House Prices and Negative Nominal Interest Rates

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Danmarks Nationalbank

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Questions

#1: How does the transmission of monetary policy through the housing and mortgage market change below zero?

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- Inflation and consumption: go up by less.

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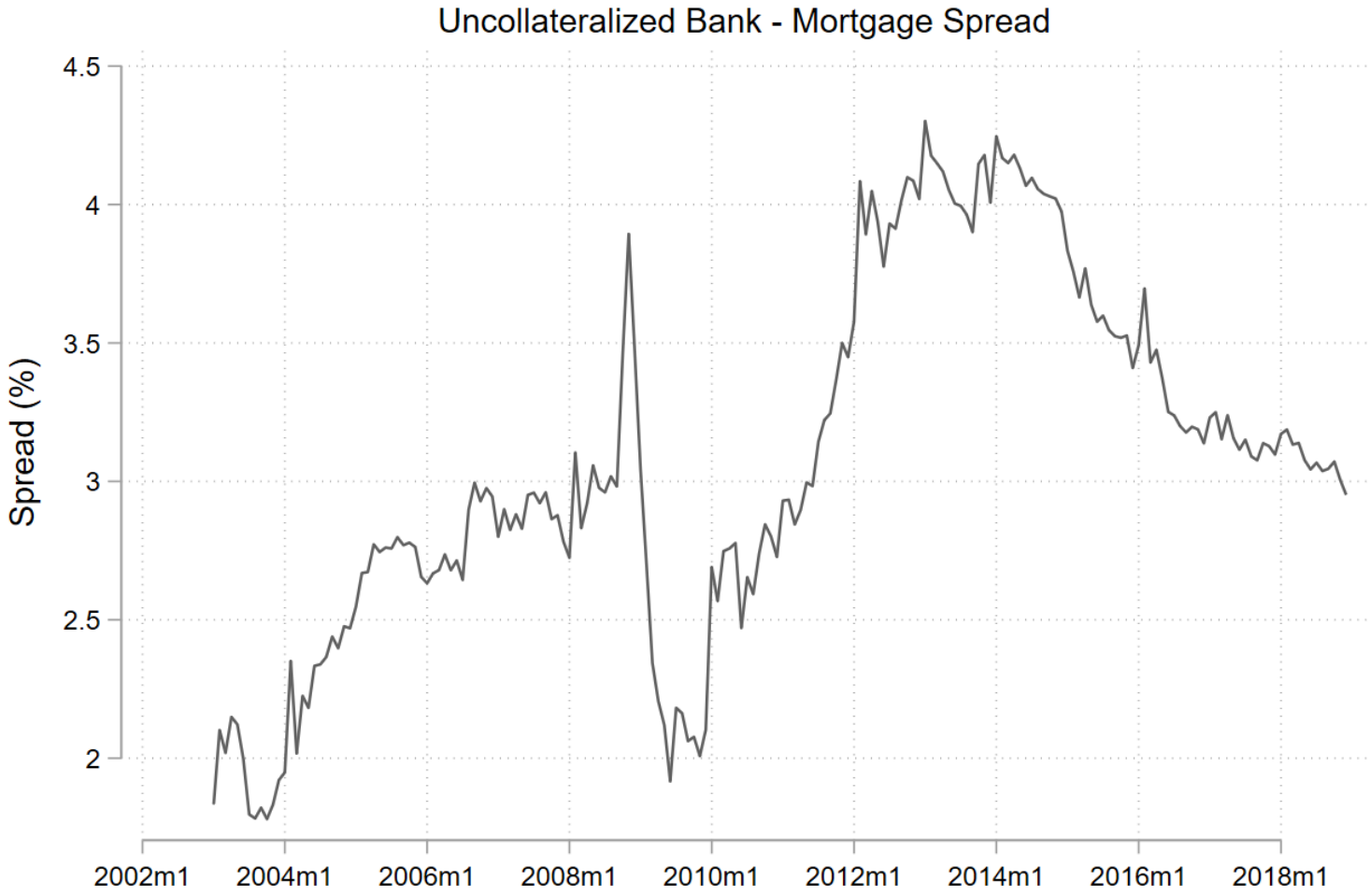
#2: Lessons for policy normalization?

- Need to hike rates by more to achieve same reduction in inflation.

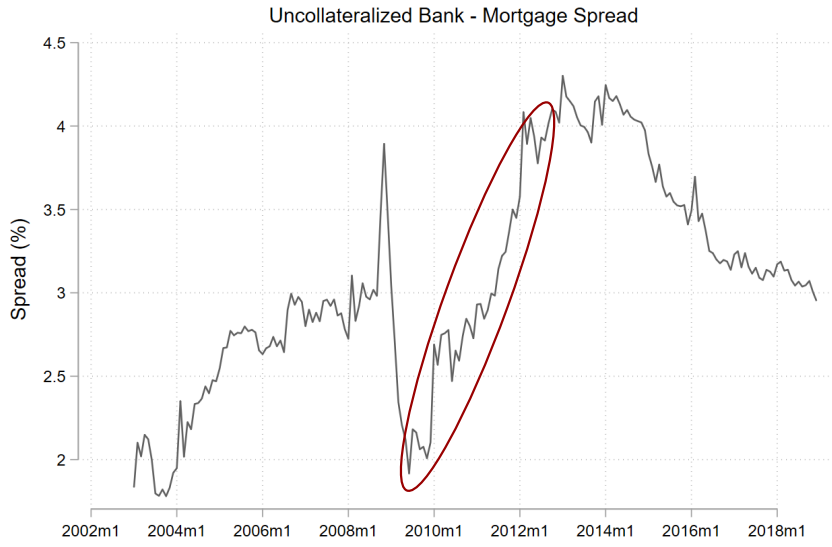
Debt Substitution Channel



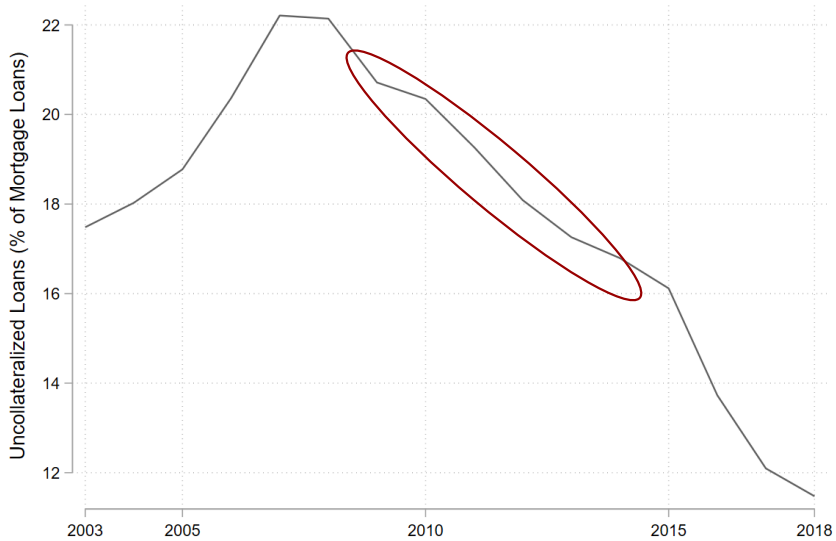
Source: Danmark Nationalbank's MFI Statistics.

- Households substitute towards relatively cheaper debt.
- Increased demand for mortgage debt will push house prices up. House Price Indices

Debt Substitution Channel



Source: Danmark Nationalbank's MFI Statistics. More Detail



Source: Statistics Denmark.

Different Funding

Mortgages - Mortgage Banks:

- Funded by mortgage bonds.
- Below zero: pass-through of monetary policy to cost of liabilities unchanged.
- **Not just in Denmark:** USA, Canada.

Uncollateralized Loans - Commercial Banks:

- Funded by deposits.
- Deposit rates: do not fall (much) below zero.
- Squeezes commercial banks' net interest margin
  $\Rightarrow$ erodes profitability/capital $\Rightarrow$ reduces pass-through. More

Related Literature

Bank Profits and Lending Conditions
Eggertsson, Juelsrud, Summers & Wold (2020), Abadi, Brunnermeier & Koby (2022), Ulate (2021), DeGroot & Haas (2021), Darracq Paris, Kok & Rottner (2021), Rognlie (2016).

Negative Interest Rates Empirical
Heider Saidi & Schepens (2019), Basten & Mariathasan (2018), Hong & Kandrac (2018), Boucinha and Burlon (2020), Eisenshmidt & Smets (2019). Altavilla, Burlon, Giannetti & Holton (2019), Bech & Malkhozov (2016), Amzallag,Calza, Georgarakos, & Soousa (2019), Bottero, Minoiu, Peydró, Polo, Presbitero, & Sette (2019), Ampudia & van den Heuvel (2019), Bittner, Bonfim, Heider, Saidi, Schepens & Soares (2022).

Negative Interest Rates in Denmark
Adolfsen & Spange (2020), Abildgren & Kuchler (2020), Mandsberg, Otte and Spange (2021), Mandsberg, Autrup, Risbjerg (2016).

Reduced Pass-Through - Household Level Evidence

$$\Delta i^b_{j,t} = \alpha + \eta I^{\text{negative}}_t + \beta \Delta i^r_t + \gamma \Delta i^r_t \times I^{\text{negative}}_t + \delta_j + z'_{j,t}\theta + \epsilon_{j,t},$$

	(1)	(2)
	Bank Loans	Mortgage Loans
Δi^r_t	0.271***	0.040***
	(0.00)	(0.00)
$I^{negative}_t$=1 × Δi^r_t	-0.299***	0.068***
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Household FE	Yes	Yes
Household Controls	Yes	Yes
F statistic	7,319	2,726
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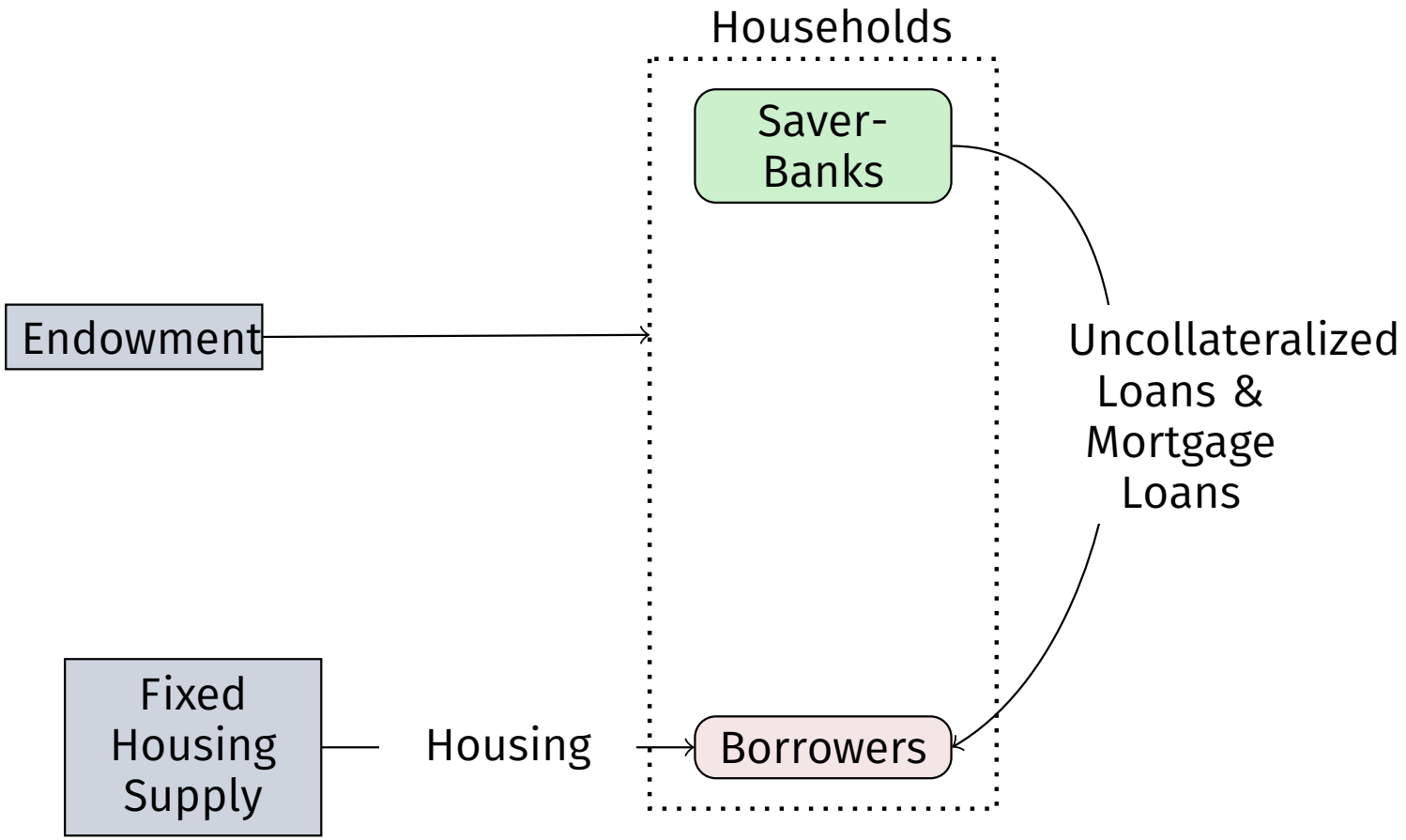
Overview - Stylized Model



More Detail

Saver-Banks

$$\max_{\{\tilde{c}_t, b_t, l_t\}} \quad E_0 \sum_{t=0}^{\infty} (\tilde{\beta}_t)^t \Big[\tilde{c}_t - \tilde{v}(l_t) \Big],$$

Subject to:

consumption

$$\tilde{c}_t + l_t + b_t = \tilde{y} + R^l_{t-1} l_{t-1} + R^b_{t-1} b_{t-1},$$

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mortgage loans

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Subject to:

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Subject to:

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Subject to:

$$\tilde{c}_t + l_t + b_t = \tilde{y} + R^l_{t-1} l_{t-1} + R^b_{t-1} b_{t-1},$$

Exogenous Spread: $R^l_t - R^b_t = \tau_{l,t}$.

More Detail

Borrowers

$$\max_{\{\hat{c}_t, b_t, l_t, \hat{h}_t\}} \quad E_0 \sum_{t=0}^{\infty} (\hat{\beta}_t)^t \Big[\log(\hat{c}_t) + j \log(\hat{h}_t) \Big],$$

consumption

Borrowers

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housing

Borrowers

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subject to:

$$\hat{c}_t + R^l_{t-1} l_{t-1} + R^b_{t-1} b_{t-1} + p_{h,t} \hat{h}_t = l_t + b_t + p_{h,t} \hat{h}_{t-1} + \hat{y},$$

Borrowers

$$\max_{\{\hat{c}_t, b_t, l_t, \hat{h}_t\}} \quad E_o \sum_{t=o}^{\infty} (\hat{\beta}_t)^t \Big[\log(\hat{c}_t) + j \log(\hat{h}_t) \Big],$$

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$$\underbrace{R^b_t b_t}_{\text{repay on mortgage debt}} \quad \leq \quad m_b \; E_t \underbrace{p_{h,t+1} \hat{h}_t}_{\text{future value of housing}} \quad ,$$

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$$\underbrace{l_t + b_t}_{\text{total borrowing}} \leq m_y \underbrace{\hat{y}}_{\text{income}}.$$

House Pricing Equation

$$p_{h,t} = j\hat{c}_t + j\sum_{i=0}^{\infty}\hat{c}_{t+i+1}\left\{\Pi_{k=0}^{i}\left[\frac{\hat{c}_{t+k}}{\hat{c}_{t+k+1}}\hat{\beta}\right]\right\}$$

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collateral constraint only

House Pricing Equation

Uncollateralized-to-Mortgage Spread

$$p_{h,t} = j\hat{c}_t + j\sum_{i=0}^{\infty}\hat{c}_{t+i+1}\left\{\Pi_{k=0}^{i}\left[\frac{\hat{c}_{t+k}}{\hat{c}_{t+k+1}}\hat{\beta}\right.\right. \qquad \left.\left. m_b\frac{\overbrace{R^l_{t+k} - R^b_{t+k}}}{R^b_{t+k}}\right)\right]\Bigg\}$$

Market Clearing

Housing supply:

$$\hat{h}_t = H$$

Resource constraint:

$$\hat{c}_t + \tilde{c}_t = \hat{y} + \tilde{y}$$

Monetary Policy Cut

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- Red = marginal impact of the debt substitution channel ($\tau_{l,t} \uparrow$).

Debt Substitution Channel - Rate Hike

Monetary policy rate hike.

Debt Substitution Channel - Rate Hike

Monetary policy rate hike.

⇓

Banks' net interest margin increases.

Source: Danmark Nationalbank's MFI Statistics.

Debt Substitution Channel - Rate Hike

Monetary policy rate hike.

$\Downarrow$

Banks' net interest margin increases.

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Uncollateralized bank - mortgage spread decreases.

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Banks' net interest margin increases.

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Households substitute away from mortgages & demand less housing.

Debt Substitution Channel - Rate Hike

Monetary policy rate hike.

⇓

Banks' net interest margin increases.

⇓

Uncollateralized bank - mortgage spread decreases.

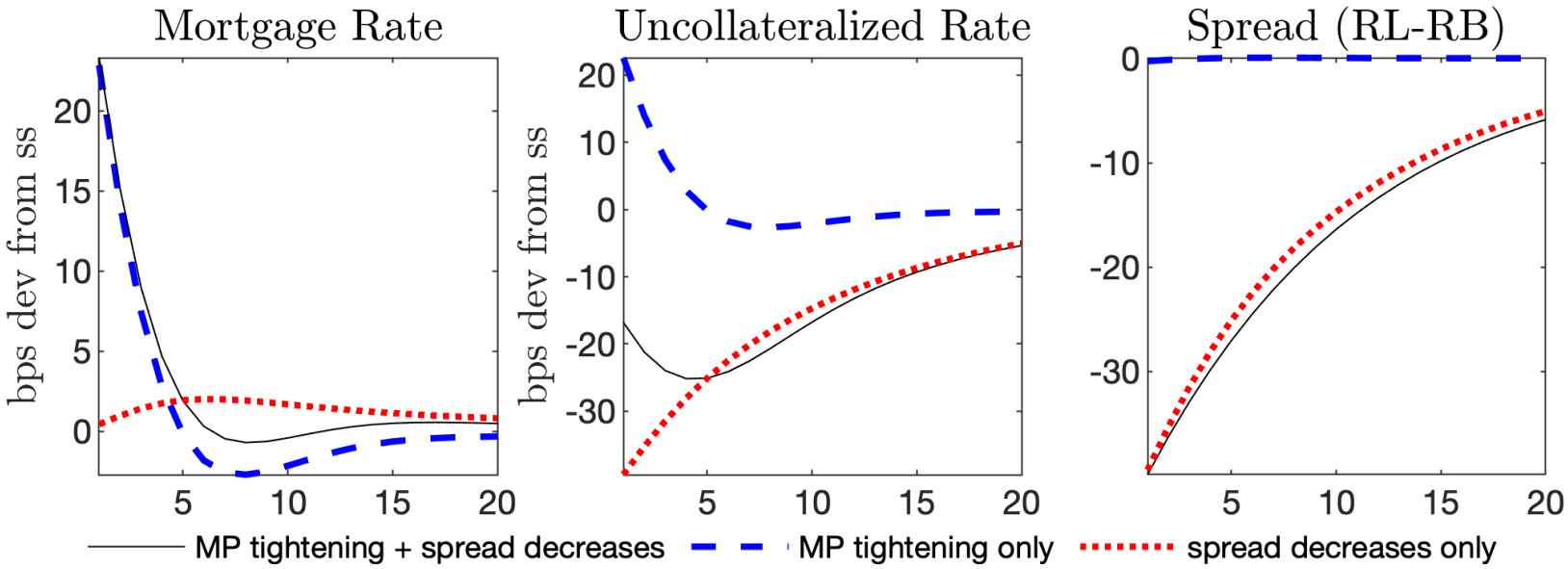
⇓

Households substitute away from mortgages & demand less housing.

⇓

House prices decrease.

Monetary Policy Hikes - Weaker at Fighting Inflation (1)



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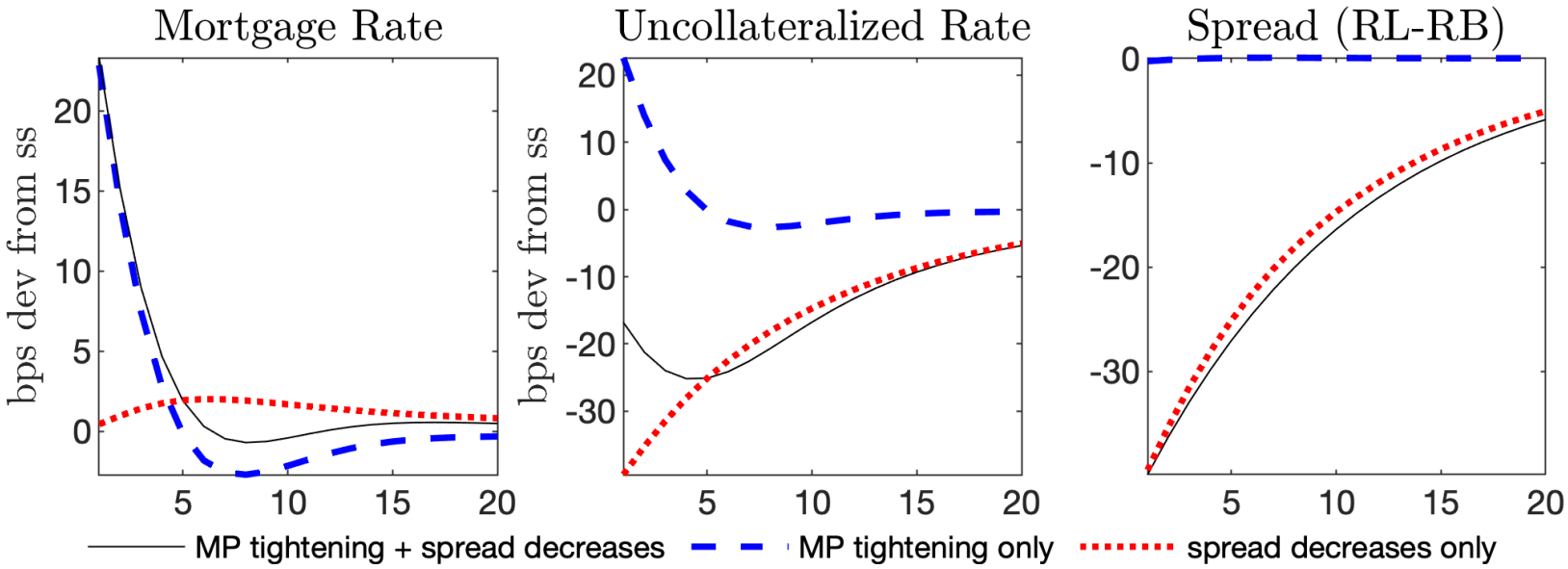
Monetary Policy Hikes - Weaker at Fighting Inflation (1)



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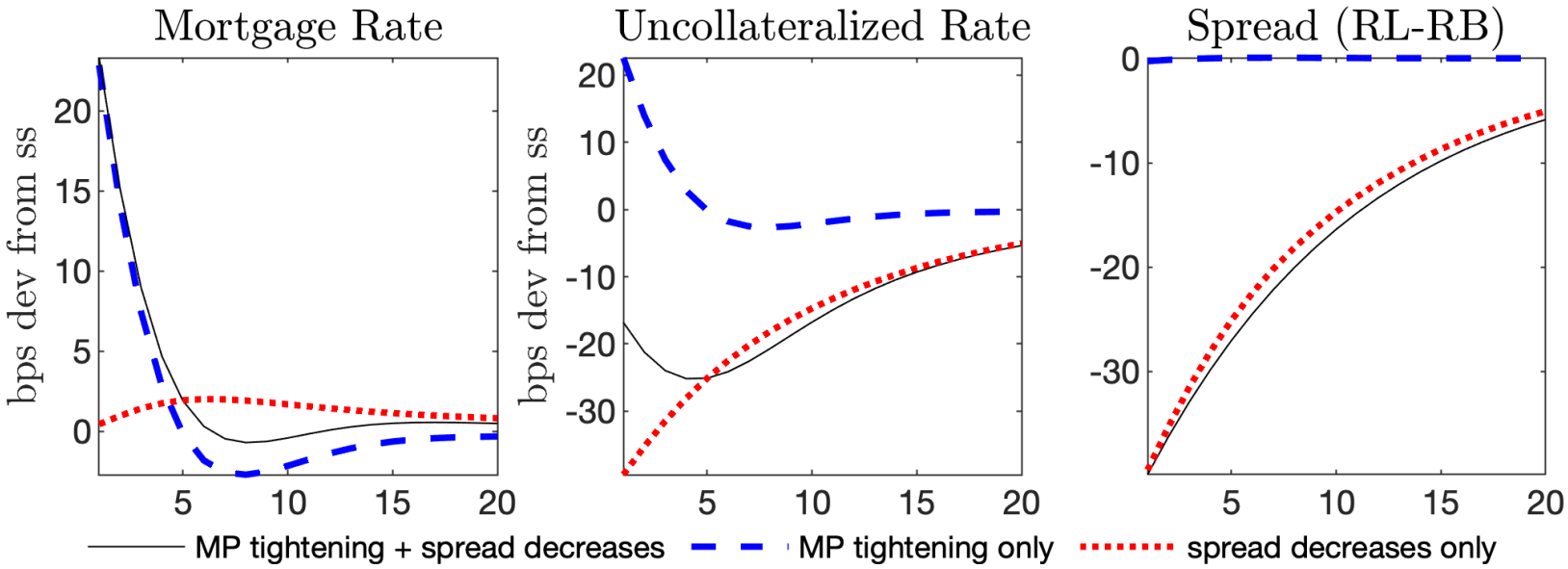

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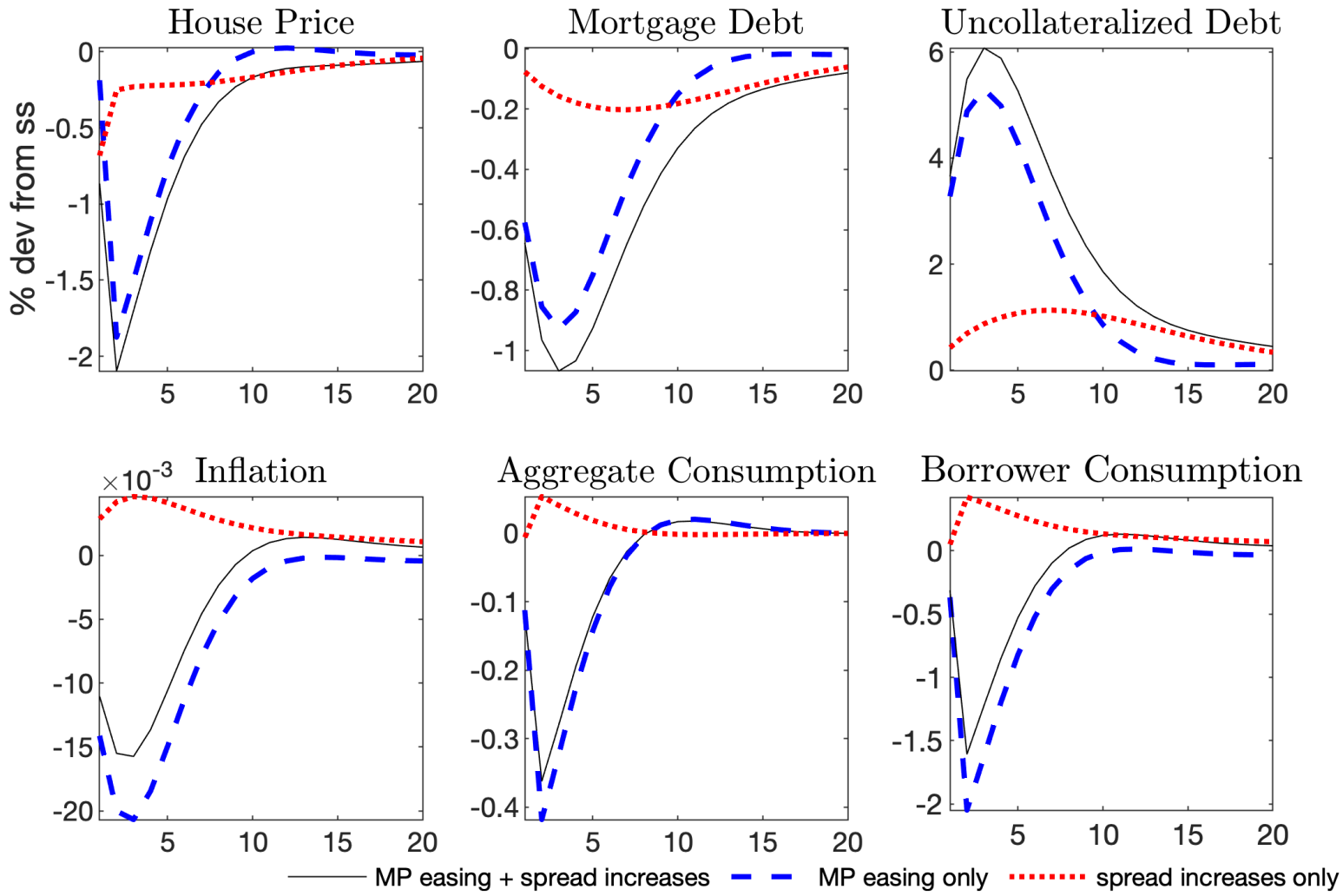
- Red = marginal impact of the debt substitution channel (**spread decreasing**, $\tau_{l,t} \downarrow$).

Monetary Policy Hikes - Weaker at Fighting Inflation (2)



Conclusion

When the nominal policy rate is negative:

- Monetary policy pass-though is different to mortgage rates vs other (bank) lending rates.
- Monetary policy cuts pushes house prices up by more.
- Monetary policy cuts are less effective at simulating borrower consumption and inflation.
- Monetary policy hikes (from low or negative nominal levels) are less effective at fighting inflation.

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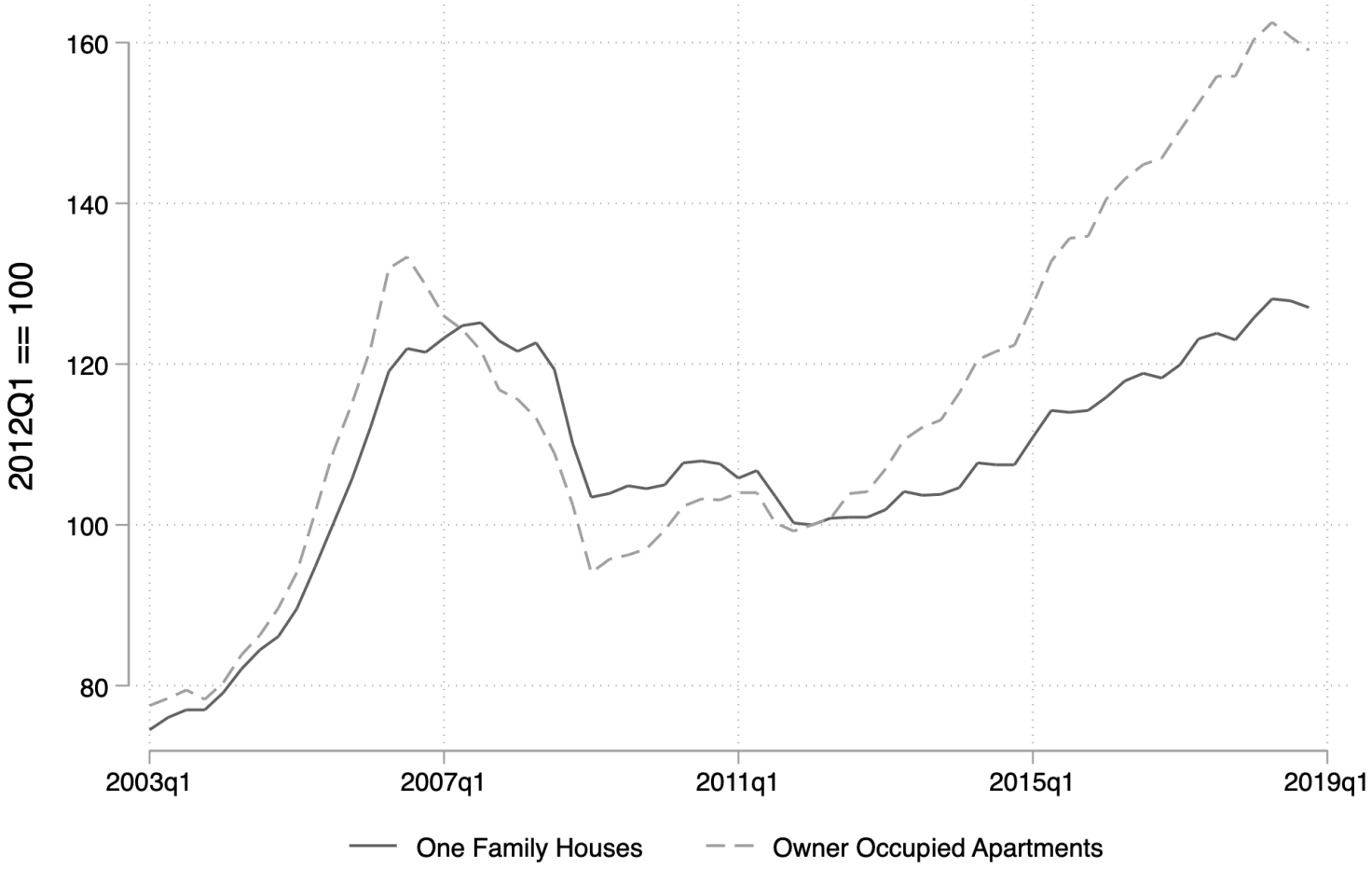
Thanks!

Backup Slides

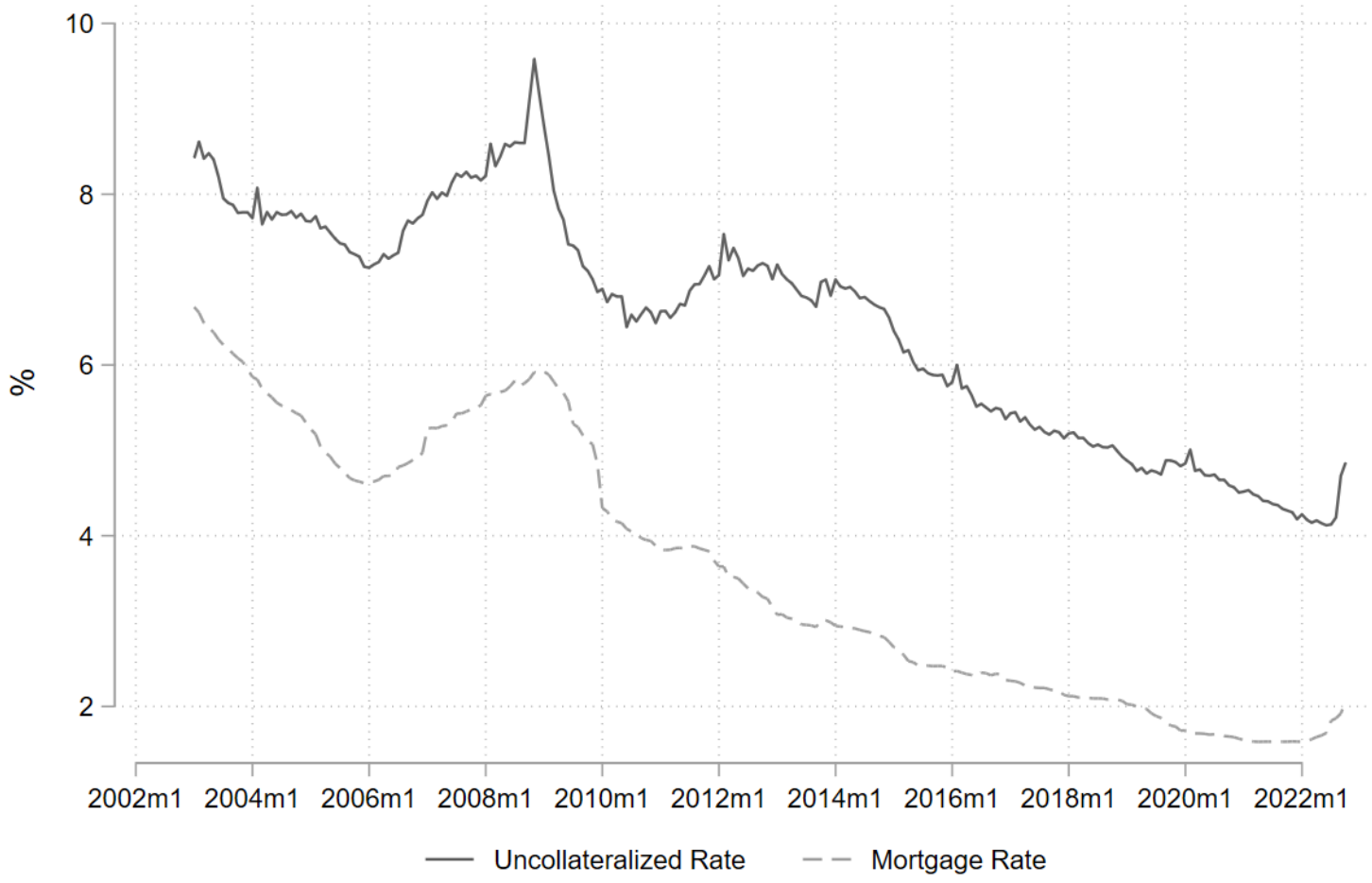
House Prices



Source: Statistics Denmark.

Go Back

Spread Decomposed



Source: Danmark Nationalbank's MFI Statistics.

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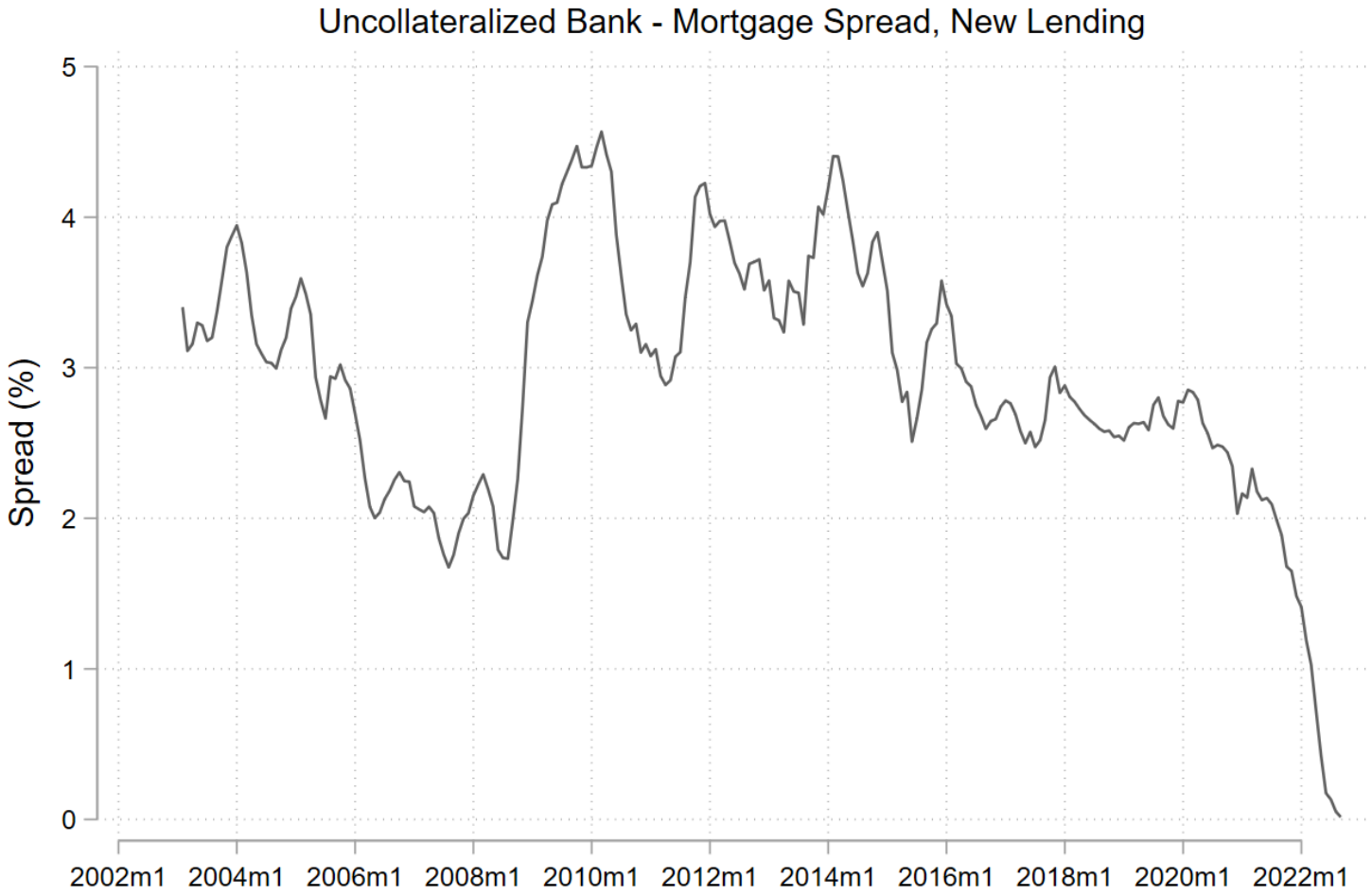
Spread - New Lending



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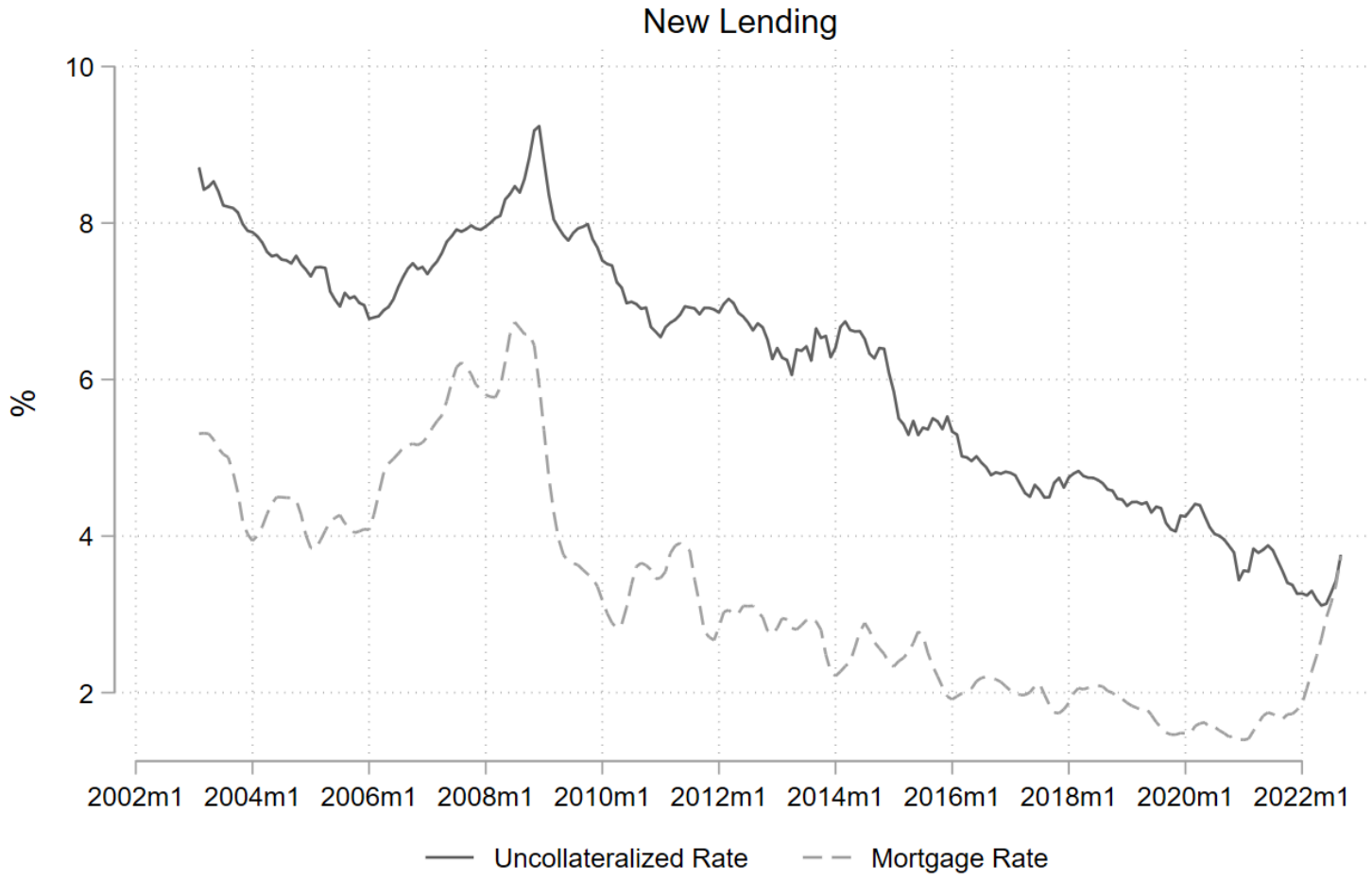
Spread - New Lending, Decomposed



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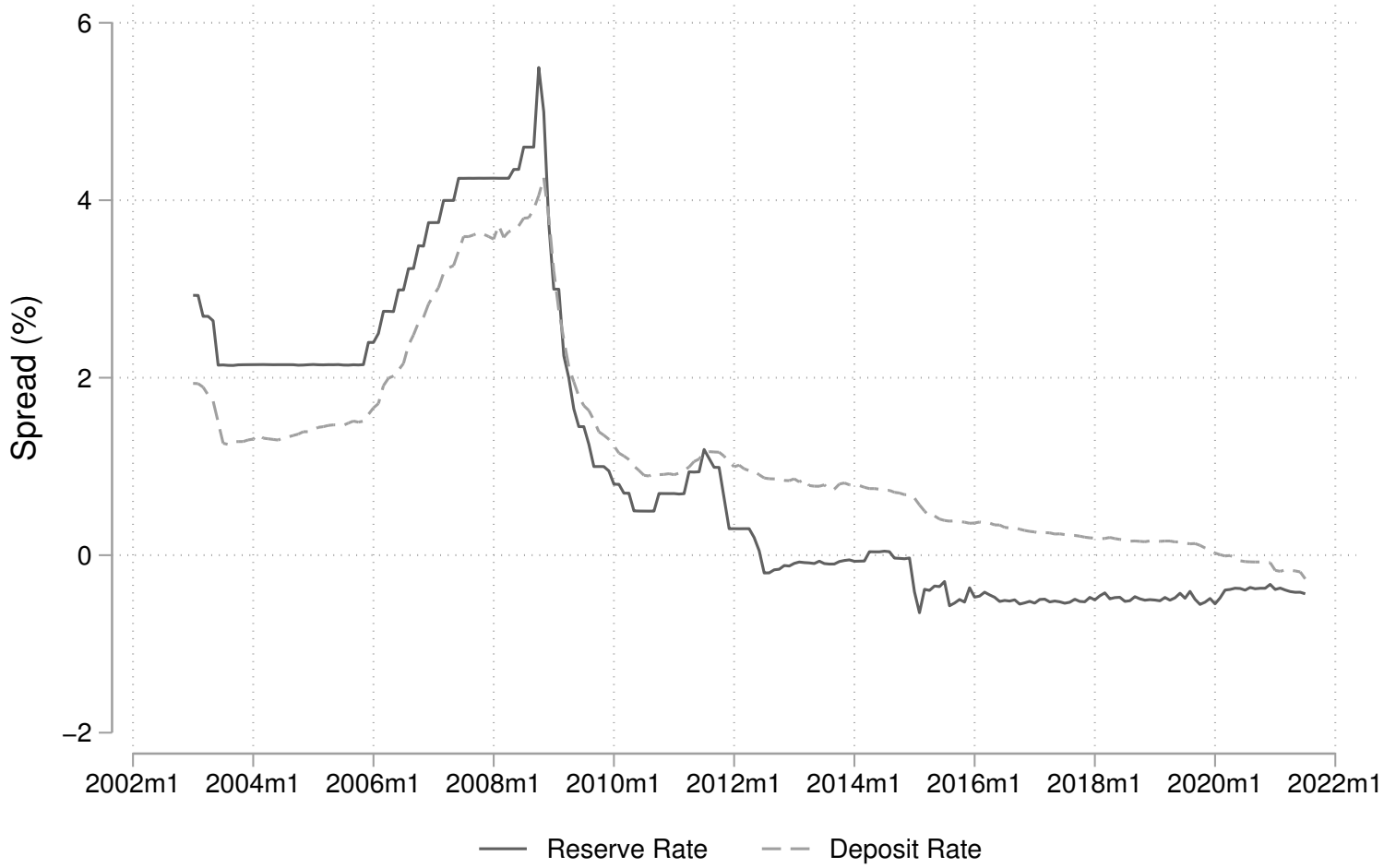
Reserve Rate and Deposit Rate



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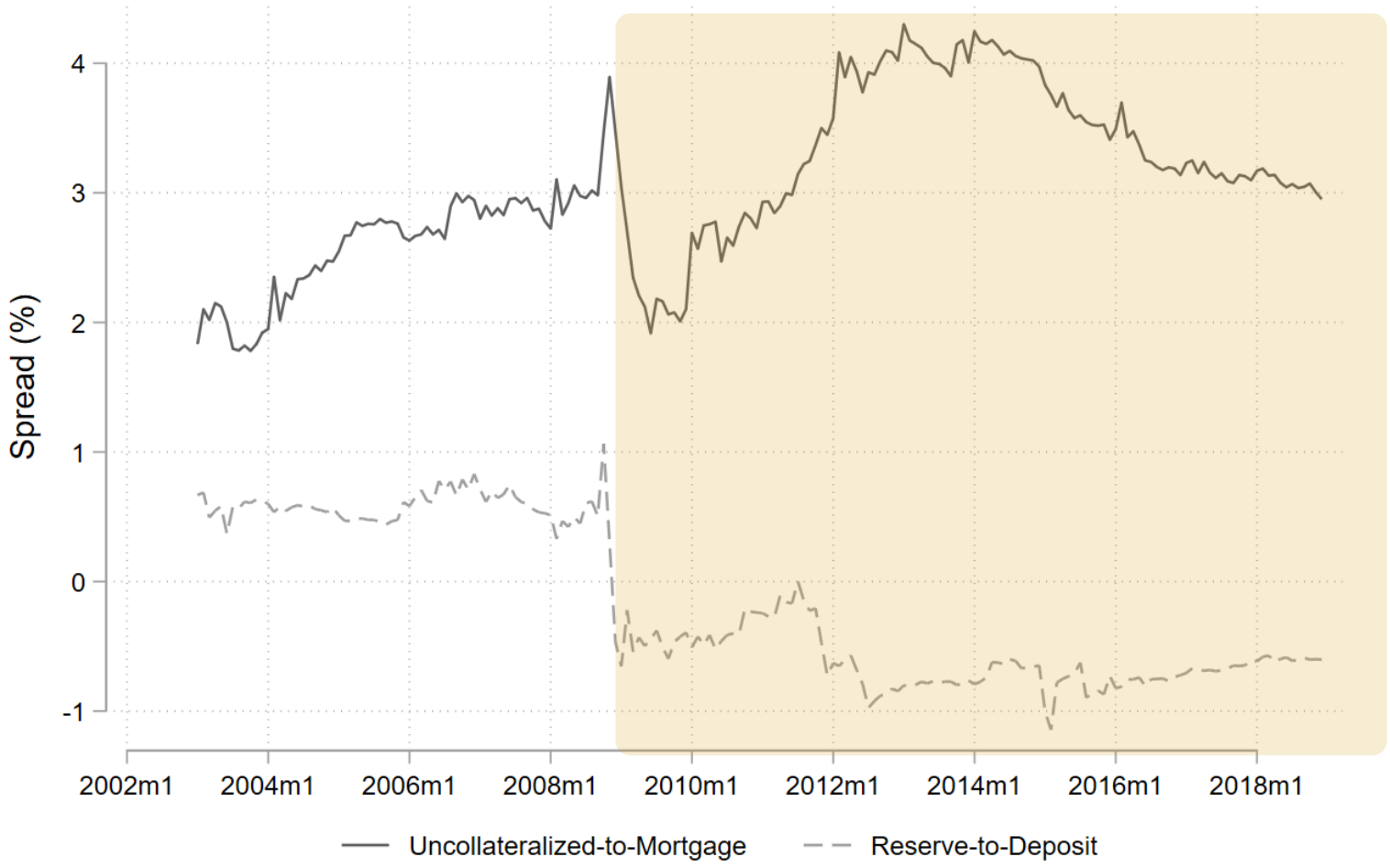

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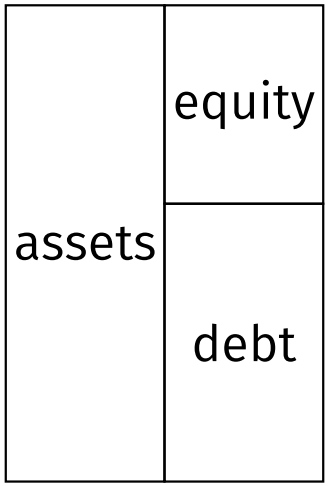
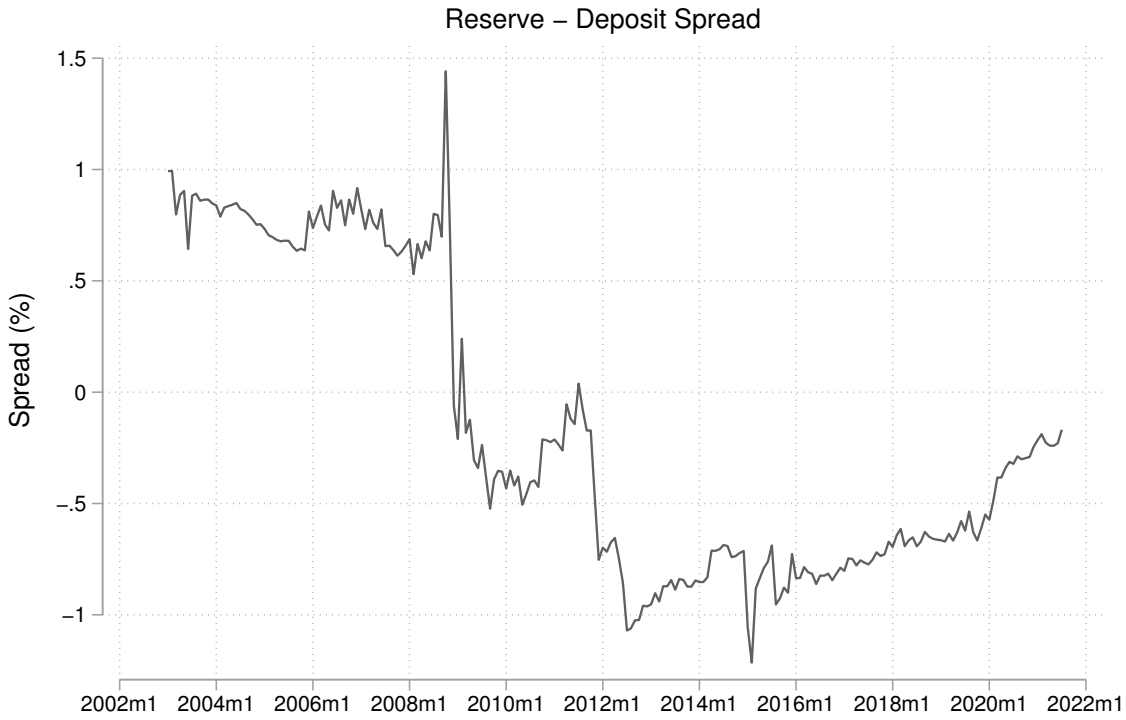
Mapping Savers to Banks





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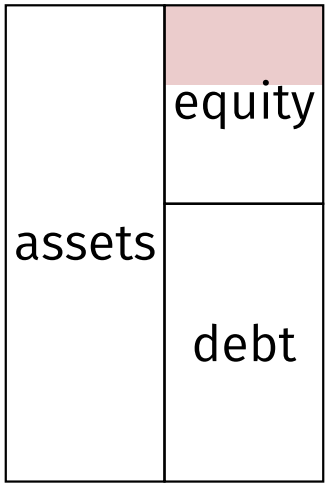

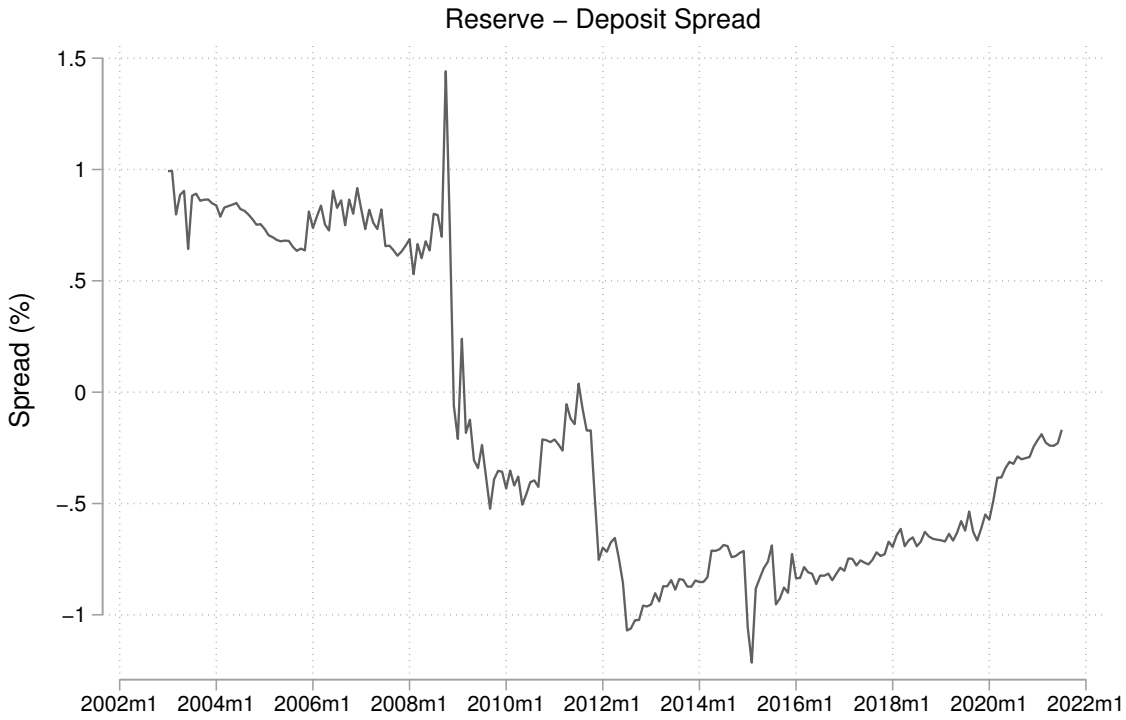

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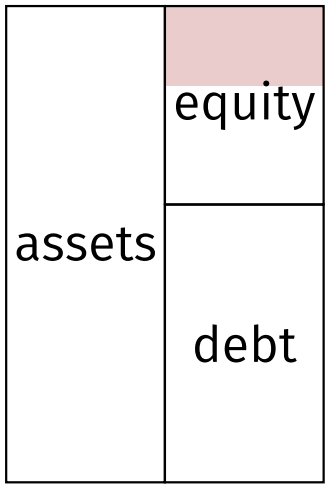
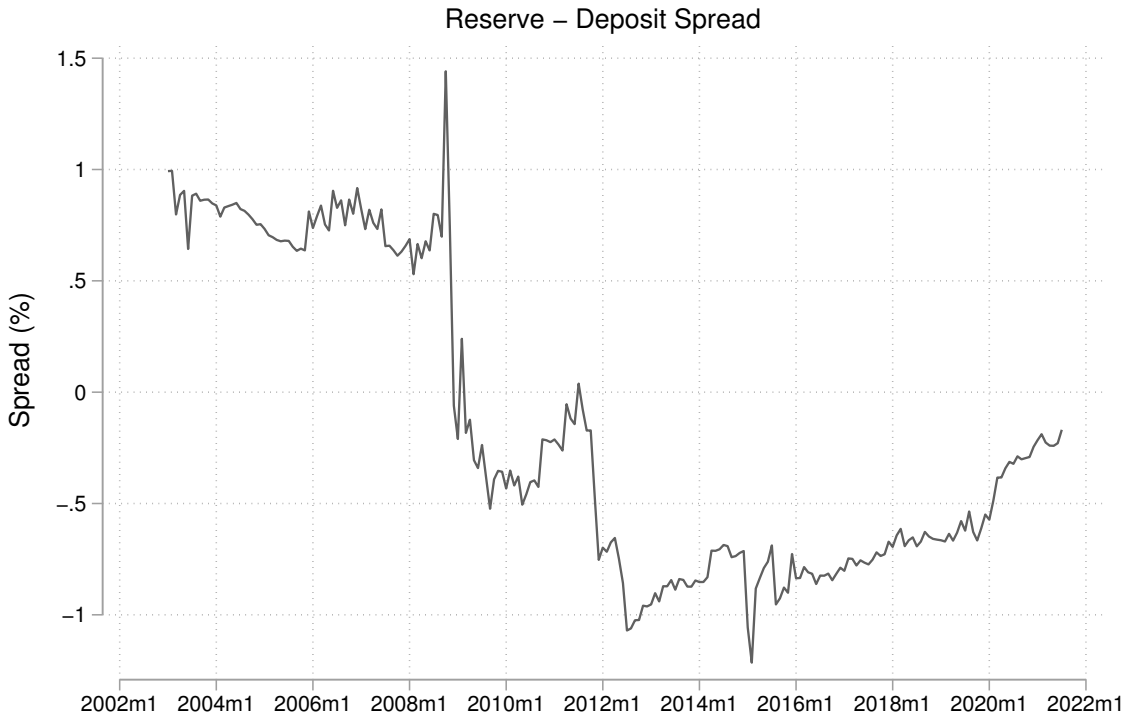


reduce lending



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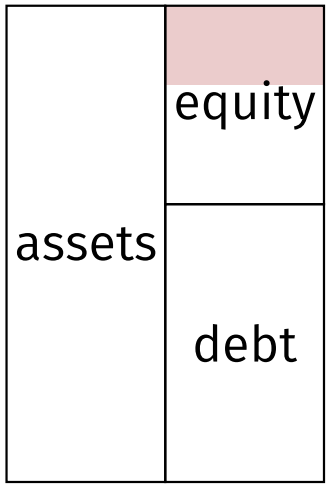
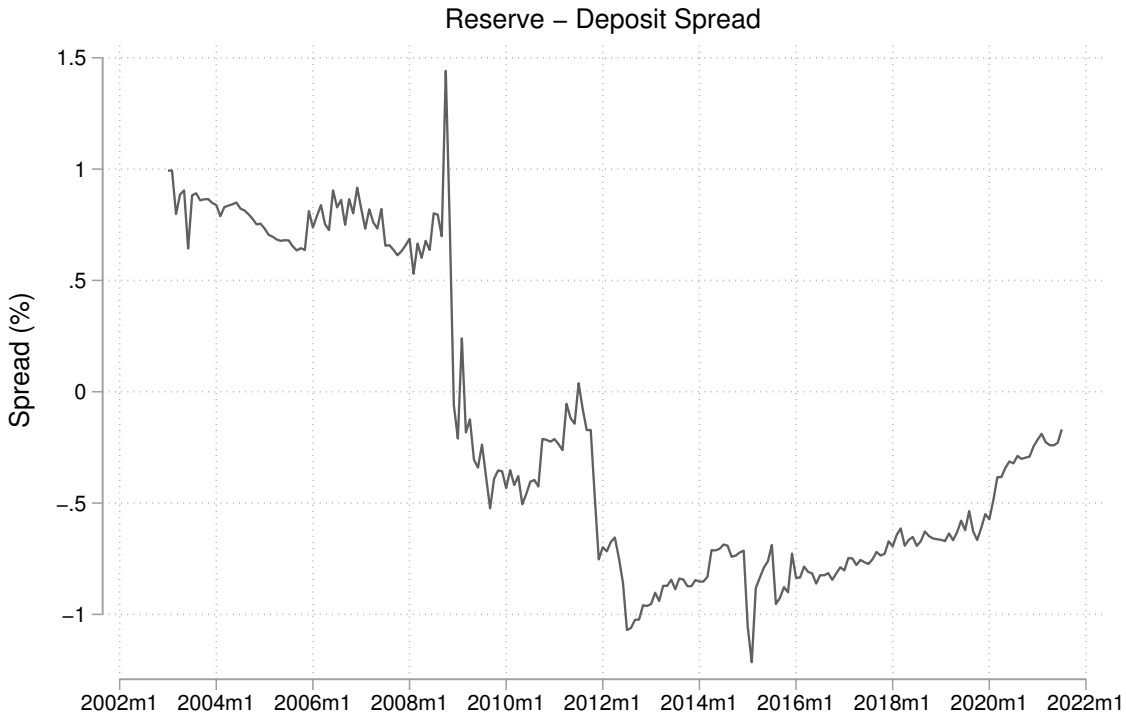


reduce lending
increase spreads



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$$\tilde{v}(l_t) = \tilde{\beta}_t \tau_{l,t} l_t,$$