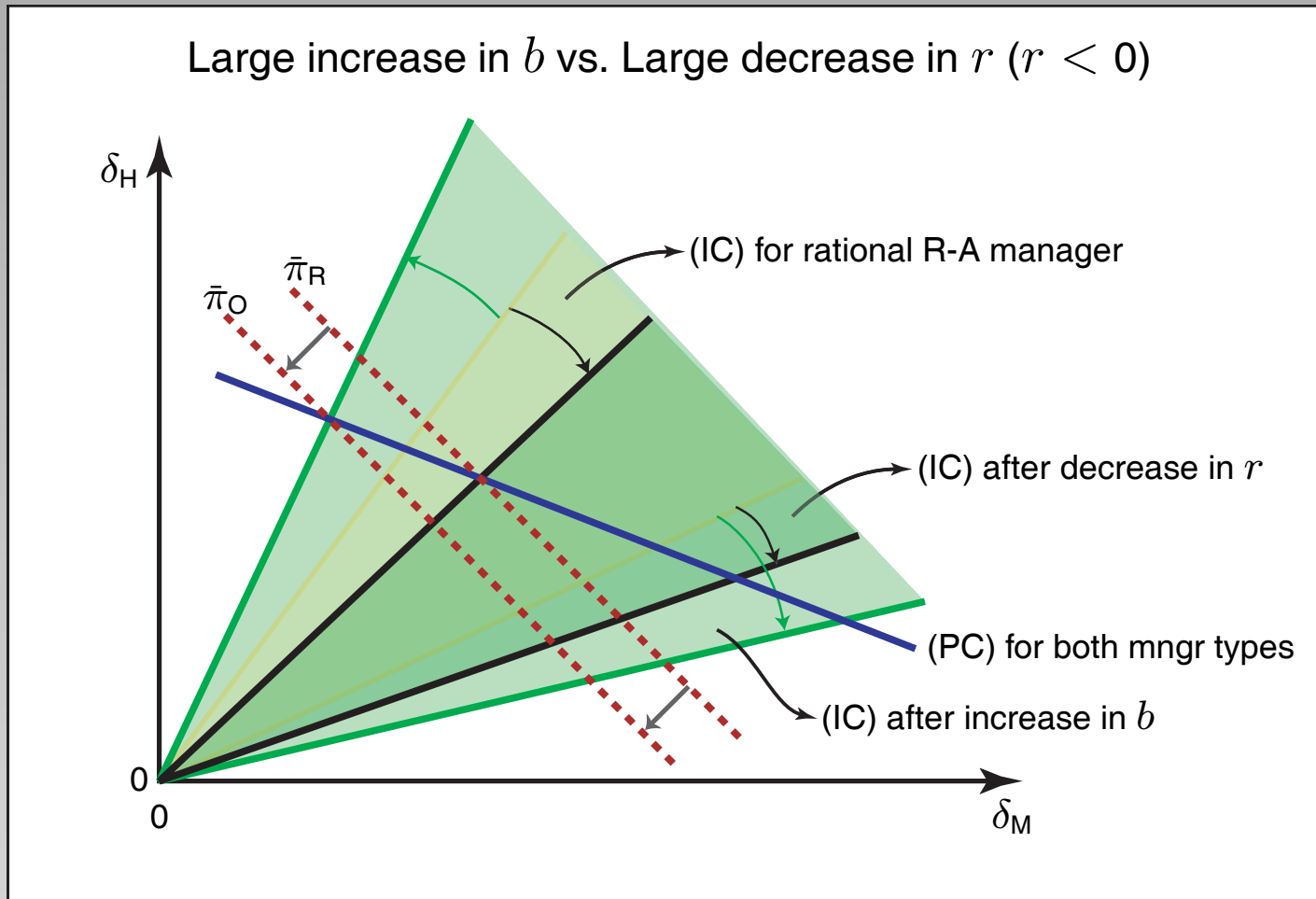


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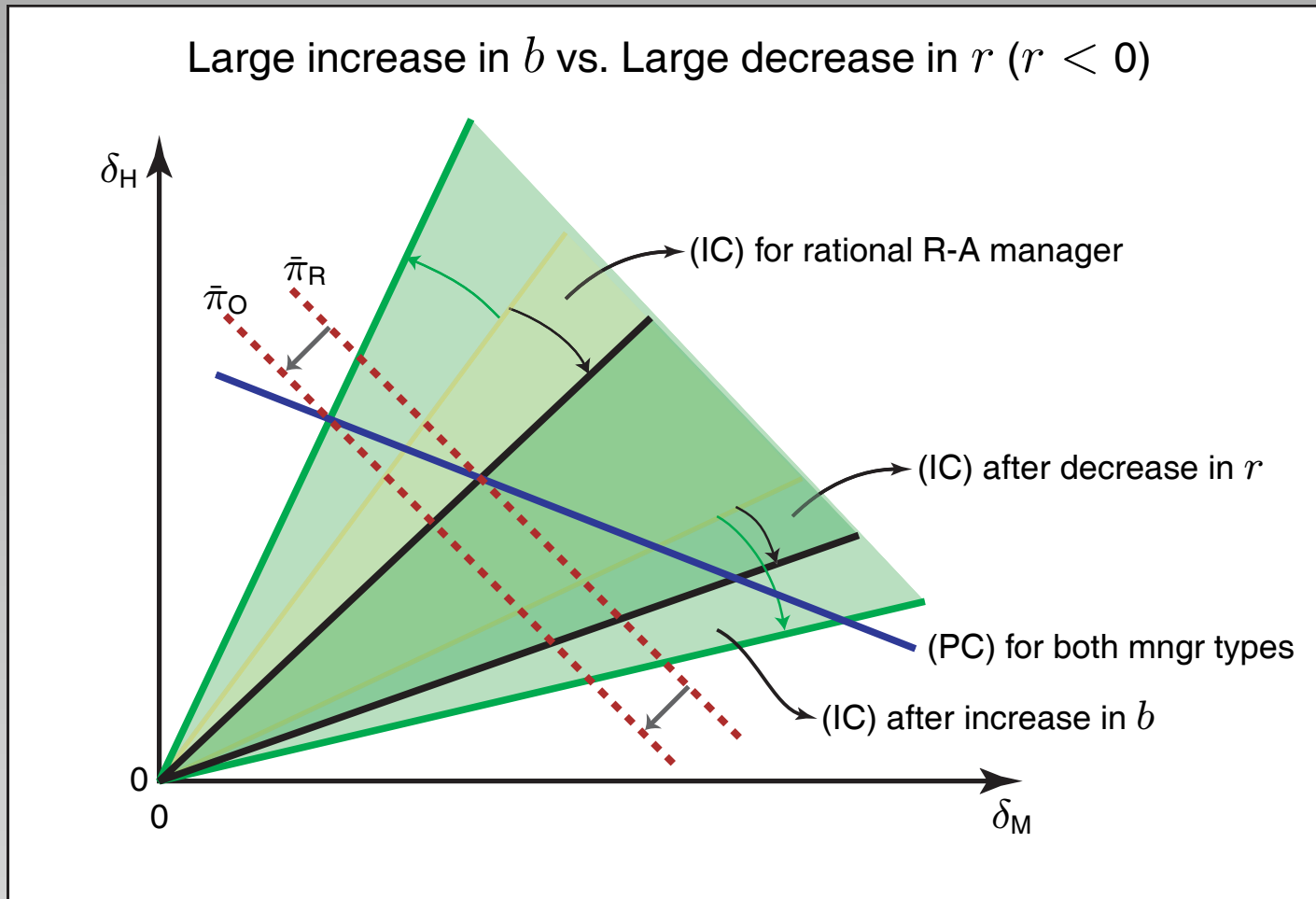


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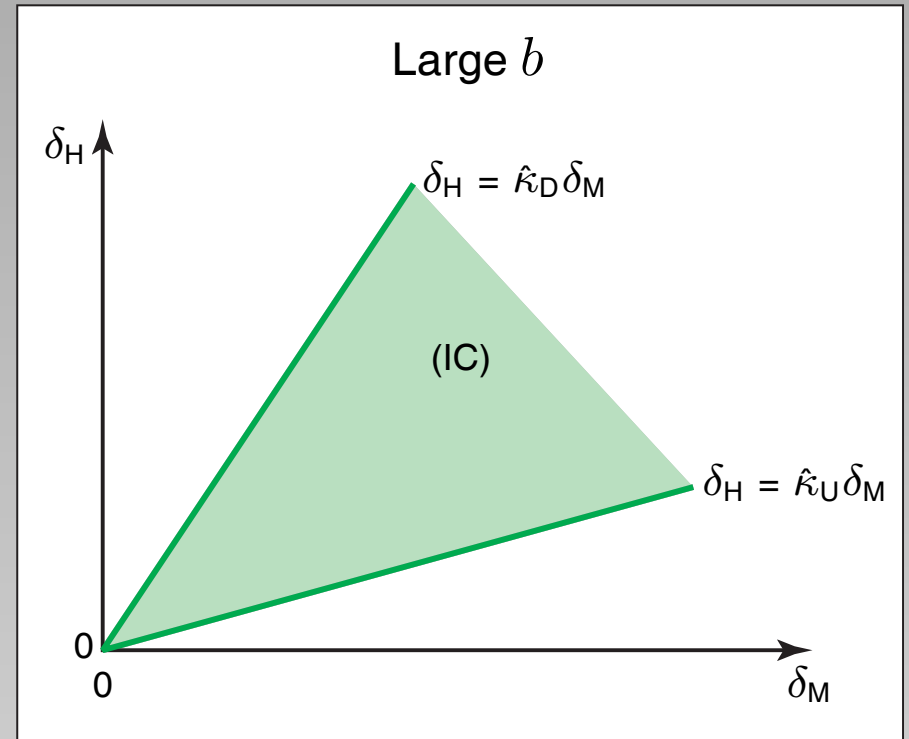
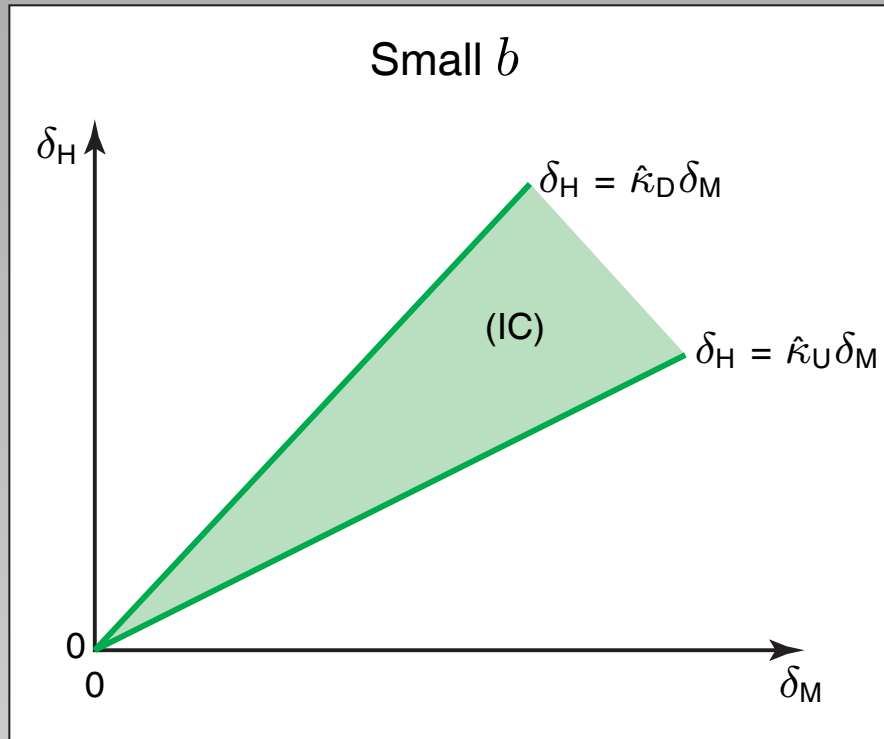
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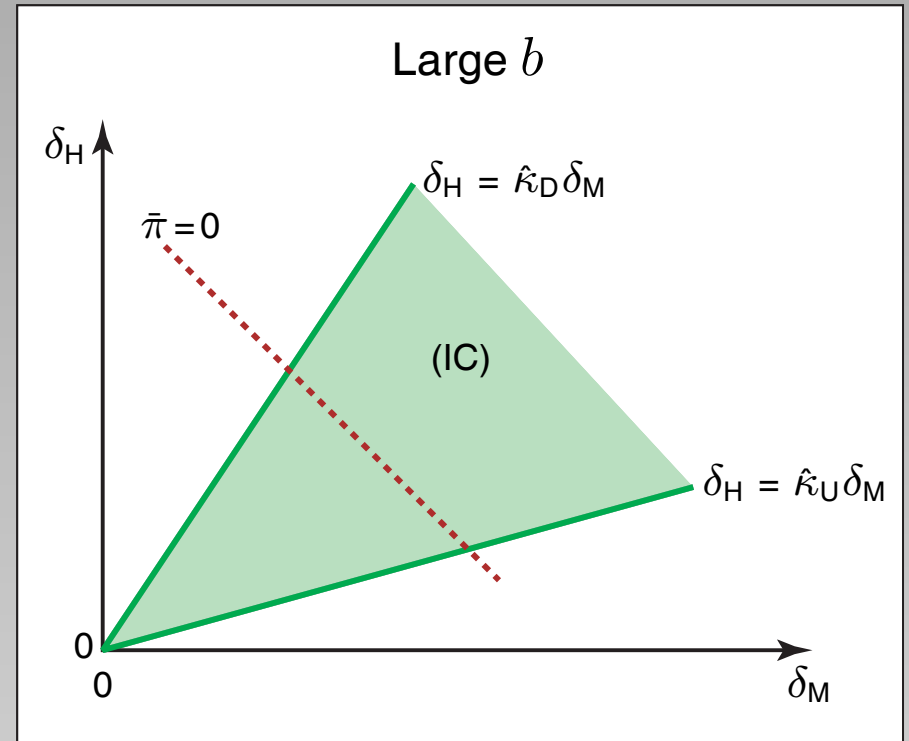
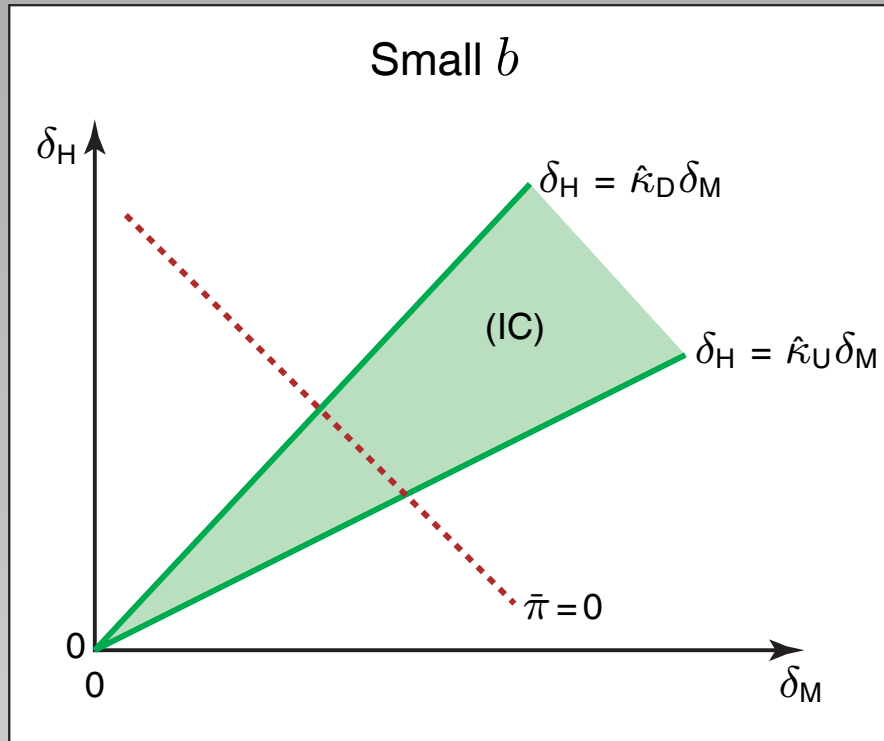
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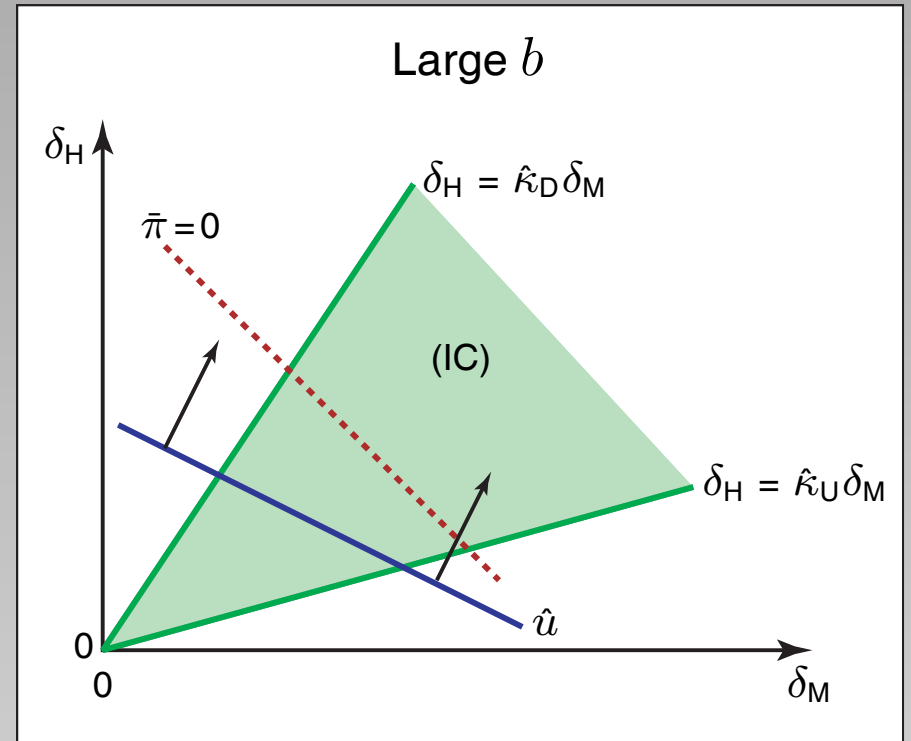
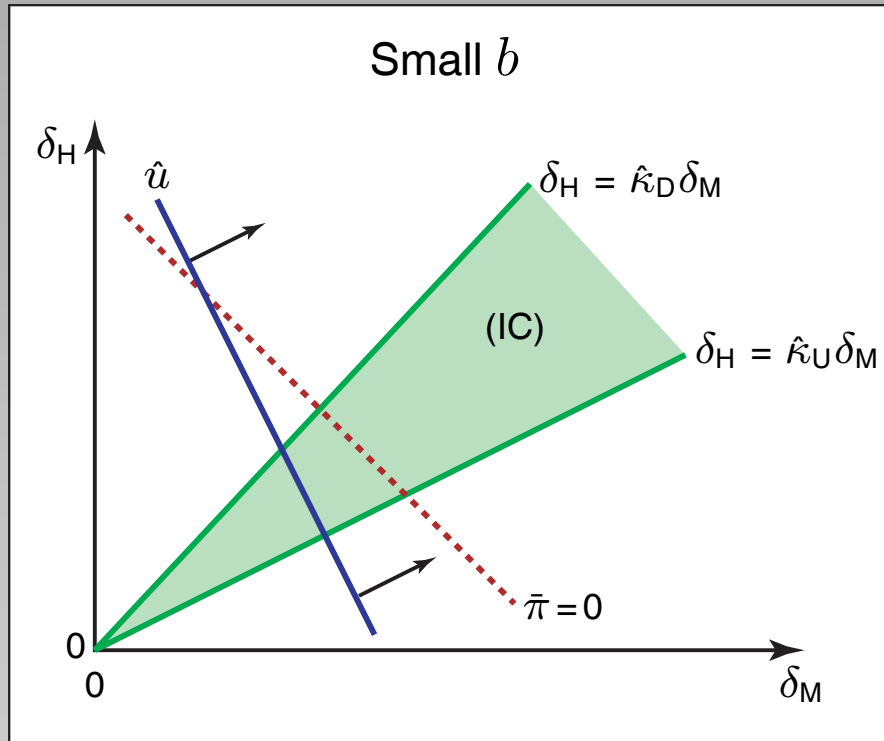
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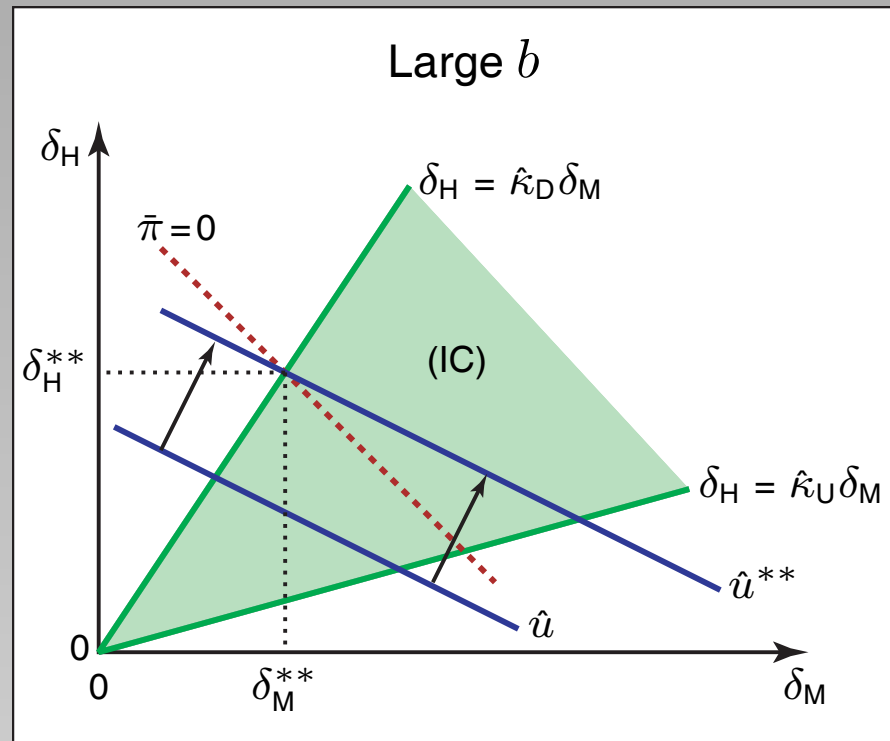
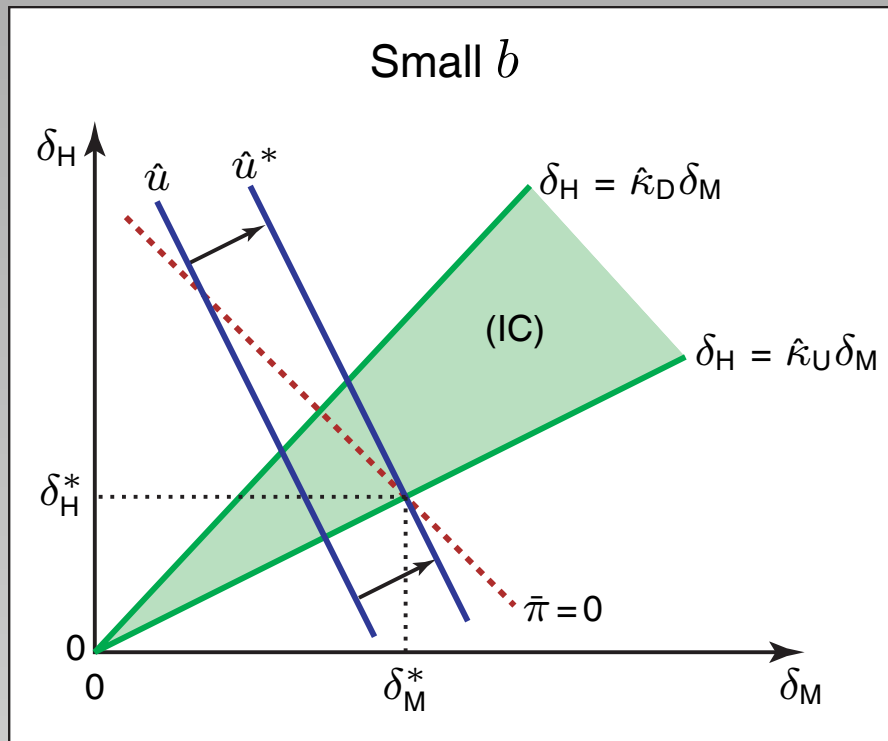
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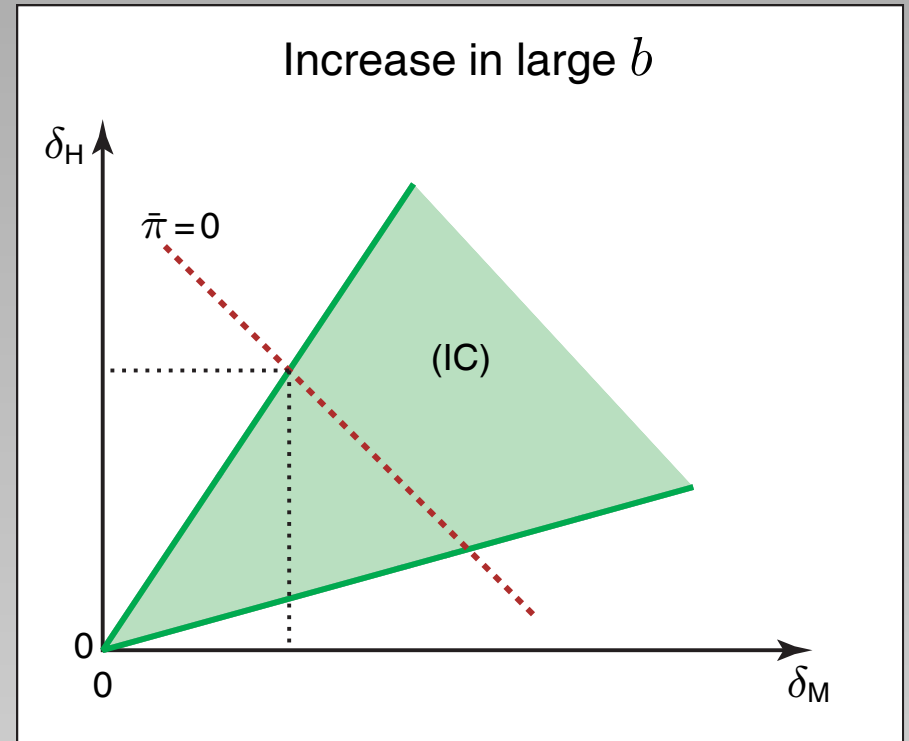
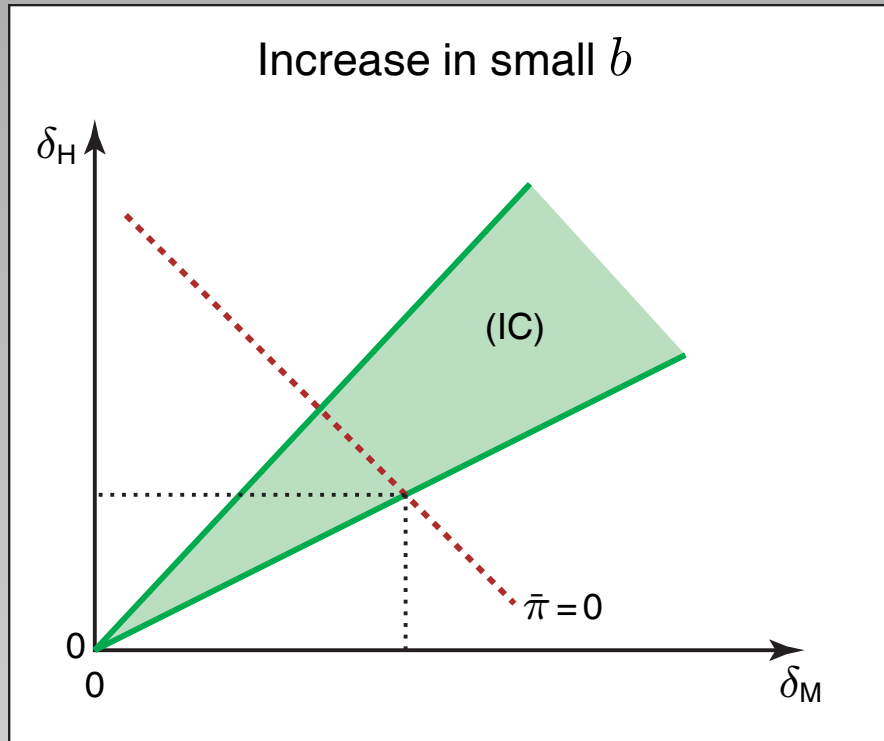
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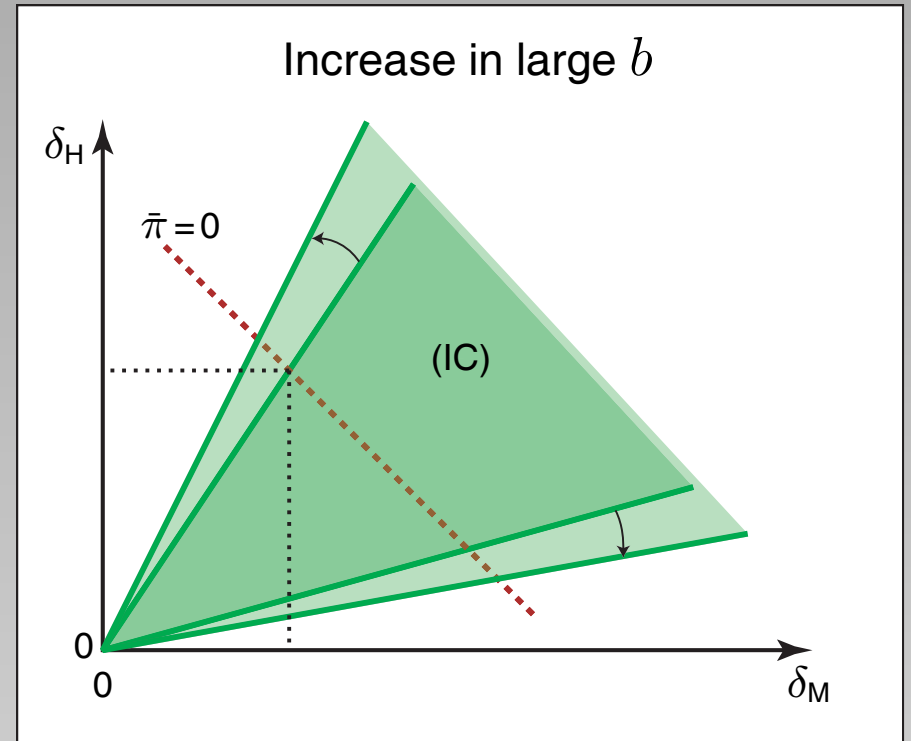
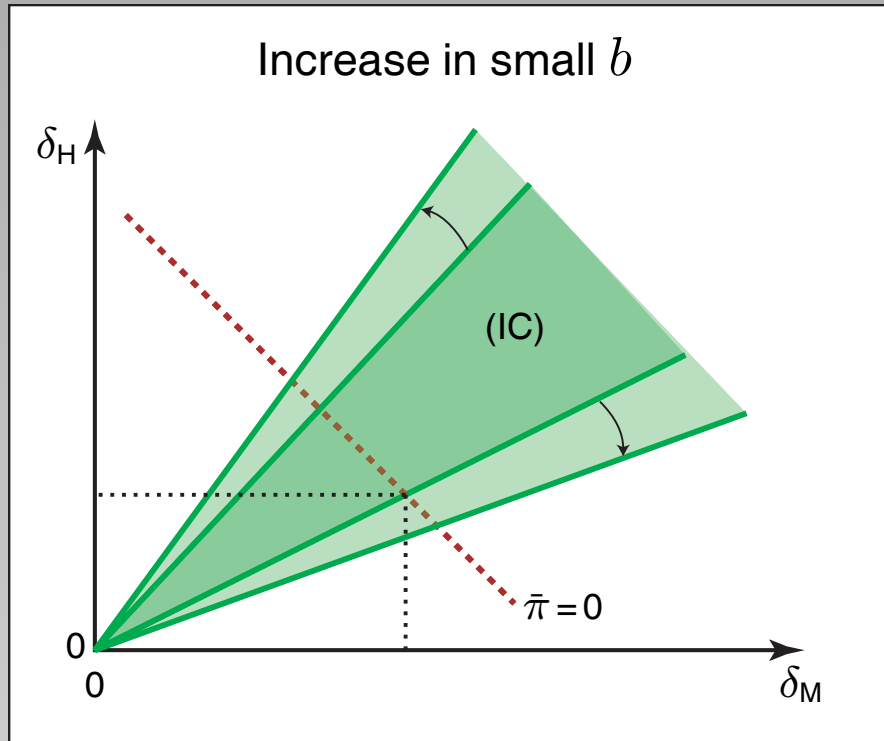
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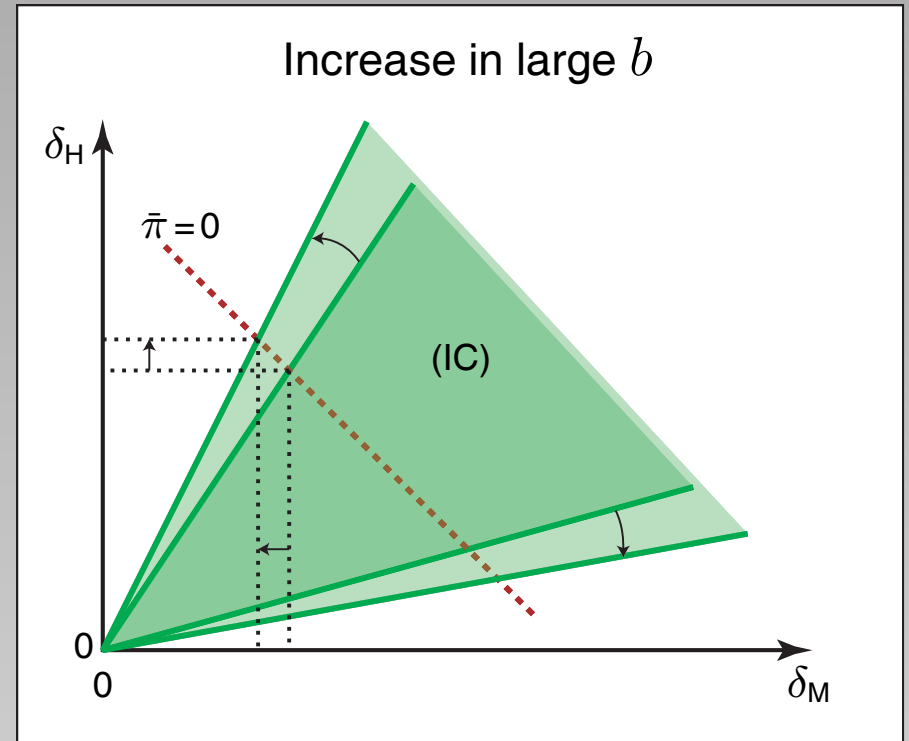
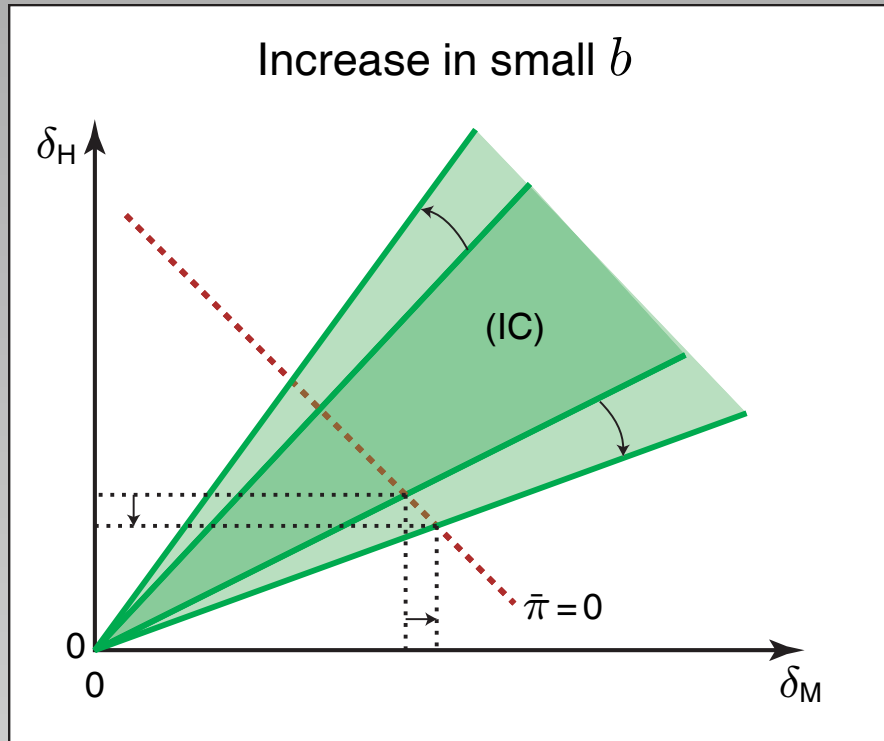
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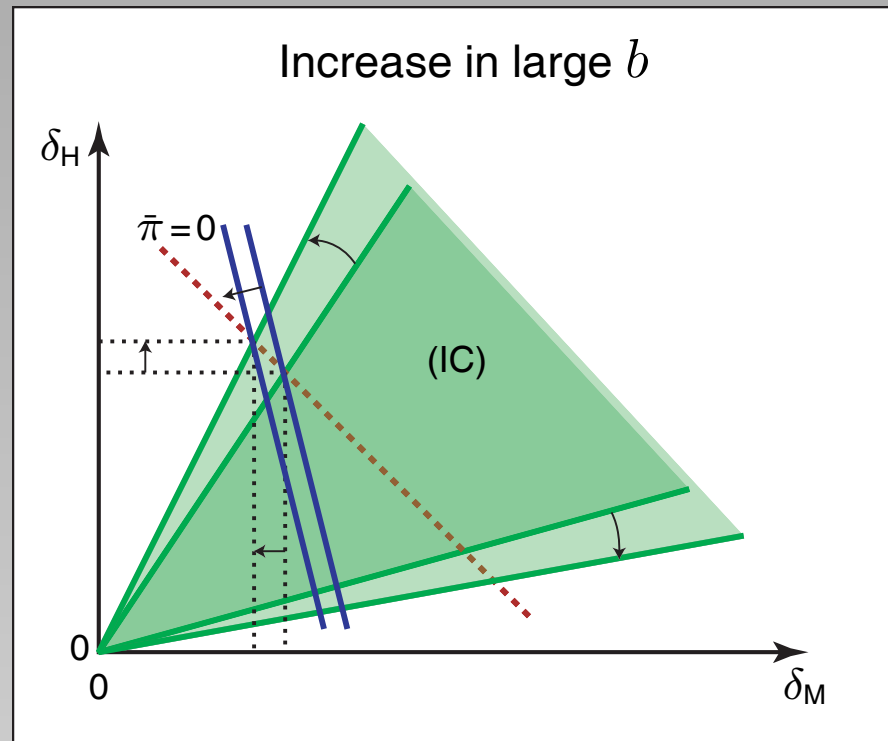
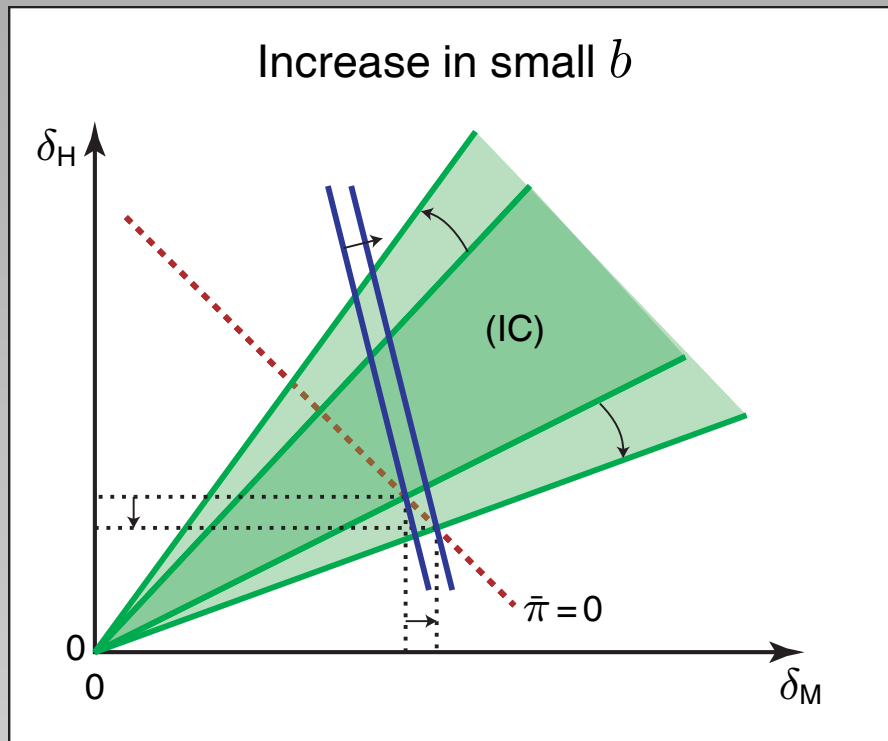
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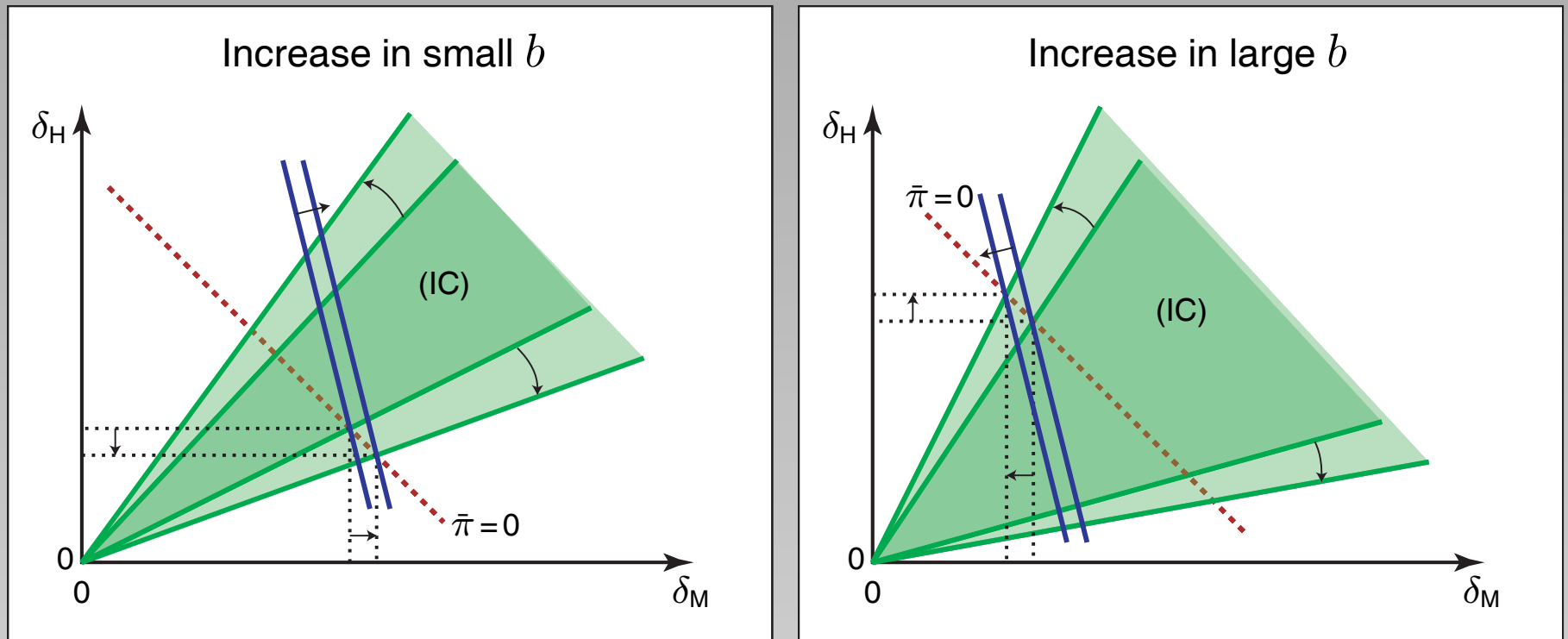
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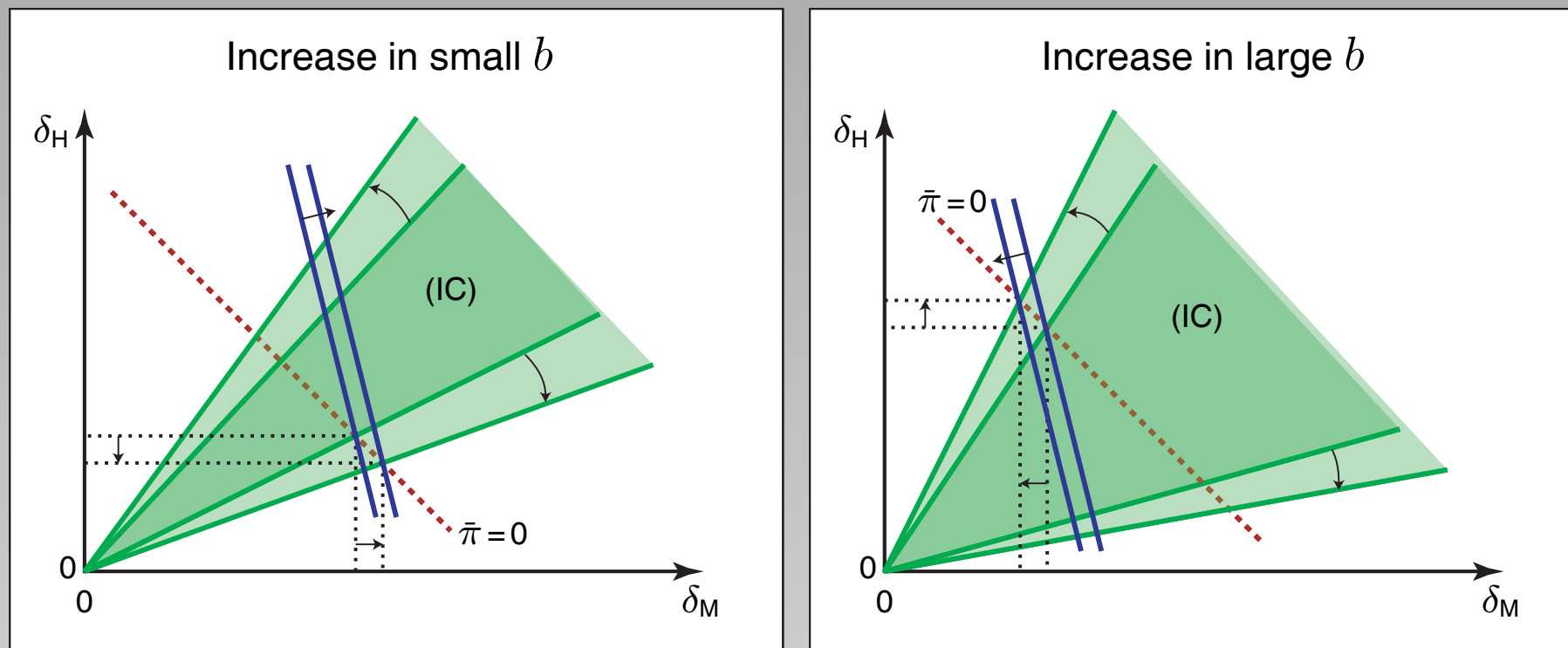
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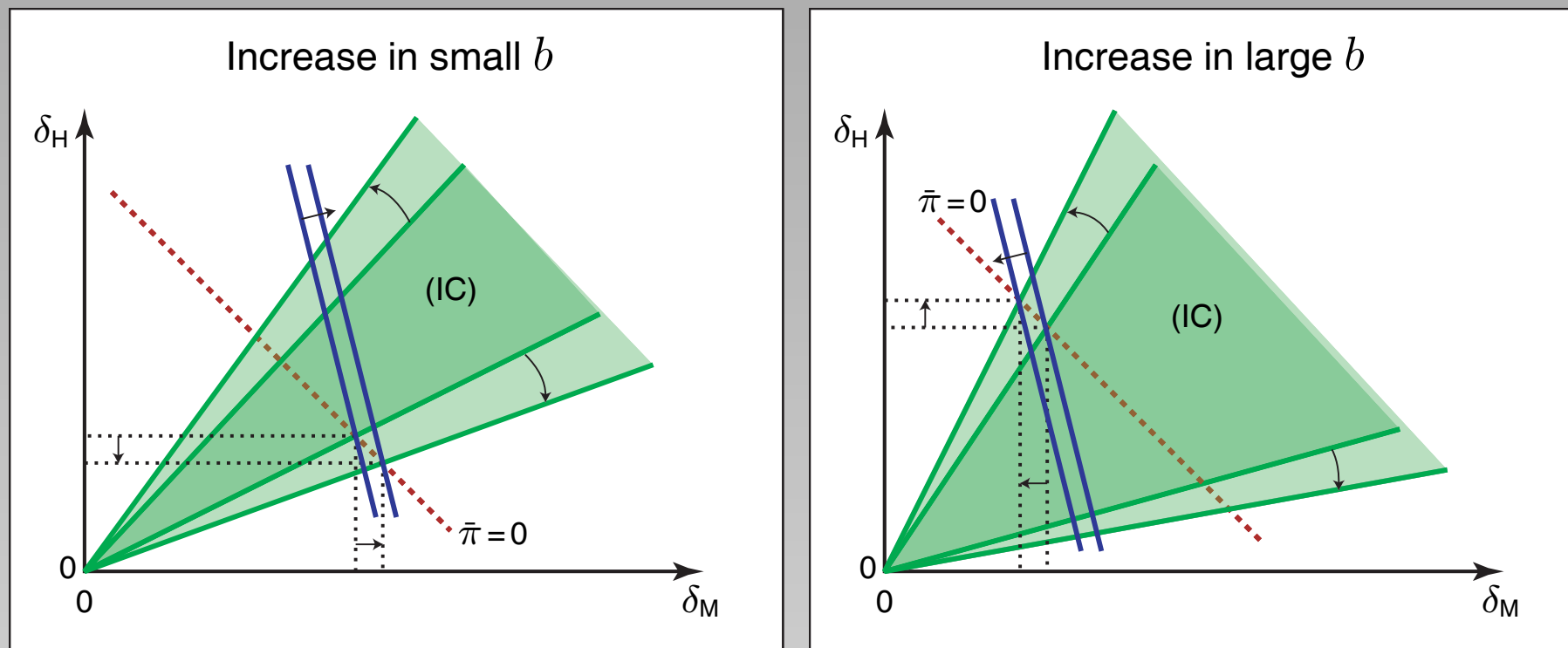
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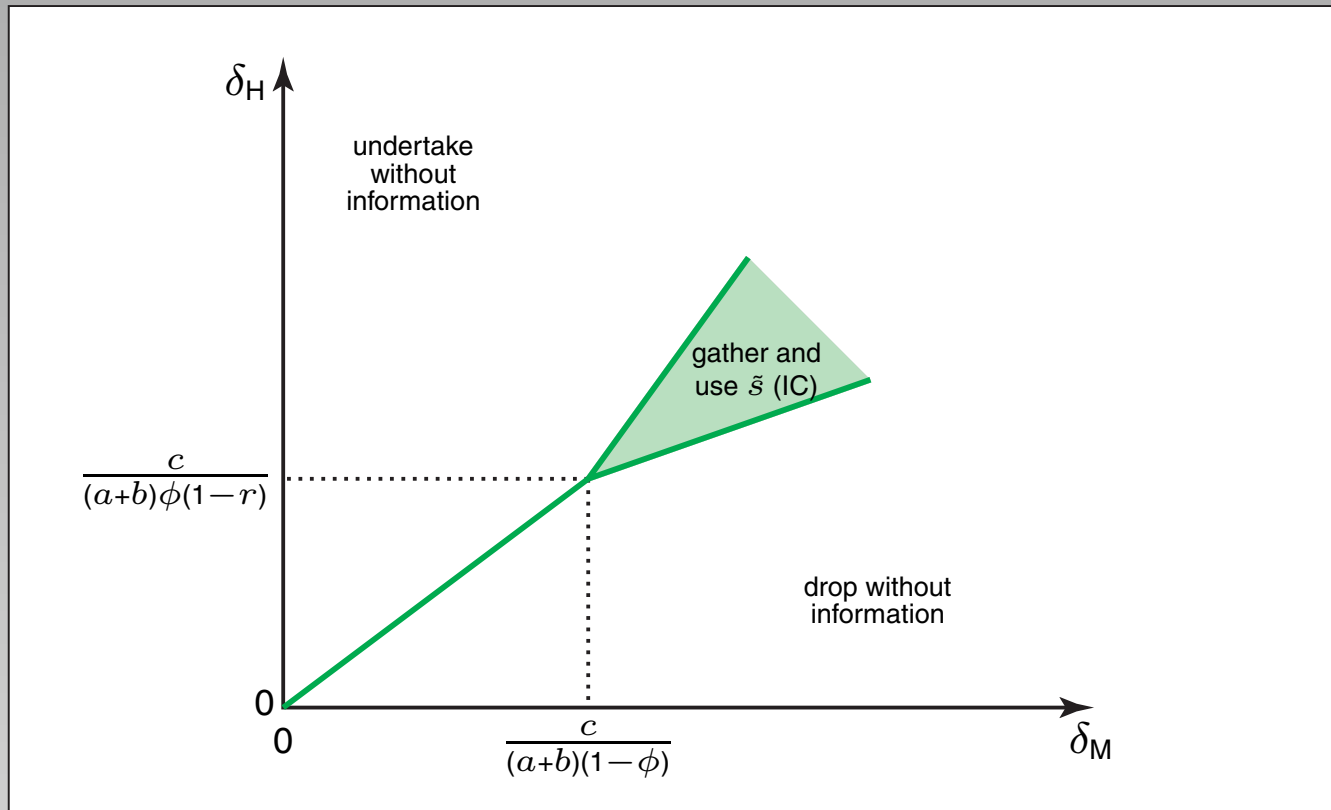
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- Additional result: The firm may consider hiring the manager *only* when he is overconfident.
 - Need to increase δ_H to motivate effort.
 - Increases the appeal of risky project even with $\tilde{s} = 0$.
 - Rational manager cannot be realigned profitably.
 - Overconfident manager does not require as high a $\delta_H \rightarrow$ “hireable”.

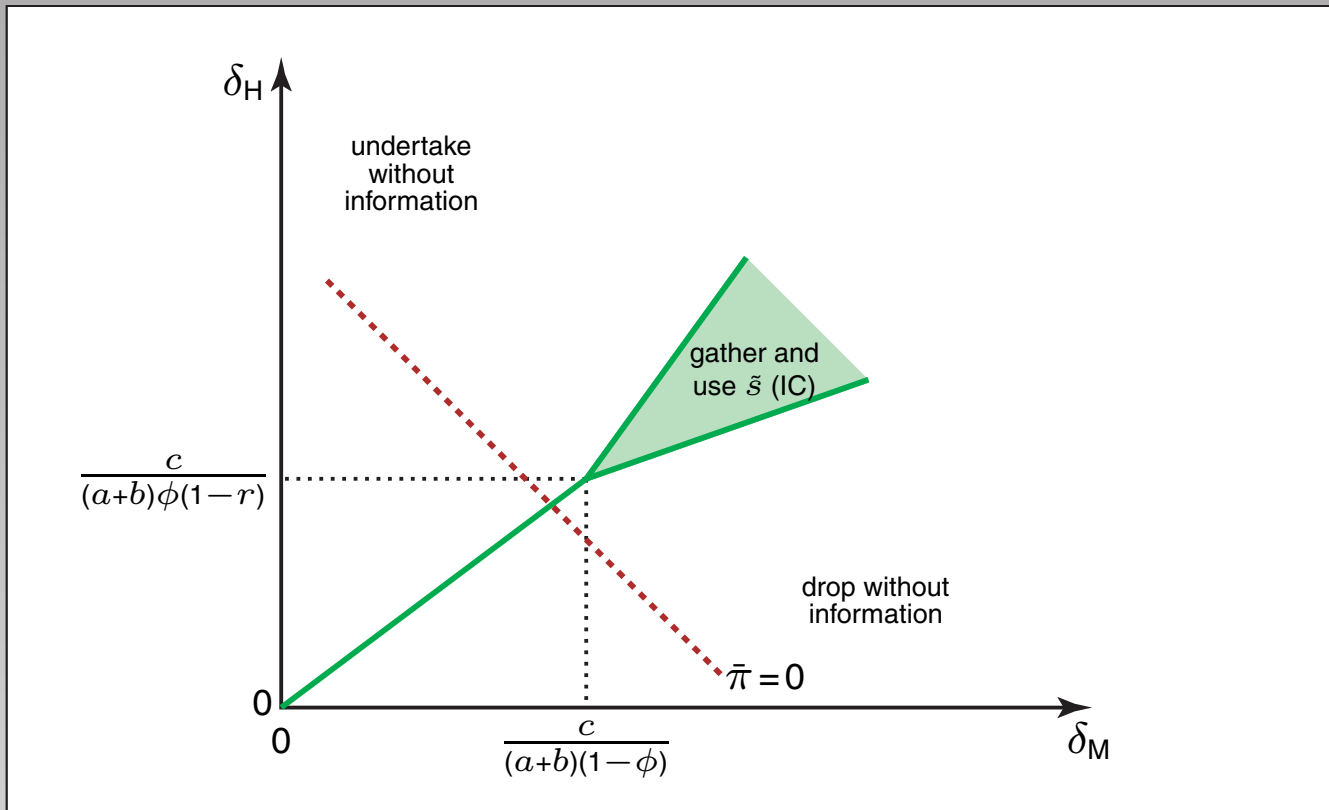
Moral Hazard

- Suppose that the manager incurs a utility cost of $c > 0$ (effort cost) to gather an informative signal \tilde{s} .
 - The compensation contract $\{\delta_M, \delta_H\}$ must now simultaneously create incentives for risk-taking *and* effort.
- Effect of overconfidence on effort incentives.
 - The manager overvalues the benefit of (reduction of risk from) effort.
 - Thus, effectively, he under-estimates the cost of effort.
 - As a result, his incentives are to easier to realign, as before.
 - Previous results (with or without competition) still hold.
- Additional result: The firm may consider hiring the manager *only* when he is overconfident.
 - Need to increase δ_H to motivate effort.
 - Increases the appeal of risky project even with $\tilde{s} = 0$.
 - Rational manager cannot be realigned profitably.
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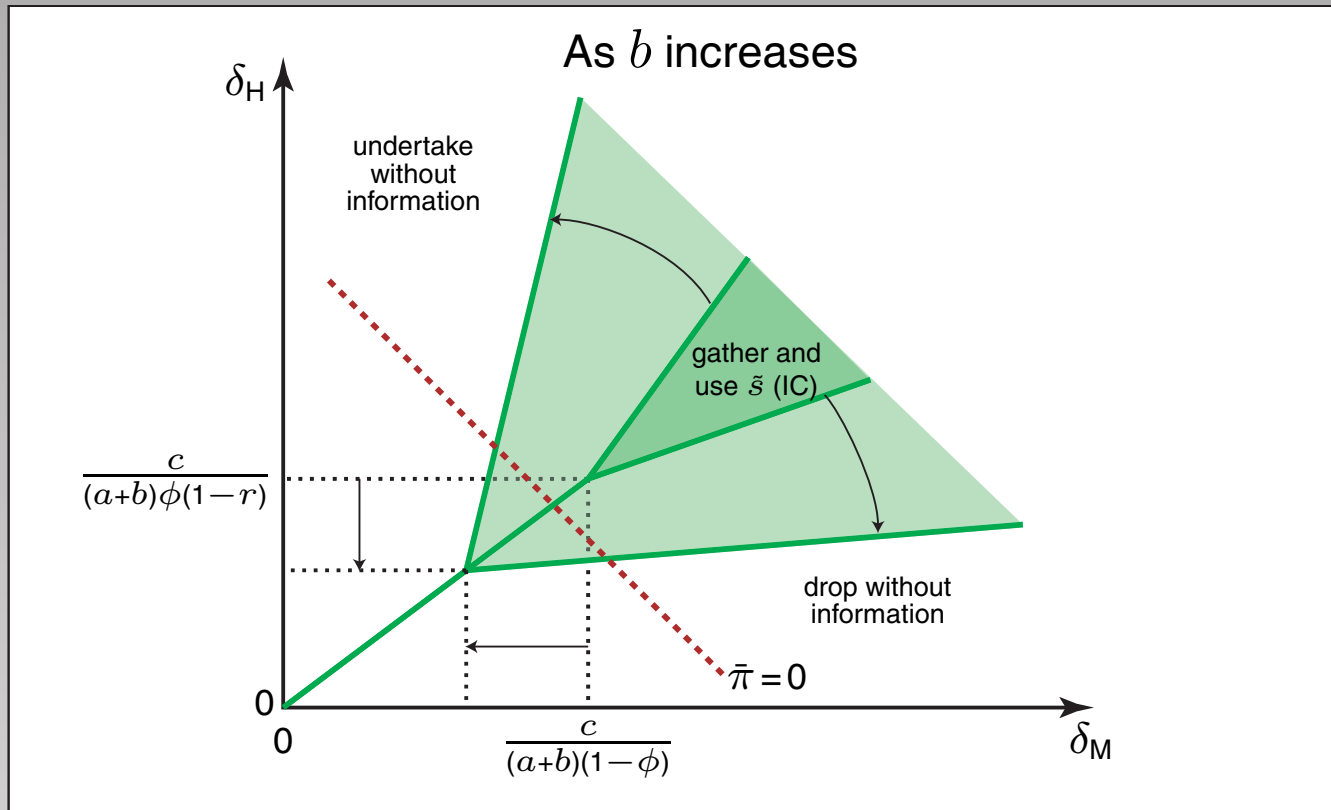
Moral Hazard (cont'd)



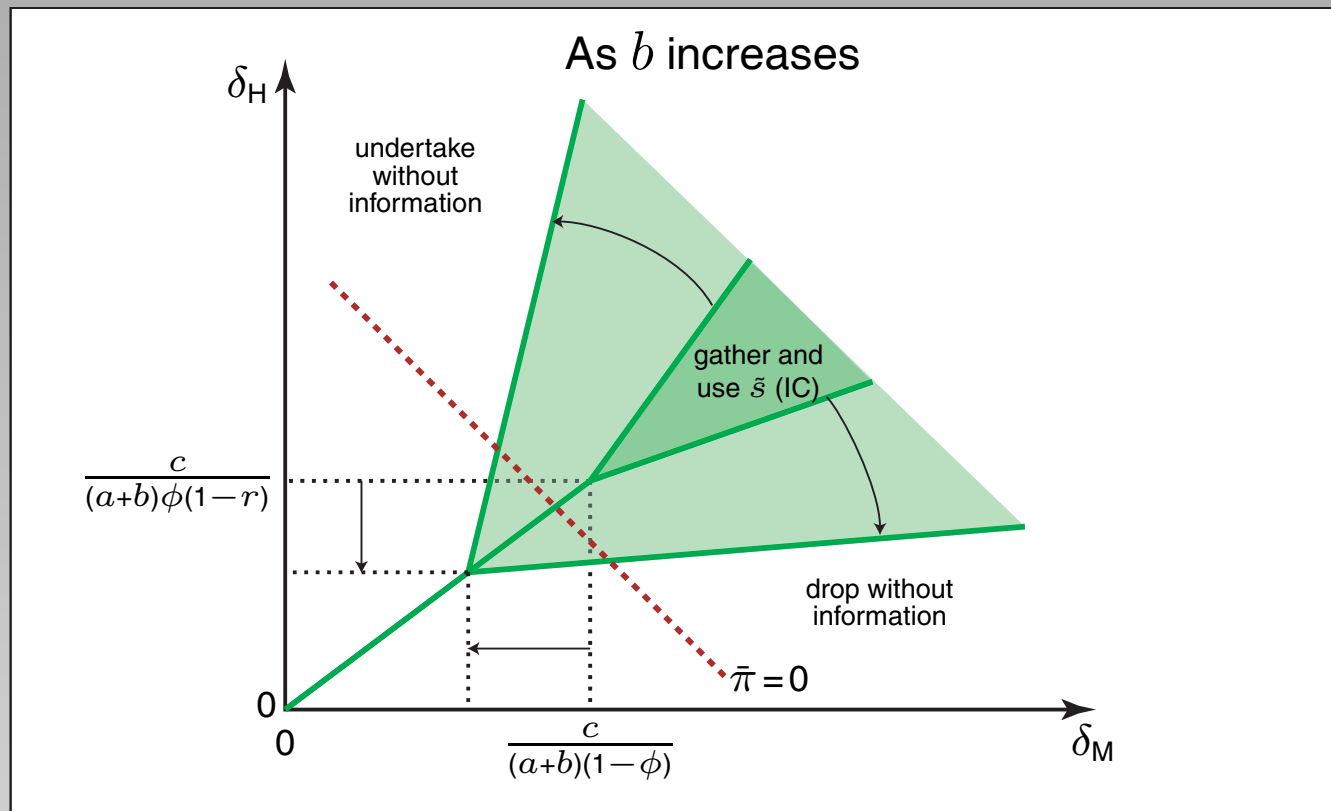
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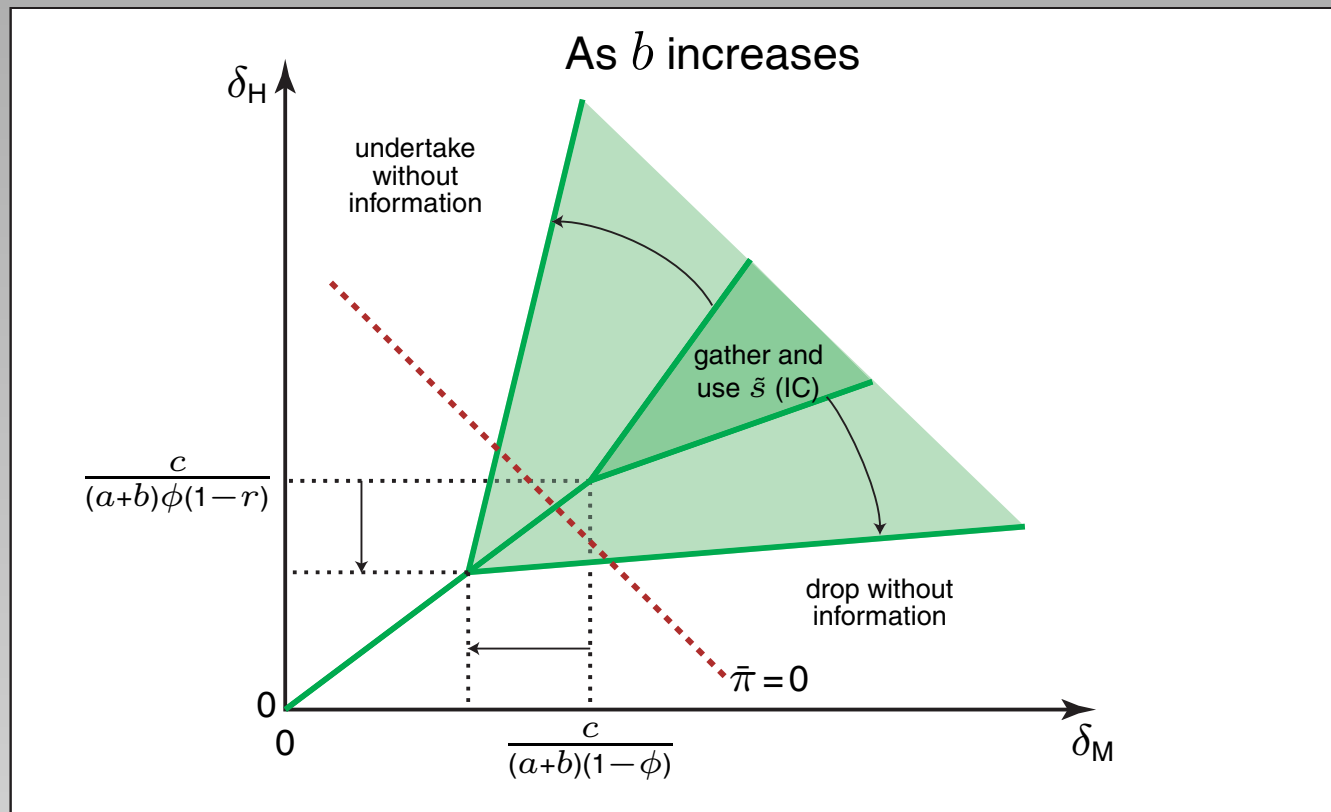


Moral Hazard (cont'd)



- Two potential roles for overconfidence.
 - Better risk-sharing through flatter compensation contracts (low b).
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 - Opposite after $\tilde{s} = 0$.
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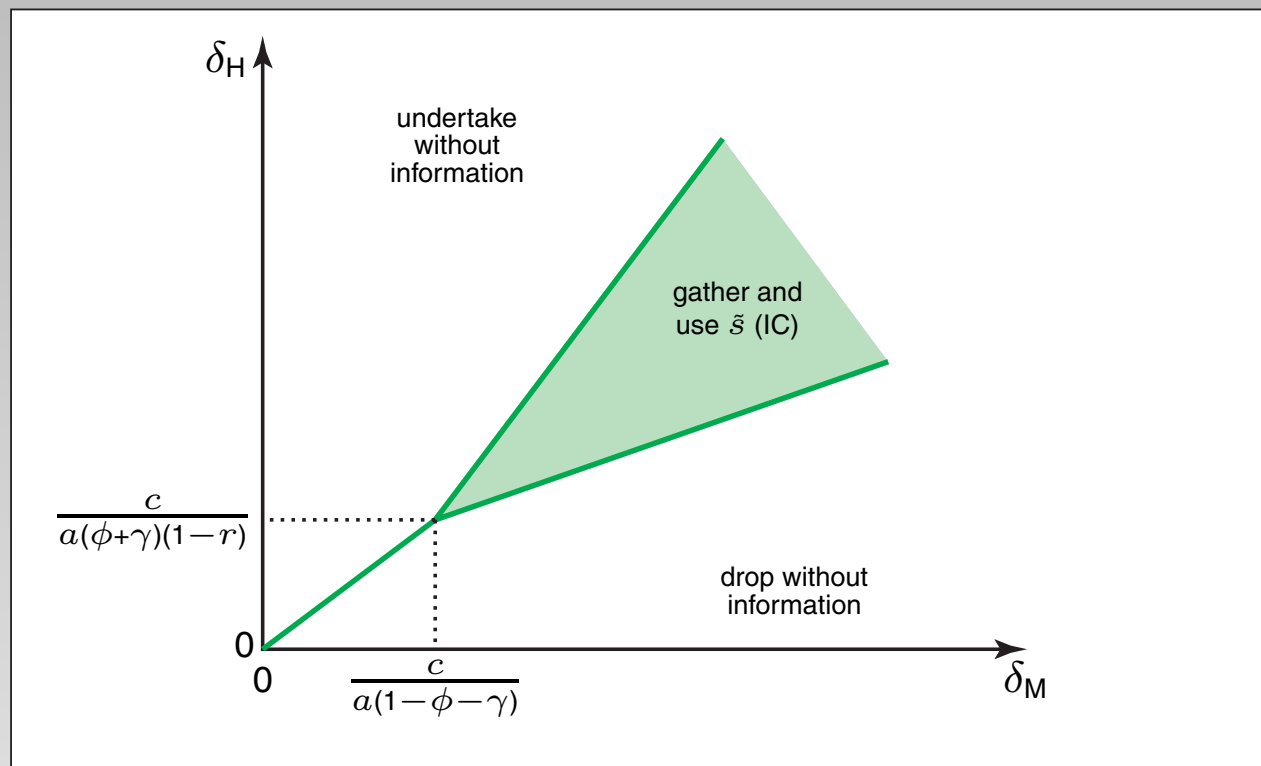
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Overconfidence vs. Optimism (cont'd)

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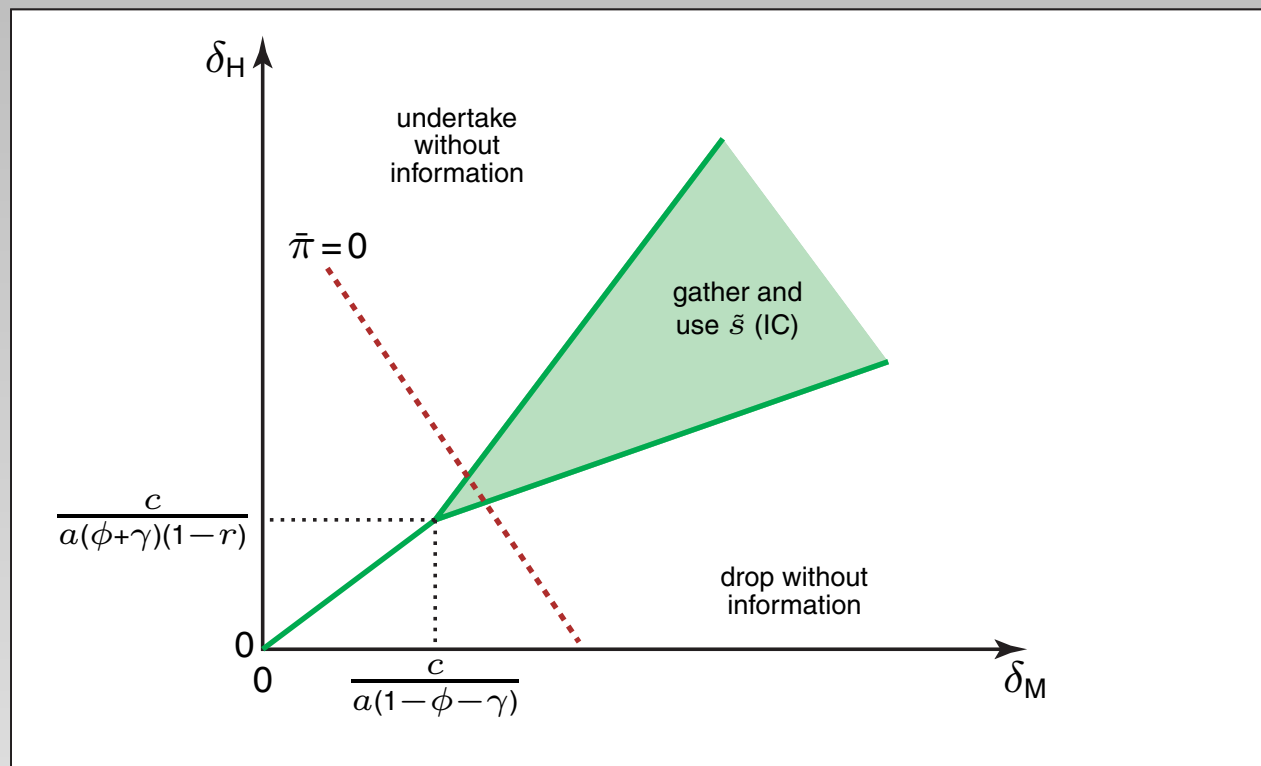
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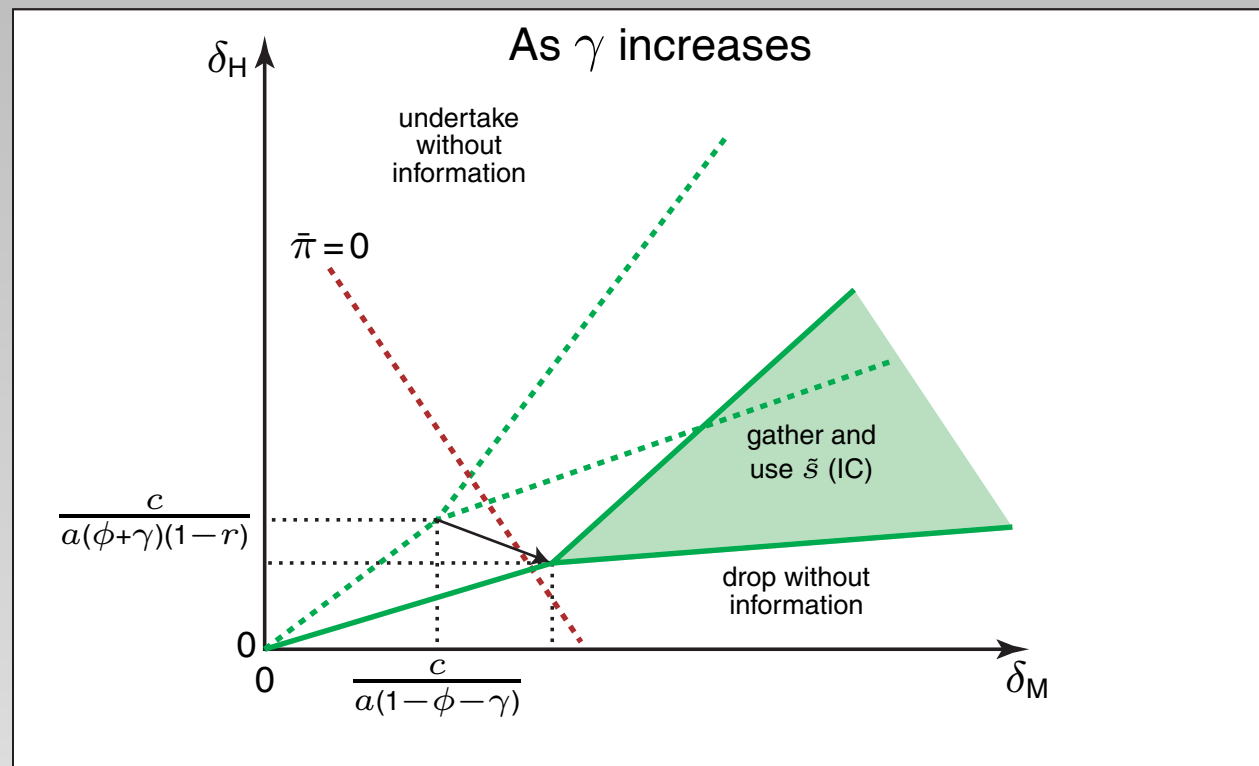
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 - Realigning the manager's risk-taking incentives (through compensation) is easier/cheaper with overconfident managers.
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 - Allows for more compensation to come from flat wage.
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