Banks as Secret Keepers

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Introduction

"Every banker knows that if he has to prove he is worthy of credit, in fact his credit is gone."

Walter Bagehot, *Lombard Street: A Description of the Money Market*, 1873.

- We are interested in understanding why banks are purposefully opaque
- ...and what the implications are for the types of investments that banks undertake.

Two Polar Systems

Stock Markets

-to provide risk sharing

- Equity
- Continuous price discovery
- Transparent
- Information sensitive
- Centralized
- Not urgent

Money Markets

-to provide liquidity

- Debt
- Obviating price discovery
- Opaque
- Information insensitive
- Bilateral
- Urgent

Banks and Markets

- Securities markets are information revealing institutions, creating price-contingent claims *risky liquidity.*
- Banks are information concealing institutions, creating non-contingent claims *safe liquidity.*

- Depending on the risk of the underlying asset, banks can only issue limited amounts of safe liquidity to avoid information acquisition.

- **Conclusion:** The trade-off between less safe liquidity and more risky liquidity determines which firms fund projects through banks and which ones through capital markets.

Road Map

- Setting.
- Capital Markets vs. Banks.
- Preventing Information Acquisition.
- Which Assets will Banks (Markets) Fund?
- Extensions

SETTING

Preferences and Endowments

- One storable good. Three periods. Three risk-neutral agents.

$$U_F = \sum_{t=0}^{2} C_{Ft} \qquad \omega_F = (0,0,0)$$

$$U_E = \sum_{t=0}^{2} C_{Et} + \alpha \min\{C_{E1}, k\} \qquad \omega_E = (e,0,0)$$

$$U_L = \sum_{t=1}^{2} C_{Lt} + \alpha \min\{C_{L2}, k\} \qquad \omega_L = (0,e,0)$$

Technology

- The firm has two investment opportunities in period 0.
  - One is always a lemon (does not generate any payoff)
  - The other ("the project") is not a lemon
    - In period 0 it costs w
    - In period 2 it pays $\begin{cases} x > w & \texttt{prob. } \lambda & \texttt{(state } g\texttt{)} \\ 0 & \texttt{prob. } (1-\lambda) & \texttt{(state } b\texttt{)} \end{cases}$
    - The project is ex-ante efficient, $\lambda x > w$.
  - A file contains information that identifies the project and its state.
  - Only L can interpret the state of the project from the file.

Assumptions

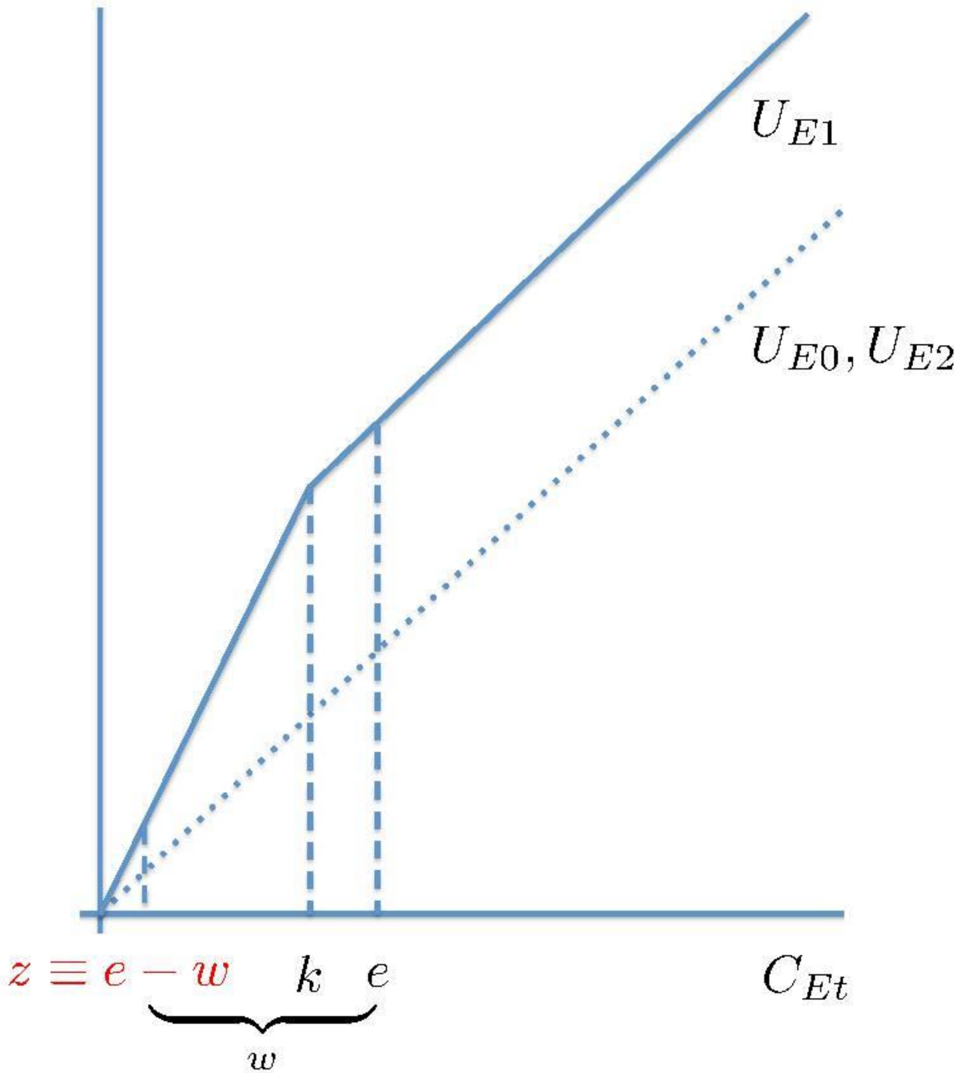
- Early consumers can cover their liquidity and investment needs, but not both.

$$e > k \text{ and } e > w \qquad \text{but} \qquad \underbrace{e < k + w}_{\text{Useful notation: } k > z \equiv e - w}$$

- Both consumers can cover all liquidity and investment needs.

$$2e > 2k + w$$

Assumptions



Benchmarks

Autarky

- Consumers store endowments. Firm cannot invest.

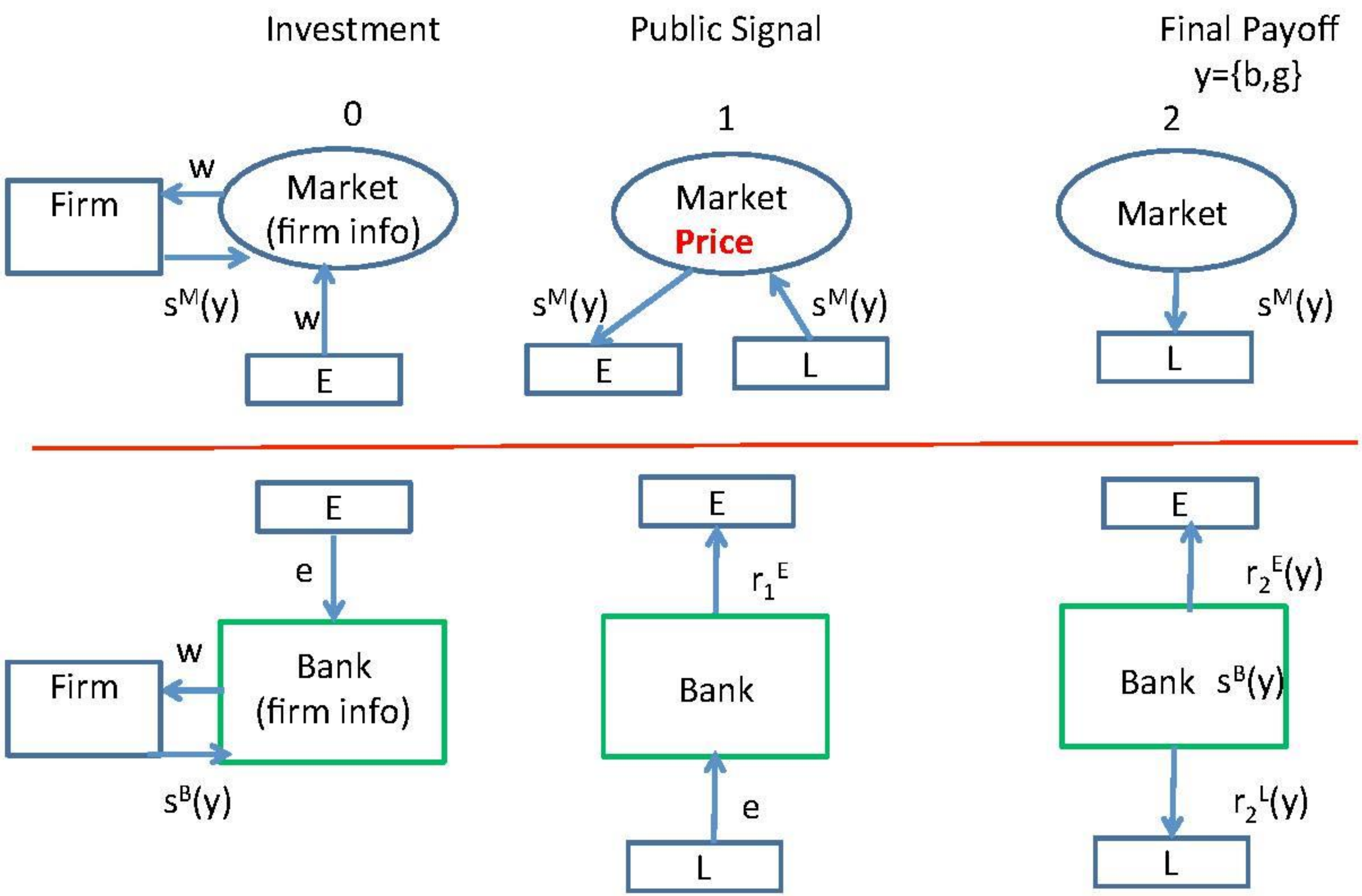
First Best (unconstrained)

- Period 0:
  - Use w from E to finance the project.

    Feasible since $e > w$
- Period 1:
  - Transfer $k - z$ from L to E.

    Feasible since $e > k - z$

Markets vs. Banks

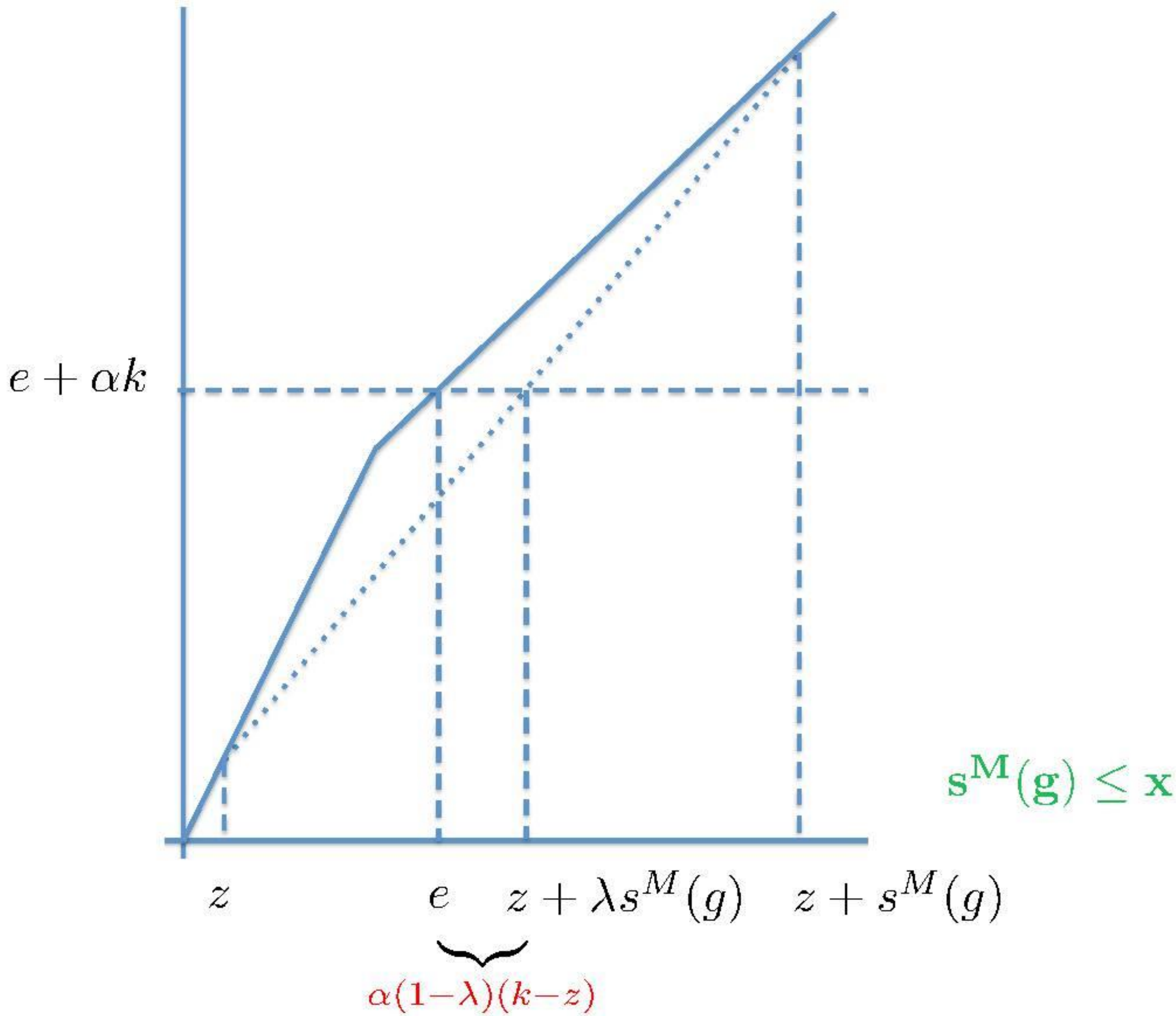


CAPITAL MARKETS

Capital Markets

- **Period 0:**
  - F shows the file to a "market agent," who verifies it.
  - A "market agent" makes the file public and issues a security that pays $s^M(b)$ or $s^M(g)$ in $t = 2$ to raise w from E.
- **Period 1:** Many Ls enter.
  - E offers its shares for sale.
  - Ls bid for these shares (having seen the file), resulting in a fair market price (either $s^M(b)$ or $s^M(g)$).
- **Period 2:** Project's payoff realized. Security holders paid.

Risky Consumption for E



Comparison of Expected Utilities

If $s^M(g) \leq x$, risky consumption for E.

First Best		**Capital Markets**
$E(U_F) = \lambda x - w$	$>$	$E(U_F) = \lambda x - \overbrace{\lambda s^M(g)}^{w+\alpha(1-\lambda)(k-z)}$
$E(U_E) = e + \alpha k$		$E(U_E) = e + \alpha k$
$E(U_L) = e + \alpha k$		$E(U_L) = e + \alpha k$

Assumption: F gets all the surplus

Capital markets implement $\alpha(1-\lambda)(k-z)$ less welfare.

If risk premium so high that $s^M(g) > x$, then no investment.

BANKS

Banks

- **Period 0:**

  F shows the file to B, who verifies it.

  F issues a security that pays $s^B(b)$ or $s^B(g)$ in $t = 2$ to B.

  E deposits e in B, who promises r_1^E in $t = 1$ and $r_2^E(b)$ and $r_2^E(g)$ in $t = 2$

  - B commits to keep the file secret.

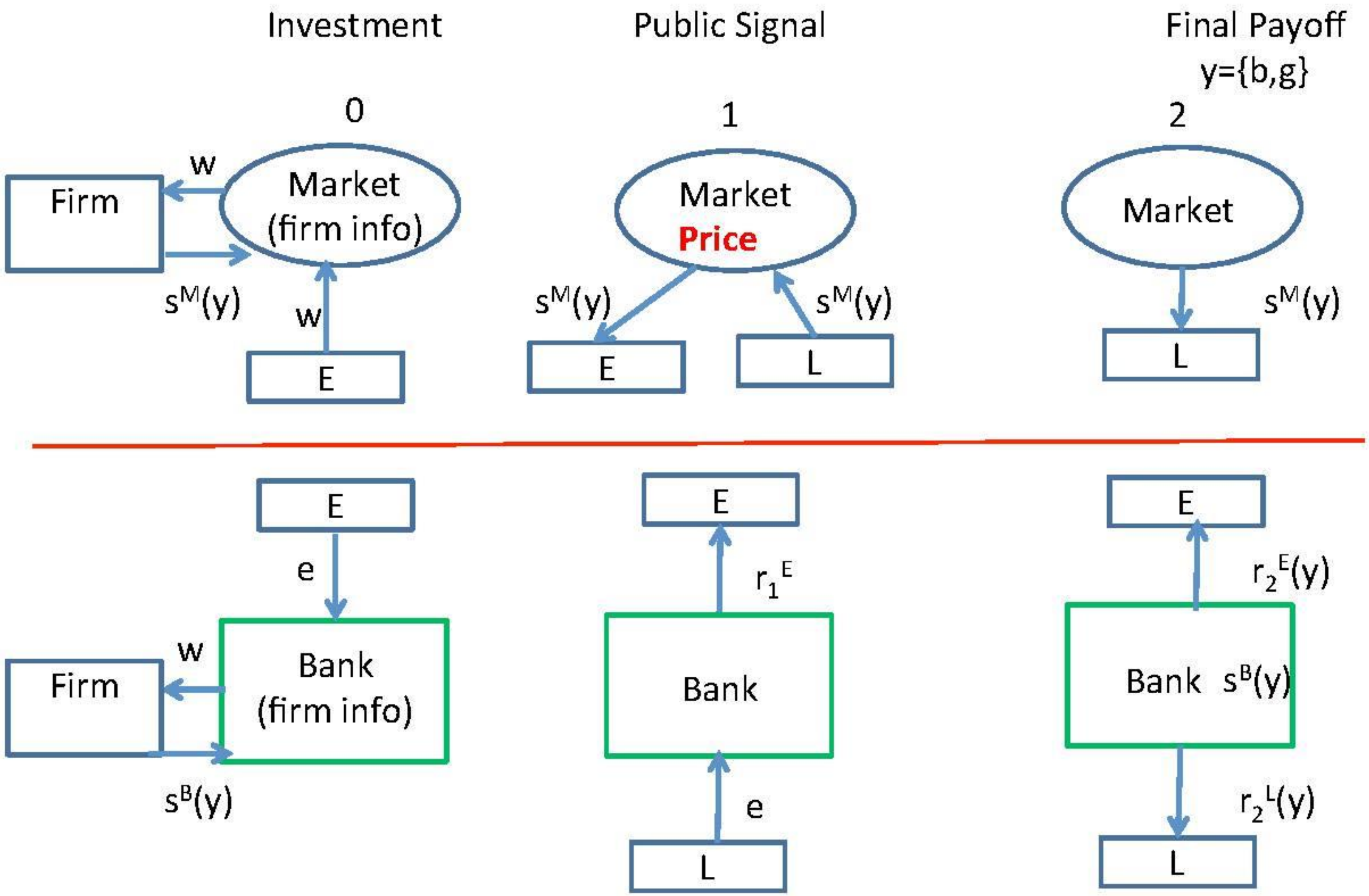
- **Period 1:** A single L enters.

  L deposits e in B, who promises $r_2^L(b)$ and $r_2^L(g)$ in $t = 2$. E withdraws r_1^E.

- **Period 2:** Projects payoff observed. Securities' holders paid.

Can B implement a contract such that $r_1^E = k$?

Markets vs. Banks



Bank Contracts

	Assets of B $(t = 1)$	Promises to E	Promises to L
Project is b $(1 - \lambda)$	$z + e$	$k + r_2^E(b)$	$r_2^L(b)$
	$\swarrow$ Residual from E $\searrow$ Deposit of L		
Project is g λ	$z + e + s(g)$	$k + r_2^E(g)$	$r_2^L(g)$

Bank Contracts

	Assets of B ($t = 1$)	Promises to E		Promises to L
Project is b ($1 - \lambda$)	$z + e$	$k + 0$	$\Rightarrow$	$\underbrace{e - (k - z)}_{>k}$
Project is g λ	$z + e + s(g)$	$k + r_2^E(g)$		$r_2^L(g)$

Bank Contracts

	Assets of B ($t=1$)	Promises to E	Promises to L
Project is b ($1-\lambda$)	$z+e$	$k+0$	$\underbrace{e-(k-z)}_{>k}$
		$\Downarrow$	
Project is g λ	$z+e+s(g)$	$k+\frac{e-k}{\lambda}$	$r_2^L(g)$

E **breaks even**

$$(1+\alpha)k+\lambda r_2^E(g)=e+\alpha k$$

Bank Contracts

	Assets of B ($t=1$)	Promises to E	Promises to L
Project is b ($1-\lambda$)	$z+e$	$k+0$	$\underbrace{e-(k-z)}_{>k}$
Project is g (λ)	$z+e+s(g)$	$k+\frac{e-k}{\lambda}$	$\underbrace{e+\frac{(1-\lambda)}{\lambda}(k-z)}_{>k}$

L **breaks even**

$$(1+\alpha)k+\lambda(r_2^L(g)-k)+(1-\lambda)(e-(k-z)-k)=e+\alpha k$$

Bank Contracts

	Assets of B ($t=1$)	Promises to E	Promises to L
Project is b ($1-\lambda$)	$z+e$	$k+0$	$\underbrace{e-(k-z)}_{>k}$
Project is g (λ)	$z+e+s(g)$	$k+\frac{e-k}{\lambda}$	$\underbrace{e+\frac{(1-\lambda)}{\lambda}(k-z)}_{>k}$

Are these promises feasible?

$$k+r_2^E(g)+r_2^L(g)=e+z+s(g) \quad \Rightarrow \quad E(s)=w$$

Bank Contracts

	Assets of B $(t=1)$	Promises to E	Promises to L
Project is b $(1-\lambda)$	$z+e$	$k+0$	$\underbrace{e-(k-z)}_{>k}$
Project is g λ	$z+e+s(g)$	$k+\frac{e-k}{\lambda}$	$\underbrace{e+\frac{(1-\lambda)}{\lambda}(k-z)}_{>k}$

Are these promises feasible?

$$k + r_2^E(g) + r_2^L(g) = e + z + s(g) \quad \Rightarrow \quad E(s) = w$$

By keeping information secret, B transfers the risk from E to L.

F keeps the insurance premium, B breaks even.

Comparison of Expected Utilities

First Best		**Banks**
$E(U_F) = \lambda x - w$	$=$	$E(U_F) = \lambda x - \overbrace{\lambda s^B(g)}^{w}$
$E(U_E) = e + \alpha k$		$E(U_E) = e + \alpha k$
$E(U_L) = e + \alpha k$		$E(U_L) = e + \alpha k$

Banks implement the First Best allocation.

INFORMATION ACQUISITION

L's Incentives to Find Out Secrets

- So far we have assumed a secret is impossible to be discovered.
- There may be incentives for L to acquire information privately.
- Assume the cost of information is γ in units of consumption.

- L has incentives to acquire information if and only if

$$(1-\lambda)(e - r_2^L(b)) > \gamma$$

L's Incentives to Find Out Secrets

- So far we have assumed a secret is impossible to be discovered.
- There may be incentives for L to acquire information privately.
- Assume the cost of information is γ in units of consumption.
- L has incentives to acquire information if and only if

$$(1-\lambda)(k-z) > \gamma$$

Banks are feasible when: γ, λ and z are high or k is low.

Distortionary contracts

- How can banks prevent information and still improve welfare?
- Banks can increase $r_2^L(b)$ to reduce the benefits of information.
- Two options:
  - **Distort Investment:** B maintains in cash more than z at $t = 0$.
    - Less investment.
  - **Distort Money Provision:** B promises less than k to E at $t = 1$.
    - Less safe liquidity.

Banks Distort Investment

		Assets of B $(t=1)$	Promises to E		Promises to L
Project is b	η	$z+e$	k	$\Rightarrow$	$e-(k-z)$
$(1-\lambda)$	$+(1-\eta)$	$\underbrace{z+w}_{e}+e$			$+(1-\eta)w$

Save more than z

Information can be avoided if and only if $r_2^L(b) \geq e - \frac{\gamma}{1-\lambda}$, or

$$(1-\eta) = \frac{1}{w}\underbrace{\left[k - z - \frac{\gamma}{(1-\lambda)}\right]}_{\texttt{Net benefit of info}} \geq 0$$

Cost of distortion: $(1-\eta)(\lambda x - w) = \frac{\lambda x - w}{w}\left[k - z - \frac{\gamma}{(1-\lambda)}\right]$

Banks Distort Money Provision

	Assets of B $(t=1)$	Promises to E		Promises to L
Project X is b $(1-\lambda)$	$e+z$	$r_1^E + 0$ **Pay less than k**	$\Leftarrow$	$\underbrace{e - \frac{\gamma}{1-\lambda}}_{>e-(k-z)}$
Project X is g λ	$e+z+s^B(g)$	$r_1^E + r_2^E(g)$		$r_2^L(g)$

Banks Distort Money Provision

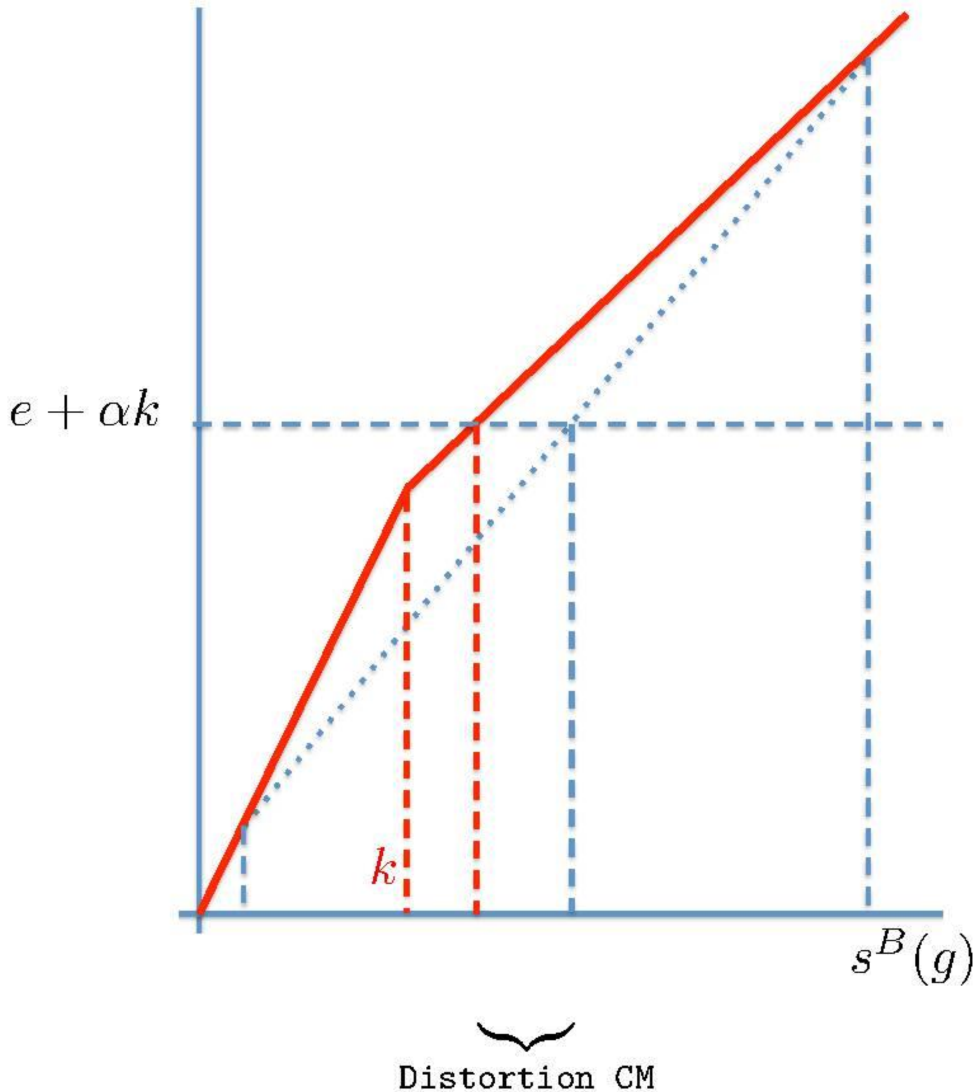
	Assets of B $(t=1)$	Promises to E		Promises to L
Project X is b $(1-\lambda)$	$e+z$	$\underbrace{z+\frac{\gamma}{1-\lambda}}_{<k}$	$\Leftarrow$	$\underbrace{e-\frac{\gamma}{1-\lambda}}_{>e-(k-z)}$
Project X is g λ	$e+z+s^B(g)$	$z+\frac{\gamma}{1-\lambda}+\frac{e-k}{\lambda}+\frac{(1+\alpha)}{\lambda}\left[k-z-\frac{\gamma}{1-\lambda}\right]$		$e+\frac{\gamma}{\lambda}$

Are these promises feasible?

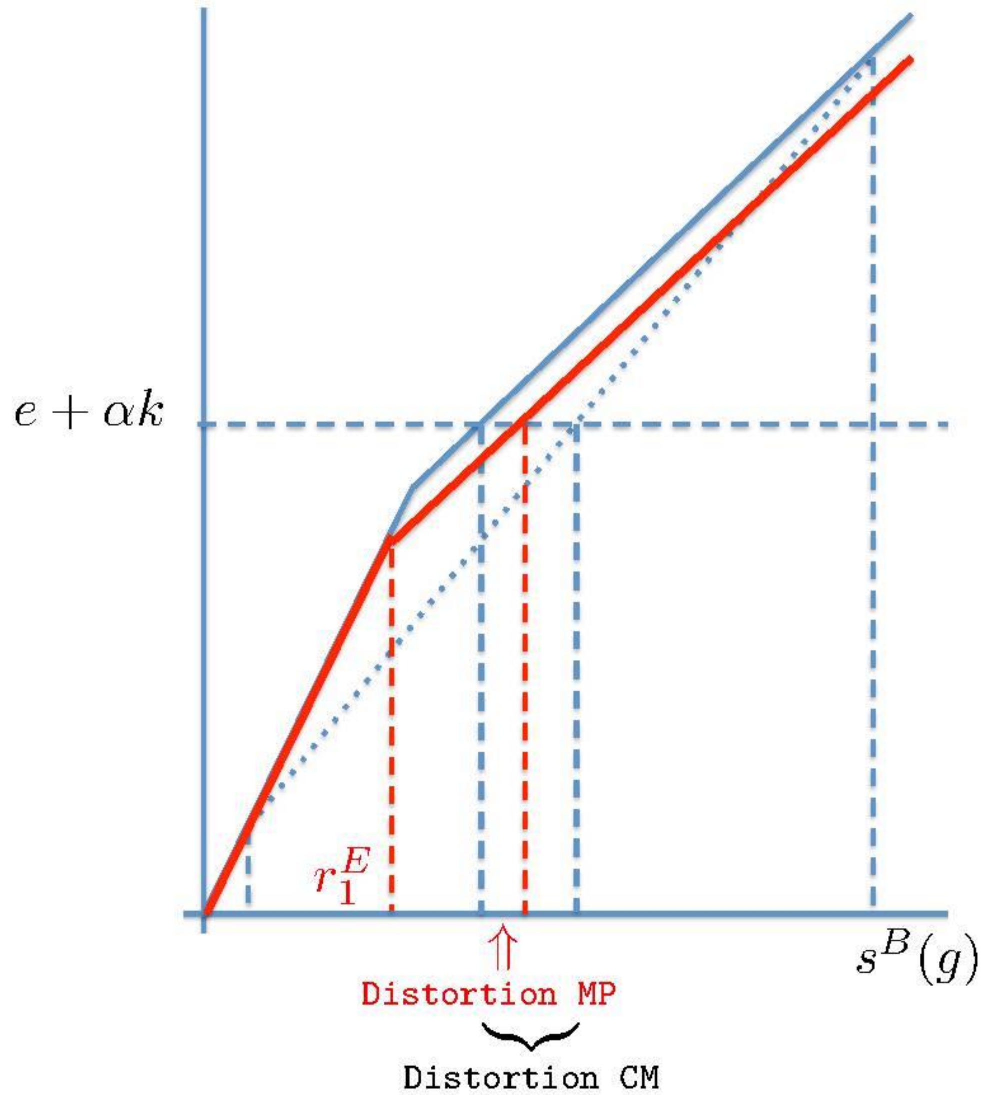
$$r_1^E+r_2^E(g)+r_2^L(g)\leq e+z+s^B(g) \quad \Rightarrow \quad s^B(g)=\frac{w}{\lambda}+\frac{\alpha}{\lambda}\underbrace{\left[k-z-\frac{\gamma}{(1-\lambda)}\right]}_{\text{Net benefit of info}}$$

Cost of banks' distortion: $\lambda s^B(g)-w=\alpha\left[k-z-\frac{\gamma}{(1-\lambda)}\right]$

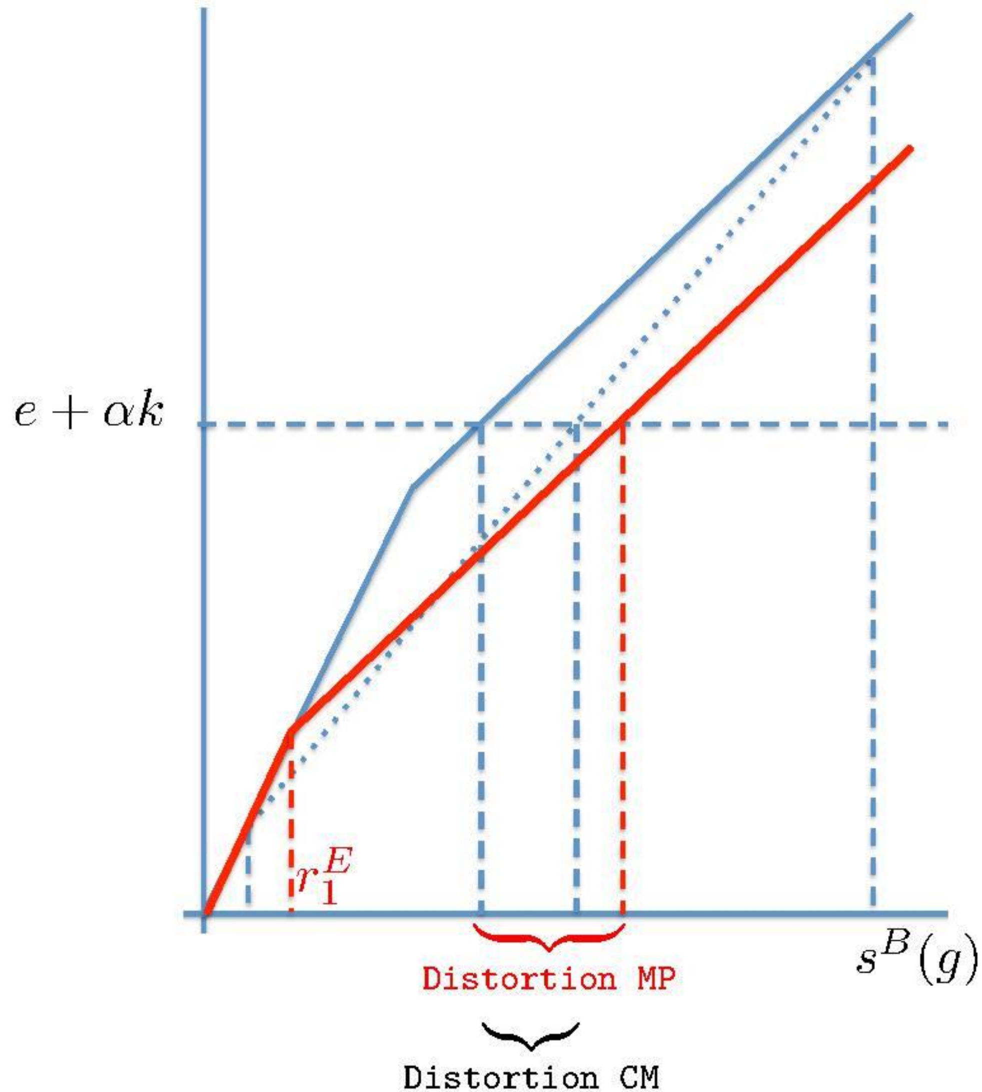
No Distortion of Money Provision



Distortion dominates Capital Markets



Capital Markets dominate Distortion



Which Distortion is Better?

- Less investment is better than less safe liquidity if and only if

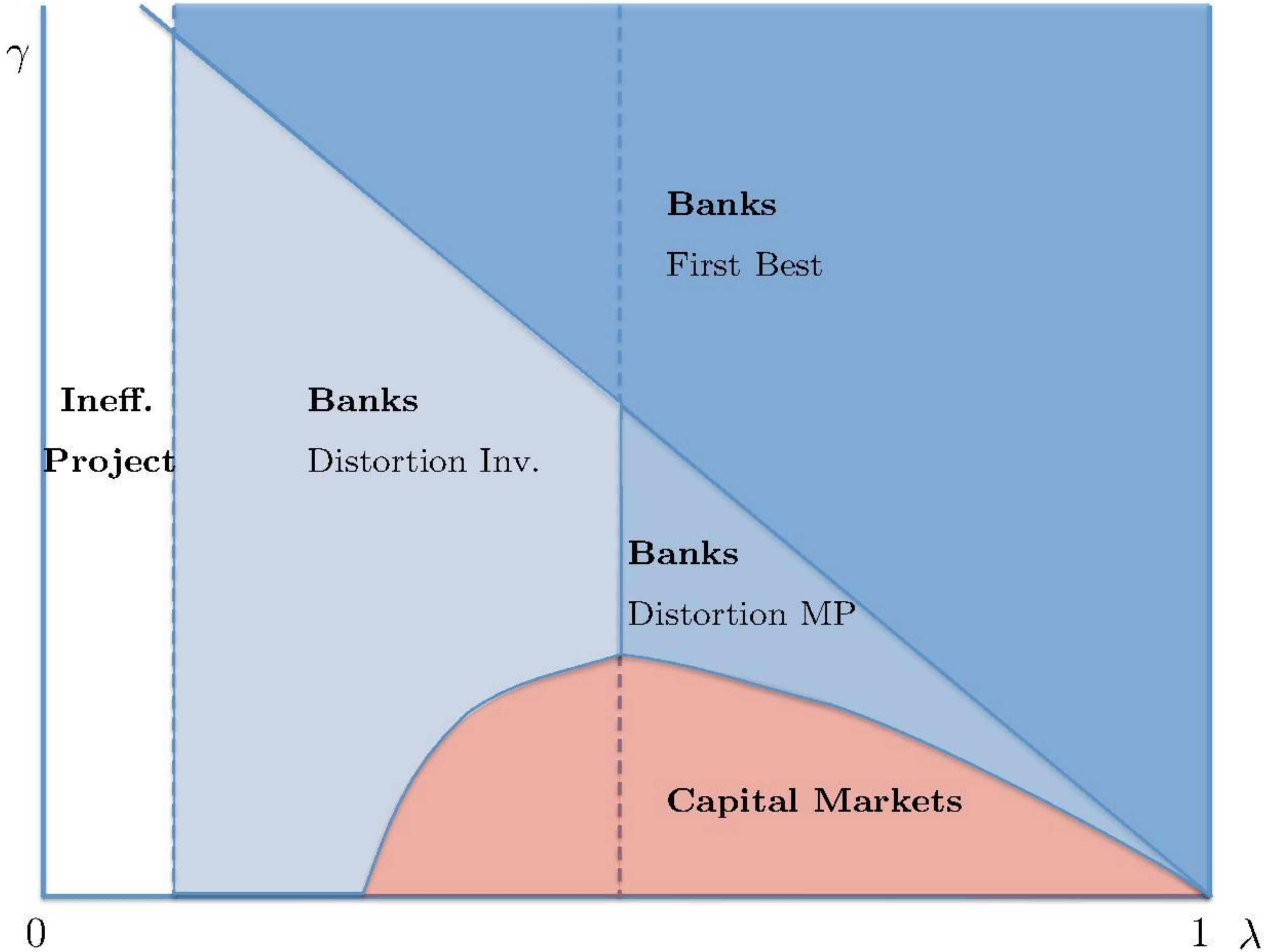
$$\frac{\lambda x - w}{w}\left[k - z - \frac{\gamma}{1-\lambda}\right] \leq \alpha\left[k - z - \frac{\gamma}{1-\lambda}\right]$$

Which Distortion is Better?

- Less investment is better than less safe liquidity if and only if

$$\underbrace{\frac{\lambda x - w}{w}}_{\texttt{NPV of project}} \leq \underbrace{\alpha}_{\texttt{Liquidity value}}$$

Banks or Capital Markets?



Final Remarks

- Banks are opaque, which indeed induce their regulation.
- Opacity is critical for private money and cheaper loans.
- Be careful with regulation that induces transparency.
- The optimal reaction to less bank equity is more opacity.