The Macroeconomics of Shadow Banking

Alan Moreira
Yale University

Alexi Savov
New York University

2015 Financial Markets Conference
Federal Reserve Bank of Atlanta
March 31, 2015

Shadow banking, what is it good for?

Three views:

1. Regulatory arbitrage
   - avoid capital requirements, exploit implicit guarantees
2. Neglected risks
   - package risky investments as safe, pass on to unsuspecting investors
3. Liquidity transformation
   - create money-like liquid instruments from a broader set of assets

Shadow banking, what is it good for?

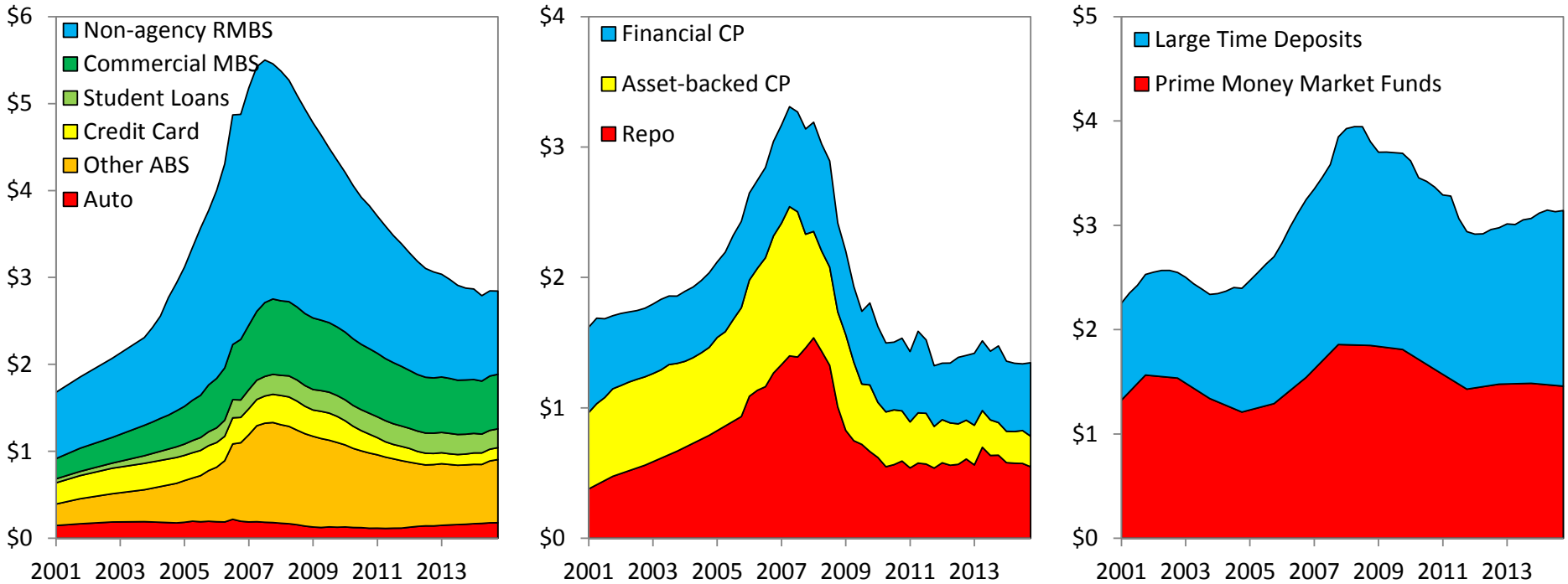
Three views:

1. Regulatory arbitrage
   - avoid capital requirements, exploit implicit guarantees
2. Neglected risks
   - package risky investments as safe, pass on to unsuspecting investors
3. Liquidity transformation
   - create money-like liquid instruments from a broader set of assets

All reform proposals take an implicit stance

The liquidity transformation view of shadow banking

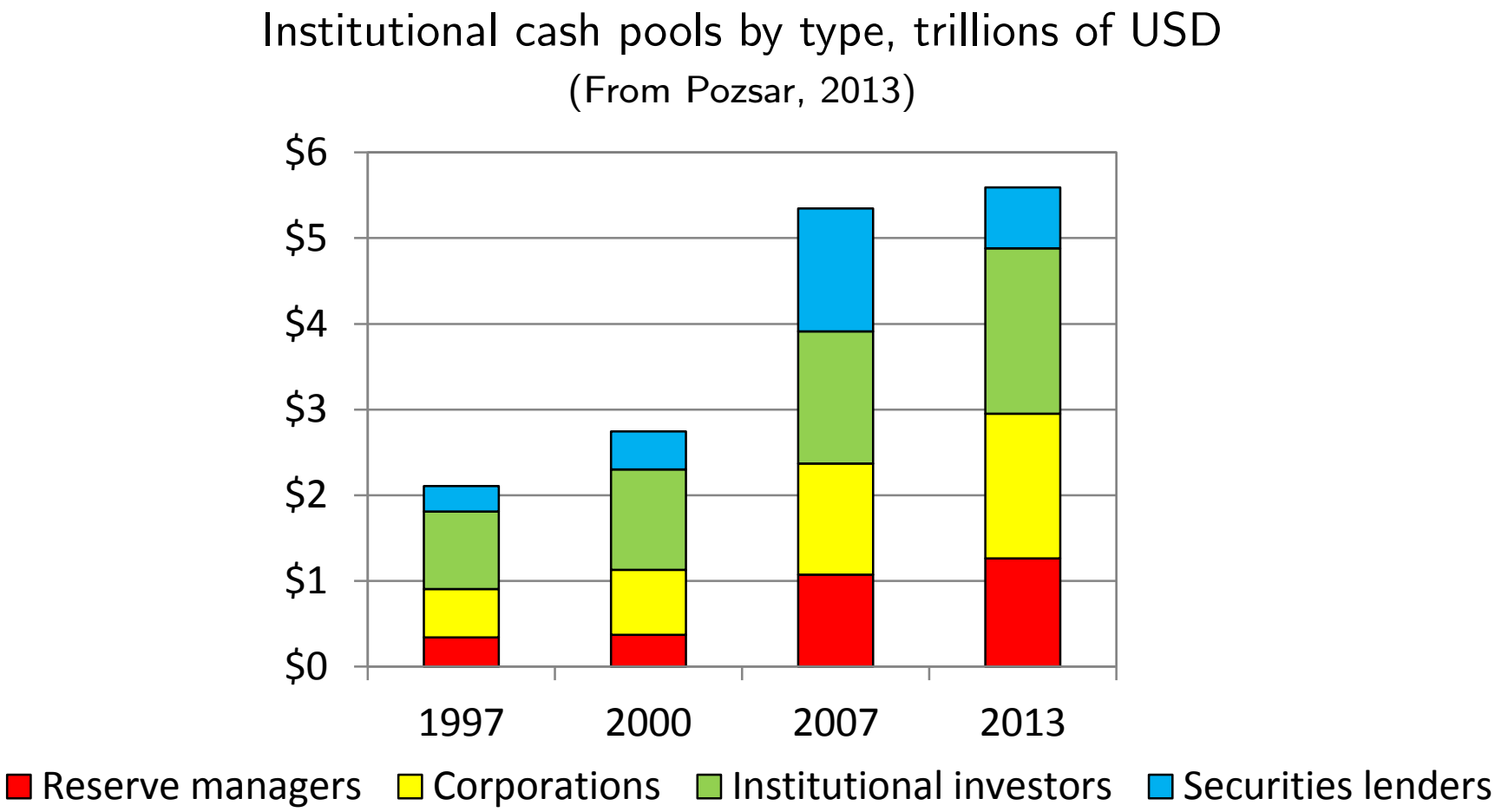
Securitized loans $\Rightarrow$ Intermediated funding $\Rightarrow$ Liquidity provision



Trillions of USD outstanding

1. Shadow banking turns risky assets into liquid liabilities
   $\Rightarrow$ expands credit to the economy and liquidity provision to households/institutions
2. Bigger booms, deeper busts
   $\Rightarrow$ tradeoff between growth and stability

The global search for money

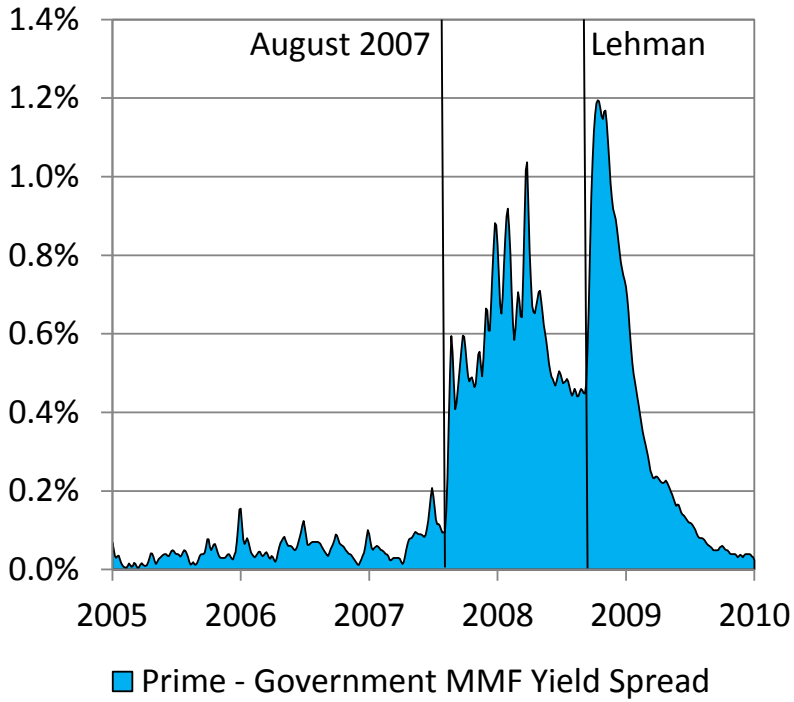


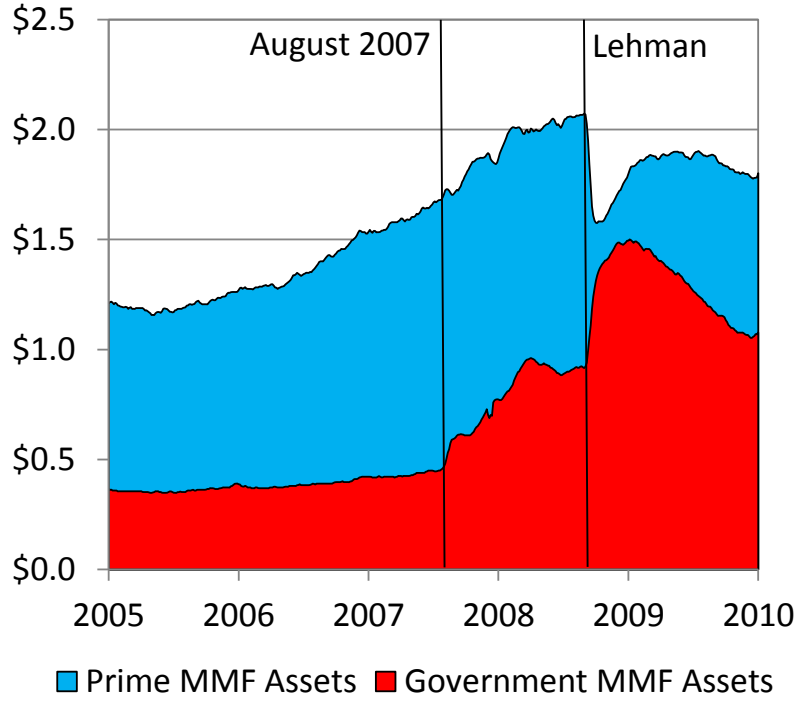
1. Demand for liquid securities has doubled, continues to grow
   - supply of fully safe (i.e. government-backed) assets has not kept up
   - shadow banking has been meeting this demand

Shadow money ≠ money

Prime vs Government Money Market Funds

(From Acharya and Mora, 2015)





1. Money-like liquidity of shadow banking securities evaporates quickly
   - uncertainty about underlying assets drives up spreads
   - flight to safety from "shadow money" into "money"

$\Rightarrow$ Tradeoff between quantity and fragility of liquidity supply

Our framework

1. Households demand liquid securities to self-insure against shocks
   - liquidity $\Leftrightarrow$ low information sensitivity (e.g. stable NAV)

2. Intermediaries invest in real capital and finance with
   - money safe $\Rightarrow$ liquid (e.g. insured deposits)
   - equity residual $\Rightarrow$ illiquid
   - shadow money safe except in a crash $\Rightarrow$ liquid except in a crash (e.g. ABCP)

Our framework

1. Households demand liquid securities to self-insure against shocks
   - liquidity $\Leftrightarrow$ low information sensitivity (e.g. stable NAV)

2. Intermediaries invest in real capital and finance with
   - money safe $\Rightarrow$ liquid (e.g. insured deposits)
   - equity residual $\Rightarrow$ illiquid
   - shadow money safe except in a crash $\Rightarrow$ liquid except in a crash (e.g. ABCP)

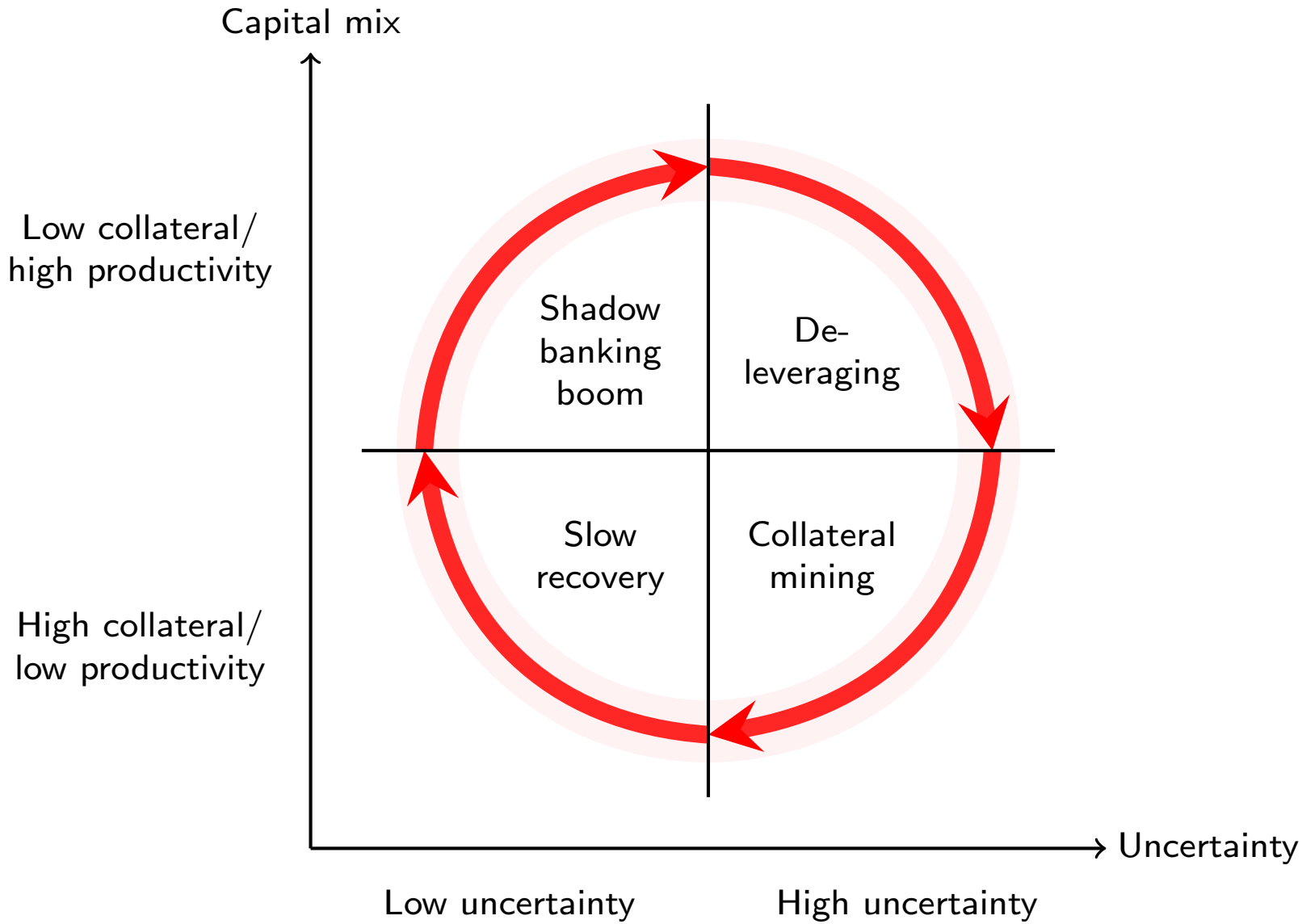
3. Collateral constrains liquidity provision:

$$\text{Money} \times 1 + \text{Shadow money} \times \left(1 - \text{Crash loss}\right) \leq \text{Value of assets in case of crash}$$

   - quantity vs. fragility tradeoff

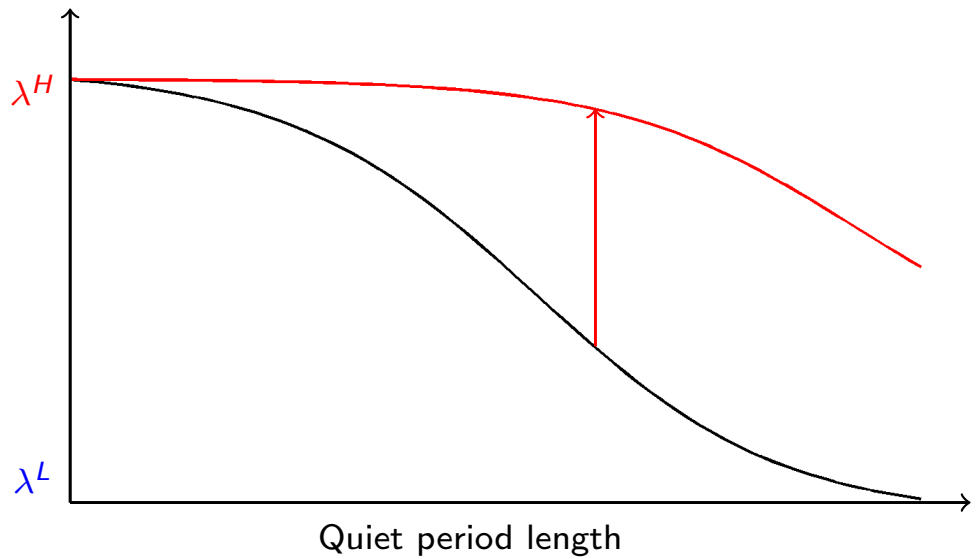
4. Uncertainty drives demand for crash-proof vs. crash-fragile liquidity

The liquidity/macro cycle



Uncertainty

1. True probability of a crash $\tilde{\lambda} \in \left\{\lambda^L, \lambda^H\right\}$ not observed
   - agents learn from crashes and other news
2. Bayesian learning $\Rightarrow$ time-varying uncertainty λ_t
   - low after a long quiet period (Great Moderation)
   - high after a crash (Reinhart-Rogoff)
   - jumps most from moderately low levels ("Minsky moment")



Intermediaries and liquidity provision

1. Households demand liquid securities
   - a liquid security is backed by enough assets to avoid adverse selection

2. Real assets risky $\Rightarrow$ illiquid $\Rightarrow$ need intermediation
   - liquidity supply constrained by crash value of assets (i.e. collateral)

$$\left(\begin{array}{c}\textit{Liquid}\\ \textit{securities}\end{array}\right) \times \textit{Collateralization} \leq \left(\begin{array}{c}\textit{Crash value}\\ \textit{of total assets}\end{array}\right)$$

3. Collateral reflects cash flow risk and endogenous price risk
   - even a cash-flow safe asset is risky in equilibrium

$$\left(\begin{array}{c}\textit{Crash value}\\ \textit{of asset } i\end{array}\right) = 1 - \left(\begin{array}{c}\textit{Cash flow}\\ \textit{risk of } i\end{array}\right) - \left(\begin{array}{c}\textit{Price}\\ \textit{risk of } i\end{array}\right)$$

Asset prices and investment

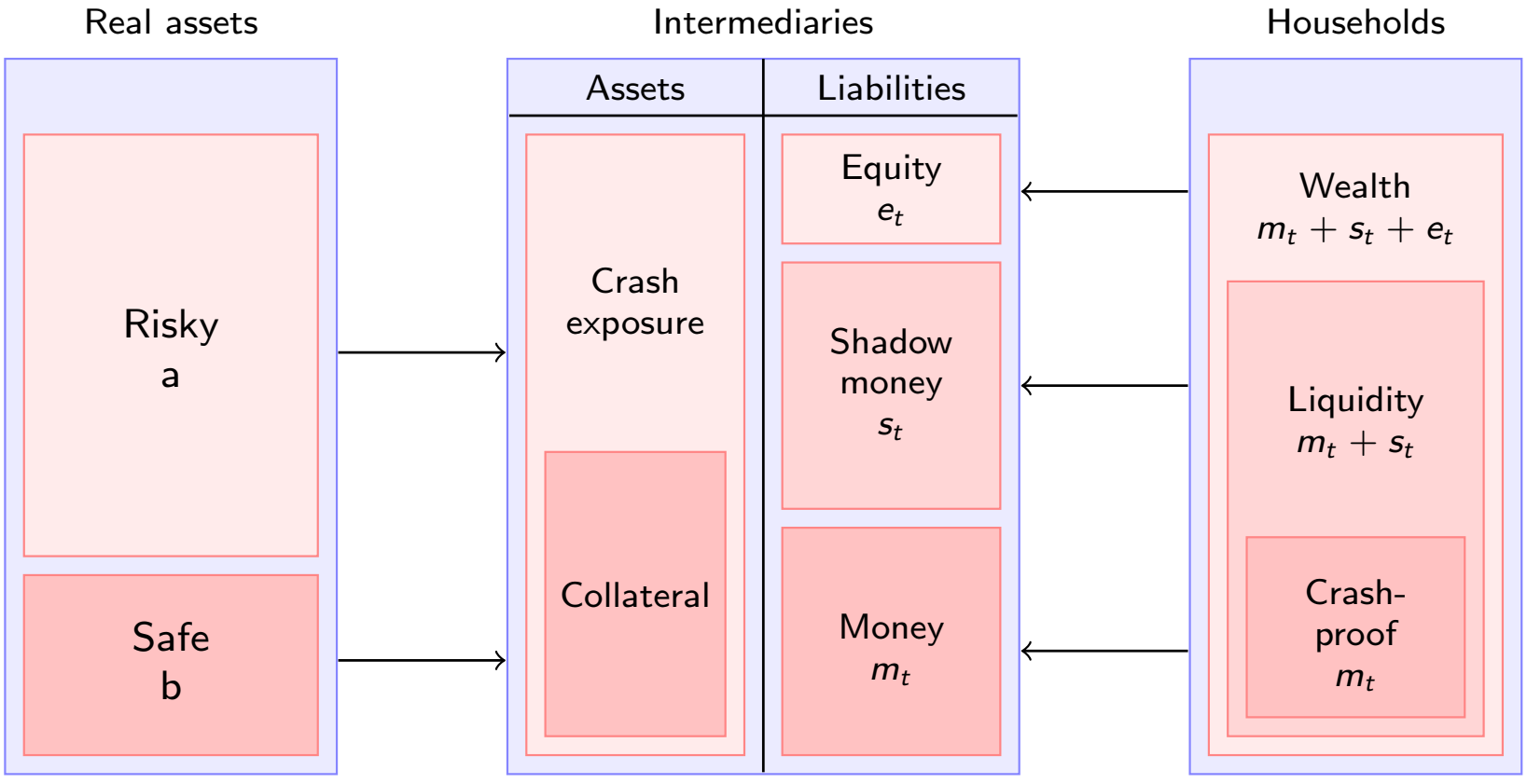
1. Intermediaries buy assets a (risky) and b (safe) and invest to maximize profits

2. Asset prices embed tradeoff between productivity and collateral value

$$\begin{pmatrix} \text{Price of} \\ \text{asset } i \end{pmatrix} = \frac{\begin{pmatrix} \text{net cash flow} \\ \text{of asset } i \end{pmatrix}}{\left[\begin{pmatrix} \text{aggregate} \\ \text{discount rate} \end{pmatrix} - \theta_t \begin{pmatrix} \text{collateral} \\ \text{value of } i \end{pmatrix}\right] - \begin{bmatrix} \text{growth} \\ \text{rate of } i \end{bmatrix}}$$

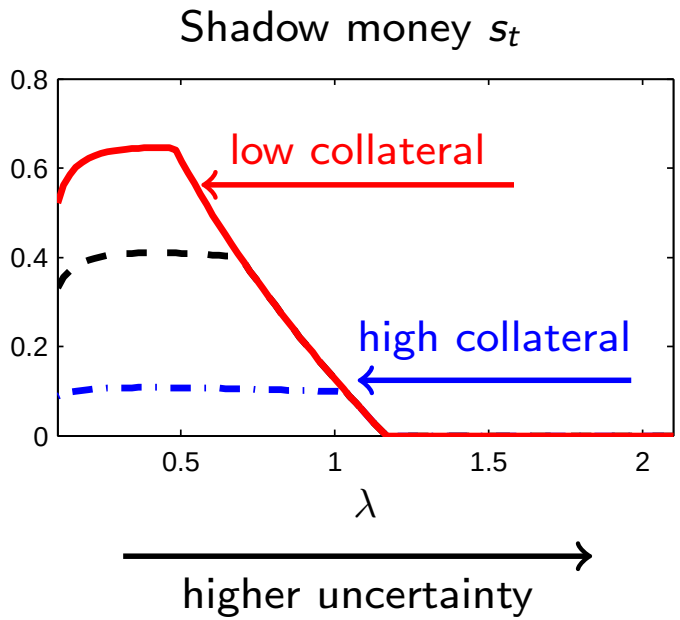
- θ_t = collateral premium, varies with asset mix and uncertainty
- aggregate discount rate decreasing in liquidity provision

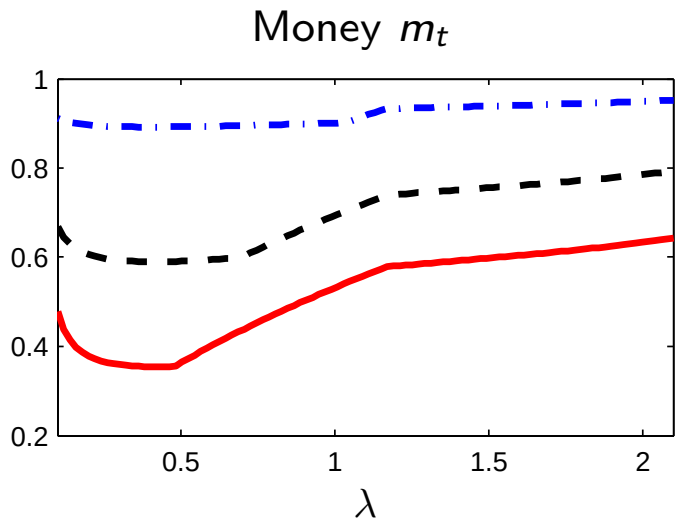
Balance sheet view



RESULTS

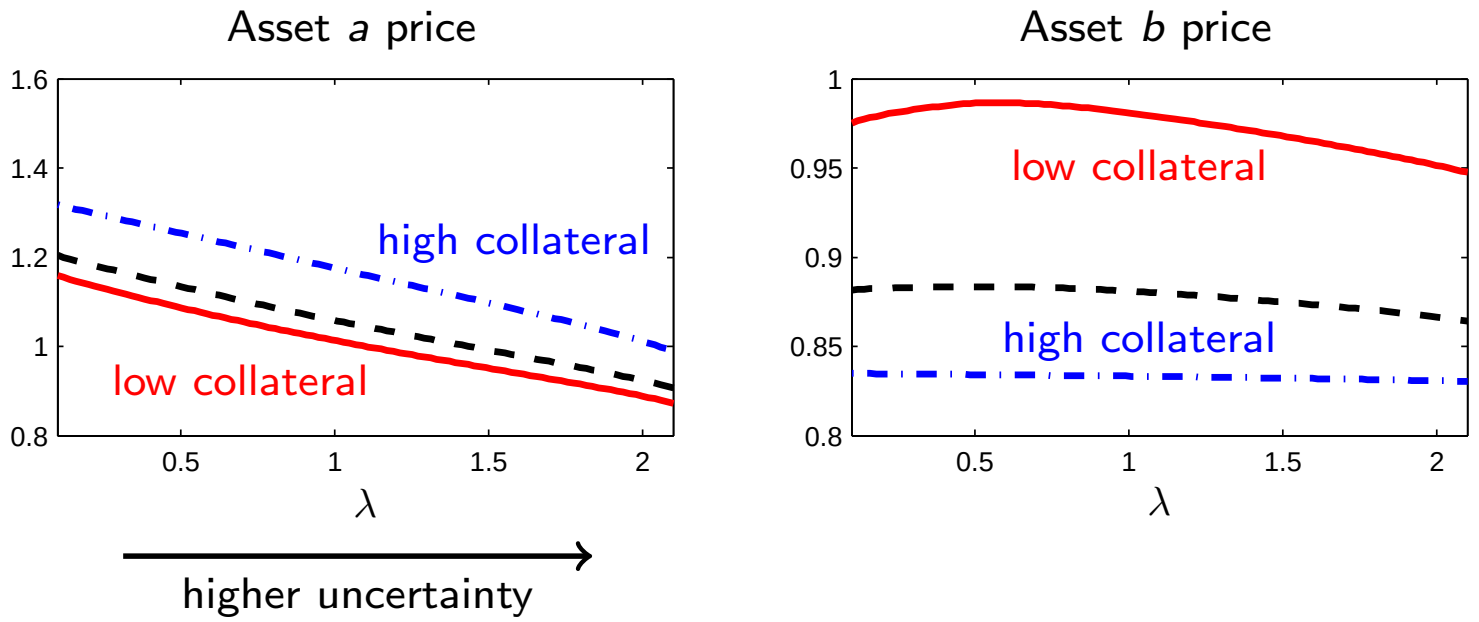
Liquidity provision





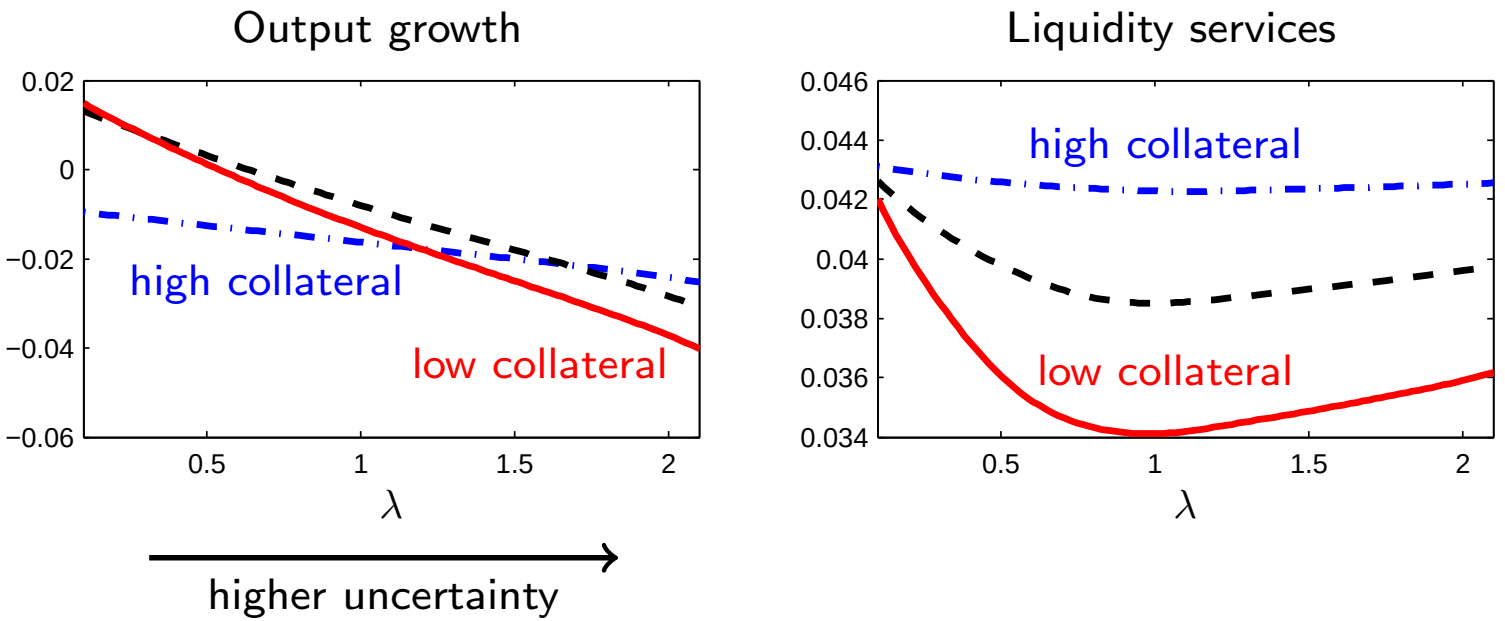
1. Shadow banking booms in low uncertainty-low collateral states
   - crowds out money creation in booms
   - disappears when uncertainty rises from a low level (e.g. August 07)

Asset prices



1. Higher uncertainty increases collateral premium, lowers risky asset price and may raise safe asset price
   - fragility buildup when uncertainty is low (invest only in risky assets)
   - collateral mining when uncertainty is high (invest only in safe assets)

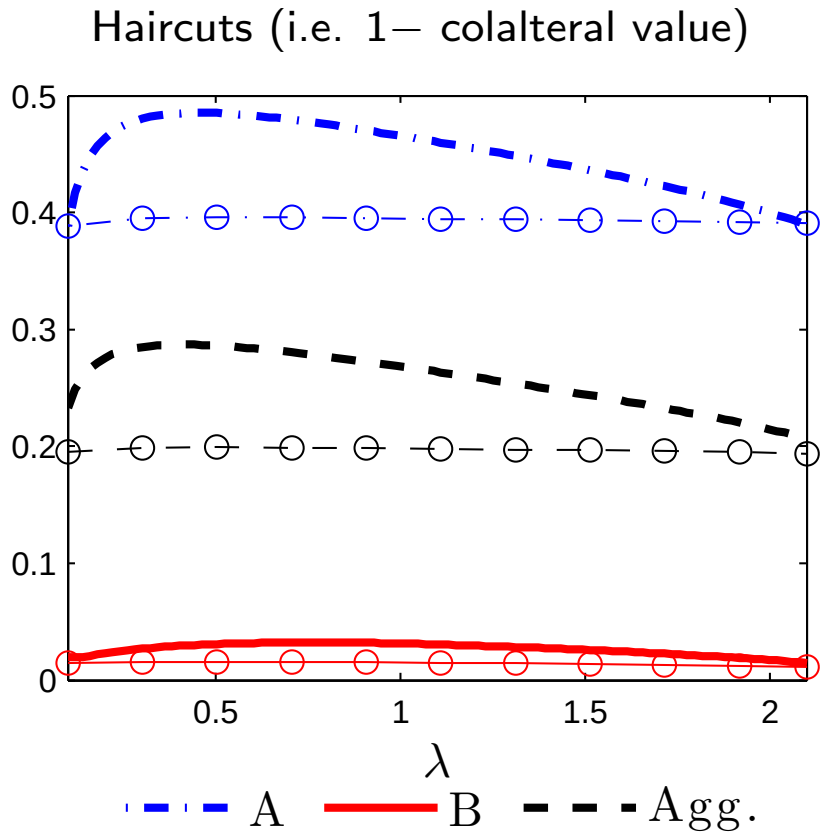
Output growth and liquidity transformation



1. Liquidity and growth are uncertainty-sensitive when liquidity transformation is high (collateral is low)

2. High growth requires liquidity *transformation* (low uncertainty, productive capital mix)
   - real economy boom coincides with shadow banking boom

Collateral runs (margin spirals)



(Circle markers: economy without shadow banking)

1. Haircuts rise as prices fall ⇒ prices fall more, etc.
2. A product of shadow banking

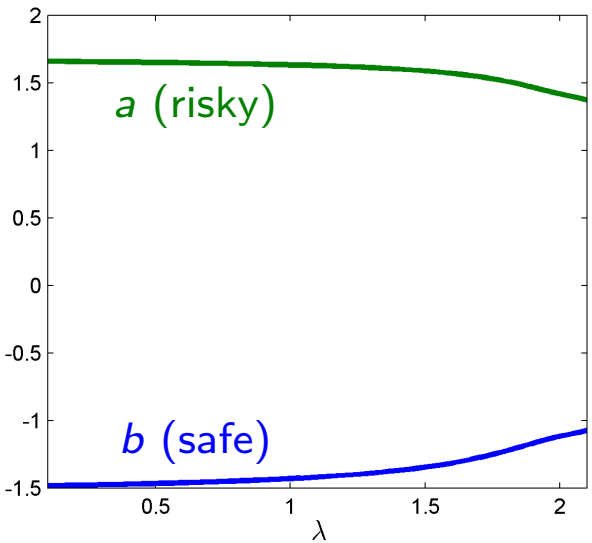
POLICY INTERVENTIONS

QE1 - Large-Scale Asset Purchases

1. Interpret safe asset b as long-term government bond
2. Fed buys a (risky) and sells b (safe) asset

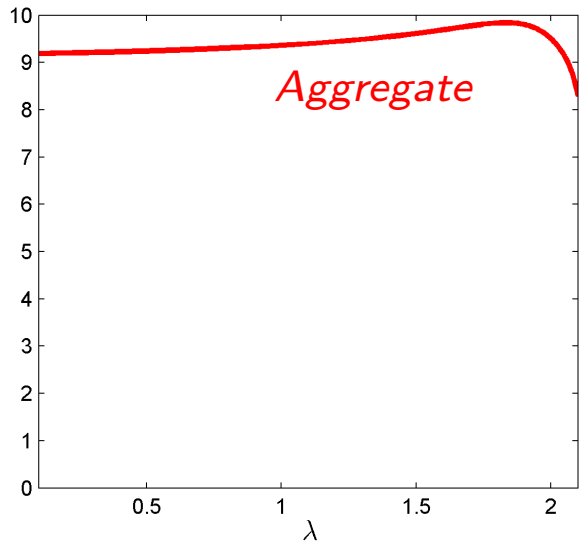
Announcement effect

(% price change)



Policy effect on collateral supply

(% change in asset crash value)

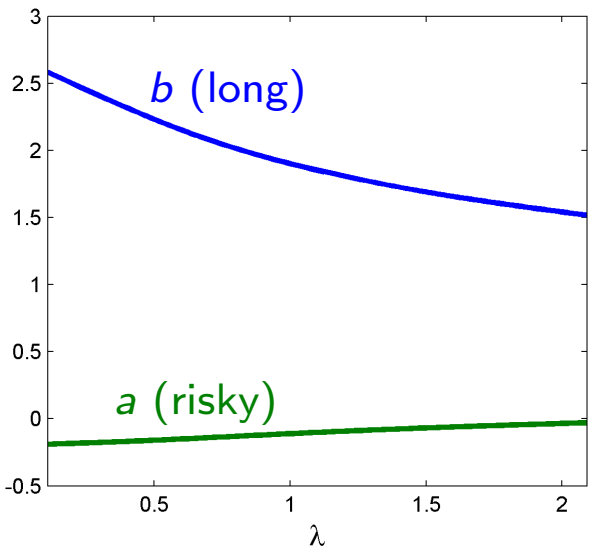


3. LSAP increases the supply of collateral $\Rightarrow$ liquidity provision rises $\Rightarrow$ discount rates fall, especially for risky/productive assets

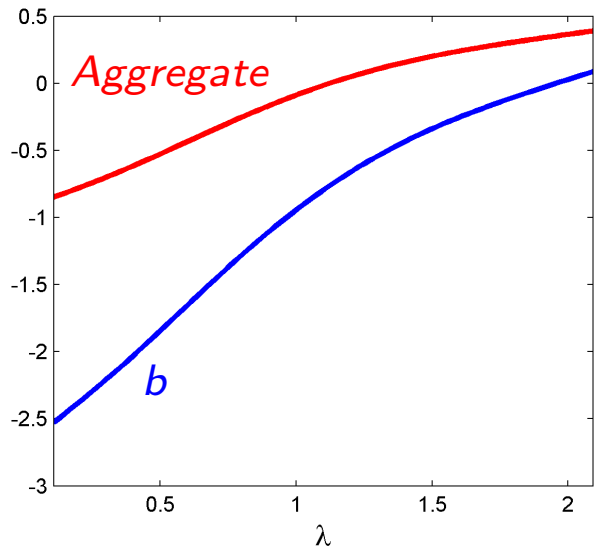
Operation Twist

1. Fed buys long-term safe bonds and sells short-term safe bonds.
   - long-term safe bond acts as crash hedge due to flight to quality
   - short-term safe bond safe but not a hedge

Announcement effect
(% price change)



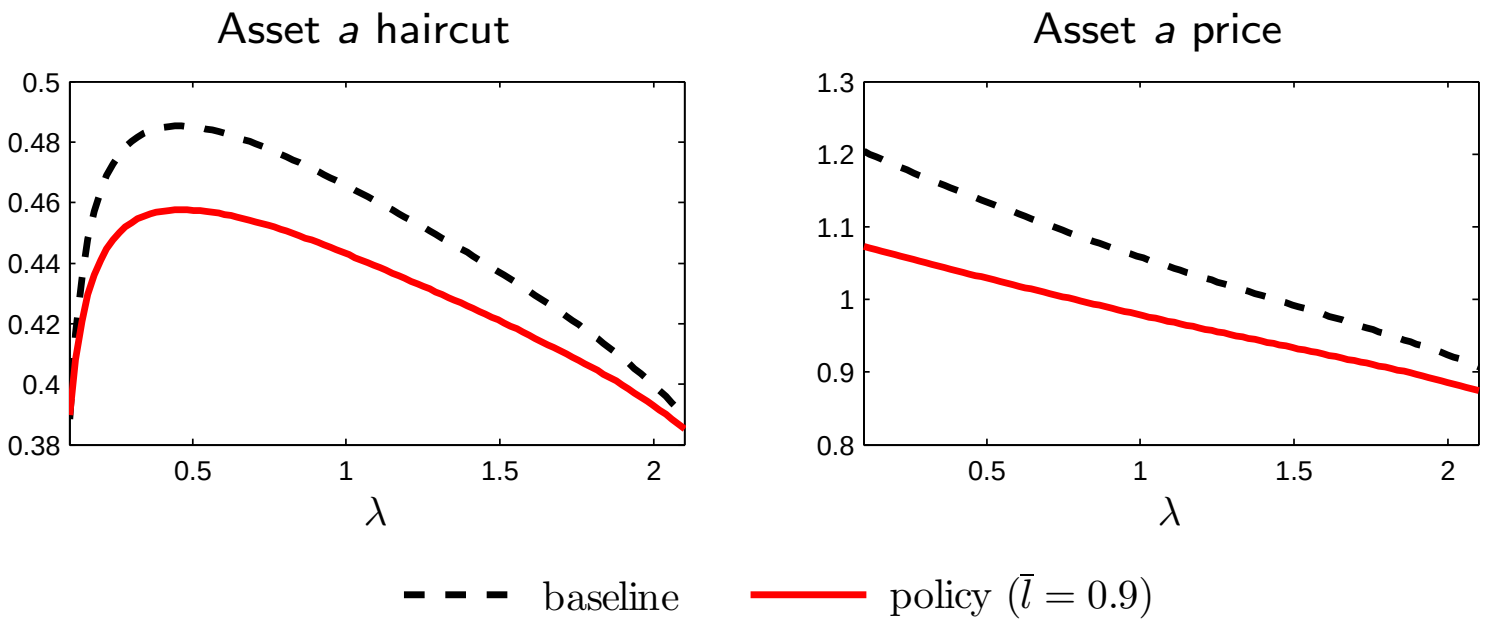
Policy effect on collateral supply
(% change in aggregate collateral and *b* collateral value)



2. OT reduces the supply of collateral ⇒ liquidity provision falls
   ⇒ discount rates rise, especially for risky/productive assets

Liquidity requirements

1. Limit liquidity mismatch: $m_t + s_t \leq \bar{l}$



3. Mitigate collateral runs, enhance financial stability
4. *But* higher discount rates, lower prices in booms

Monetary policy normalization

1. Pre-crisis view: short-term rate captures monetary policy stance
2. Our framework:

$$\textit{Tbill rate} = \begin{pmatrix} \textit{aggregate} \\ \textit{discount rate} \end{pmatrix} - \theta_t \begin{pmatrix} \textit{collateral value} \\ \textit{of Tbill} \end{pmatrix}$$

$\Rightarrow$ Tbill rate can be low if collateral premium θ_t is high and policy *tight*

3. Reverse repo facility
   - "... should help to establish a floor on the level of overnight rates." (Dudley, 2013)
   - accommodative, even though pushes the safe rate up
   - releases collateral to financial system ($\theta_t \searrow$)

Takeaways

1. Liquidity transformation and the macro cycle
   - tradeoff between quantity and fragility of liquidity provision
2. Shadow banking expands liquidity supply in booms
   - lower discount rates, more investment, more growth
   - increases economic and financial fragility
3. Framework has implications for
   - monetary policy, financial stability regulation

Takeaways

1. Liquidity transformation and the macro cycle
   - tradeoff between quantity and fragility of liquidity provision
2. Shadow banking expands liquidity supply in booms
   - lower discount rates, more investment, more growth
   - increases economic and financial fragility
3. Framework has implications for
   - monetary policy, financial stability regulation

Is it better to have been liquid and lost than never to have been liquid at all?