# Shadow Banking: The "Money" View

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# Liquidity Creation by Financial Sector

| Assets | Liabilities |
|---|---|
| Illiquid Long-term Loans | Equity + Long-term Debt |
| Treasury bonds, cash | Short-term debt |

- Financial sector transforms illiquid assets into liquid assets
  - Liquid asset = promise of cash redemption
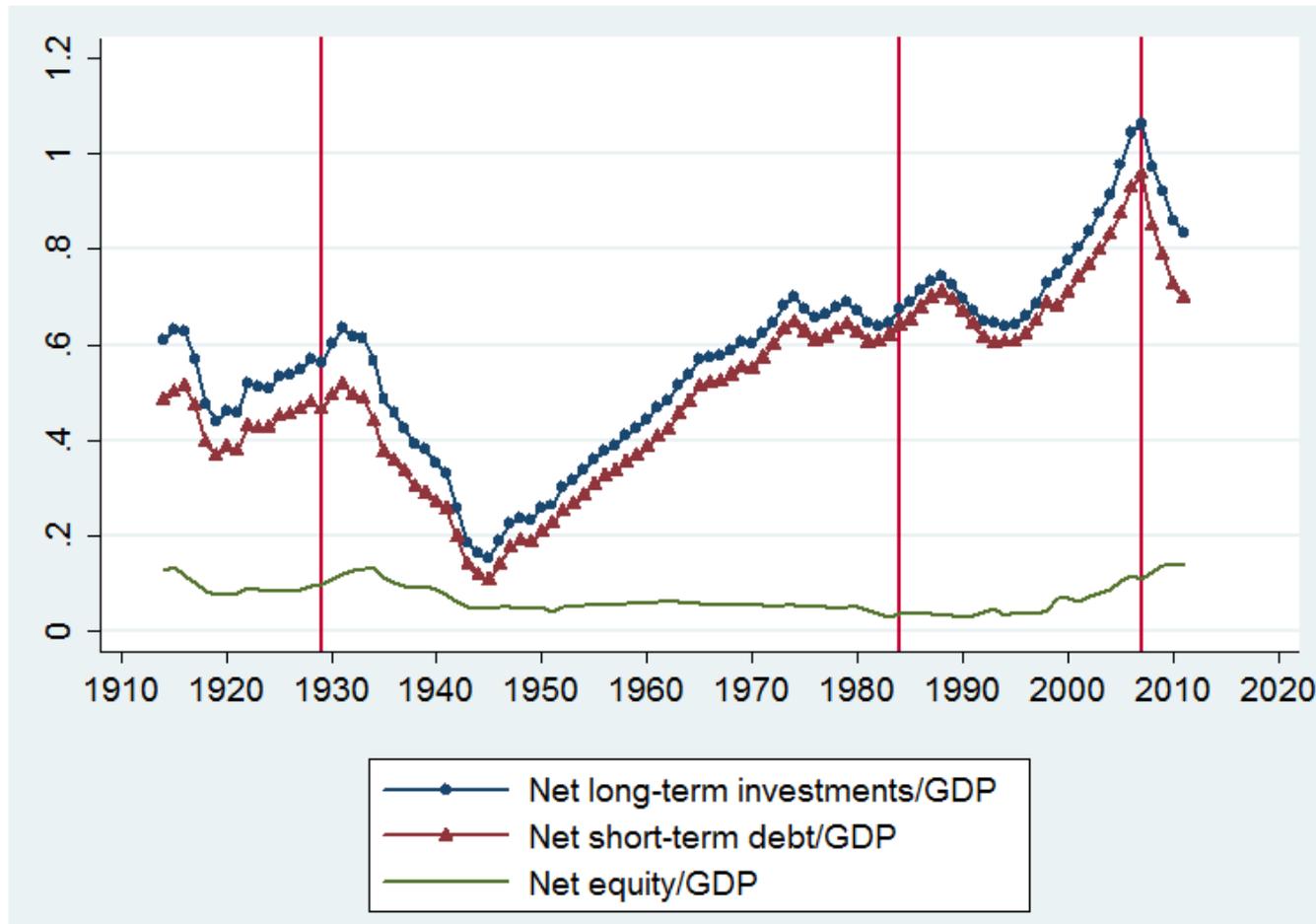  - Profit = "liquidity premium"

- "Shadow liabilities"

| Assets | Liabilities |
|---|---|
|  | Contingent credit lines |
|  | Derivatives' liquidity call |

# Liquidity Mismatch 2002 - 2013



- From Bai, Krishnamurthy and Weymuller (2013)

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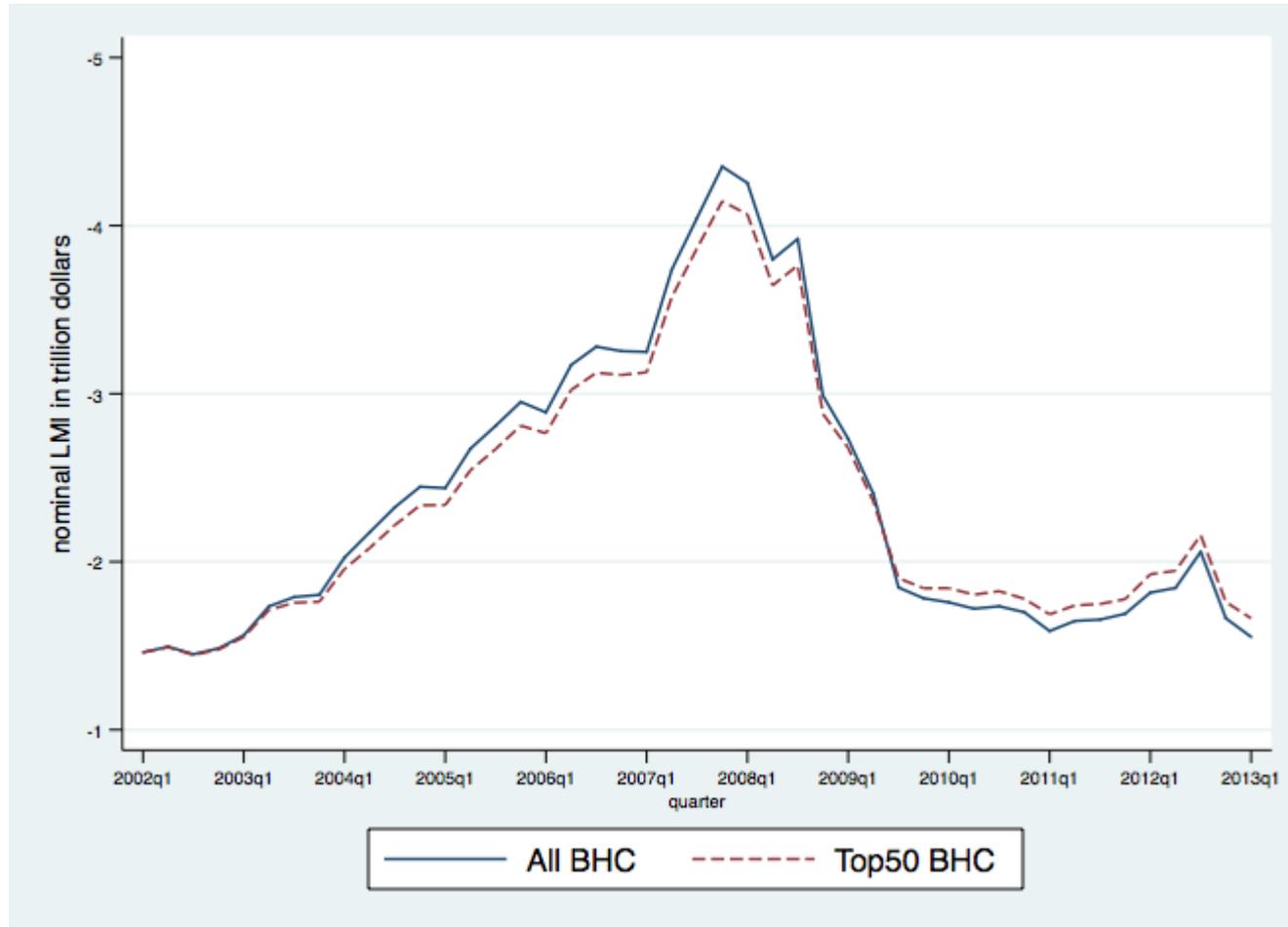
# Liquidity Creation: 1914-2012



- From Krishnamurthy and Vissing-Jorgensen (2013)

# Outline

- Why was there so much liquidity creation 2002-2007?

- Theory: The "money" view
  - Gorton, and others

- Evidence for the money view historically

- Interpreting 2002-2007 movements in the money view

# Model and Notation

- <u>Liquidity demanders</u> (money-market investors, non-financial corporates, households, foreign investors):

$$\text{max } U(\mathbf{L}) - \mathbf{P\,L}$$

**$L = L^{private} + L^{public}$**
**P = Price of liquidity**

- <u>Private liquidity supply</u> (banks + shadow banks):

$$\text{max } \mathbf{P\,L}^{\mathbf{private}} - F(\mathbf{L}^{\mathbf{private}})$$

**F(L)** is private cost of running a liquidity mismatch

- <u>Government supplied liquidity</u>: $\mathbf{L}^{\mathbf{public}}$.

# Private supply of liquidity

**Liquidity demanders:**

$$\max U(L) - P\, L$$

$$L = L^{private} + L^{public}$$

**P = Price of liquidity**

**Liquidity supply:**

$$\max P\, L^{private} - F(L^{private})$$

**F(L)** is private cost of running a liquidity mismatch

Government supplied liquidity: $L^{public}$

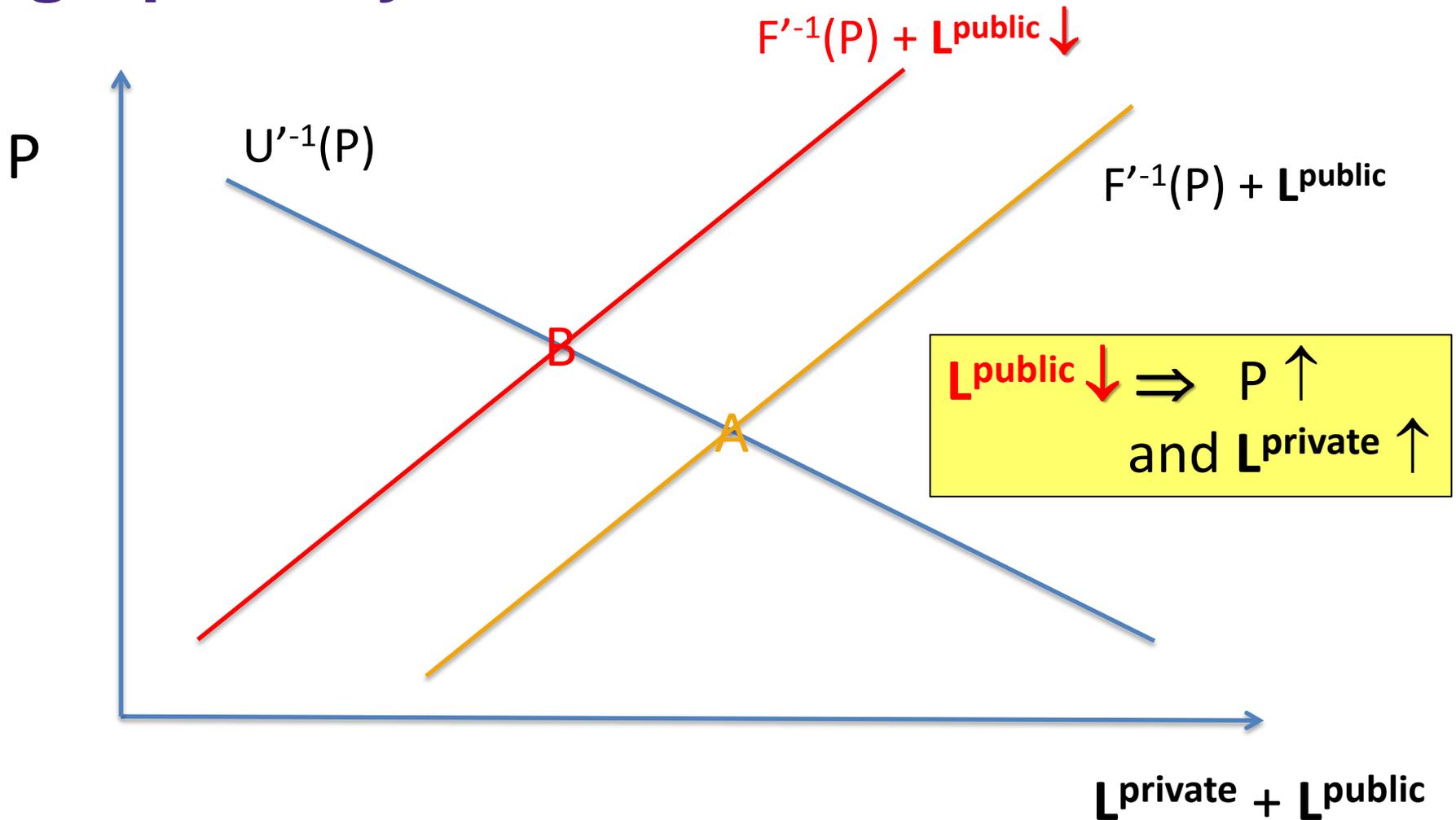**Equilibrium:**
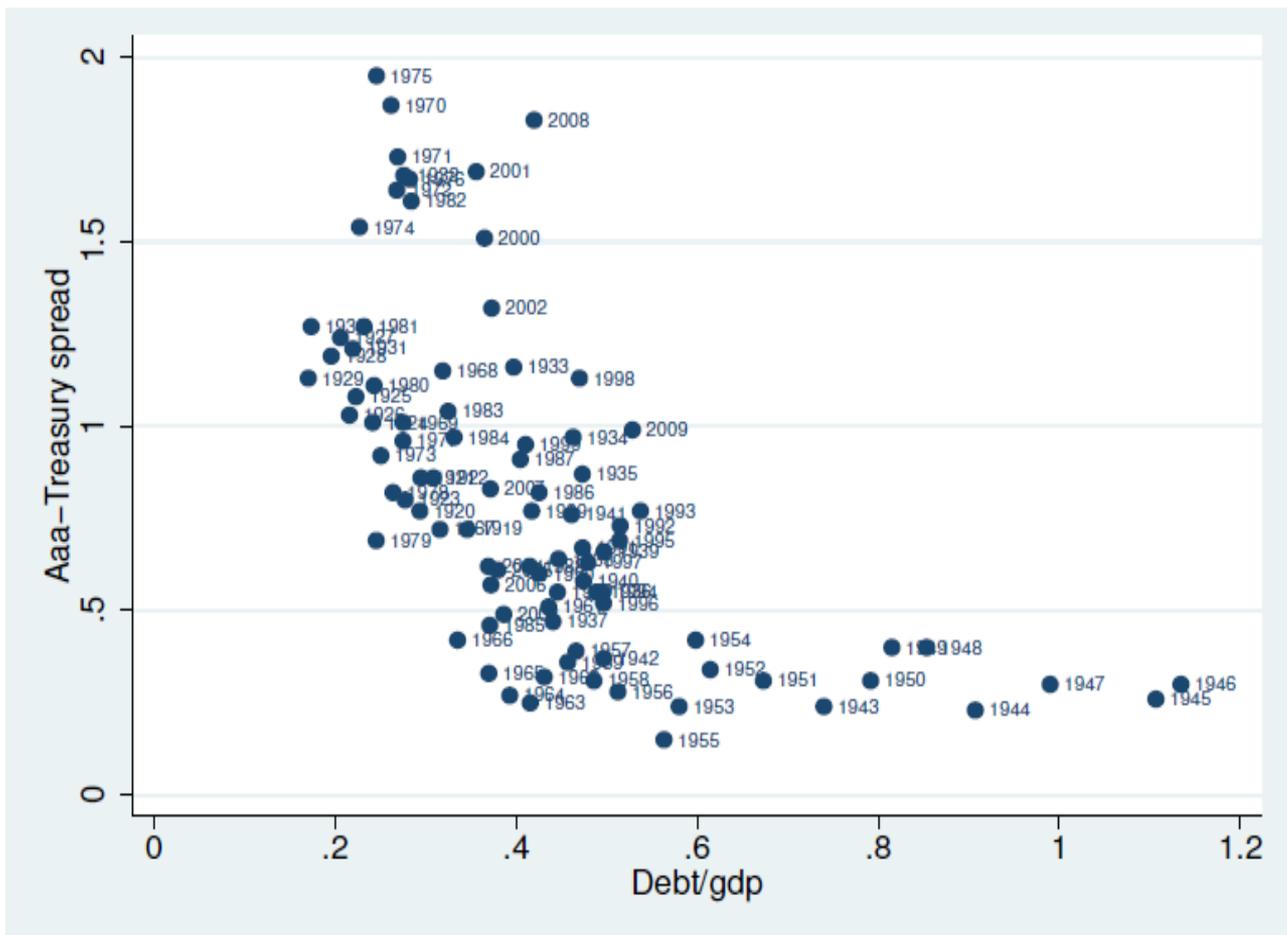
$$U'(L^{private} + L^{public}) = P = F'(L^{private}).$$

*demand*          *supply*

# graphically



$F'^{-1}(P) + L^{public} \downarrow$

$U'^{-1}(P)$

$F'^{-1}(P) + L^{public}$

B

A

$L^{public} \downarrow \Rightarrow P \uparrow$
and $L^{private} \uparrow$

P
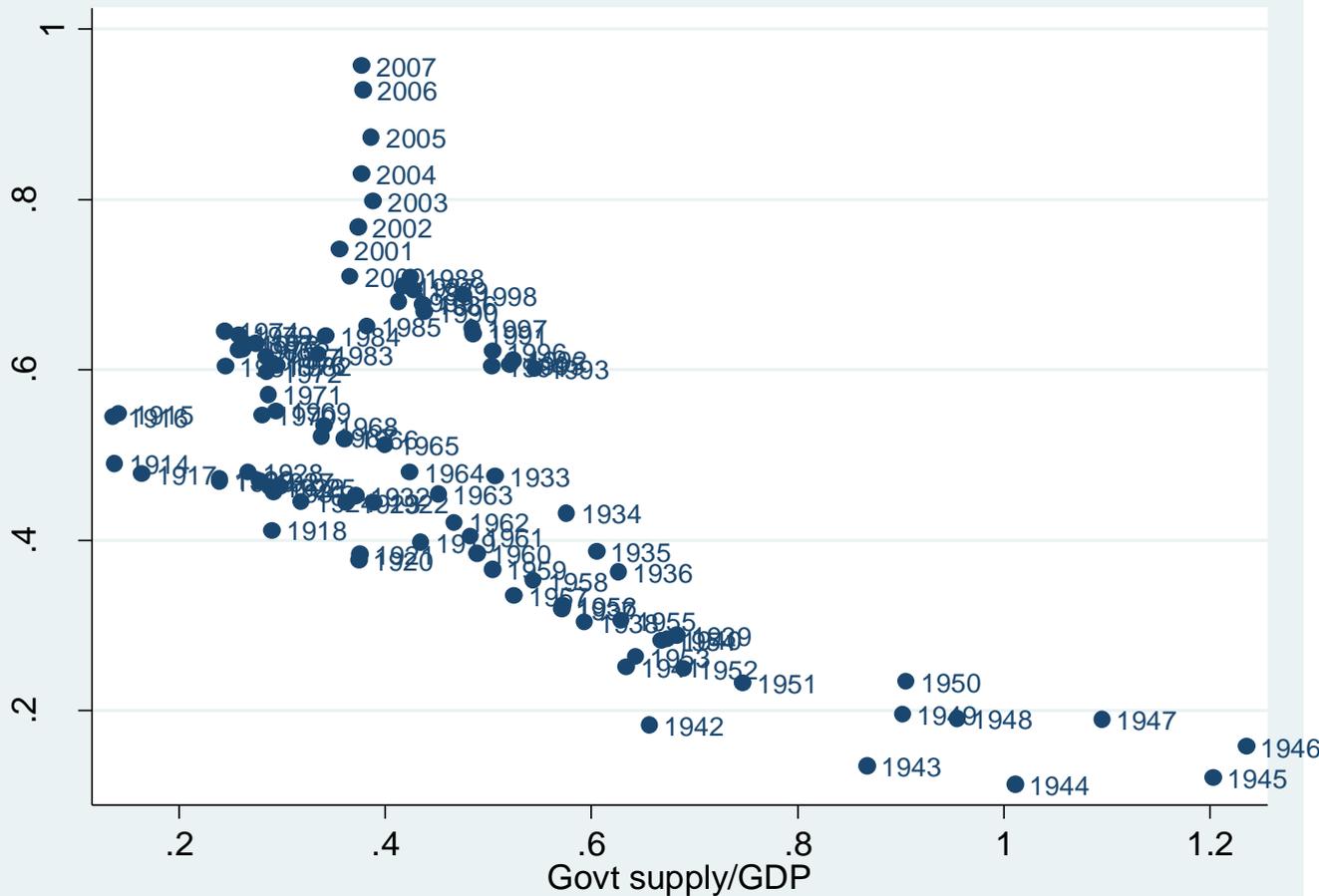
$L^{private} + L^{public}$

# Liquidity premium and public supply



- Aaa-Treasury is proxy for **P**

- The graph measures liquidity demand,

$U'(L^{private} + L^{public}) = P$

**Based on variation in $L^{public}$ = Debt/GDP**

- From Krishnamurthy and Vissing-Jorgensen (2012)

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# Private and public supply of liquidity



$L^{private} =$

**Short-term Debt**

*Banks + Shadow banks (broker/dealers,securiti zation, repo, MMFs)*

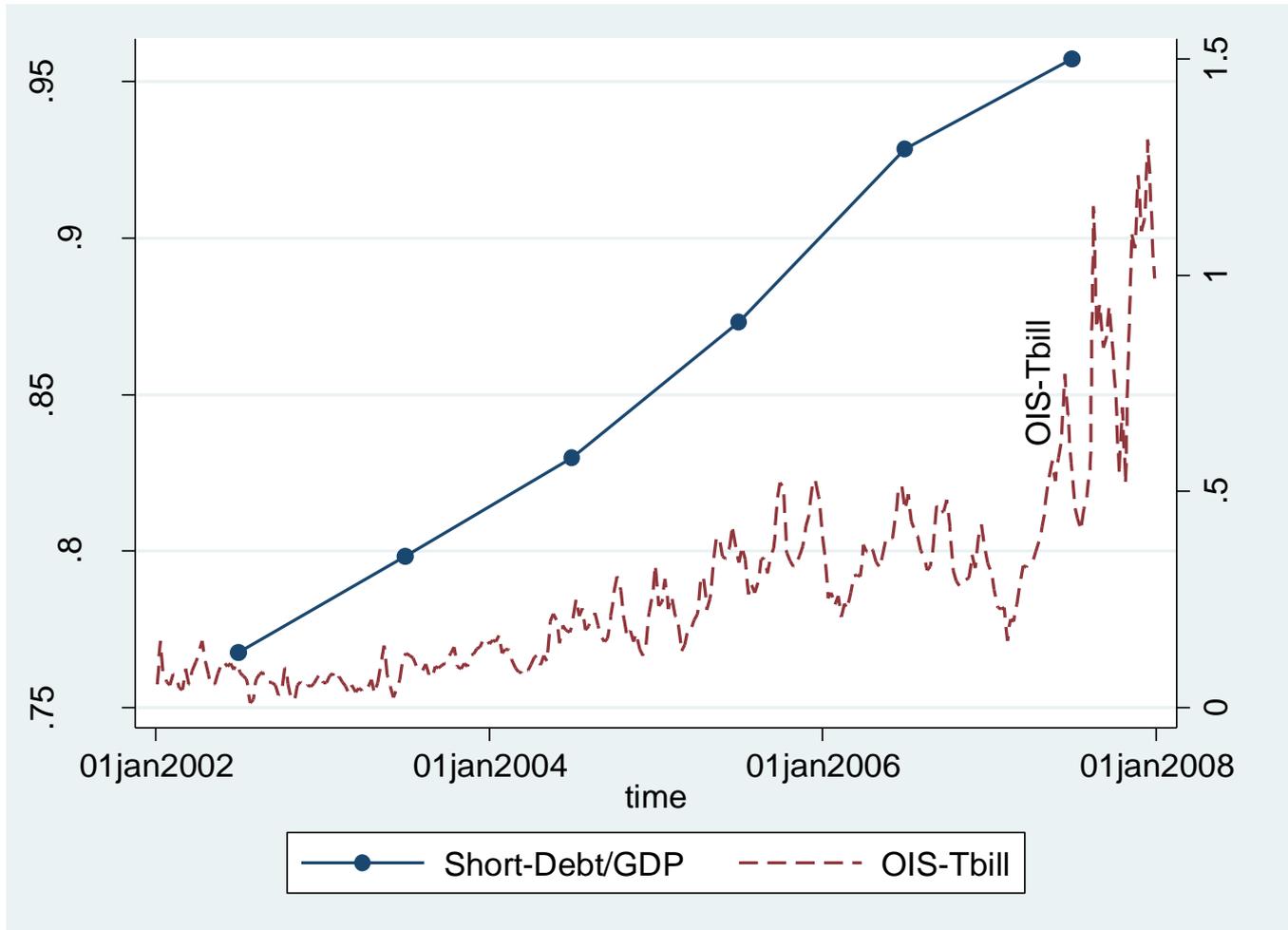*After netting inter-bank and shadow bank sector claims*

Graph measures

variation in $L^{private}$

based on variation

in $L^{public}$
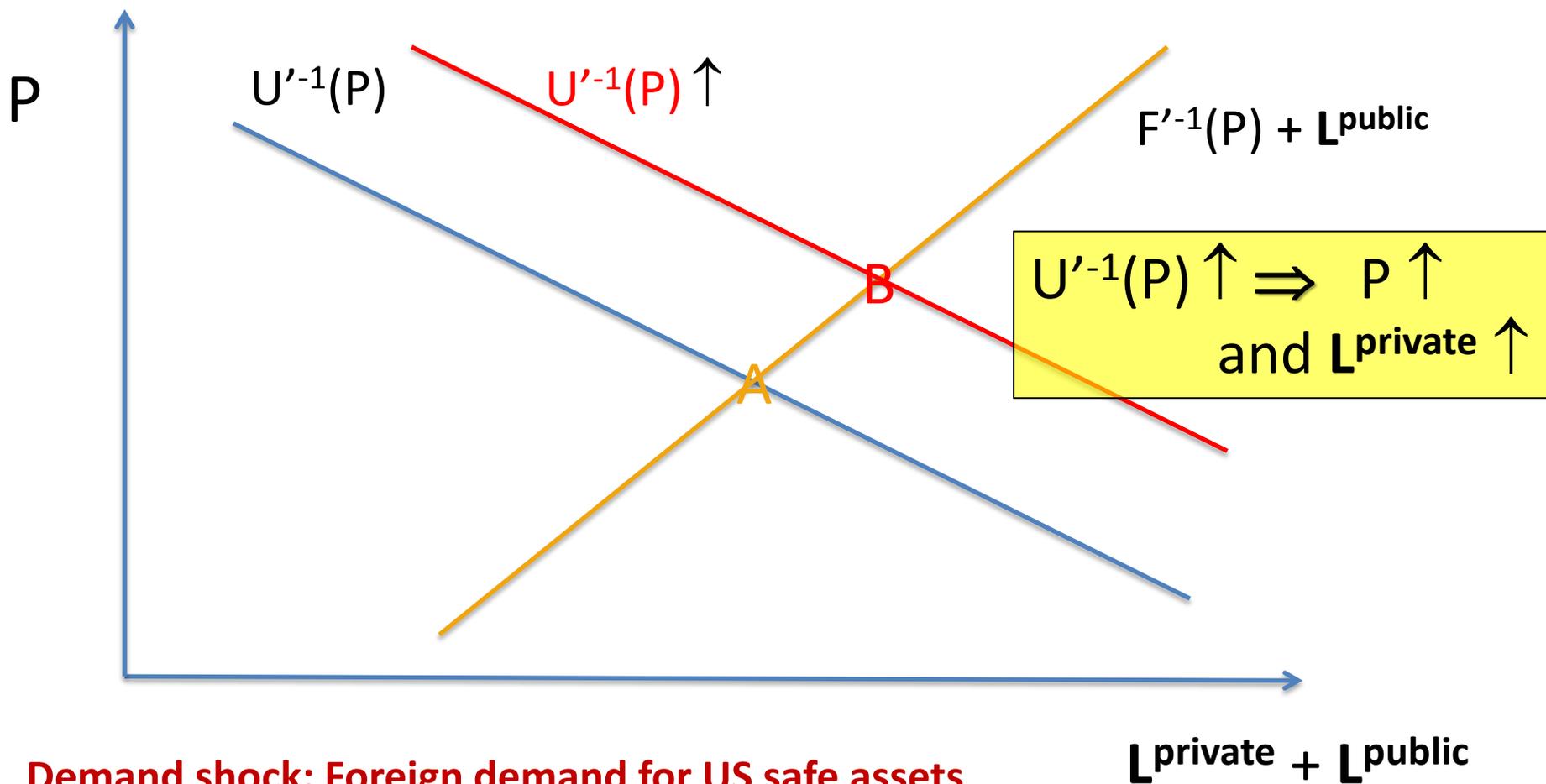
- From Krishnamurthy and Vissing-Jorgensen (2013)

# Crisis Build-up: 2002 - 2007



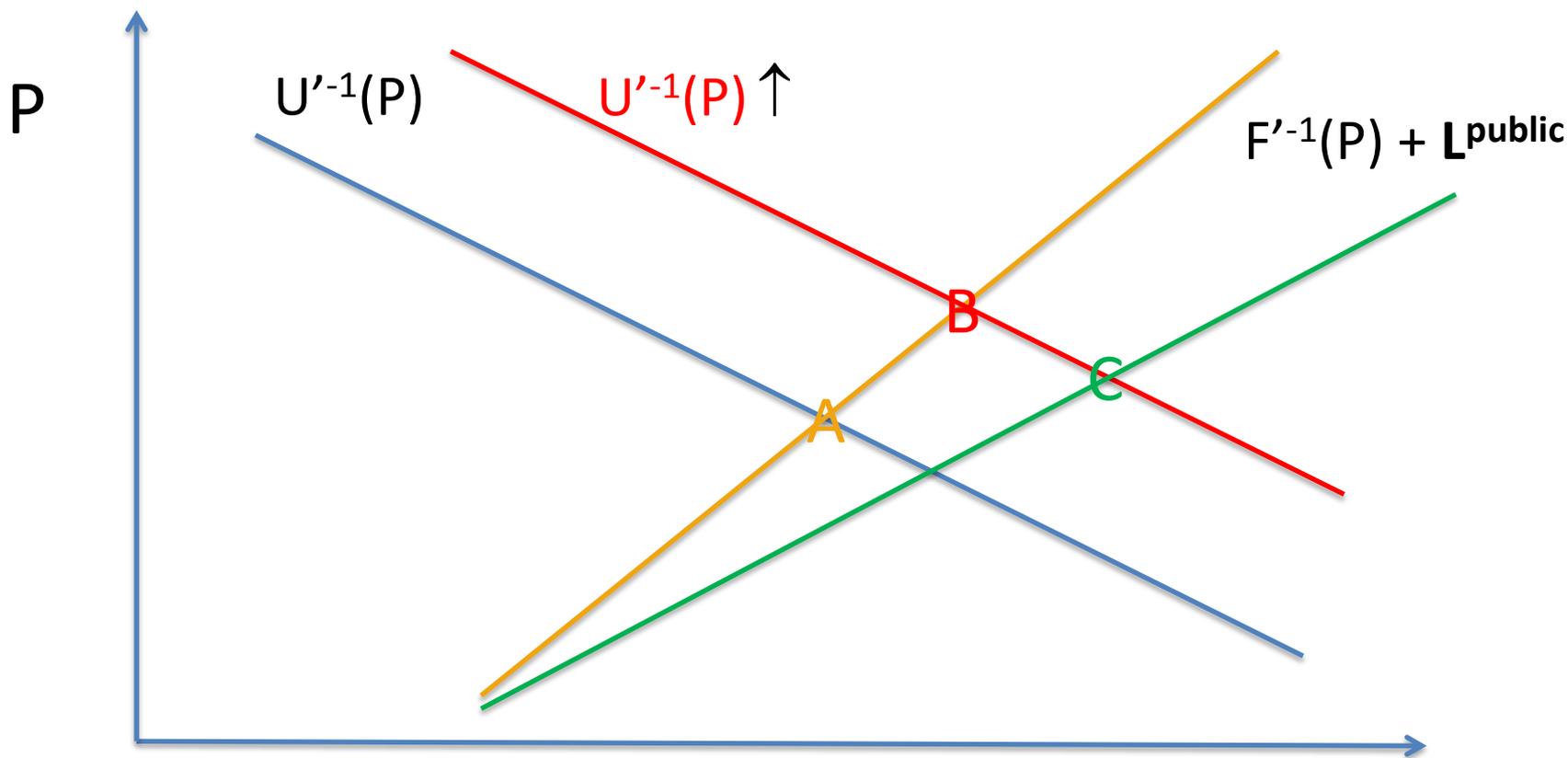Spread between **3M OIS and T-Bills** measures liquidity premium **(P)**

Short-Debt rises by **$5.4 trillion** from 2002Q2 to 2007Q2

# Money Demand Shock



P

U'$^{-1}$(P)     U'$^{-1}$(P) ↑

F'$^{-1}$(P) + L$^{public}$

B

A

U'$^{-1}$(P) ↑ ⟹ P ↑
and L$^{private}$ ↑

**Demand shock: Foreign demand for US safe assets
Caballero and Krishnamurthy (2008)**

L$^{private}$ + L$^{public}$

# Decomposition 1: Structural Approach

Based on data from 1920-2001, we can estimate the slope of **F'$^{-1}$(P):**[1]

- We find: Per 10 basis point increase in **P**, financial sector supplies 0.026 more short-term debt/GDP

- From first-half 2002 to first-half 2007, average **P** increases by 32 basis points

- Pure demand shift explains 0.08 = (3.2 X 0.026) increase in short-term debt/GDP

- Actual increase is 0.19

- Supply factors responsible for 0.11

[1]This comes from regressing Short-term Debt/GDP on the spread between CP and T-Bills, instrumented by Debt/GDP and (Debt/GDP)$^2$

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# Decomposition 2: Reduced Form Approach
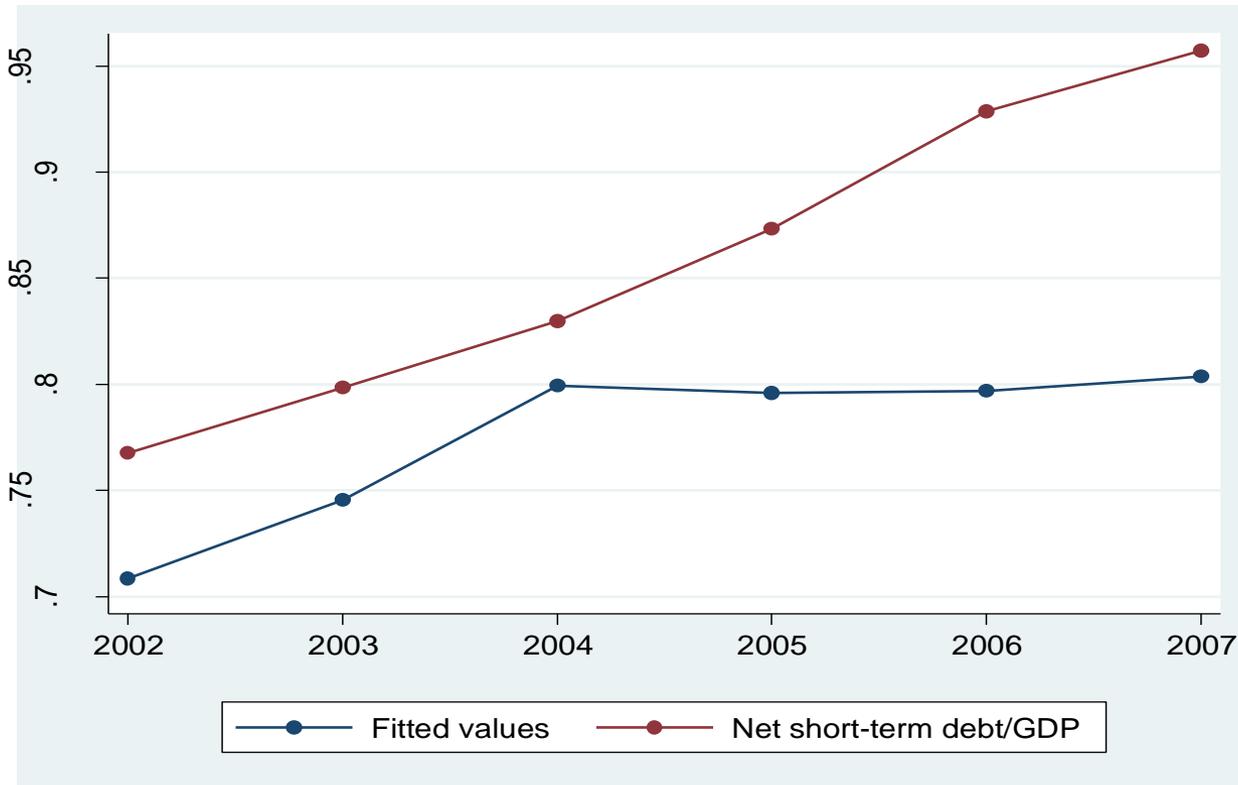


- Regress short-term debt on $L^{public}$ and **Foreign Holdings** of US Treasury bonds (as proxy for demand factors)

- Fitted values increase by **0.10**

# Summary: Money and Bank Growth

- Banks and Shadow Banks run a liquidity mismatch
  - This mismatch grew substantially from 2002 to 2007
- Two factors:
  1. Money demand shock
     - Foreign demand for safe/liquid assets rose
  2. Money supply shock
     - Banking sector found it cheaper to run a liquidity mismatched book
- Roughly equal contribution to growth of liquidity mismatch

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# References

1. "Financial Fragility and Global Imbalances", Caballero and Krishnamurthy (2008), *American Economic Review*

2. "Aggregate Demand for Treasury Debt" Krishnamurthy and Vissing-Jorgensen (2012), *Journal of Political Economy*

3. "Short-term Debt and Financial Crises: What we can learn from Treasury Supply" Krishnamurthy and Vissing-Jorgensen (2013), working paper

4. "Measuring Liquidity Mismatch in the Banking Sector" Bai, Krishnamurthy and Weymuller (2013), working paper

5. "Liquidity Mismatch Measurement" Brunnermeier, Gorton and Krishnamurthy (2013), Risk Topography: Systemic Risk and Macro Modeling, NBER Volume