Macroeconomics of Financial Markets

Regulation and Policy

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REGULATION (or intervention?)

Financial Intervention

- Two leading views of financial intervention.
  - Ex-ante policies (macroprudential) are good (they prevent crises!).
  - Ex-post policies (bailouts) are bad (they induce crises!).

- but....
  - Ex-ante policies also have costs (they are blunt).
  - Ex-post policies also have benefits (they are focused).

- What is the optimal mix?
- **Main paper: Jeanne and Korinek (16).....my own version**

A Simple Story

- Let's start with a setting without financial amplification
- Entrepreneurs.
  - Endowment 1 at $t = 0$.
  - Project at $t = 1$.
    - Pays $Y > 1$ (probability $1 - p$).
    - Pays xY if a fraction x is refinanced (probability p).
  - Savings s at $t = 0$ refinances $x = s$ if needed (lost if not needed).
- Households.
  - Endowment 1 at $t = 1$.
- Government
  - Can tax individuals to maximize welfare

$$\underbrace{\eta}_{\texttt{Weight<1}} \left[\underbrace{u(c_0^e) + (1-p)u(c_{1,g}^e) + pu(c_{1,b}^e)}_{\texttt{U of entrepreneurs}} \right] + \underbrace{u(c_1^h)}_{\texttt{U of hhs}}$$

First Best

- No financial frictions: Entrepreneurs can borrow b from households at a price 1 (since no default and no discounting).

$$\begin{array}{lll} \max\limits_{s,b} & u(1-s)+(1-p)u(Y)+pu(sY+b(Y-1)) & \\ s.t. & b \leq 1 \qquad and \qquad & s+b \leq 1 \end{array}$$

- First best is given by $s = 0$ and $b = 1$.
- The whole project is refinanced!

- Also implementable if the government has access to lump-sum transfers across agents (irrelevance of financial frictions)!

Laissez Faire

- Entrepreneurs cannot borrow from households ($b = 0$).

$$\max_s u(1-s) + (1-p)u(Y) + pu(sY)$$

$$pYu'(sY) = u'(1-s)$$

- If $u(c) = \log(c)$

$$s = \frac{p}{1+p}$$

- Only a fraction $\frac{p}{1+p}$ gets refinanced!

Bailouts

- Conditional on refinancing needs, the government solves.

$$\begin{aligned} \max_{\widehat{s}} \quad & \eta u((s+\widehat{s})Y) + u(1-\widehat{s}) \\ s.t. \quad & s+\widehat{s} \leq 1 \end{aligned}$$

$$\eta Y u'((s+\widehat{s})Y) = u'(1-\widehat{s})$$

- If $u(c) = \log(c)$

$$\widehat{s} = \frac{\eta - s}{1+\eta}$$

Bailouts

- How entrepreneurs react ex-ante knowing bailouts will occur.

$$\max_s \log(1-s) + (1-p)\log(Y) + p\log((s + \underbrace{\widehat{s}}_{\frac{\eta - s}{1+\eta}})Y) + \lambda s$$

$$\lambda = \underbrace{\frac{1}{1-s}}_{MC(s)} - \underbrace{\frac{p}{1+s}}_{MB(s)} > 0 \qquad \Rightarrow \qquad s = 0$$

- Only a fraction $\frac{\eta}{1+\eta}$ gets refinanced!

Ex-ante optimum mix

- Ex-ante the government solves

$$\begin{aligned} \max_{s,\widehat{s}} \quad & \eta\left[u(1-s)+(1-p)u(Y)+pu((s+\widehat{s})Y)\right]+(1-p)u(1)+pu(1-\widehat{s}) \\ s.t. \quad & s+\widehat{s}\leq 1 \end{aligned}$$

$$\begin{aligned} \eta pYu'((s+\widehat{s})Y) &= \eta u'(1-s) \\ \eta pYu'((s+\widehat{s})Y) &= pu'(1-\widehat{s}) \end{aligned}$$

Then

$$\underbrace{\frac{u'(1-s)}{p}}_{\texttt{MC of } s} = \underbrace{\frac{u'(1-\widehat{s})}{\eta}}_{\texttt{MC of } \widehat{s}}$$

Ex-ante optimum mix

- Ex-ante the government solves

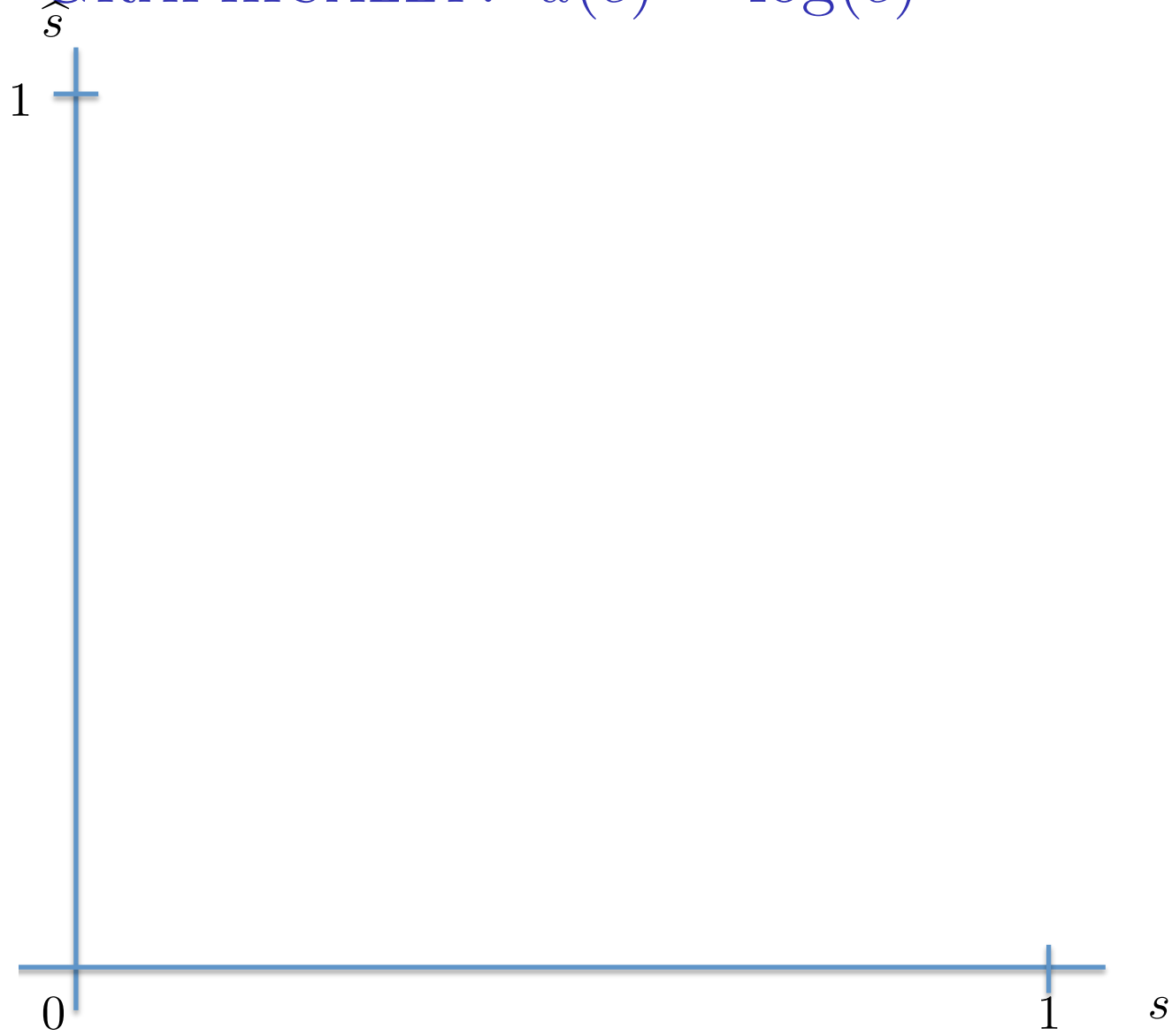
$$\begin{aligned} \max_{s,\widehat{s}} \quad & \eta\left[u(1-s)+(1-p)u(Y)+pu((s+\widehat{s})Y)\right]+(1-p)u(1)+pu(1-\widehat{s}) \\ s.t. \quad & s+\widehat{s}\leq 1 \end{aligned}$$

$$\begin{aligned} \cancel{\eta} \cancel{p} Y u'((s+\widehat{s})Y) &= \cancel{\eta} u'(1-s) \quad \Rightarrow \textit{Entrepreneurs' ex-ante RF} \\ \eta \cancel{p} Y u'((s+\widehat{s})Y) &= \cancel{p} u'(1-\widehat{s}) \quad \Rightarrow \textit{Government's ex-post RF} \end{aligned}$$

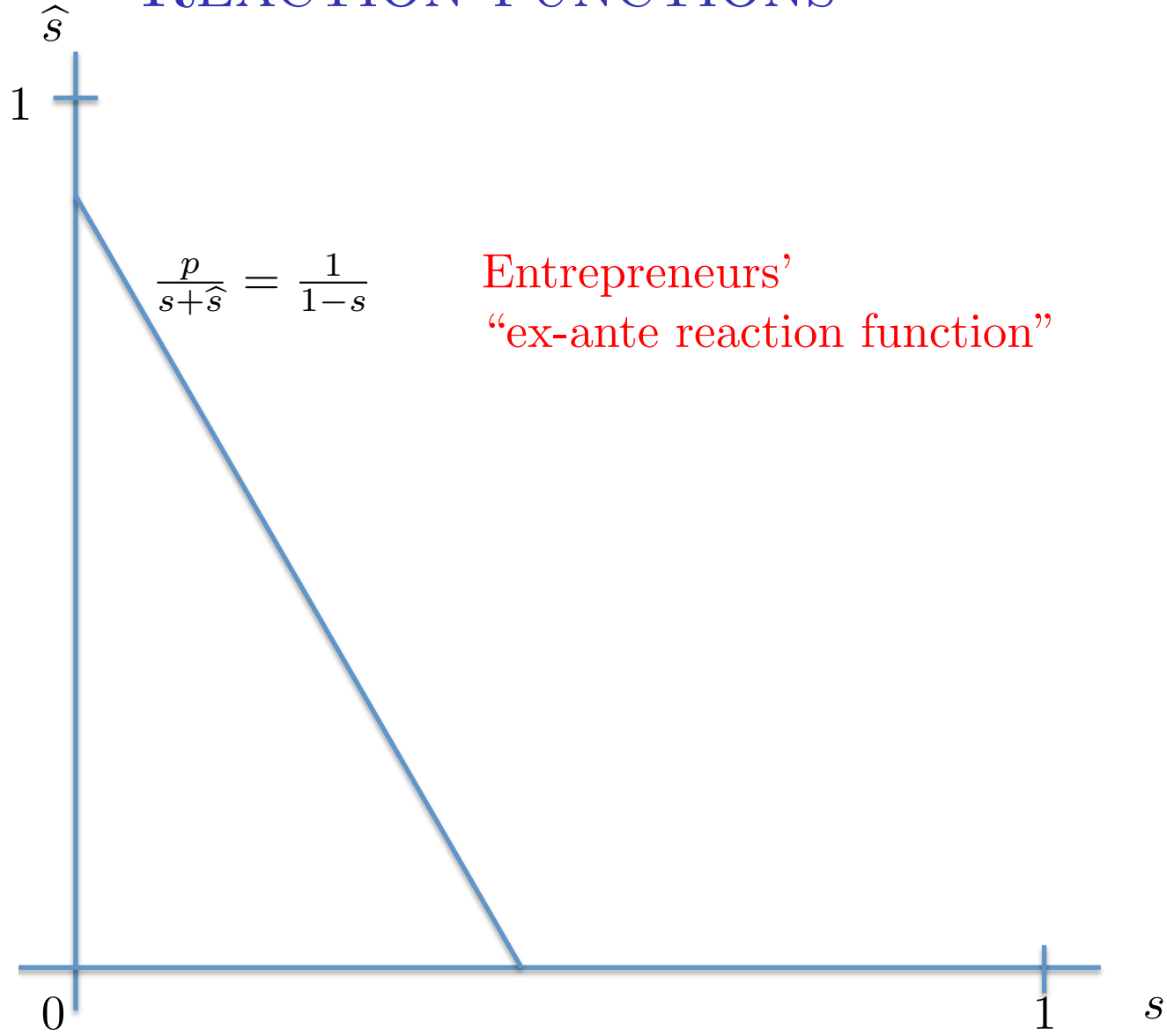
Then

$$\underbrace{\frac{u'(1-s)}{p}}_{\texttt{MC of } s} = \underbrace{\frac{u'(1-\widehat{s})}{\eta}}_{\texttt{MC of } \widehat{s}}$$

Graphically: $u(c) = \log(c)$



Reaction functions



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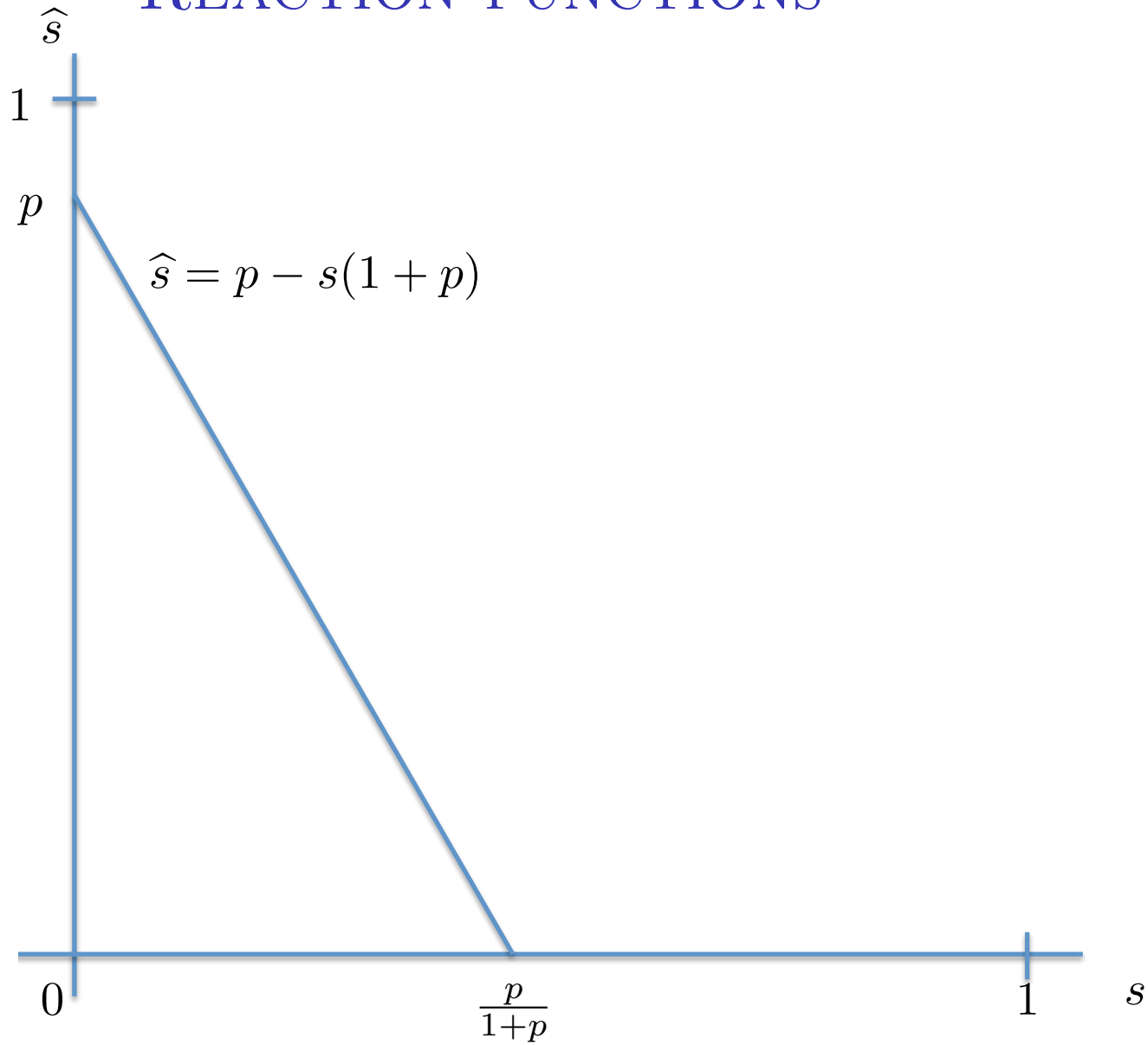

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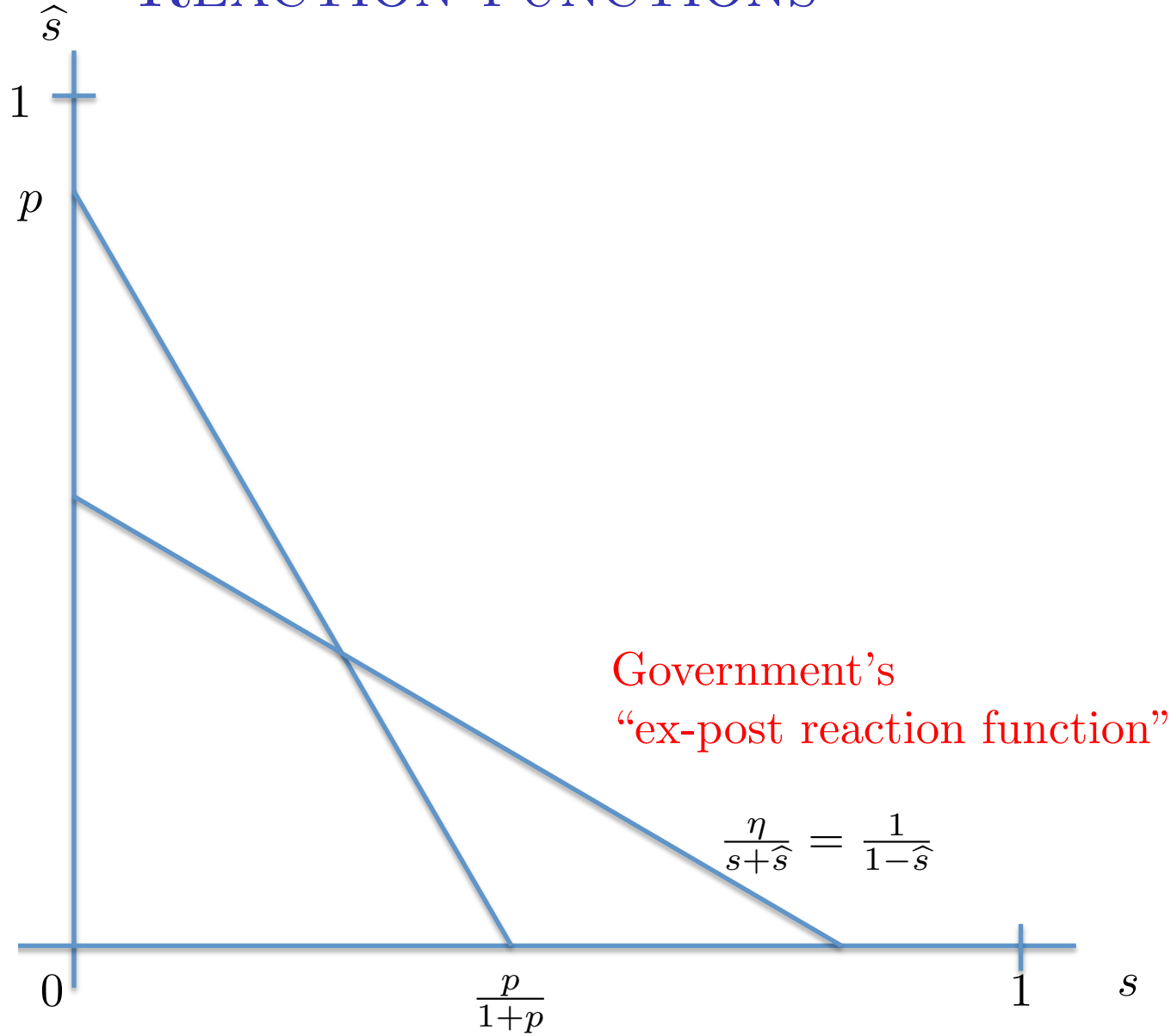

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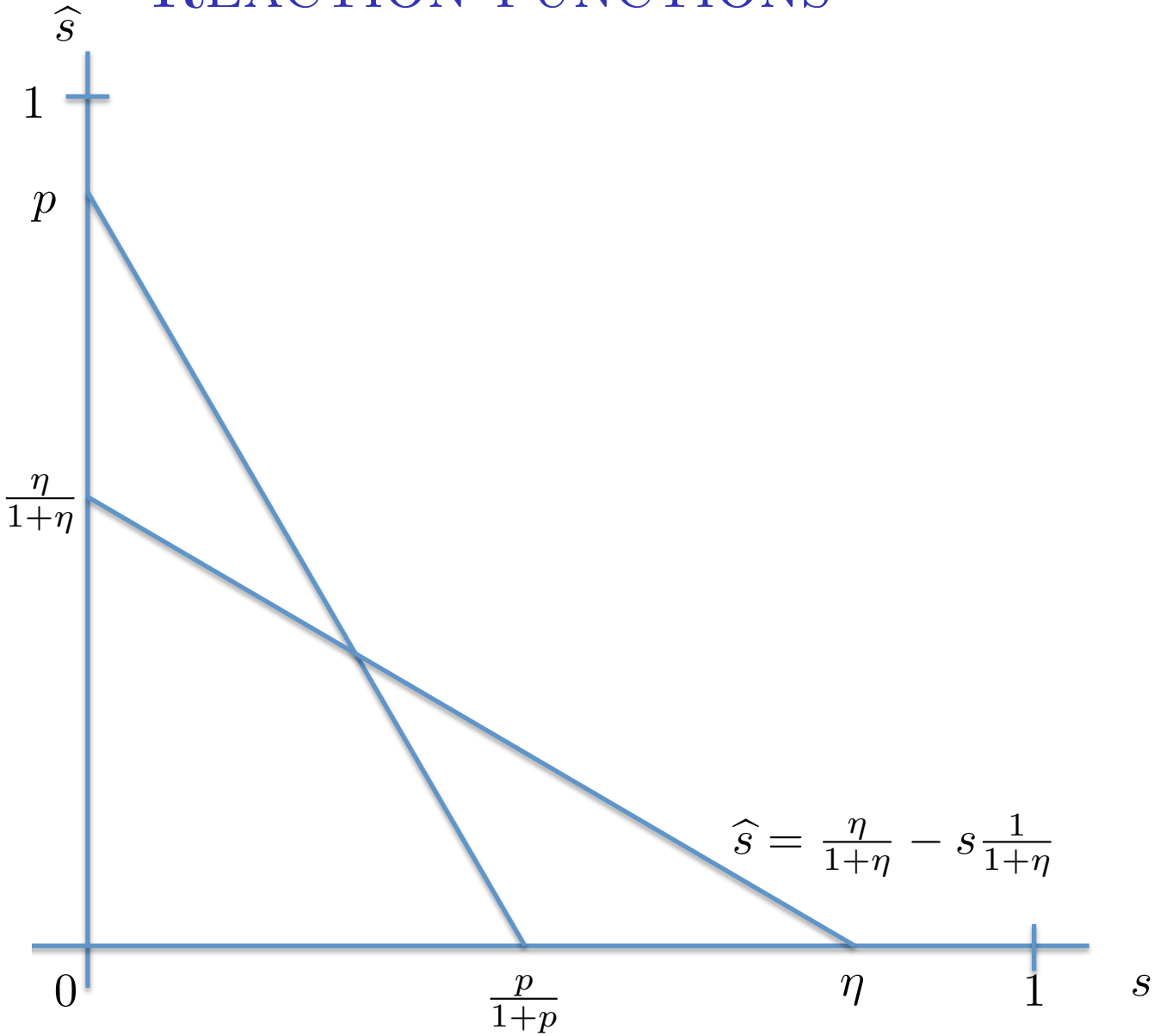
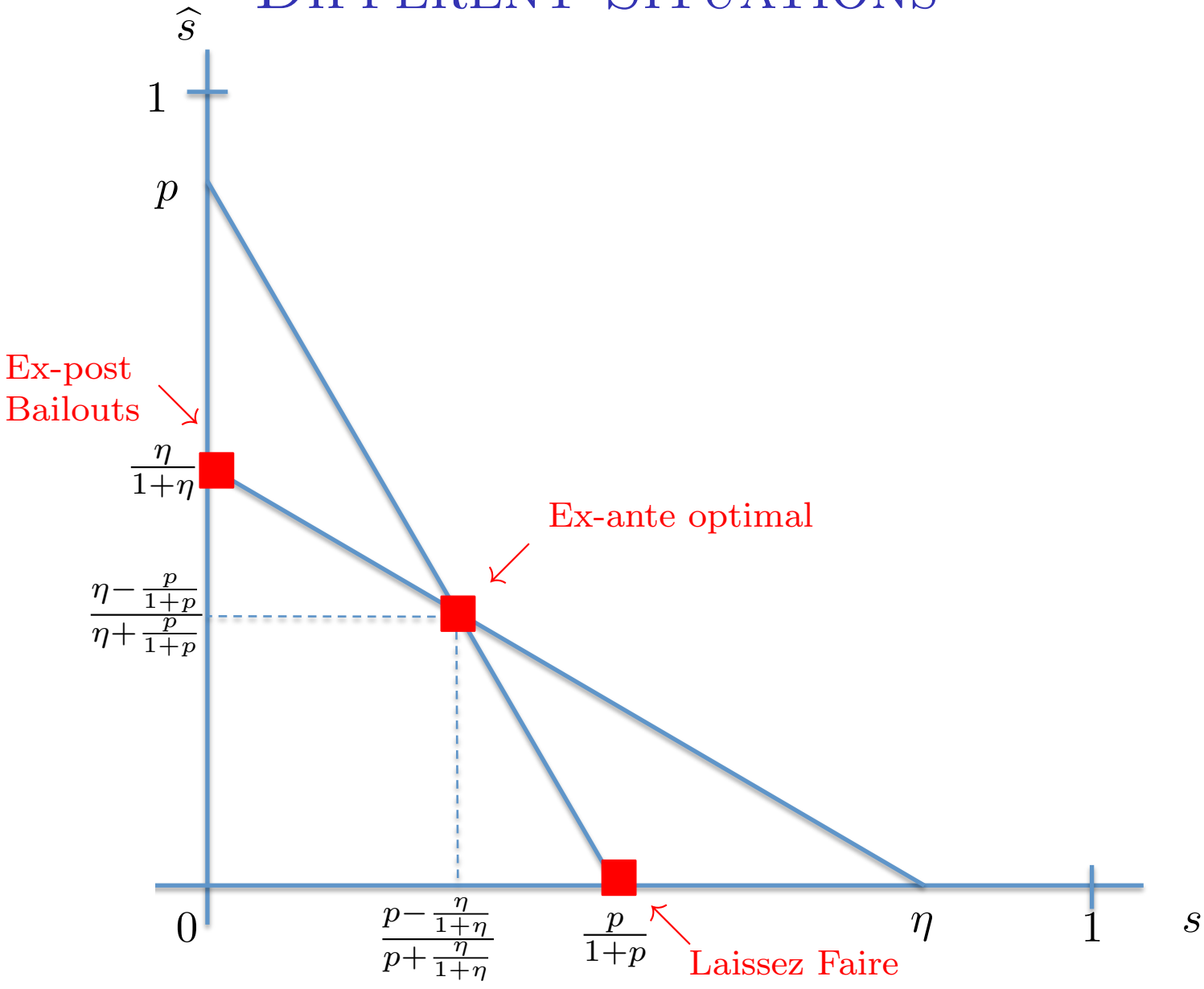


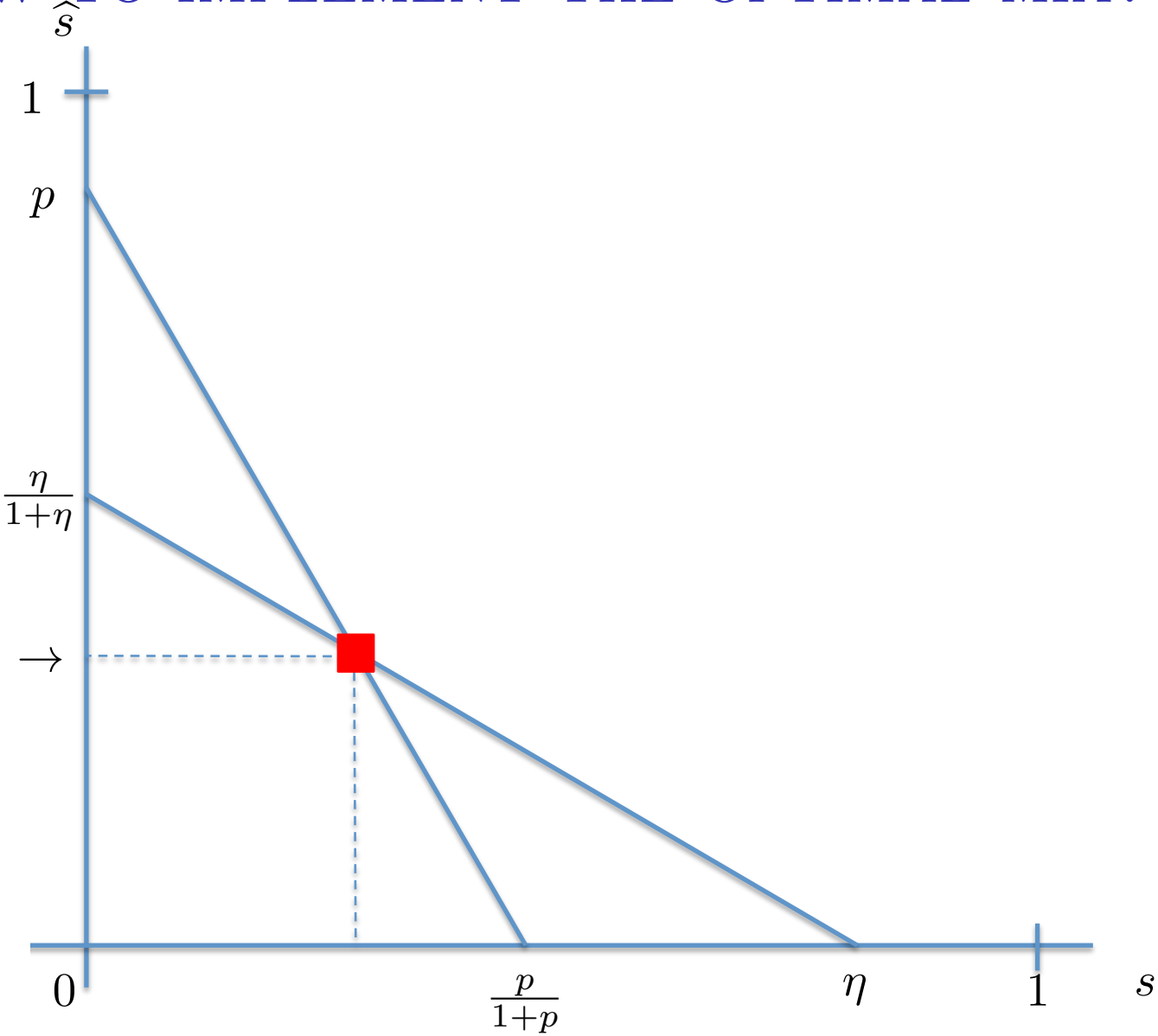
Different Situations

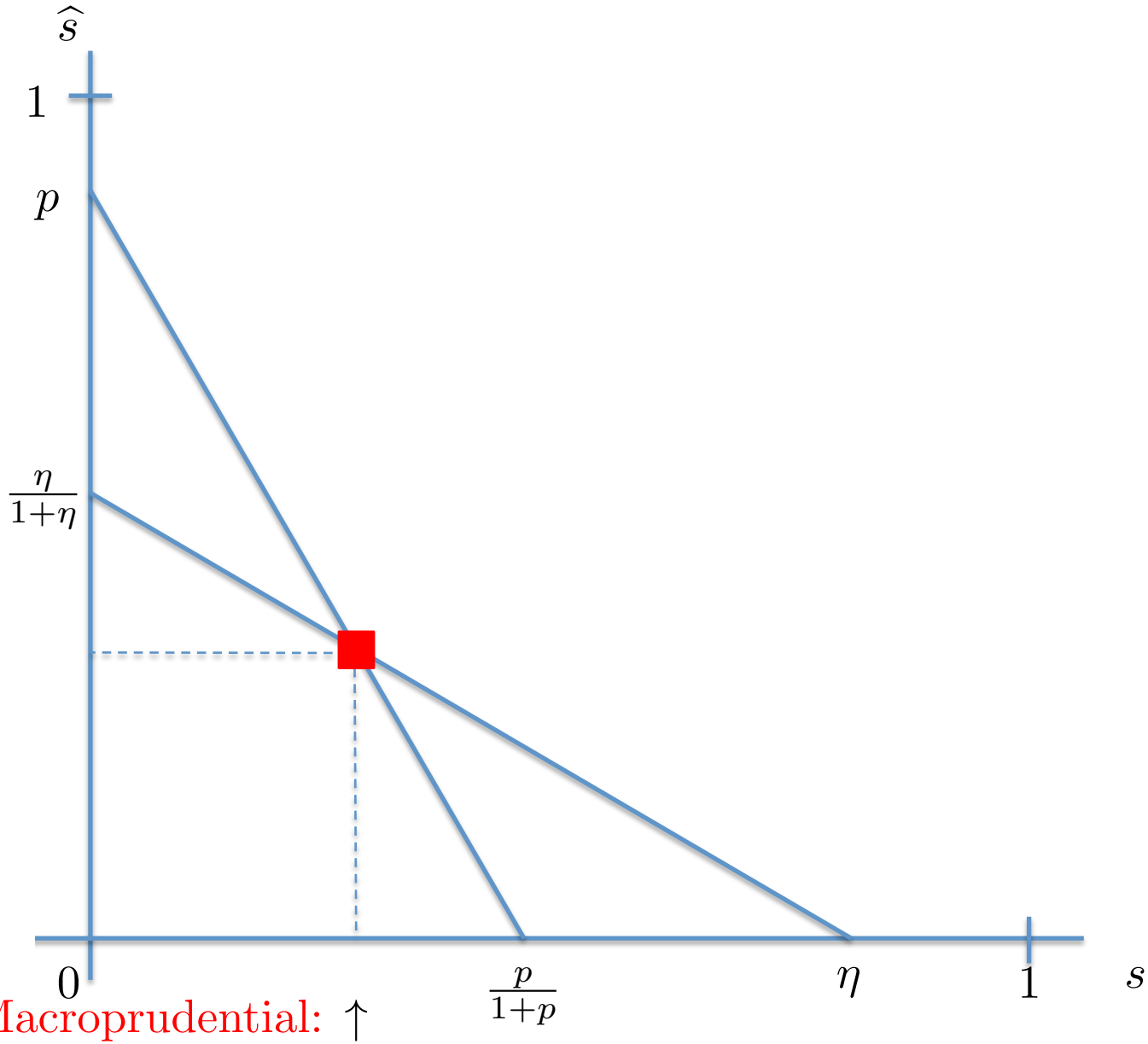


How to implement the optimal mix?

Commitment:

Never bailout more than $\widehat{s}^*$ $\rightarrow$





Macroprudential: ↑

Tax s^* to entrepreneurs.

Main Point

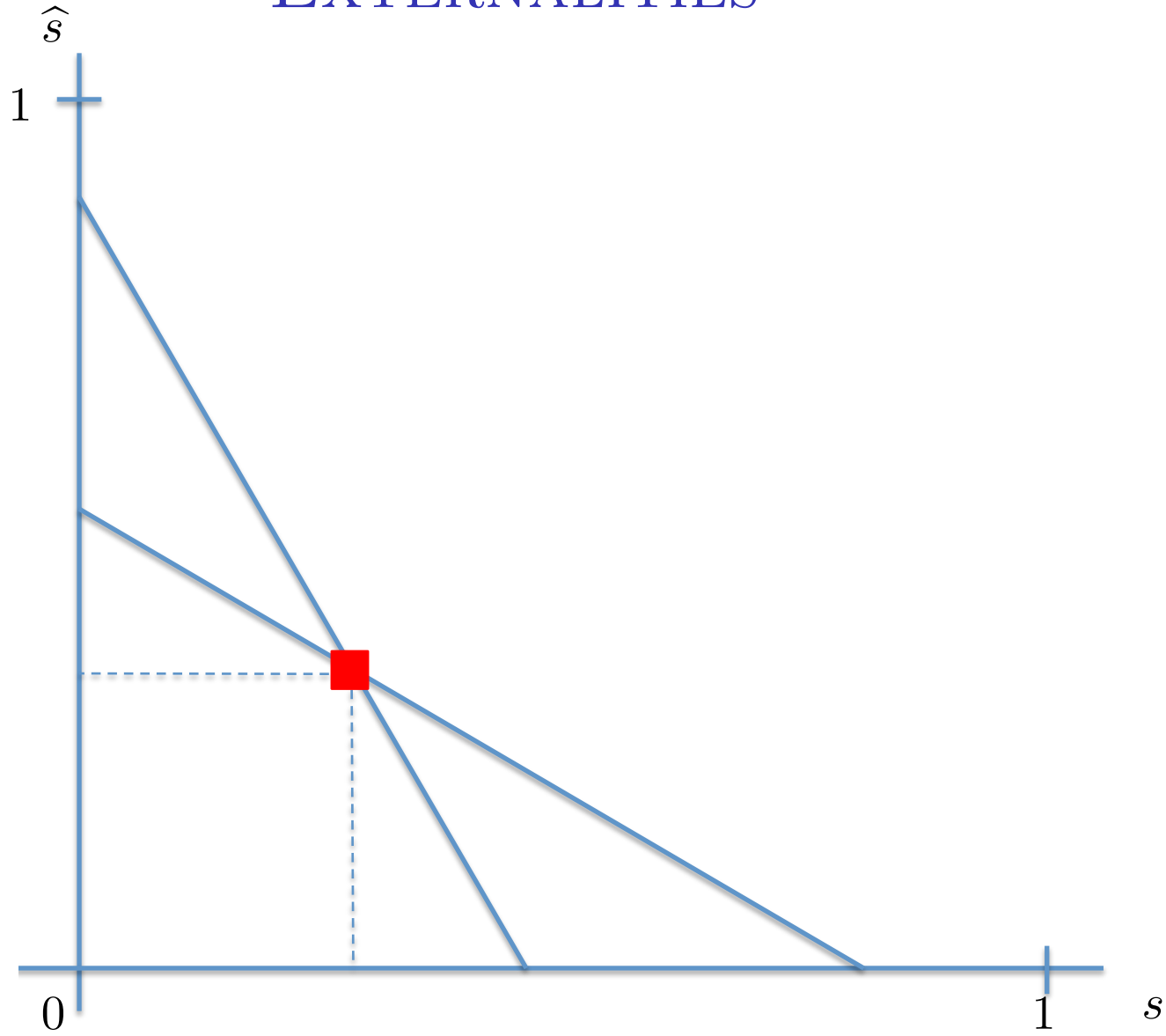
- Applying the right policy ex-ante policy (tax s^*) eliminates the time inconsistency and implements the ex-ante optimal.

- Two policies (taxes to entrepreneurs and households) to hit two targets (s^* and $\widehat{s}^*$).

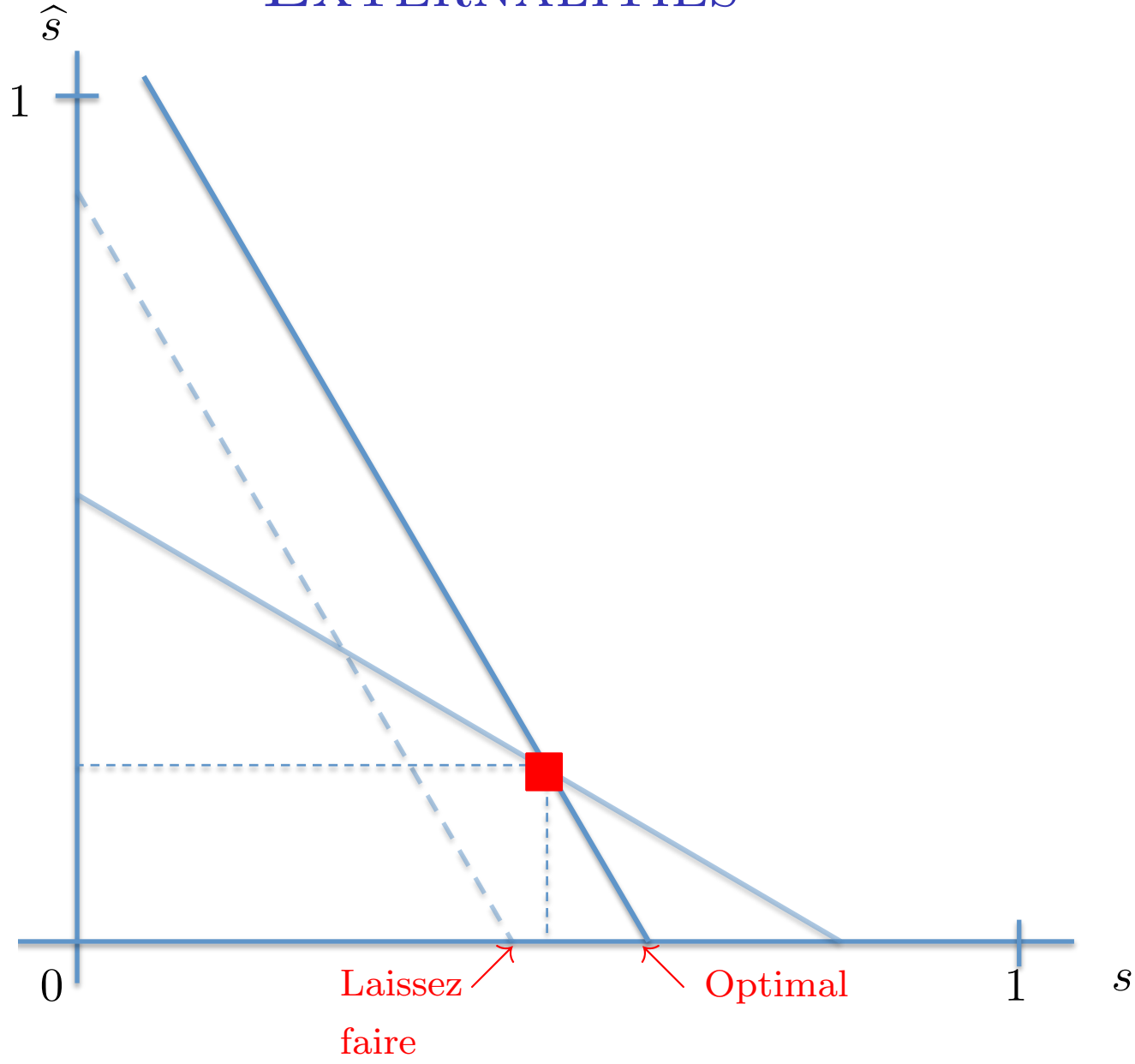
- We do not need externalites to justify macroprudential policies!

- Now we can ask how externalities affect the optimal mix!
  How do they affect reaction functions?

Externalities



Externalities



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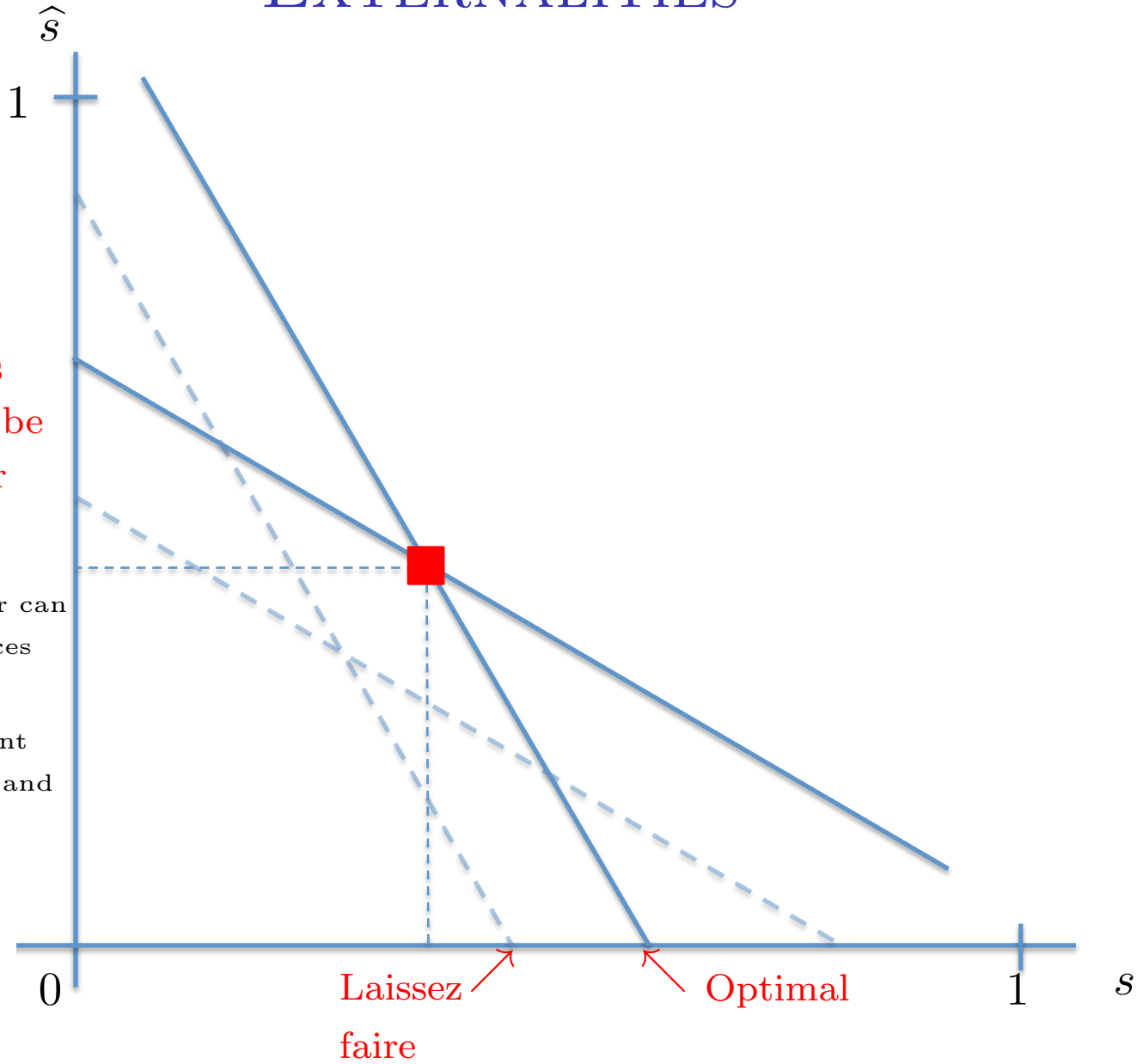


Externalities are likely to be solved better ex-post

How a regulator can affect asset prices ex-post?

Also commitment issues (Bianchi and Mendoza)

Is there always over borrowing?

- Pecuniary externalities may not induce over-borrowing!
  - Benigno et al. (11) show this is possible in a production economy.

- Bailouts without commitment may not induce over-borrowing!
  - Nosal and Ordonez (13). Private agents compete away their over borrowing incentives in the presence of government uncertainty about the nature of shocks.
  - Bailouts may correct incentives to under-borrow: Green (10), Keister (11) or Cheng and Milbradt (10)

(Monetary) POLICY

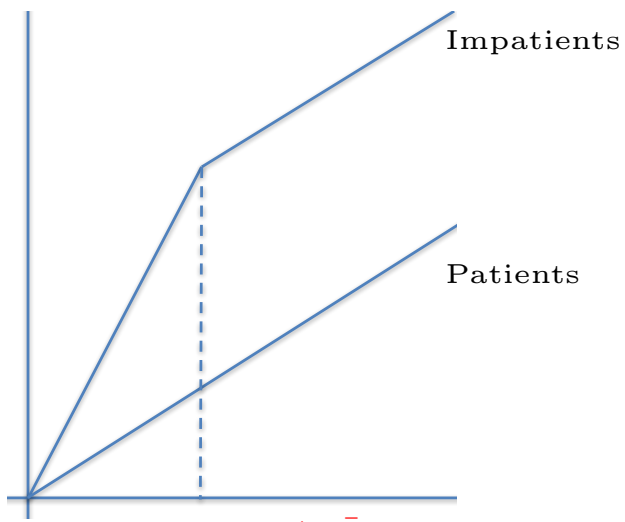
Money and Banks

- In DD (83), banks provide insurance using a real asset.
- In reality they do using a "private" money-like asset.
- Role of monetary policy in the presence of nominal bank runs?
- **Main paper: Robatto (17).....my own version**

- When bank runs limit the use of private money, the monetary authority can provide "public" money as an alternative.

A Simple Story

	$t=0$	$t=1$	$t=2$
Endowments:	$\bar{M},\ \bar{K}$		
Technology:		$A_1\bar{K}$	$A_2\bar{K},\ \frac{\bar{M}}{P_2}$
Preferences:			
Impatients (κ)		$C_1 + (\theta - 1)\min\{C_1, \bar{C}\}$	C_2
Patients ($1-\kappa$)			C_2



First Best

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Technology:		$A_1\bar{K}$	$A_2\bar{K},\ \frac{\bar{M}}{\bar{P}_2}$
Preferences:			
Impatients (κ)		$\frac{A_1\bar{K}}{\kappa}$	$A_2\bar{K}$
Patients ($1-\kappa$)		0	$A_2\bar{K}+\frac{\bar{M}}{(1-\kappa)\bar{P}_2}$

Decentralization with Money

	$t=0$	$t=1$	$t=2$
Endowments:	$\bar{M},\ \bar{K}$		
Technology:		$A_1\bar{K}$	$A_2\bar{K},\ \frac{\bar{M}}{\bar{P}_2}$
Preferences:			
Impatients (κ)		$A_1\bar{K}+\frac{\bar{M}}{P_1}$	$A_2\bar{K}$
Patients ($1-\kappa$)		0	$A_2\bar{K}+\frac{\bar{M}}{\bar{P}_2}+\frac{\kappa}{1-\kappa}\frac{\bar{M}}{\bar{P}_2}$

Impatients can use money to buy production from patients.

Market clearing: $\kappa\bar{M} = P_1(1-\kappa)A_1\bar{K} \qquad \Longrightarrow \qquad P_1 = \frac{\kappa}{1-\kappa}\frac{\bar{M}}{A_1\bar{K}}$

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Implementation of the first best allocation!

Banks

	$t=0$	$t=1$	$t=2$
Endowments:	$\bar{M},\ \bar{K}$		
Technology:		$A_1\bar{K}$	$A_2\bar{K},\ \frac{\bar{M}}{\bar{P}_2}$
Preferences:			
Impatients (κ)		$A_1\bar{K}+\frac{\bar{M}/\kappa}{P_1^B}$	$A_2\bar{K}$
Patients ($1-\kappa$)		0	$A_2\bar{K}+\frac{\bar{M}/(1-\kappa)}{\bar{P}_2}$

Banks transfer money from patients to impatients.

Market clearing: $\kappa\frac{\bar{M}}{\kappa} = P_1^B(1-\kappa)A_1\bar{K} \quad \Longrightarrow \quad P_1^B = \frac{P_1}{\kappa} > P_1$

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Banks do not improve welfare, just increase prices!

Banks

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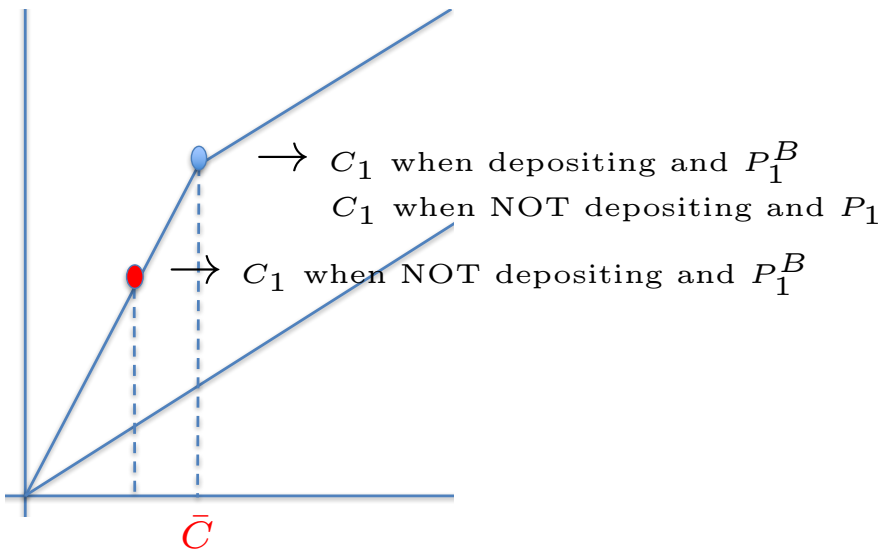


Multiple equilibria that implement the first best!

- No Banks and Low Prices.
- Banks and High Prices.

Runs

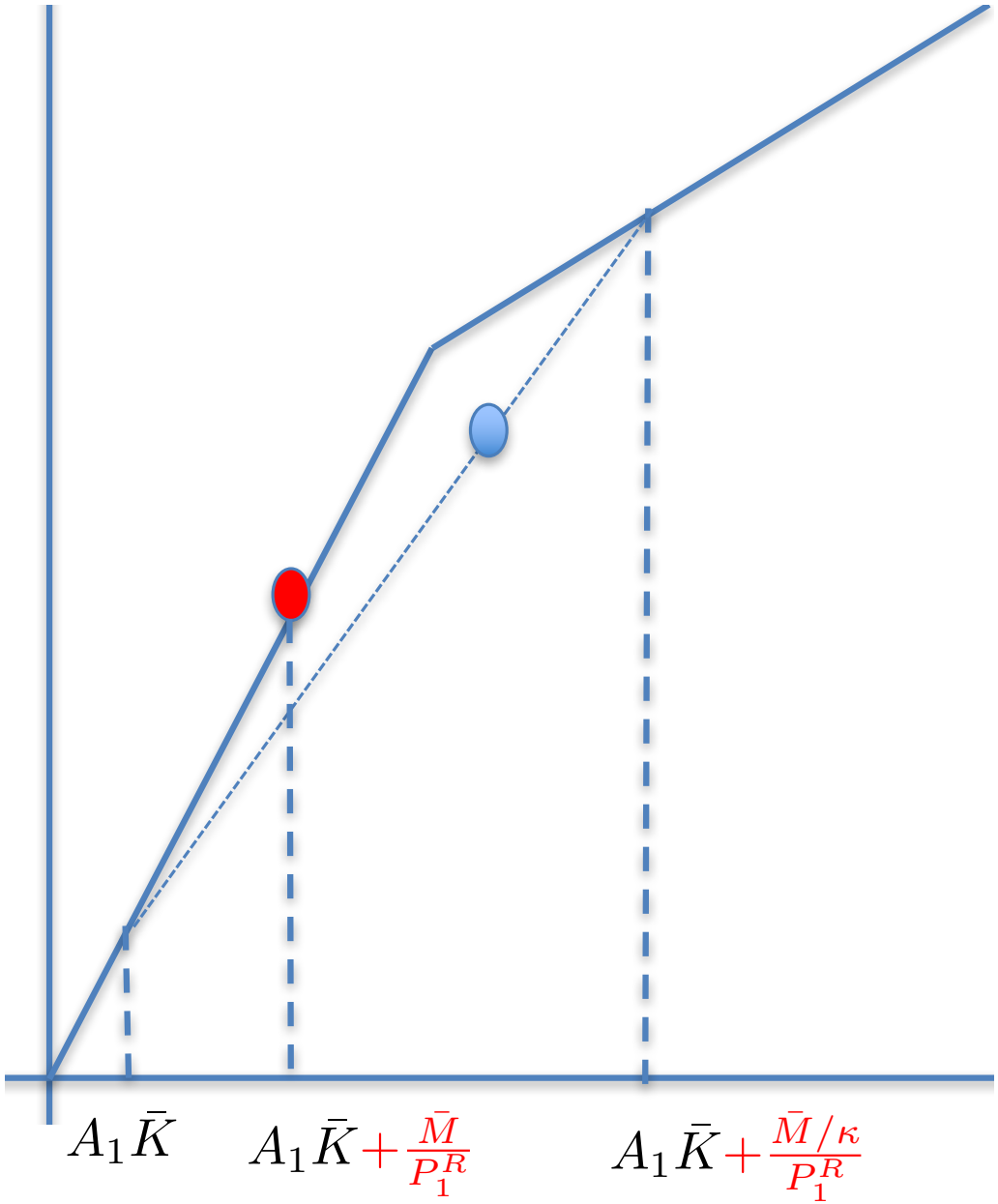
A fraction q of patients withdraw at $t = 1$, such that $r = \frac{\kappa - (1-\kappa)q}{\kappa} > \kappa$.

	$t = 0$	$t = 1$	$t = 2$
Impatients (κ)			
Withdraw (r)		$A_1\bar{K} + \frac{\bar{M}/\kappa}{P_1^R}$	$A_2\bar{K}$
Cannot withdraw ($1-r$)		$A_1\bar{K}$	$A_2\bar{K}$
Patients ($1-\kappa$)			
Withdraw (q)		0	$A_2\bar{K} + \frac{\kappa r}{1-\kappa}\frac{\bar{M}/\kappa}{\bar{P}_2} + \frac{\bar{M}/\kappa}{\bar{P}_2}$
Cannot withdraw ($1-q$)		0	$A_2\bar{K} + \frac{\kappa r}{1-\kappa}\frac{\bar{M}/\kappa}{\bar{P}_2}$

Market clearing: $r\kappa\frac{\bar{M}}{\kappa} = P_1^R(1-\kappa)A_1\bar{K} \quad \Longrightarrow \quad P_1^R = \frac{\kappa}{r}P_1 > P_1$

$$P_1^R = rP_1^B < P_1^B$$

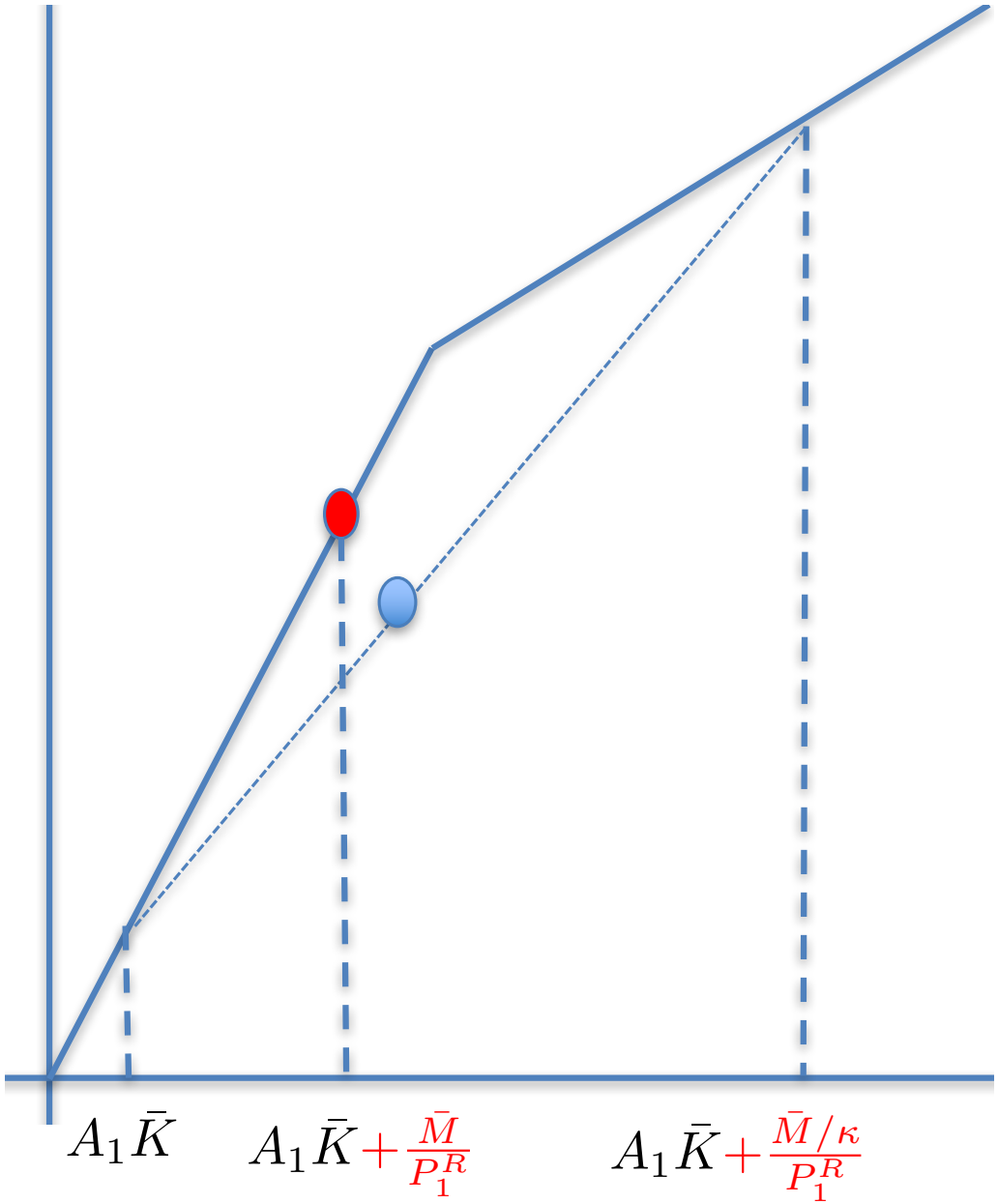
Runs



When r is high

agents deposit all their money

Runs

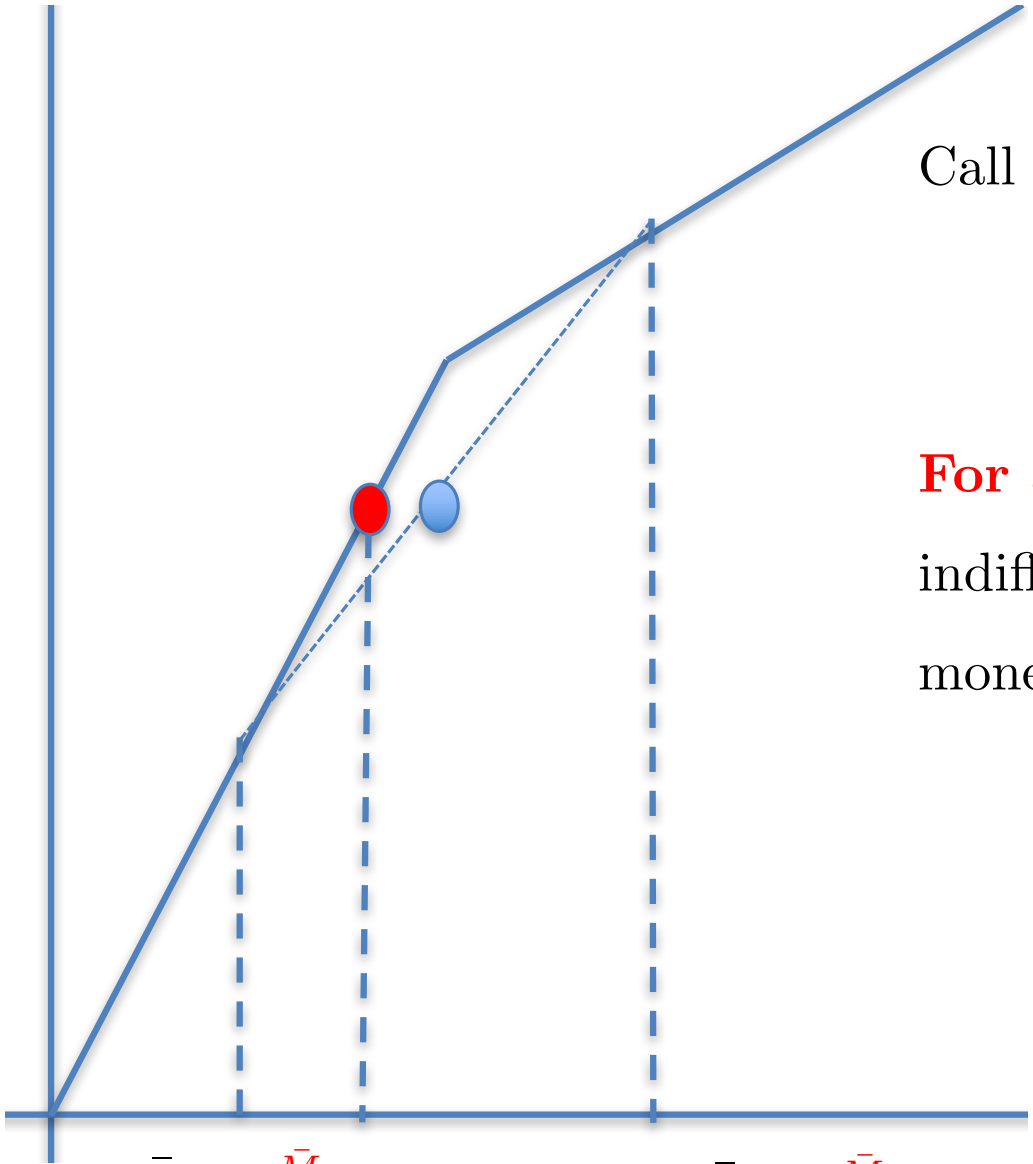


As runs become more likely

$\downarrow r \implies \downarrow P_1^R$

- $\uparrow$ incentives to maintain cash.
- $\downarrow$ incentives to deposit.

Runs



Call f the fraction of money at home.

$$\uparrow f \implies \downarrow P_1^R$$

For a set parameters, agents are indifferent between depositing some money or no money.

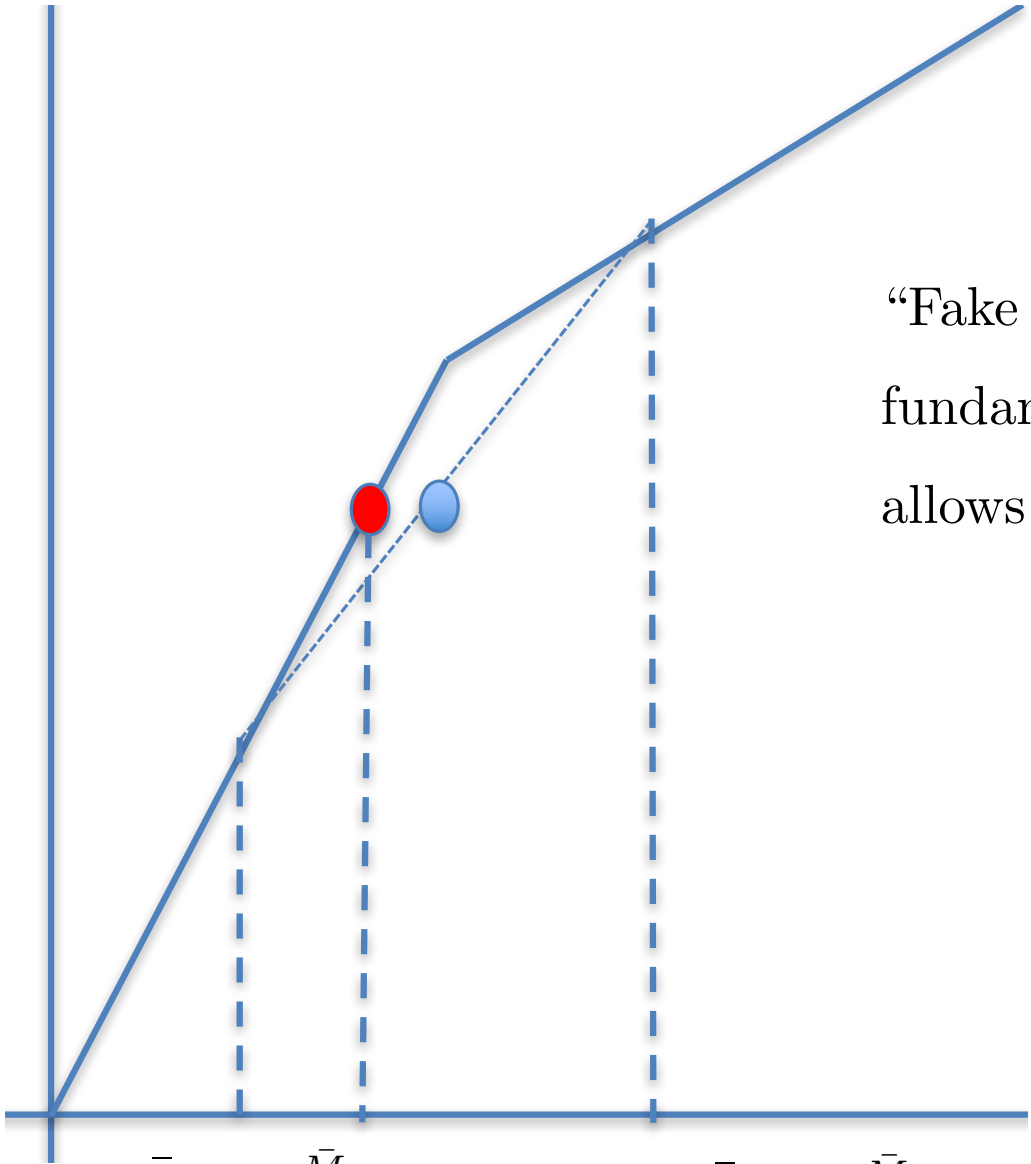
Monetary Policy

The Fed can introduce "fake" money at $t = 1$, which reveals itself at $t = 2$.

	$t = 0$	$t = 1$	$t = 2$
Impatients (κ)			
Withdraw (r)		$A_1\bar{K} + \frac{(1+x)\bar{M}/\kappa}{P_1^R}$	$A_2\bar{K}$
Cannot withdraw ($1-r$)		$A_1\bar{K}$	$A_2\bar{K}$
Patients ($1-\kappa$)			
Withdraw (q)		0	$A_2\bar{K} + \frac{\kappa r}{1-\kappa}\frac{\bar{M}/\kappa}{\bar{P}_2} + \frac{\bar{M}/\kappa}{\bar{P}_2}$
Cannot withdraw ($1-q$)		0	$A_2\bar{K} + \frac{\kappa r}{1-\kappa}\frac{\bar{M}/\kappa}{\bar{P}_2}$

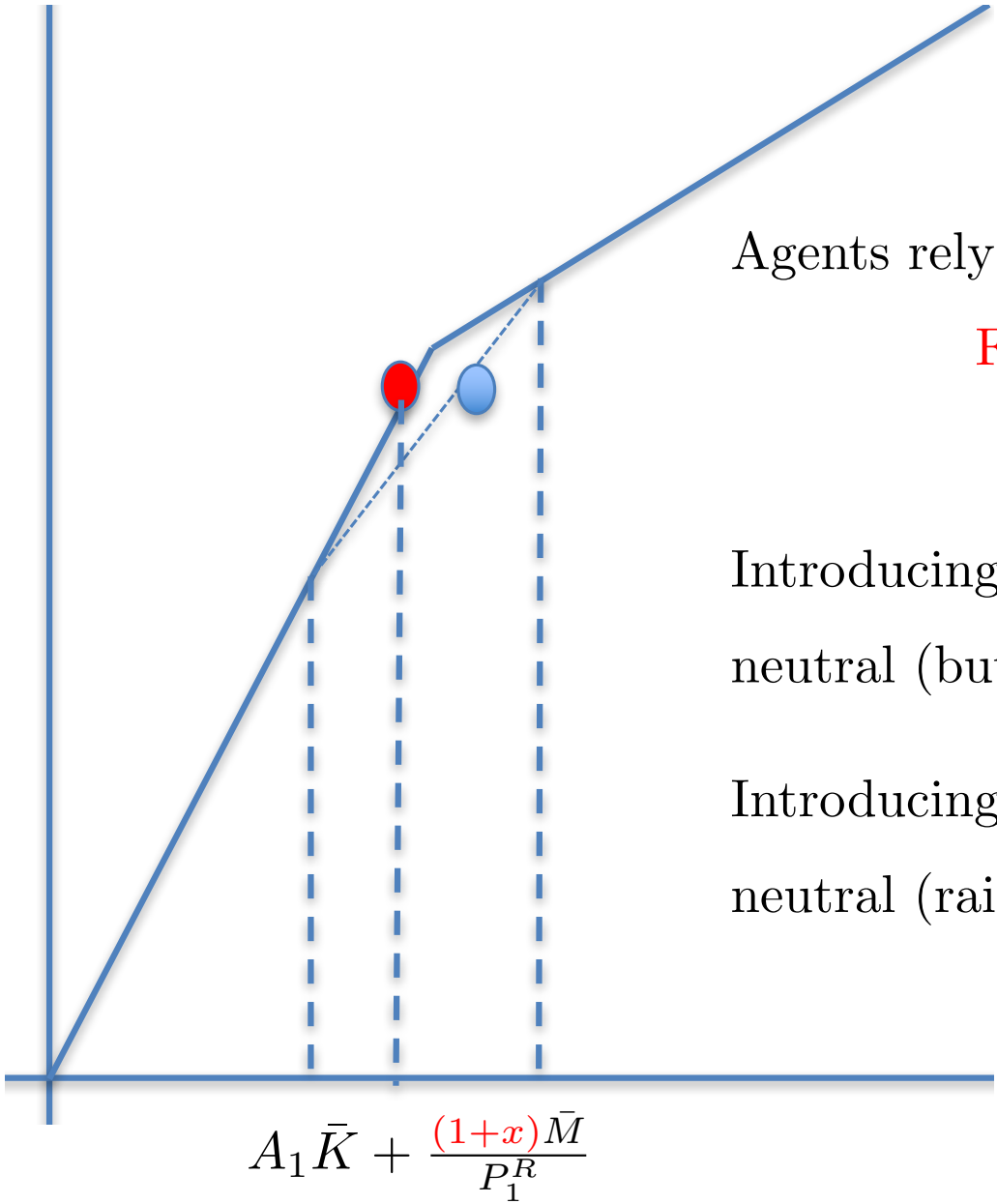
Market clearing: $r\kappa\frac{(1+x)\bar{M}}{(1+x)\kappa} = P_1^R(1-\kappa)A_1\bar{K} \quad \Longrightarrow \quad P_1^R$ is the same!

Monetary Policy



"Fake money" does not change the fundamental value of money, but allows for more transactions.

Monetary Policy



Agents rely less on banks for insurance

Flight to liquidity!

Introducing "fake money" without runs is neutral (but may displace banks).

Introducing "true money" (permanent MP) is neutral (raises both P_1 and $\bar{P}_2$).

Take Aways

- Optimal policy here: Shoot the banker!

- This is about fiat money but the same insights carry to non-fiat money-like assets (repos, for example).....remember Gorton and Ordonez (14)?

POLICY CHALLENGES

Challenge I: Face Lower Real Rates

- Surprising decline in the *Long Run Neutral Real Interest Rate*

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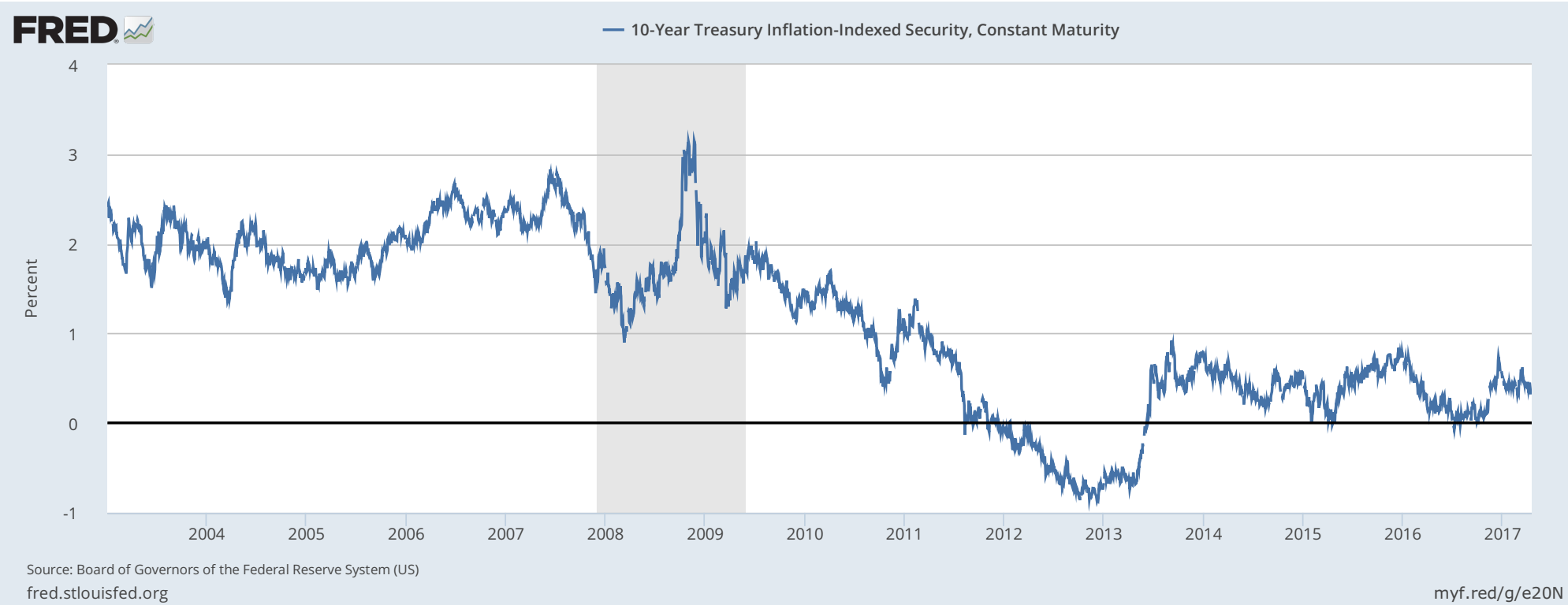
- Surprising decline in the *Long Run* *Neutral* *Real Interest Rate*
- How do we know?



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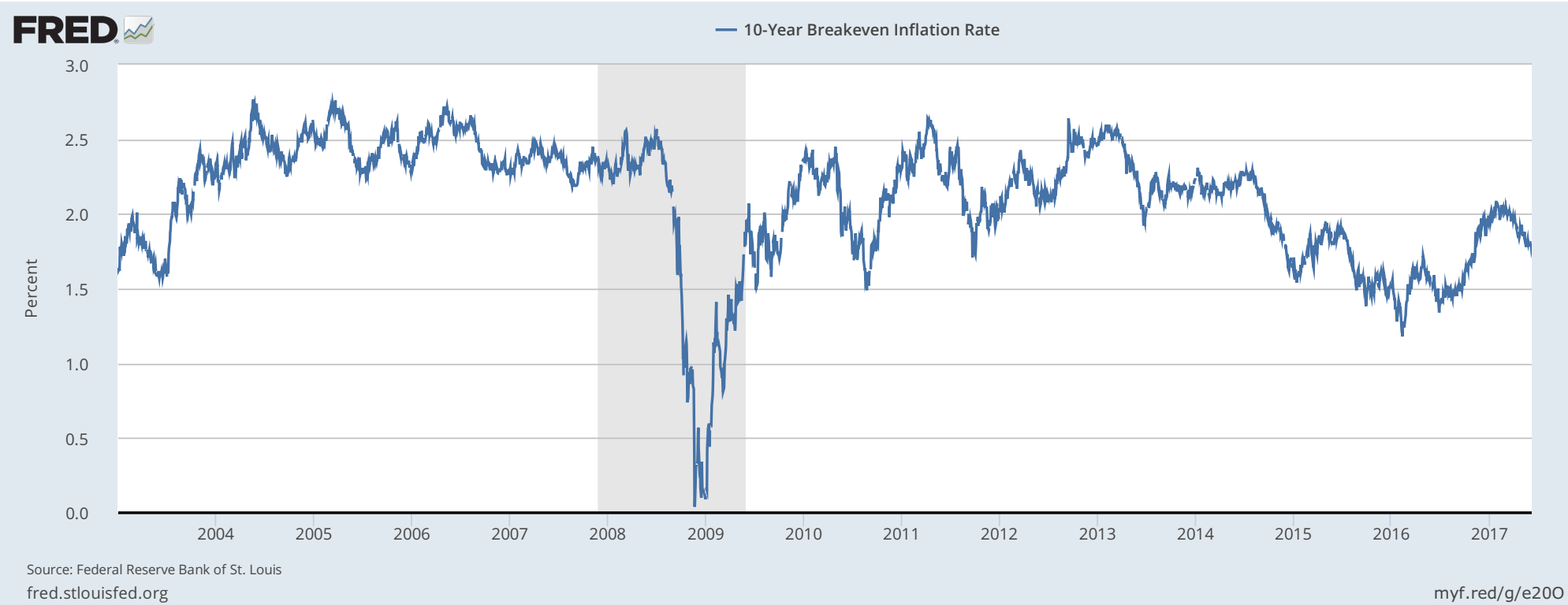

Challenge I: Face Lower Real Rates

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- Why is this a challenge?
  - Smaller space to conduct monetary policy (ZLB).
  - Financial Instability

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- What to do? **Monetary Solution:** Increase inflation target.
  - Costly in terms of credibility and price dispersion.

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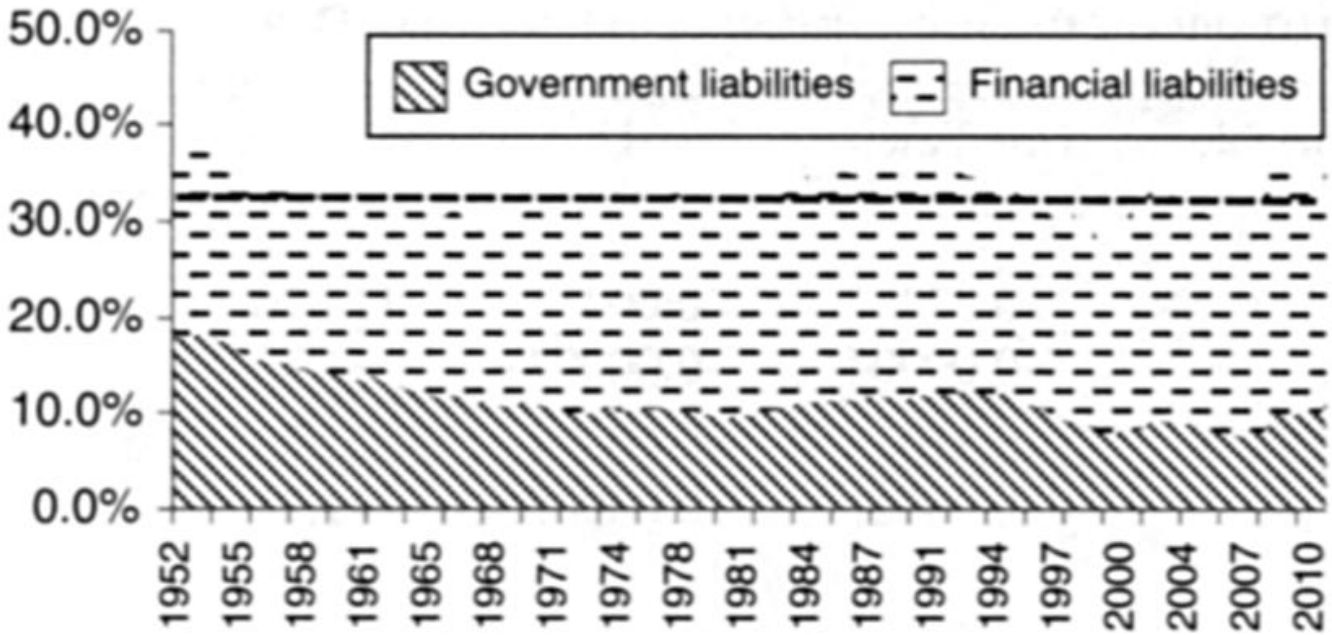
  - Smaller space to conduct monetary policy (ZLB).
  - Financial Instability
- What to do? **Monetary Solution:** Increase inflation target.
  - Costly in terms of credibility and price dispersion.
- What to do? **Fiscal Solution:** Increase the LRNRIR with public debt
  - Impossible under Ricardian Equivalence.
  - Possible but distortionary under OG and/or incomplete markets.

    (Ordonez and Piguillem, WP 2017)

Public Debt as a Safe Asset

- The private sector finds ways to provide safe assets when public debt is low (and public safe assets are scarce).



Public Debt as a Safe Asset

- The private sector finds ways to provide safe assets when public debt is low (and public safe assets are scarce).

- How? By creating information insensitive assets.
  (Dang, Gorton, Holmstrom and Ordonez, AER 2017).
- Private safe assets are beneficial but fragile!
  (Gorton and Ordonez, AER 2014).
- We need backstops when private safe assets fail.
  (Gorton and Ordonez, WP 2017).

Challenge II: Provide Public Safe Assets

- What to do? **Fiscal Solution:** "Buy and sell" public debt.
  - Costly: Increases taxation uncertainty and reduces LRNRIR!

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- What to do? **Fiscal Solution:** "Buy and sell" public debt.
  - Costly: Increases taxation uncertainty and reduces LRNRIR!

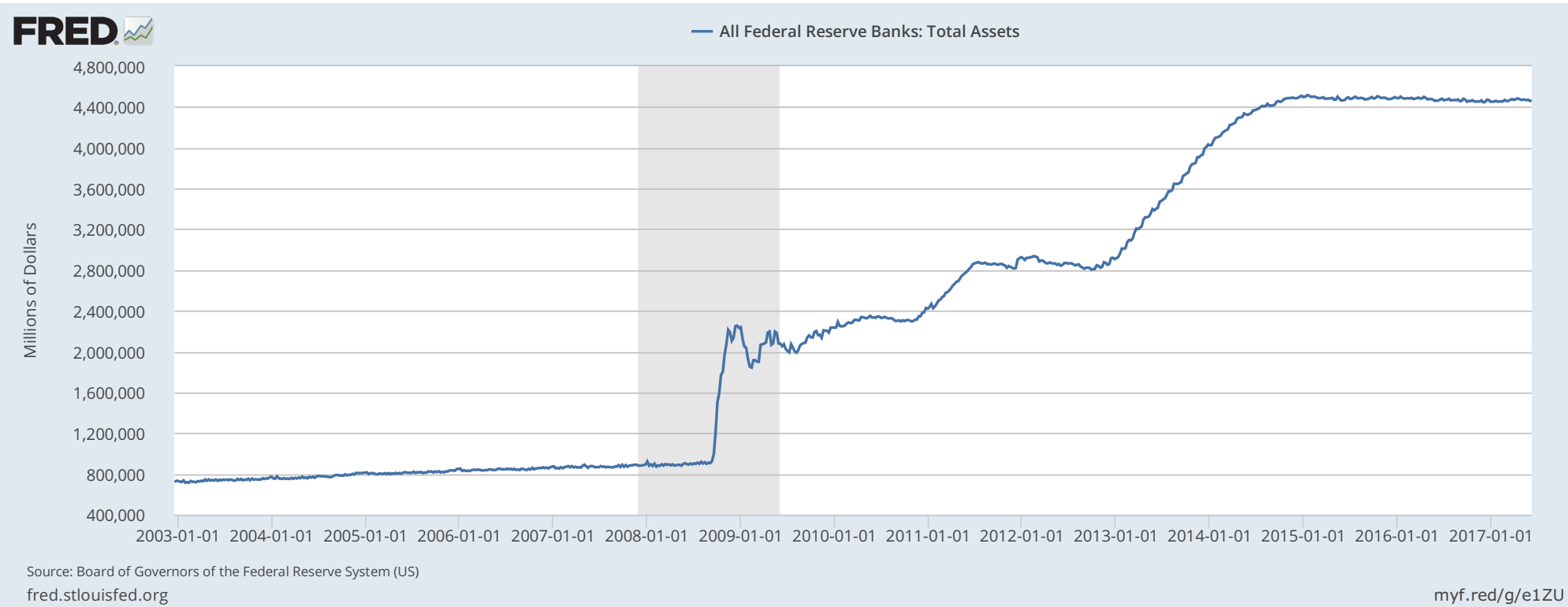
- What to do? **Monetary Solution:** "Buy and sell" reserves.
  - Benefit 1: More effective (direct and broad) interest rate management.
  - Benefit 2: Smooth out the use of government debt as a safe asset.

    A large Fed balance sheet can be used to stabilize taxation needs.
  - Costly: Higher government borrowing rates.

- The FED is already taking this path!

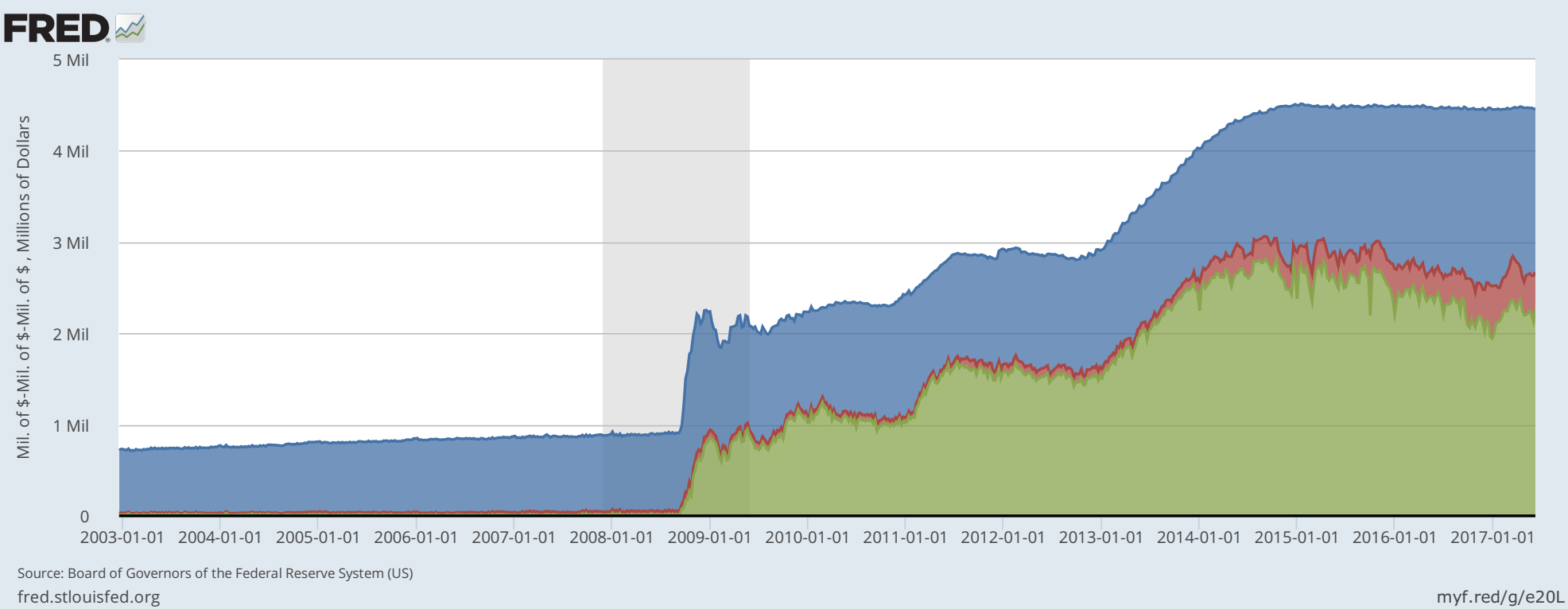
FED Balance Sheet

- Large increase in the Fed balance sheet...)



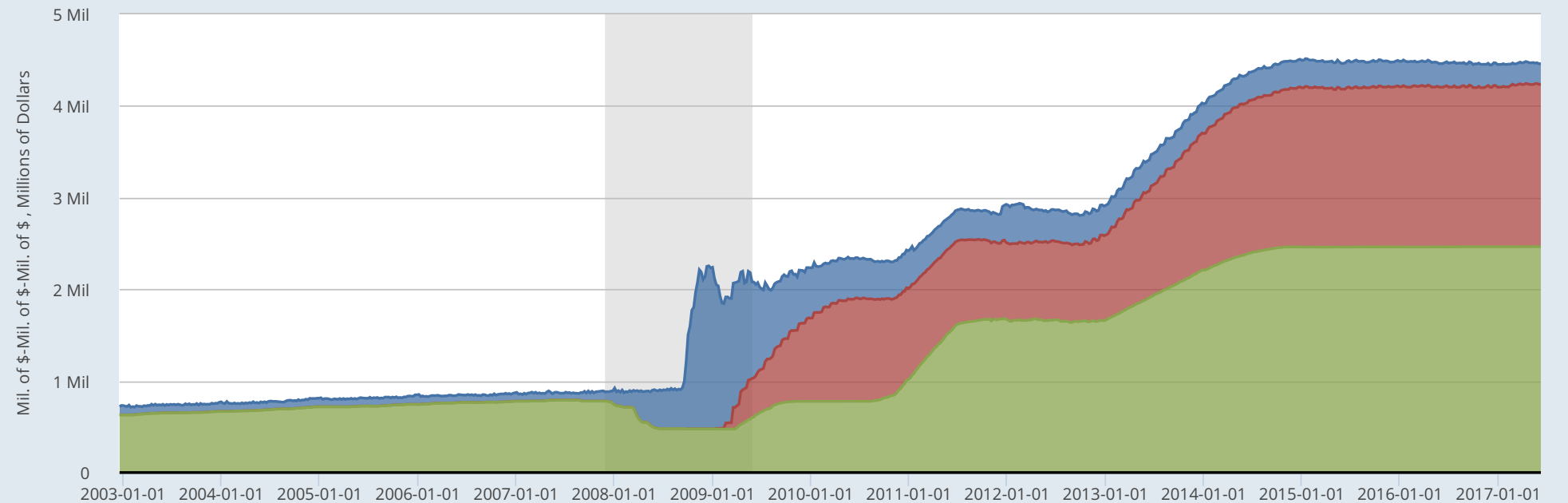
FED Balance Sheet

- Large increase in the Fed balance sheet...
- ...mostly to provide safe assets (Fed deposits to commercial banks and reverse repos to non-commercial banks)



FED Balance Sheet

- Large increase in the Fed balance sheet...
- ...mostly to provide safe assets (Fed deposits to commercial banks and reverse repos to non-commercial banks)
- backed by Treasury securities and federally guaranteed ABS



Wrapping Up

- Challenge I: Face low LR neutral real rates.
  - Monetary Solution: Increase inflation target.
  - Fiscal Solution: Increase public debt.

- Challenge II: Provide public safe assets when needed.
  - Monetary Solution: Buy and sell reserves. Large Fed balance sheet
  - Fiscal Solution: Buy and sell treasury bonds. Taxation uncertainty.

- My take: We need high public debt to provide the Fed with a stable and sufficient collateral to stabilize financial markets.

  The current combination of high public debt and large Fed balance sheet may have emerged to stay.

  Political considerations are key for evaluating these trade-offs!