

# Mortgage Debt and Shadow Banks

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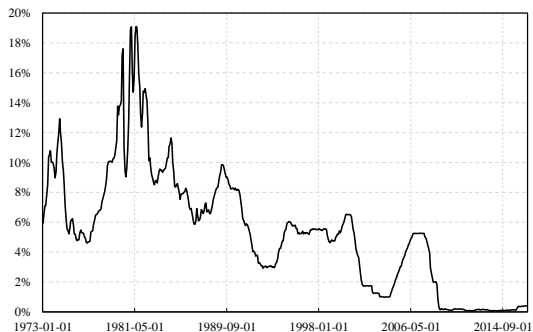
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Views expressed are those of the author and do not necessarily reflect official positions of De Nederlandsche Bank.

# Stylized facts

Figure: Downward sloping trend in effective Federal Fund rate



Source: Federal Reserve Bank of St. Louis database (FRED Economic Data)

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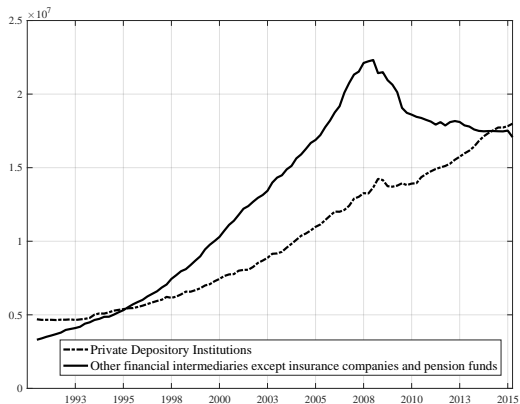
**Figure:** Mortgages and corporate loans as % of aggregate balance sheet of financial sector U.S.



Source: Historical statistics on banking (Federal deposit insurance corporation)

# Stylized facts

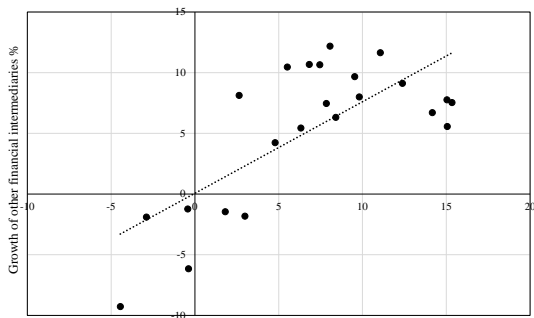
Figure: Total liabilities traditional banks and shadow banks U.S.



Source: Flow of funds accounts of the United States (FRB)

# Stylized facts

Figure: Growth financial investment and shadow banks



Source: own calculations

# Introduction

- Correlation between the growth rate of the shadow banking sector and the reallocation from corporate loans towards mortgages
- No encompassing framework exists that explains a causal relationship in general equilibrium context
- The need for such a framework comes from recent concerns about financial stability:
  - A reallocation of funds towards houses rather than physical capital might harm production capacity making it eventually harder to repay mortgage debt
  - A vastly growing shadow banking sector might increase the likelihood of fire-sales and bank runs

# This paper

- Builds a tractable model that shows how an exogenous inflow of funds on domestic bank balance sheets depresses real interest rates economy-wide and increases the share of mortgages on the aggregate bank balance sheet. This in turn fosters growth of, in particular, the shadow banking sector.

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- Shows that growth of the shadow banking sector reduces financial stability because shadow banks create more uninsured deposits than are socially optimal.
- Examines two policy options designed to re-align private and social interests

# Literature

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- Household debt
  - Household debt is unproductive: Benigno and Fornaro (2014), Bernanke (2015) and Borio et al. (2016),
  - Household debt affects business cycle fluctuations: Glaeser et al. (2008), Mian and Sufi (2014) and Mian et al. (2016)

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- Safe money-like claims
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  - Greenwood et al. (2015, 2016) examine policy options to enhance financial stability
- Shadow banks
  - Gennaioli et al. (2013) show how an increase in savings drives securitization, leverage and financial instability.
  - Moreira and Savov (2014) shadow banks can create liquidity via securitization but also additional instability.

# Model summary

- The model introduces three sources of heterogeneity:
  - patient and impatient consumers (superscript  $j \in \{p, i\}$ )
  - traditional banks and shadow banks (superscript  $b \in \{tb, sb\}$ )
  - mortgages and corporate loans (superscript  $\iota \in \{e, f\}$ )

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  - traditional banks and shadow banks (superscript  $b \in \{tb, sb\}$ )
  - mortgages and corporate loans (superscript  $\iota \in \{e, f\}$ )
- Three states of the world (good, bad, disaster) and an early signal (optimistic or pessimistic) about this state of the world

## Model: real side

- Both households obtain utility from consumption, owning a house, holding deposits (cash-in-advance motive) and leisure
- Patient households save (housing, bank equity and deposits) and maximize utility s.t. their budget constraints
- Impatient household borrow (mortgages and corporate loans) and maximize utility s.t. their budget constraints + capital accumulation constraint + collateral constraints for both houses and physical capital



## Model: banks

- Banks maximize profits:

$$\Pi_t^b = i_t^e B_t^{e,b} + i_t^f B_t^{f,b} - i_t^{m,b} M_t^b - i_t^{q,b} Q_t^b - \xi D_t. \quad (1)$$

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- s.t. bank budget constraint and equity buffer constraint
- Traditional bank equity buffer constraint:

$$\pi_b[(1 + i_t^f)B_t^{f,tb} + (1 + i_t^e)B_t^{e,tb}] \geq (1 + i_t^{m,tb})M_t^{tb}. \quad (2)$$

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- Shadow bank equity buffer constraint:

$$\kappa_t^f(1 + i_t^f)B_t^{f, sb} + \kappa_t^e(1 + i_t^e)B_t^{e, sb} \geq (1 + i_t^{m, sb})M_t^{sb}. \quad (3)$$

# Proposition 1

## Proposition

- a) If  $\kappa_t^e < \frac{\pi_b}{1+\chi i_t^e}$  and  $\kappa_t^f < \frac{\pi_b}{1+\chi i_t^f}$  traditional banks specialize in both mortgages and corporate loans.
- b) If  $\kappa_t^e < \frac{\pi_b}{1+\chi i_t^e}$  and  $\frac{\pi_b}{1+\chi i_t^f} < \kappa_t^f$  traditional banks specialize in corporate loans while shadow banks specialize in mortgages.
- c) If  $\kappa_t^e > \frac{\pi_b}{1+\chi i_t^e}$  and  $\frac{\pi_b}{1+\chi i_t^f} > \kappa_t^f$  traditional banks specialize in mortgages while shadow banks specialize in corporate loans.

- where  $\chi$  is the deposit insurance cost per unit of bank investment in loans.

# Endogenous liquidation parameter

Liquidation parameter:

$$\kappa_t^l = (1 - \omega) \left( E_{t|S'=L}(\pi_s) \right) \varphi_1^l \left( \frac{B_t^l}{B_t} \right) \varphi_2^l \left( \frac{M_t^{sb}}{M_t} \right), \quad (4)$$

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## Proposition

*Let  $B^*$  and  $M^*$  denote the social optimal amounts of shadow bank loans and deposits and let  $B'$  and  $M'$  denote the private optimal amount of shadow banks loans and deposits, then the liquidation value  $\kappa_t^l$  is too high, shadow banks invest too much and create too much deposits, i.e.,  $B^* < B'$  and  $M^* < M'$ , if  $|\frac{\partial \kappa_t^l}{\partial B_t^l}| < |\frac{\partial \kappa_t^l}{\partial M_t^s}|$ .*

# Calibration

## Real side:

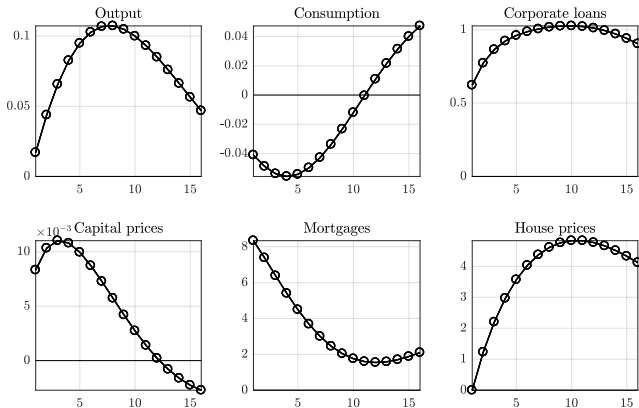
- Patient households lower discount factor than impatient households
- Housing supply fixed, while capital accumulation is subject to “conventional” adjustment costs
- Expected productivity unity
- Housing 25% of consumption bundle

## Financial side:

- Loan-to-value ratio of unity
- Bank equity approximately 8% of loans
- DGS costs 1% of balance sheet
- Relative competitiveness traditional bank versus shadow bank varies

# Results

**Figure:** An in inflow of foreign funds and the real economy

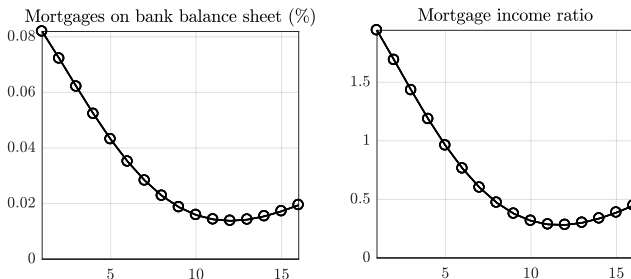


Notes: Impulse responses following an increase in bank deposits, that is, a positive shock to  $\epsilon_t^m$  while the expected asset liquidation values ( $\kappa_t^e$  and  $\kappa_t^f$ ) remain constant. The increase in foreign funds equals 3% of total domestic deposits  $M_t$ . Horizontal axis shows quarters. Vertical axis shows deviations from steady state.



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**Figure:** An inflow of funds and the share of mortgages



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# Internalization of positive externality

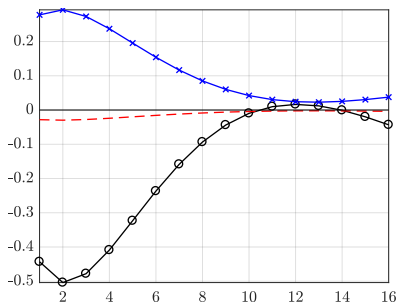
# Internalization of positive externality

- Mortgage growth  $\rightarrow$  higher  $k_t^\iota \rightarrow$  more shadow bank lending  $\rightarrow$  deeper  $\iota$  market  $\rightarrow$  higher  $k_t^\iota$ : social  $\approx$  private  $\frac{\partial \kappa_t^\iota}{\partial B_t^\iota} > 0$
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Figure: Expected asset liquidation  $\kappa_t^\iota$  value following an inflow of funds



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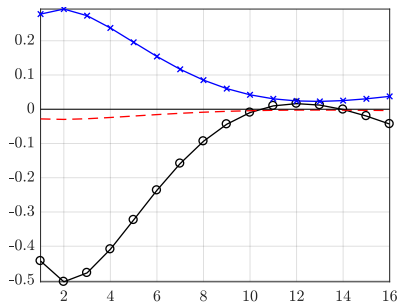
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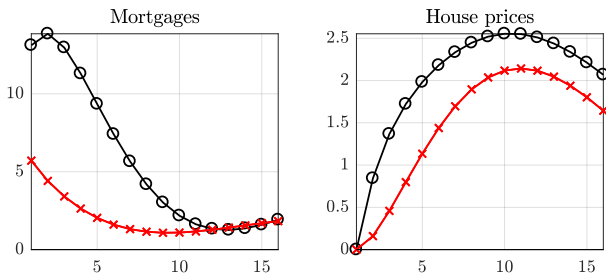




# Loan-to-value

- LTV ratios limit house price and thereby mortgage supply fluctuations when shocks hit the economy
- LTV ratios reallocate funds from mortgage loans to corporate loans, not only in steady state but also when credit supply

Figure: LTV 100 % (black line), 90% (red line)



# Interest on central bank money

- Central bank eliminates the incentive for banks to finance themselves with deposits rather than equity
- Patient household money demand equation:

$$M_t^j = \left[ \frac{\gamma^m}{C_t^p} \left( \frac{1 + i_t^q}{i_t^q - i_t^m} \right) \right]^{\frac{1}{\sigma^m}} \quad (5)$$

- Traditional banks in principle unaffected
- Creates a level playing field because it eliminates shadow banks' regulatory arbitrage and thereby restores Modigliani Miller in the model

# Conclusion

- A decline in real interest rates could explain:
  - Reallocation of bank investment from corporate loans to mortgages
  - Growth of the shadow banking sector
- Growth of the shadow banking sector is accompanied by externalities and therefore undermines financial stability
- Two solutions proposed:
  - Loan-to-value ratios
  - Interest on central bank money