Equity allocation and risk-taking in the intermediation chain

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Bank of Spain - CEMFI Financial Stability Conference
June 3, 2019

The views expressed in this paper are our own and do not necessarily coincide with those of Banca d'Italia

Motivation

- Shift from originate-to-hold to **originate-to-distribute**
- Important driver: increase in **safe asset demand**
  - Bernanke 05, Bernanke 11, Caballero & Krishnamurty 11

$\Rightarrow$ **Securitization** creates safe assets through **diversification** of idiosyncratic loan risks

- Evidence securitization **worsens quality** of originated loans
  - Loutskina & Strahan 11, Purnanandam 11, Ashcraft et al. 19

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Questions

- How do **securitization & loan risk** respond to increase in **safety demand**?
- How emergence of securitization affects **welfare**?

This paper

Competitive equilibrium model of capital structure and loan risk in modern intermediation chain with:

1. Demand for safety by some investors
2. Idiosyncratic risk & moral hazard at loan origination

The economics of securitization:

1. Pooling of loan risks increases supply of safe assets & investment $(+)$
2. Aggravates moral hazard at origination $(-)$

$\Rightarrow$ **Quantity vs quality** trade-off

Main results

1. **Safety paradox:**

More **safety demand** leads to securitization boom & **riskier loans**

2. **Welfare effects from securitization**:

For high safety demand, originate-to-distribute intermediation **Pareto dominates** originate-to-hold model, **despite riskier loans**

3. **Government support to safe asset creation**:

Fiscally neutral government guarantees to securitized safe assets lead to **Pareto gains** & (sometimes) **riskier loans**

Timeframe and agents

- $t = 0, 1$
- Two types of investors with one unit of funds (linear utility)
  - **Savers:** invest *only in safe assets* & measure μ
  - **Experts:** skills to set-up financial firms & measure $1 - \mu$

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- Two types of **competitive** financial firms
  - Loan **originator**
  - **Intermediaries** that engage in securitization

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  - **Intermediaries** that engage in securitization
- Two types of securities issued in competitive markets:
  - **Safe** securities (S): return R_S
  - **Risky** securities (I): expected return R_I
    - [*I*ntermediaries purchase risky securities]

Originators

At $t = 0$

- CRS access to positive NPV loans with return at $t = 1$

$$A_{i,z} = \begin{cases} A_H = A_L + \Delta & \text{with prob. } p \\ A_L < 1 & \text{with prob. } 1 - p \end{cases}$$

- **Moral hazard:** risk-choice p unobservable, disutility cost $c(p)$
- Return exposed to some **idiosyncratic risk** (more next)

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- **Moral hazard:** risk-choice p unobservable, disutility cost $c(p)$
- Return exposed to some **idiosyncratic risk** (more next)
- Investment size: x
- Funding structure:
  - Equity: 1 unit from expert
  - Safe securities (S)**:** x_S units, promise $d_S x$ at $t = 1$
  - Risky securities (I): x_I units, junior promise $d_I x$ at $t = 1$
- $[x, x_S, x_I, d_S, d_I$ observable: no commitment problem$]$

Originator's problem

Given returns R_S, R_I

- Tuple $(x, x_S, x_I, d_S, d_I, p)$ **maximizing net equity return**

$$\max_{x,x_S,x_I,d_S,d_I,p} \quad R_{E,O} \equiv \left(E\left[(A_{i,z} - d_S - d_I)^+ \,|p \right] - c(p) \right) x$$

subject to

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subject to

- Funding constraint

$$x = 1 + x_S + x_I$$

- Securities' pricing constraints

$$R_S x_S = d_S x \ \& \ R_I x_I = E[\min(d_I, A_{i,z} - d_S)|p]x$$

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- **Safe repayment constraint**

$$d_S \leq A_L$$

- **Incentive compatible risk choice**

$$p = \arg\max_{p'} E\left[(A_{i,z} - d_S - d_I)^+ | p' \right] - c(p')$$

Intermediaries

At $t = 0$, given R_S, R_I

- Purchase pool of risky securities issued by originators
- Minimum pool return is $(1 - \lambda) R_I$ (**aggregate risk)**
  - **Pledgeable** to safe securities

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- Asset size y funded with equity (1 unit) & safe securities (y_S)

Problem at $t = 0$

- (y, y_S) choice to **maximize equity return**

$$\max_{y, y_S} \; R_{E,I} \equiv R_I y - R_S y_S$$

subject to

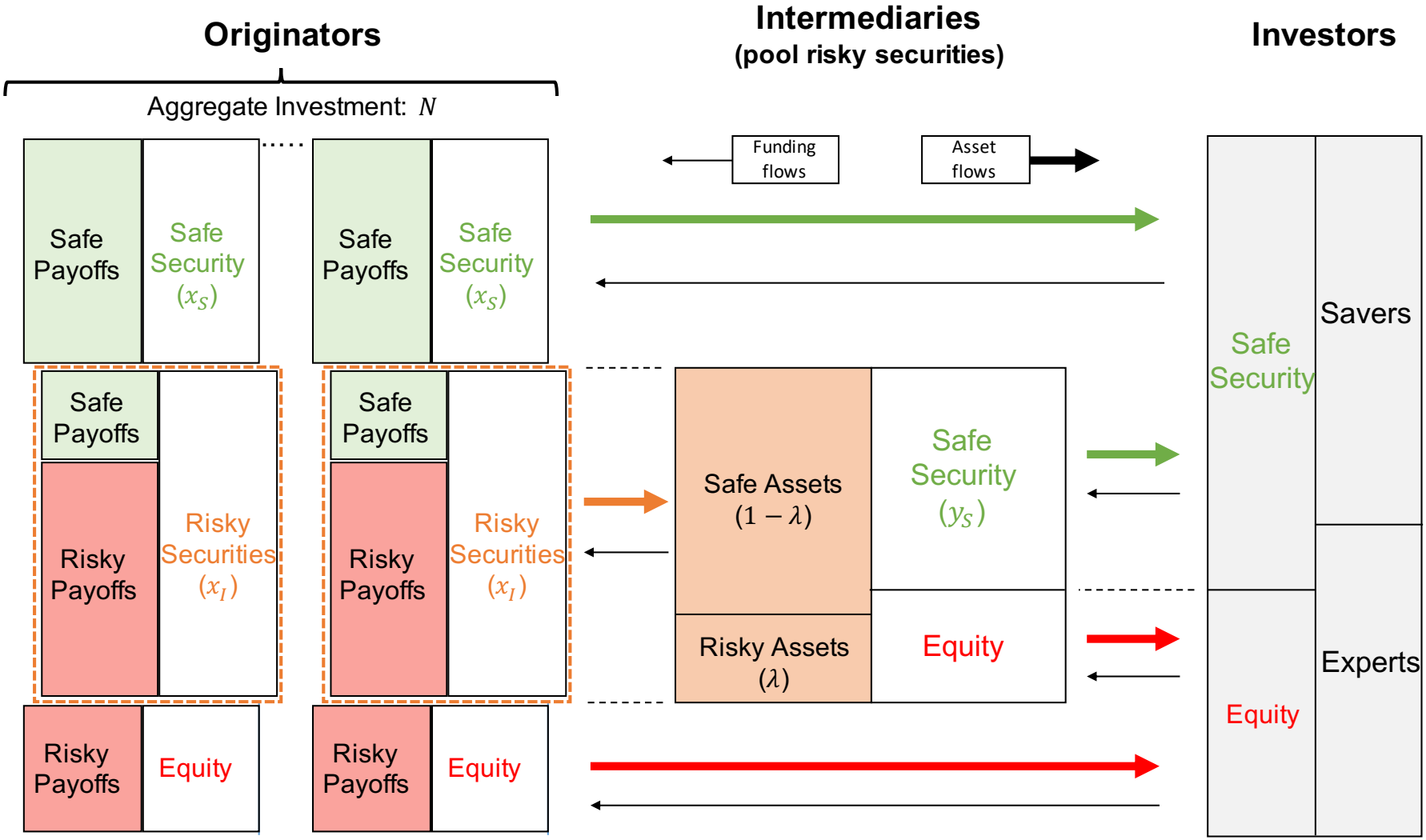
- Funding constraint

$$y = 1 + y_S$$

- **Safe repayment constraint**:

$$R_S y_S \leq (1 - \lambda) R_I y$$

Illustration: Financing flows



Competitive equilibrium

Given safety demand μ, a **competitive equilibrium** is:

- Originators' & intermediaries balance sheet choices
- Aggregate amount of equity E_O^*, E_I^* and lending N^*
- Expected returns on securities R_S^*, R_I^* and equity R_E^*

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such that

1. Originators and intermediaries solve their problems
2. Equity return is R_E^* for all active financial firms
3. Agents' investment and consumption decisions are optimal
4. Market for safe securities clears:

$$\text{Demand by } S \text{ \& } E = \text{Supply by } O \text{ \& } I$$

5. Market for risky securities clears:

$$\text{Demand by } I \ = \text{Supply by } O$$

Benchmark: No intermediaries (traditional economy)

- All originators' external funding safe
  $\Rightarrow$ **No moral hazard**: efficient p choice
- One financing friction: savers only value safe return A_L

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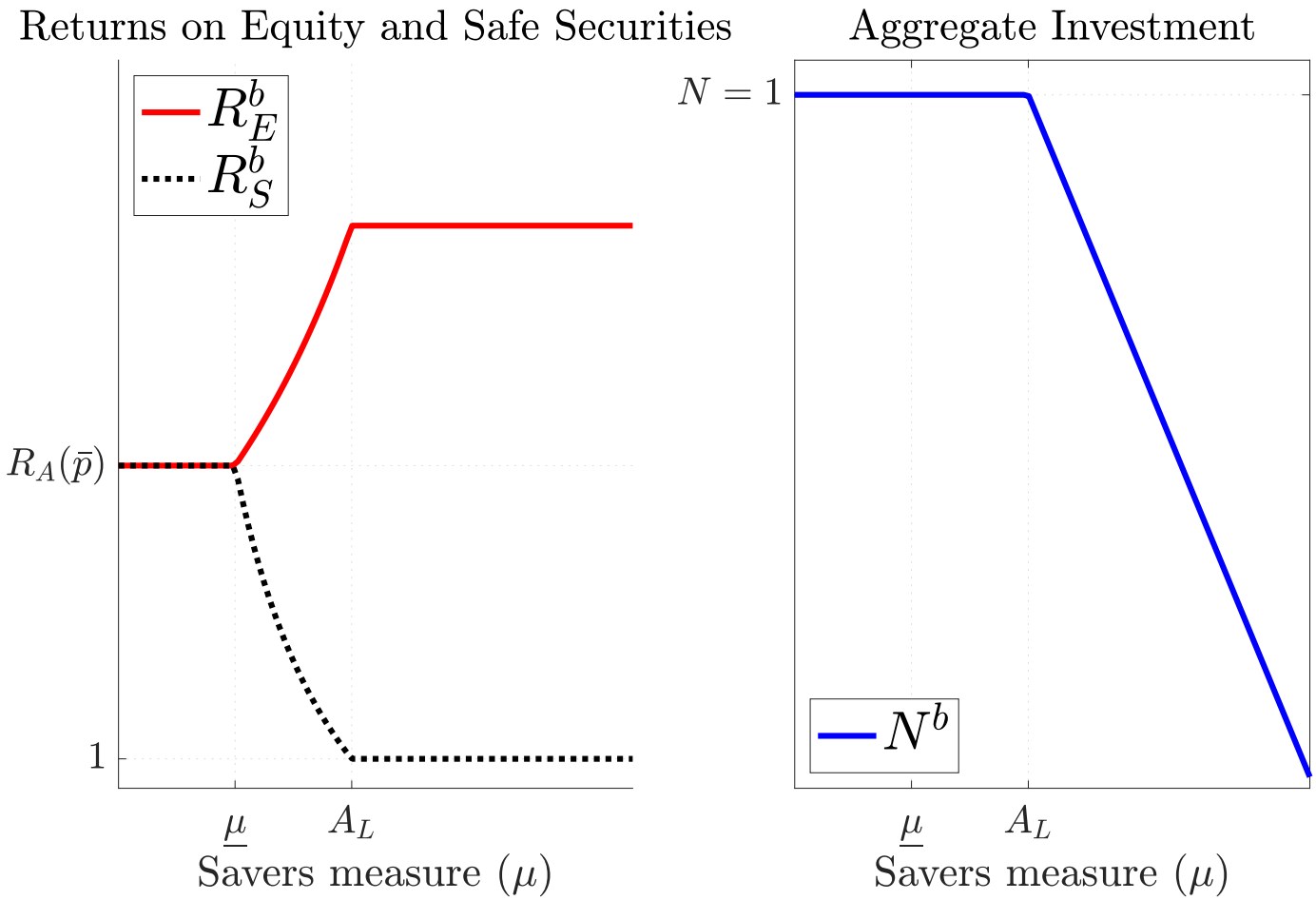
(Prop) Three equilibrium regions

1. Low μ : safe pay-offs **abundant**
   - Max safe rate, no equity spread; full investment
2. Medium μ : safe pay-offs **scarce**
   - Safe rate falls, equity spread increases; full investment
3. High μ : safe pay-offs **very scarce**
   - Minimum safe rate, max equity spread; not full investment

Illustration: Equilibrium without intermediaries



- If $R^b_E > R^b_S$, experts can exploit spread by creating safe assets with intermediaries

Equilibrium with intermediaries: private trade-offs

- Due to market segmentation: $R_S^* \leq R_I^* \leq R_E^*$

Originator risky external funding choice

- Optimal d_I^* trades-off leverage gains & MH costs

(Prop) d_I^* & p^* determined by **discount** $\frac{R_E^*}{R_I^*}$ in funding of risky returns **offered by intermediary** relative to equity cost

- $\frac{R_E^*}{R_I^*} \uparrow$: higher risky promises & riskier loans ($d_I^* \uparrow$ & $p^* \downarrow$)

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Funding discount pass-through

(Lemma) Intermediary funding discount $\frac{R_E^*}{R_I^*}$ is weighted average:

$$\frac{R_E^*}{R_I^*} = (1-\lambda)\frac{R_E^*}{R_S^*} + \lambda$$

$\Rightarrow$ If $\frac{R_E^*}{R_S^*} \uparrow$ then intermediary funding more attractive ($\frac{R_E^*}{R_I^*} \uparrow$)

Equilibrium with intermediaries

Aggregate effects from securitization

- Intermediaries increase supply of safe securities:

$$\text{Supply (per loan)} = \frac{A_L}{R_S^*} + \underbrace{\frac{(1-\lambda)p^* d_I^*}{R_S^*}}_{\text{Securitized safe assets}}$$

- Equity reallocated from origination to intermediation

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(Main Prop) **Properties of equilibrium with intermediaries**

1. Higher aggregate investment :

$$N^* \geq N^b \text{ and } N^* > N^b \text{ for high } \mu$$

2. Riskier originated loans:

$$p^* \leq p^b \text{ and } p^* < p^b \text{ for medium/high } \mu$$

3. Equilibrium is Pareto constrained efficient

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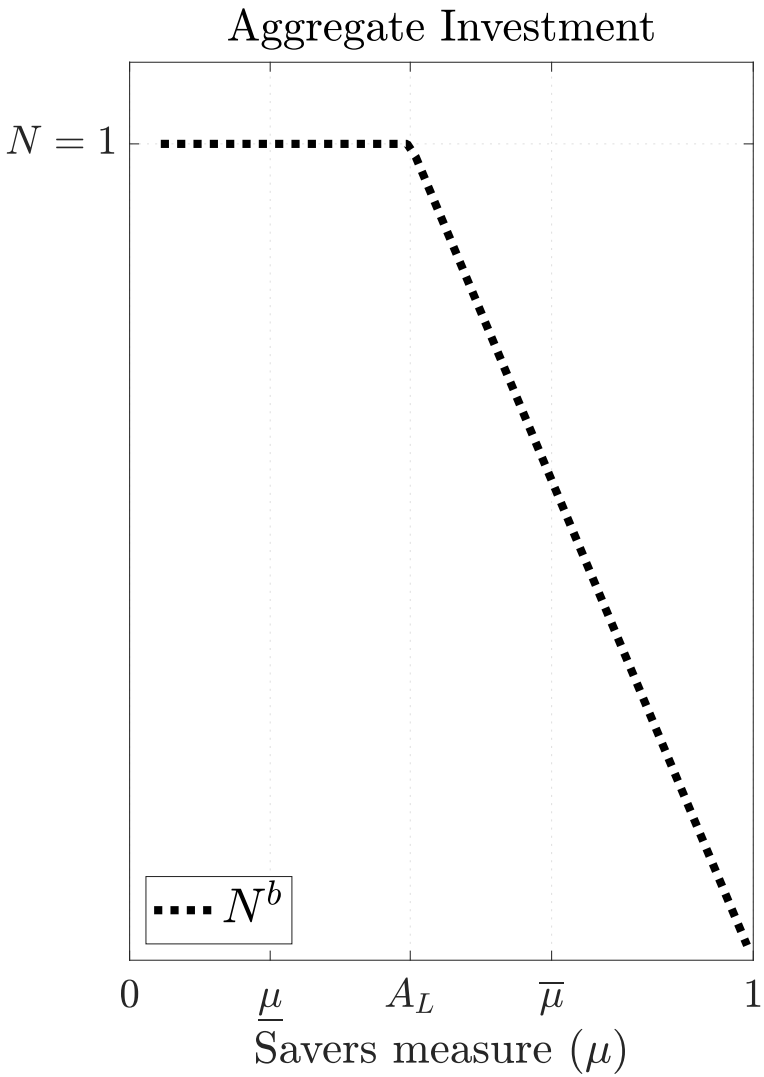

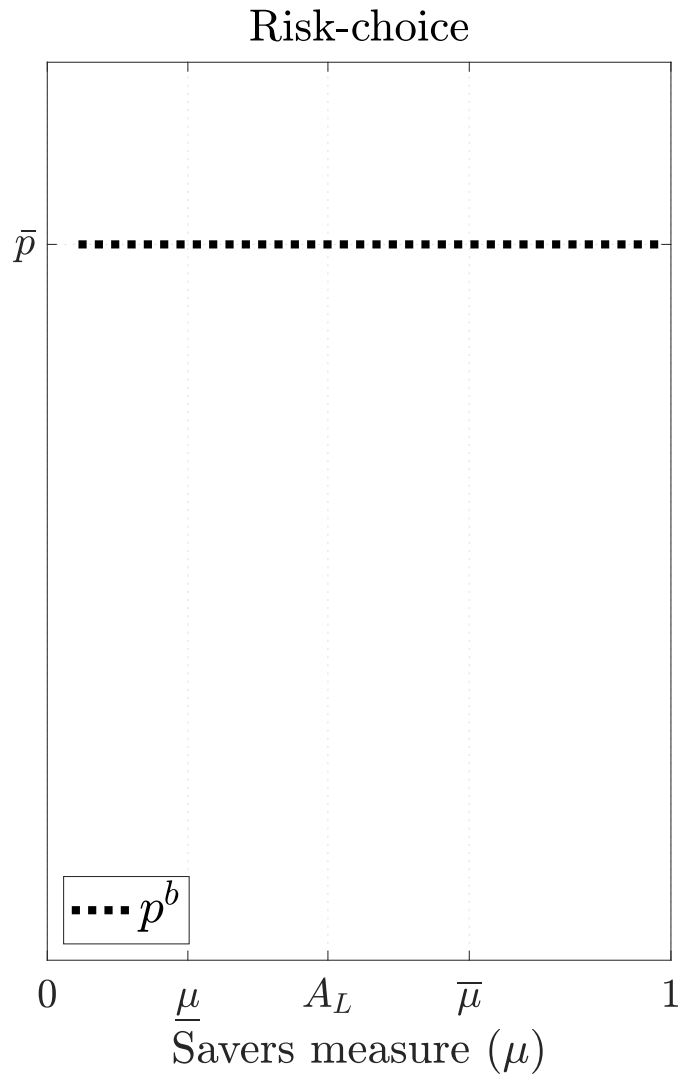

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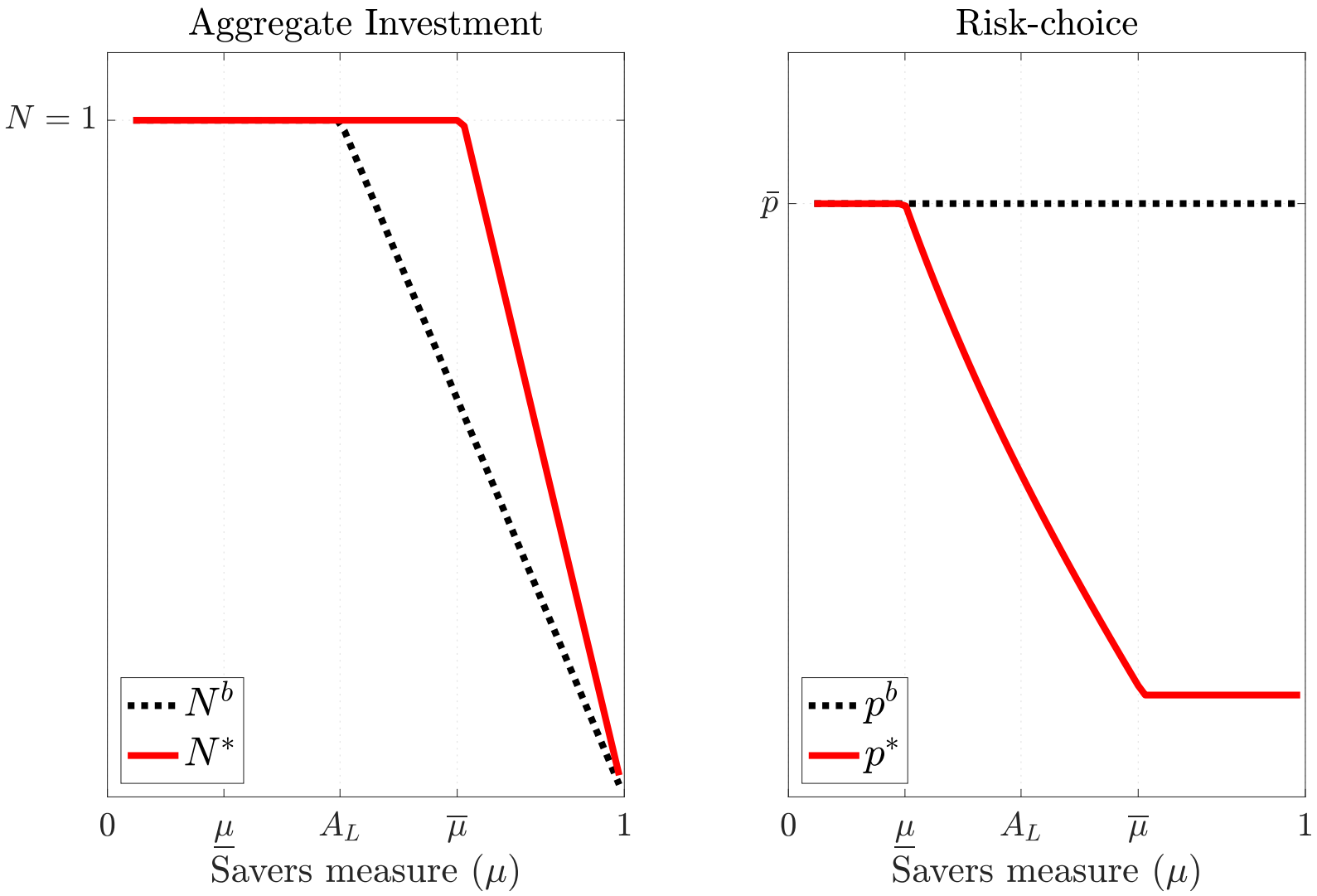
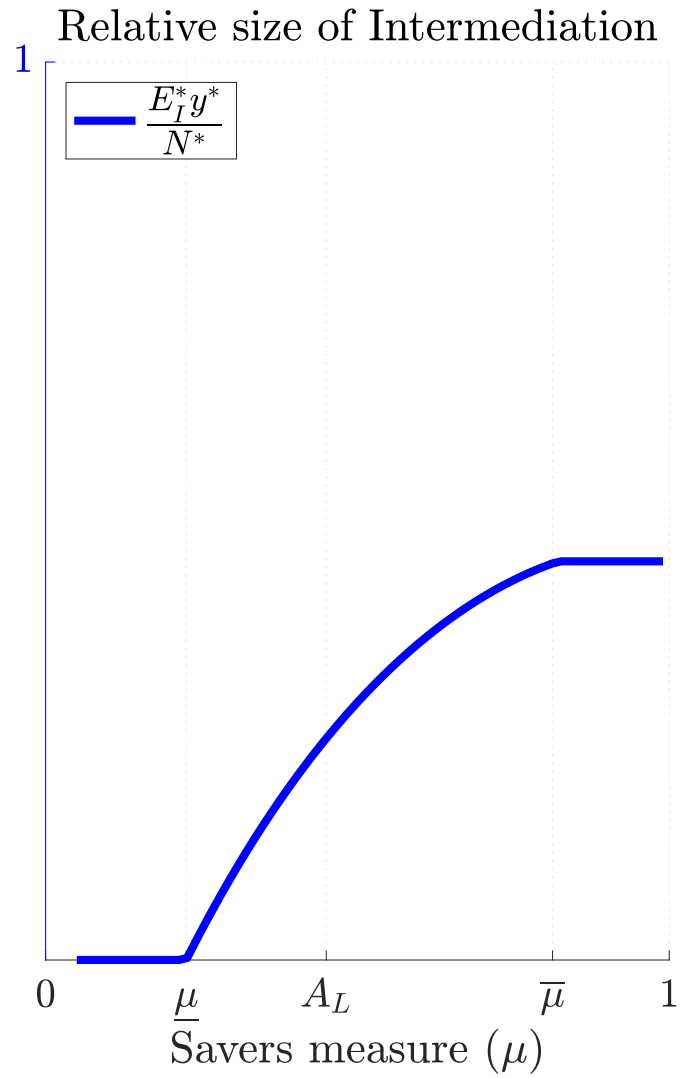
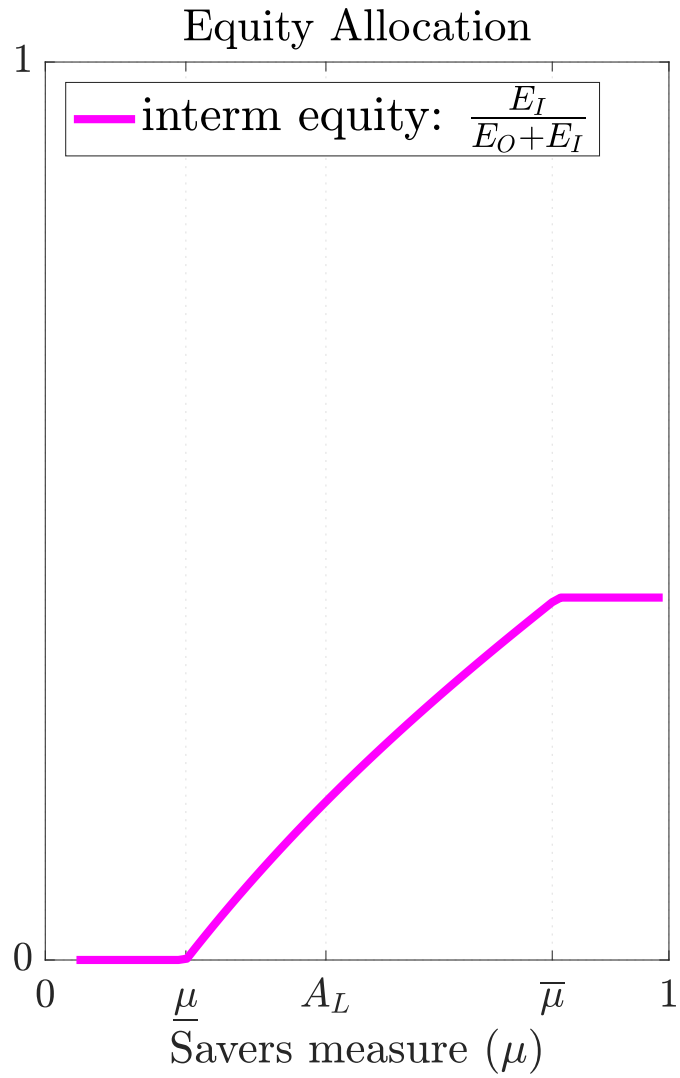


$\Rightarrow$ **Safety paradox**: more demand for safety, riskier loans

Illustration: Securitization boom & equity reallocation





Welfare implications of emergence of securitization

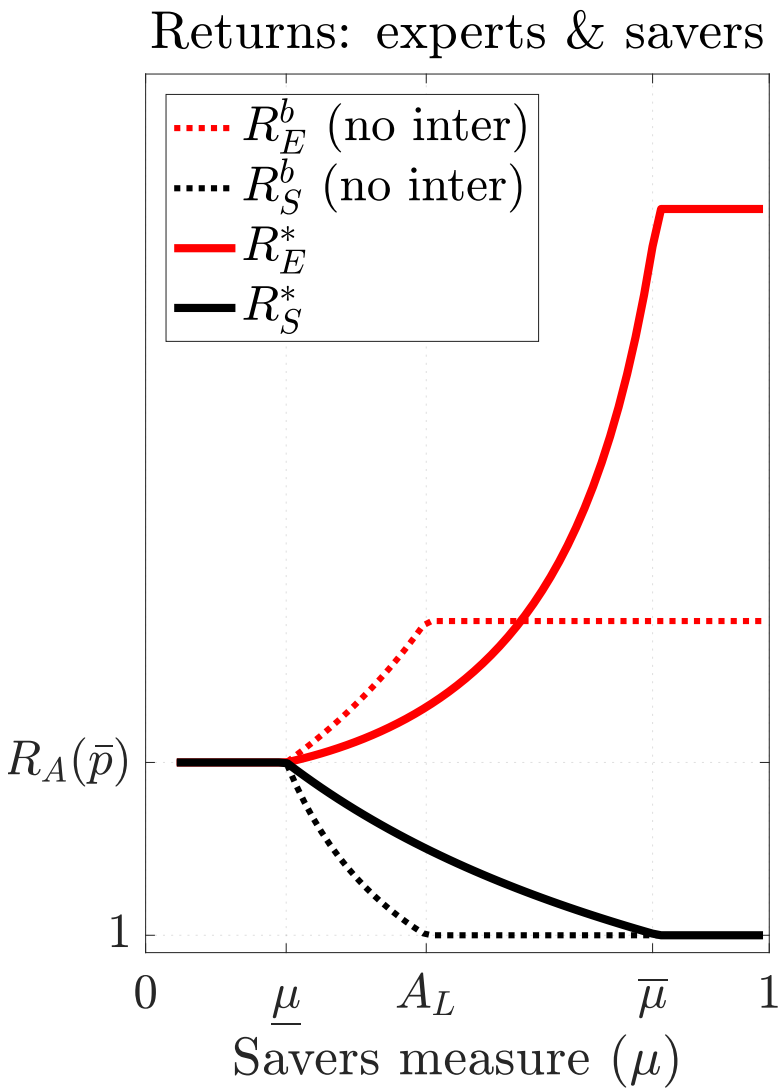
Quantity vs quality welfare trade-off:

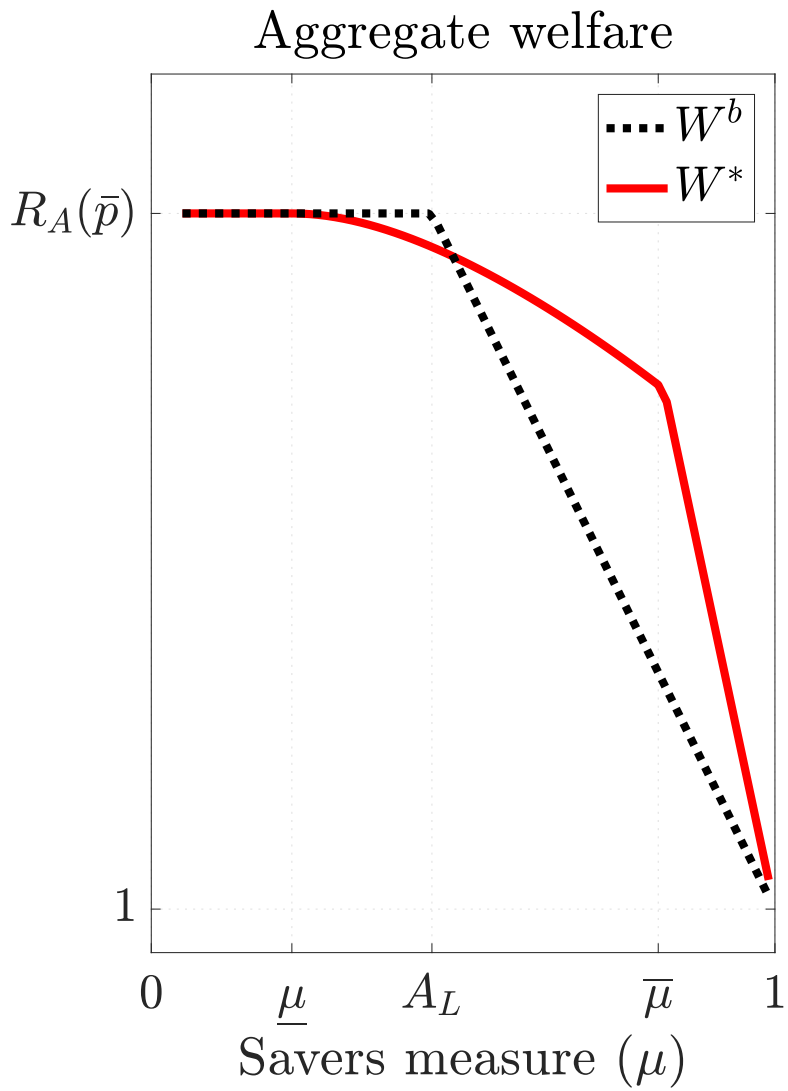
1. More aggregate investment $(+)$
2. Riskier originated loans $(-)$

(Prop) **Welfare effect** from securitization

1. Medium μ : Aggregate welfare losses
   - Because (close to) full investment in traditional economy
2. High μ : Pareto (& agregate welfare) gains
   - Because very low investment in traditional economy

Illustration: Welfare implications





Government guarantees

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- Can it use them to mitigate costs from safe asset scarcity?

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(Prop) **Fiscally neutral guarantees** to safe securities issuance + lump sum transfers lead to Pareto gains & sometimes riskier loans

Intuitions

- Guarantees **substitute for loss absorption** role of equity at intermediation
- Allow for equity reallocation towards skin-in-the-game role

$\Rightarrow$ Optimal to direct guarantees towards securitized assets

Conclusions

- Equilibrium model of the manufacturing of safe assets through securitization
- New demand for safety paradox:
  - Securitization is response to demand for safety
  - Yet, creation of safe assets worsens quality of originated loans
- Rich welfare effects from emergence of securitization depending on demand for safety
- Rationale for Government guarantees to issuance of securitized assets

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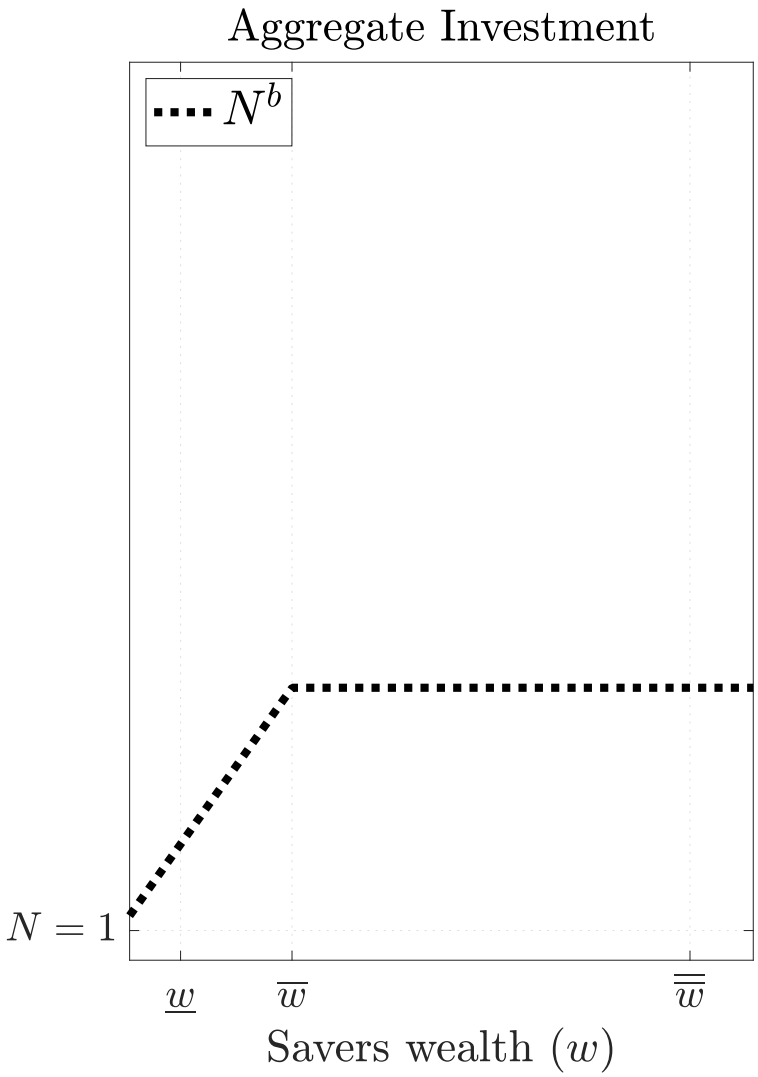

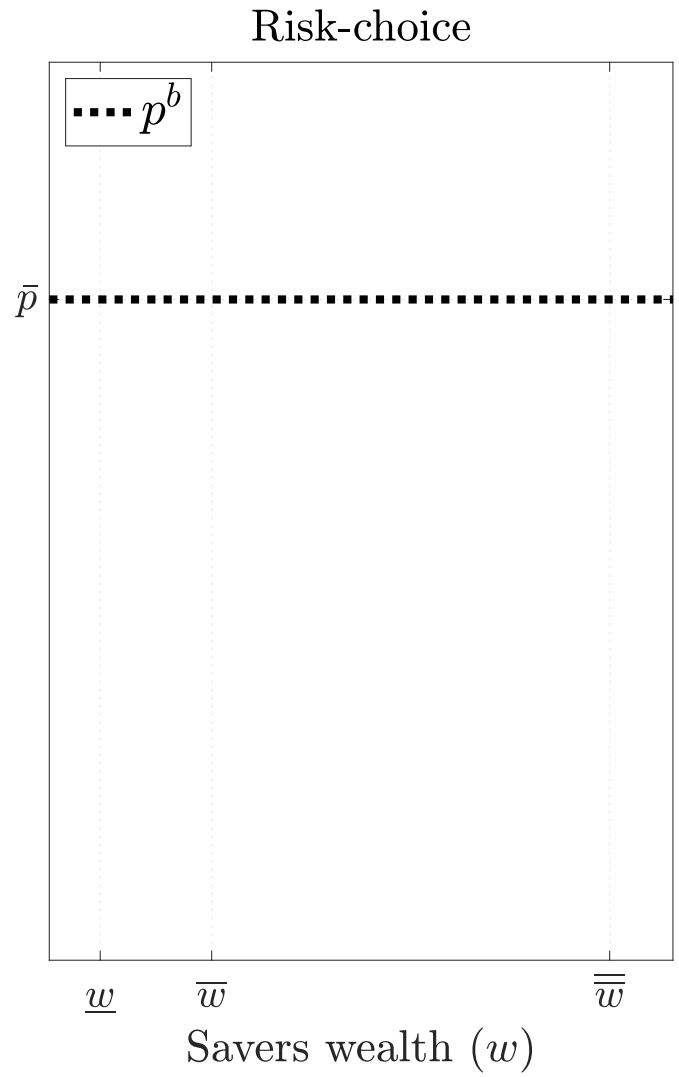

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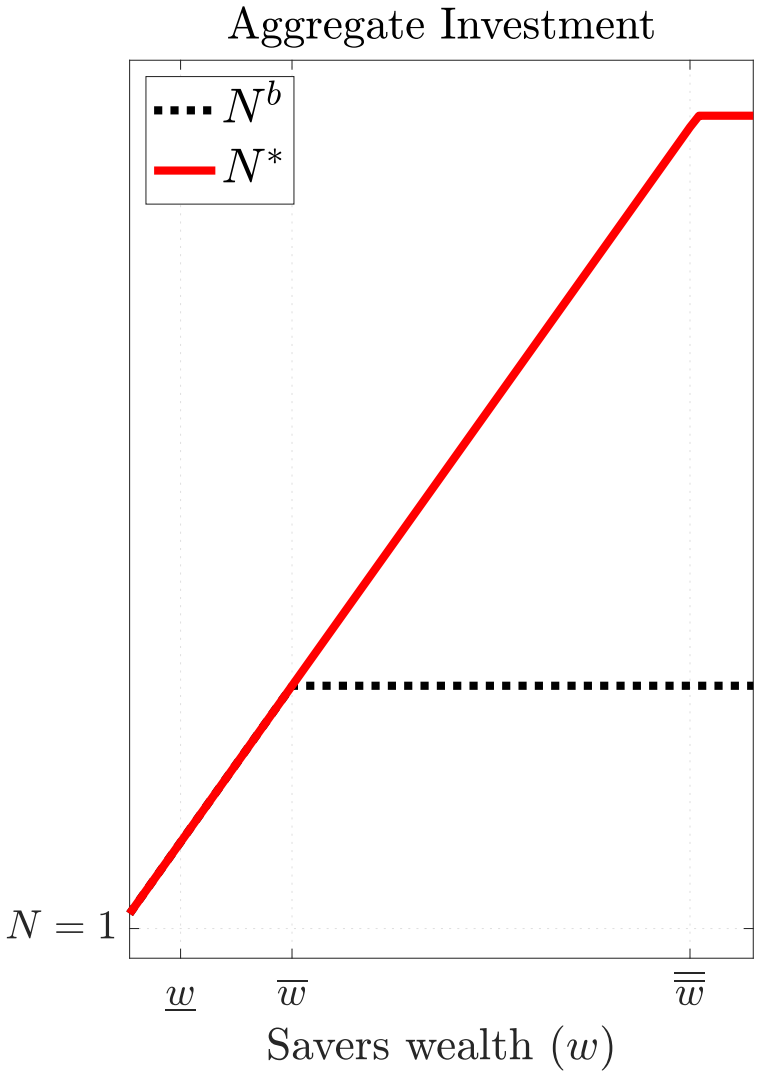

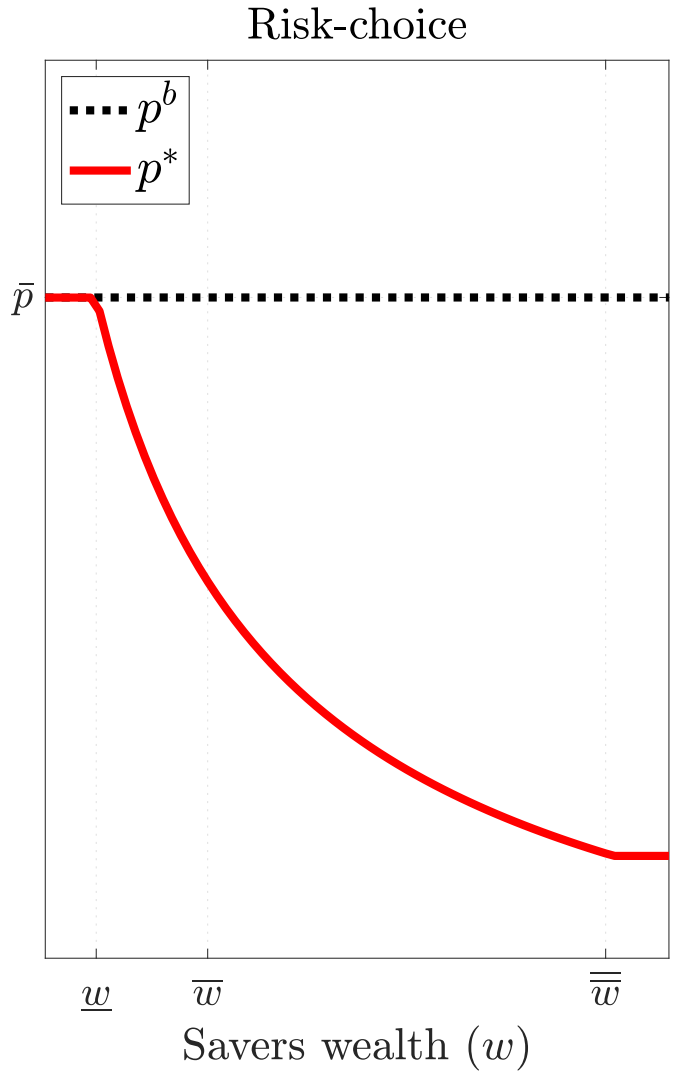

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