

Credit and Banking in a DSGE Model

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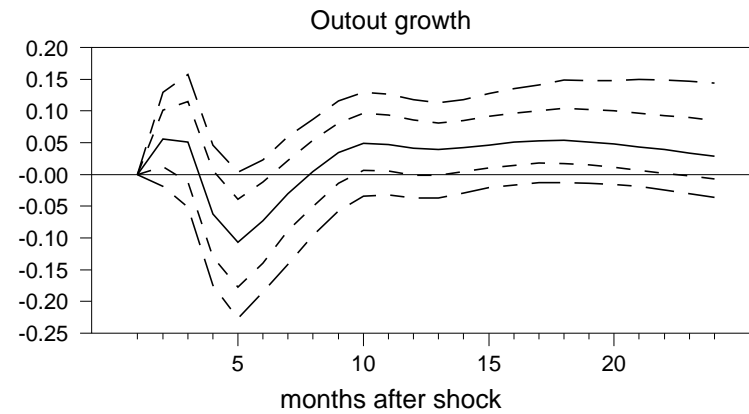
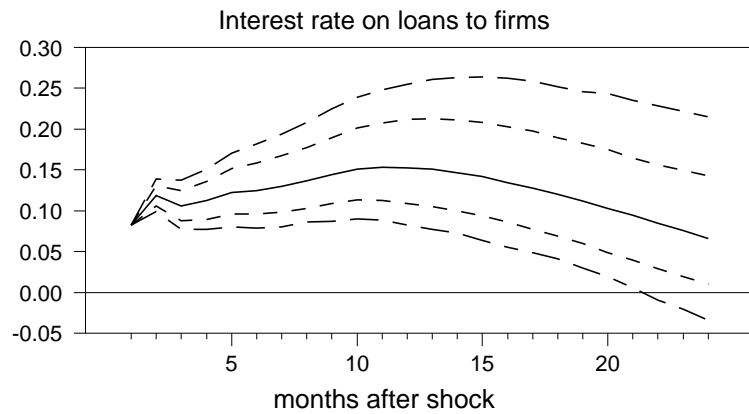
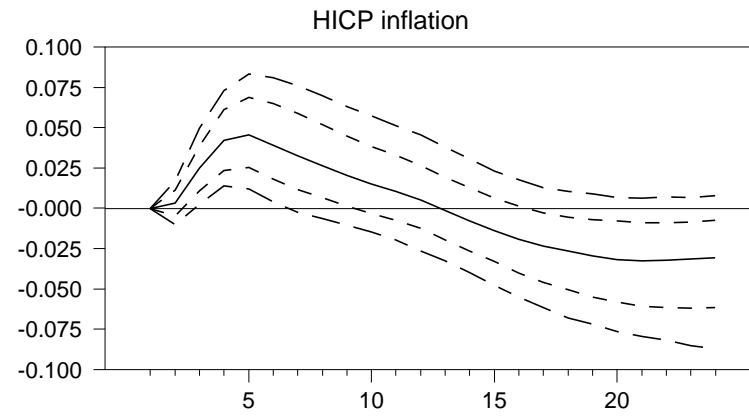
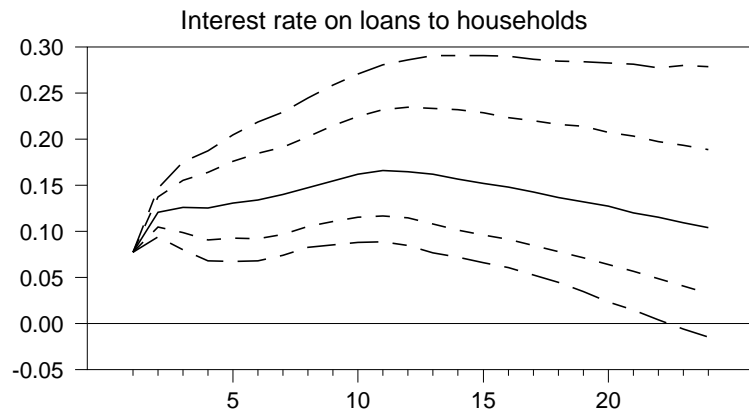
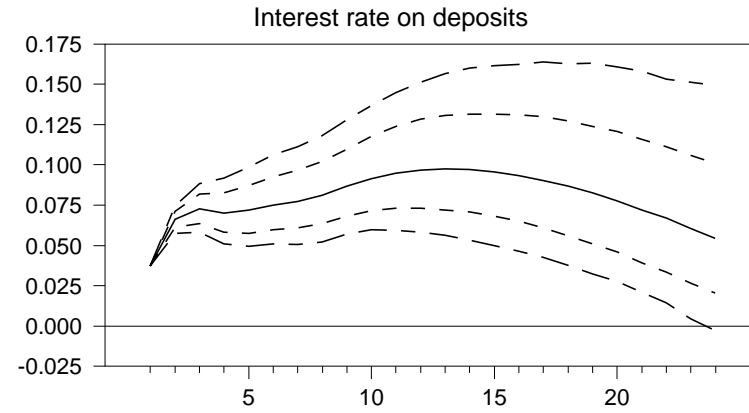
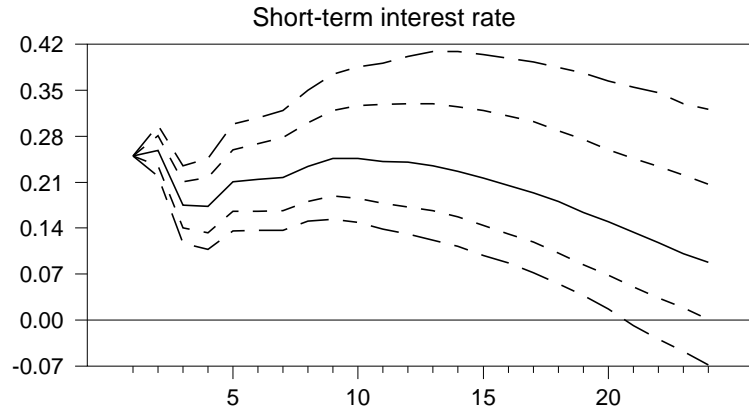


Motivation for the paper

- Banks play an active role in the intermediation industry, particularly in the euro area
 - Bank loans/Total non-equity finance = 90% in euro area
 - Bank loans/Total non-equity finance = 60% in the U.S.
- In the euro area households' and firms' credit have different dynamics and driving forces: the former has been decelerating since 2005, the latter accelerating since 2004

Motivation for the paper

- Agents face different interest rates, which respond differently to changes in the monetary policy stance

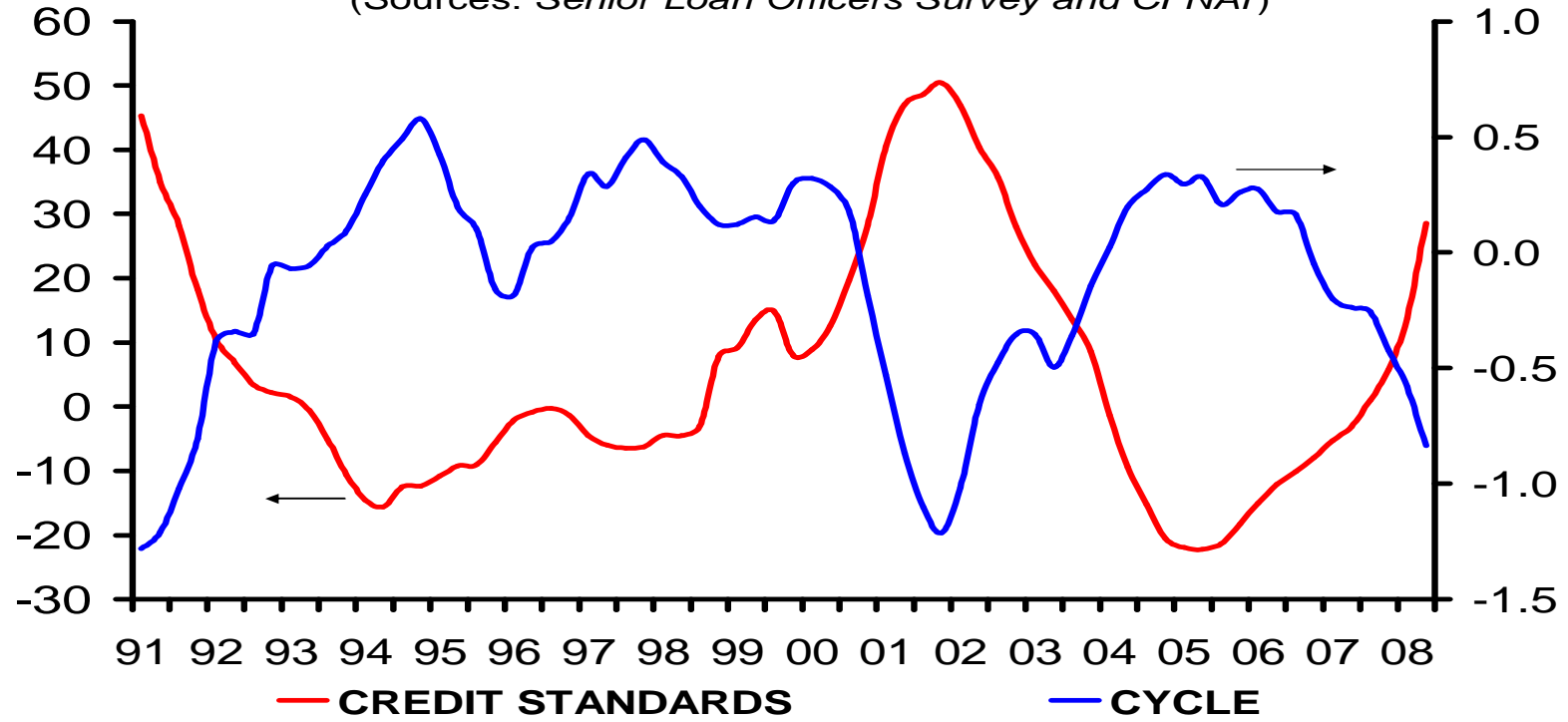


Motivation for the paper

- Agents face different interest rates, which respond differently to changes in the monetary policy stance
- Along the business cycle banks adjust credit standards to changing macroeconomic conditions

CREDIT STANDARDS AND THE BUSINESS CYCLE IN THE US

(Sources: Senior Loan Officers Survey and CFNAI)



Issues we are interested in analysing

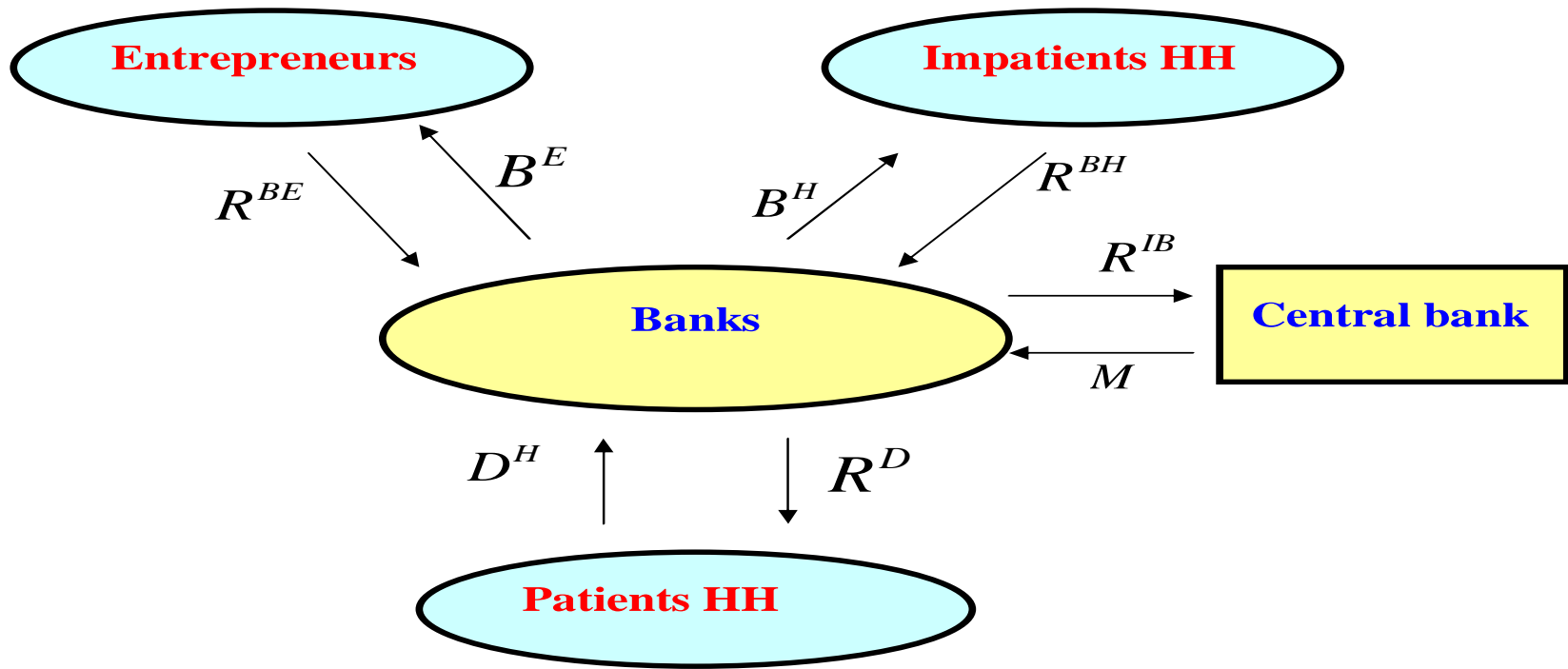
- Is imperfect pass-through of policy shocks to bank rates of any consequence for the monetary policy transmission mechanism?
- What are the effects on the economy of a financial turmoil in a model with an explicit role for credit and banking?
- How does bank capital affect the transmission mechanism of monetary policy?

The rest of the talk

- The model
- Monetary policy shock
- Technology shock
- “Financial turmoil” scenario
- The role of bank capital

The model

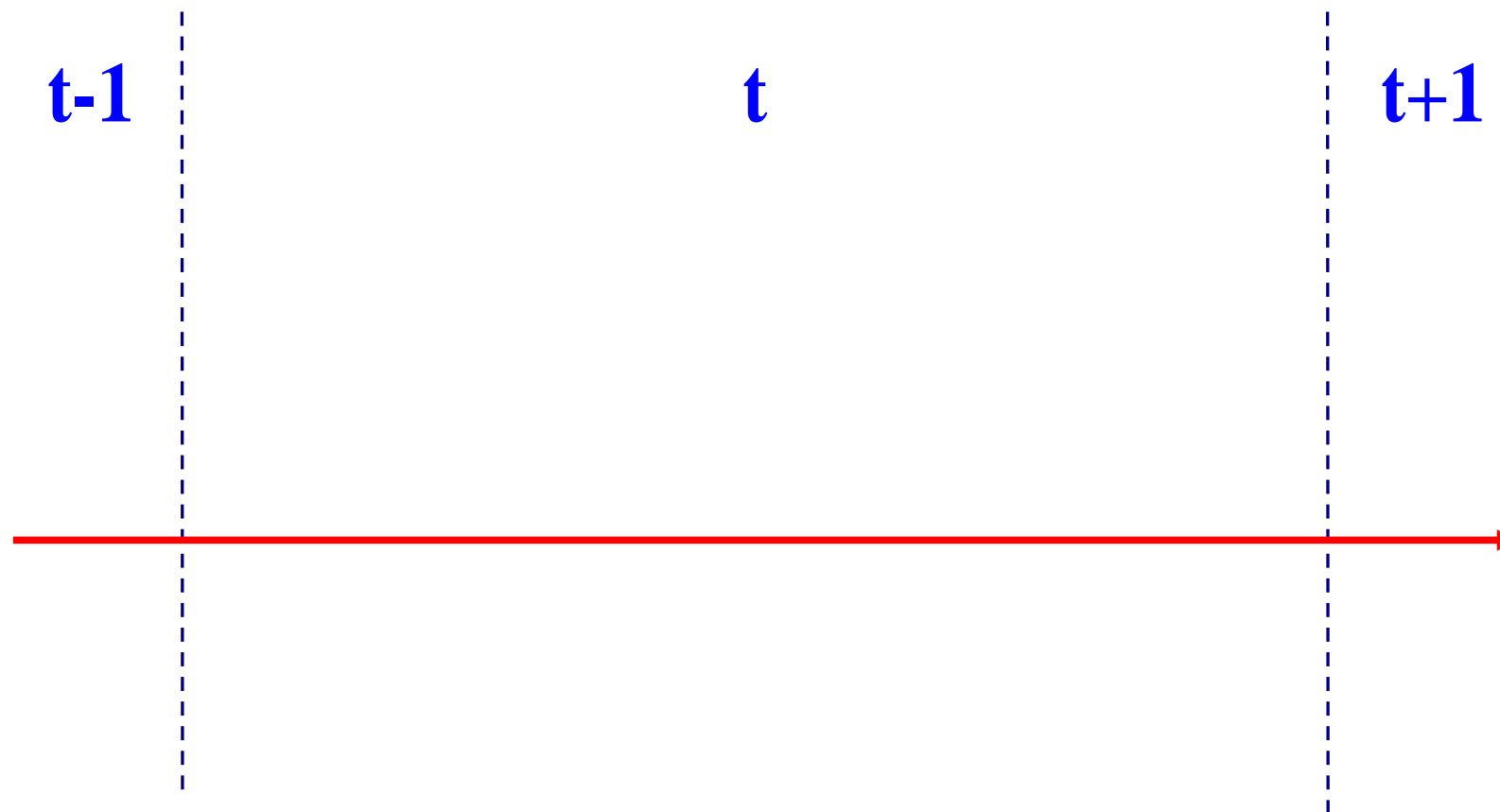
- We based our model on Iacoviello (2005), Christensen, Corrigan, Mendicino and Nishiyama (2007), Christiano, Eichenbaum and Evans (2005), Smets and Wouters (2003, 2007) and add monopolistic competitive banks (see Andrés and Arce, 2007 for an interesting microfoundation)



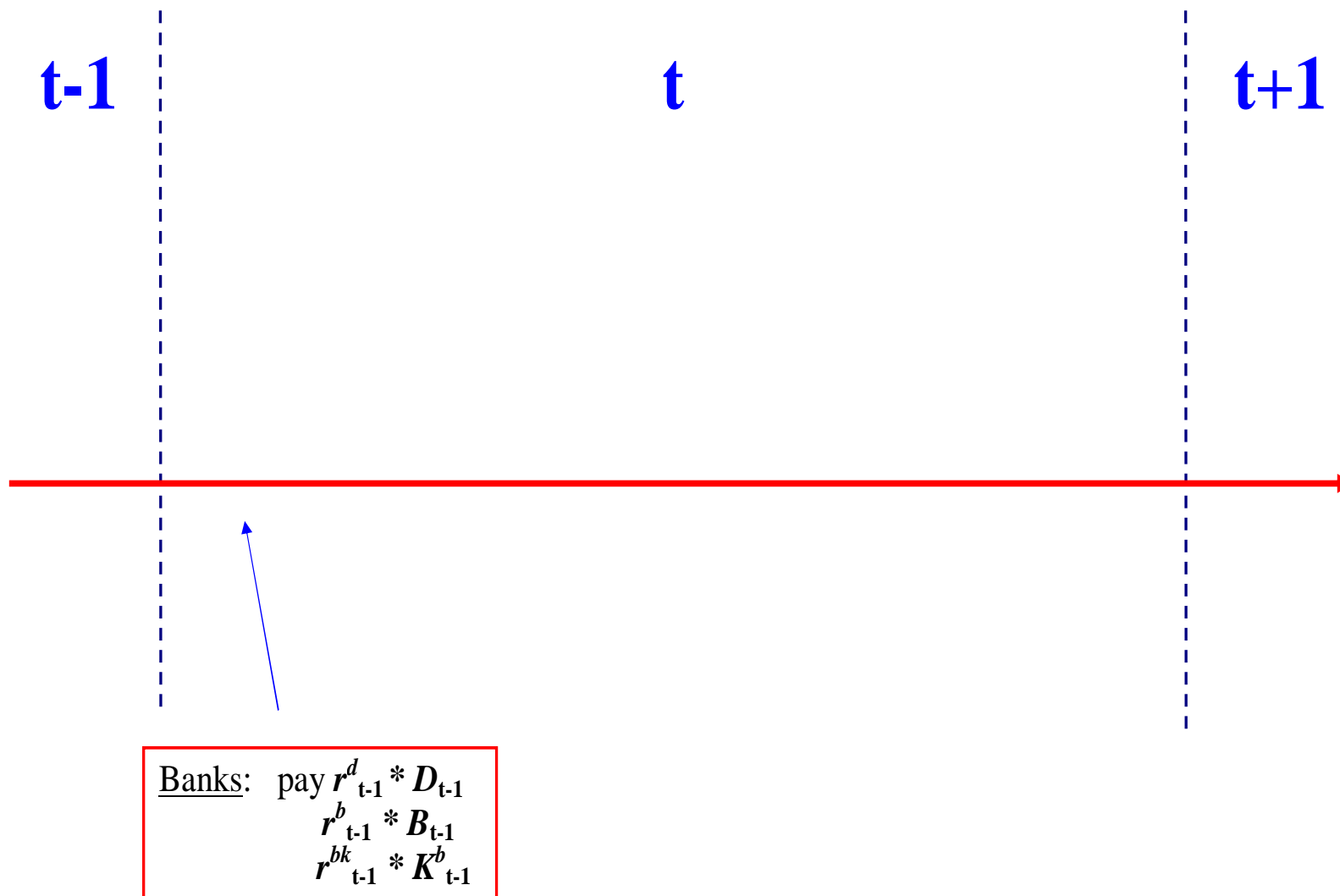
The banking sector

- Banks, with market power, collect deposits D and borrow from the central bank in order to produce and grant loans B to households and firms
- Credit to households \neq Credit to firms
- Borrowing limits are tied to value of the collateral:
households \rightarrow houses, firms \rightarrow capital
- Distinct demand elasticities w.r.t. the interest rate
- Different interest rate on deposits and loans to households and firms
- Slow response of bank rates to marginal costs due to adj. costs

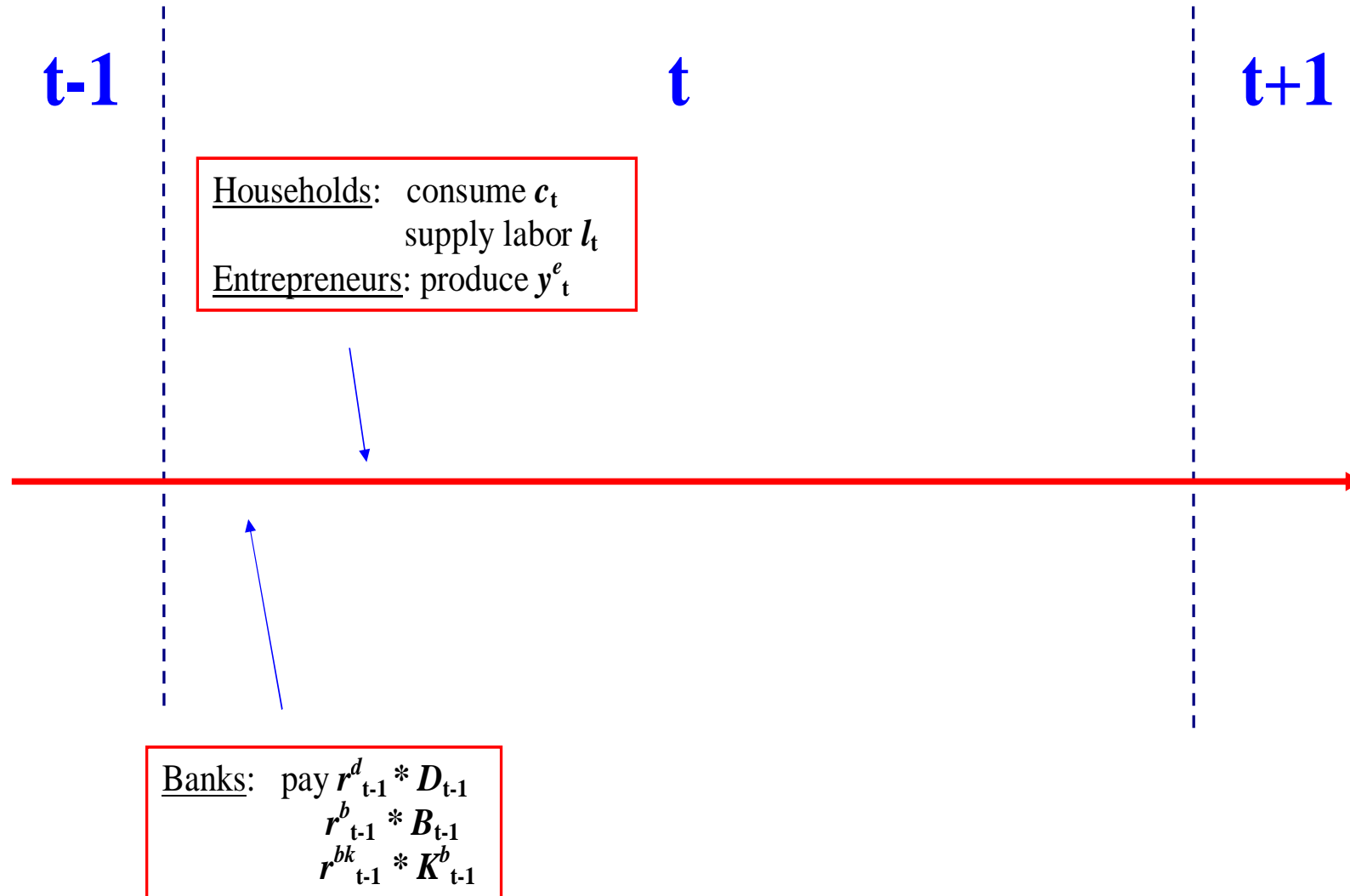
The timing of the model and the banking sector



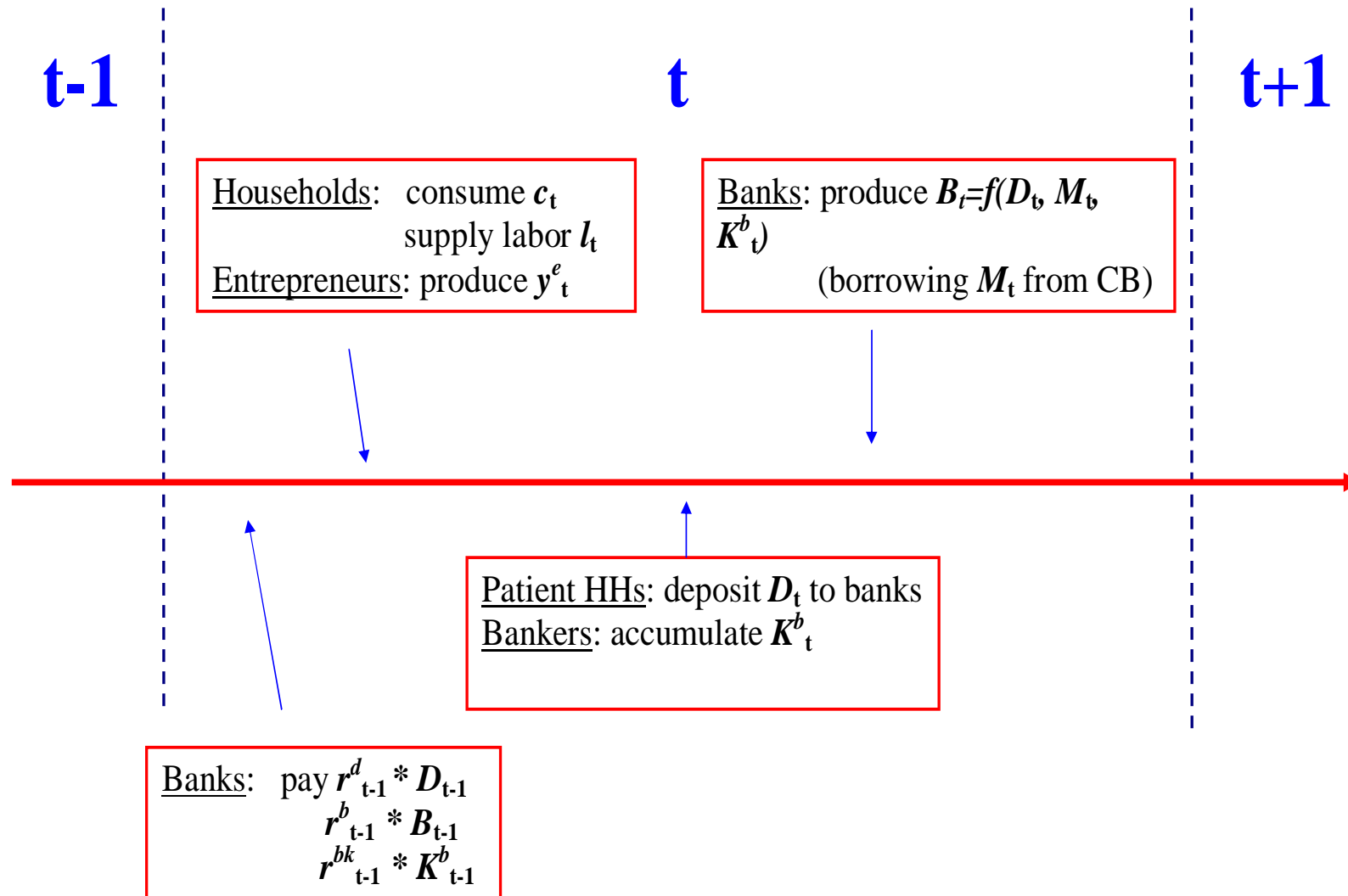
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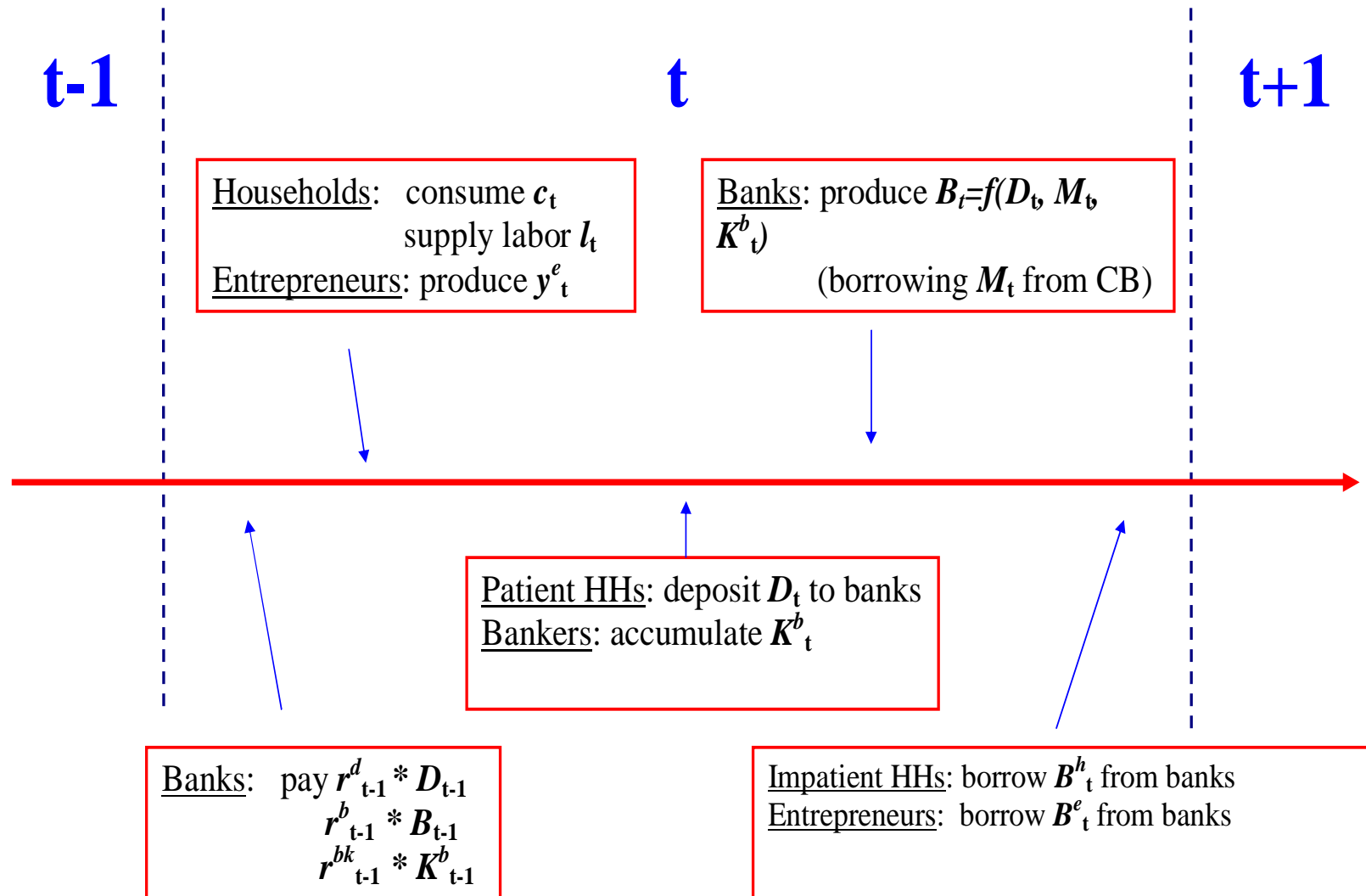
The timing of the model and the banking sector



The timing of the model and the banking sector



The timing of the model and the banking sector



The timing of the model and the banking sector

Given demand functions, banks set rates as mark-ups (or mark-downs) on the marginal cost s.t. adjustment costs

$$\hat{R}_t^{bank} = \theta(\kappa, \varepsilon) \hat{R}_{t-1}^{bank} + \theta(\kappa, \varepsilon) \beta_P E_t[\hat{R}_{t+1}^{bank}] + \frac{\theta(\kappa, \varepsilon)(\varepsilon - 1)}{\kappa} \hat{MC}_t^{bank}$$

Under flexible rates

$$R_t^{bank} = \frac{\varepsilon}{\varepsilon - 1} MC_t^{bank}$$

Production function for loans

$$B_t = f(D_t + M_t, K_t^{bank}) \quad \Rightarrow \quad MC_t^{bank} = f(R_t^{IB}, r_t^{K_b})$$

simplified version

$$B_t = D_t + M_t \quad \Rightarrow \quad MC_t^{bank} = R_t^{IB}$$

Other features of the model

- Heterogeneity in discount factors \Rightarrow borrowers and lenders
- Households work, consume, buy deposits and houses (in fixed supply)
- Entrepreneurs consume, accumulate physical capital and produce
- Bankers consume and accumulate bank capital
- Real and nominal “typical” frictions

Applications

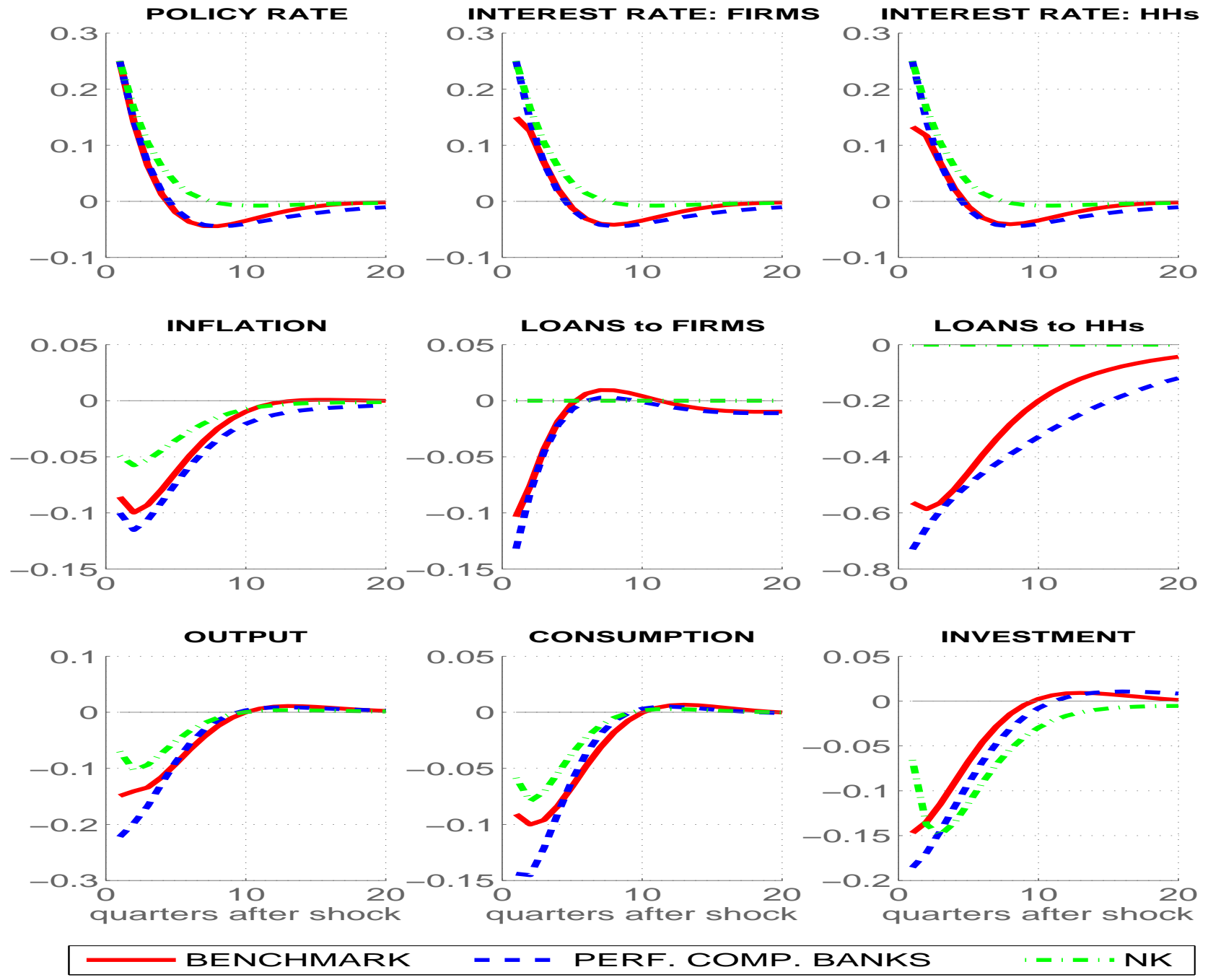
- Contractionary monetary policy shock
- Expansionary technology shock
- Financial “turmoil” scenario: a tightening of collateral requirements and an exogenous increase in interest rates on loans to households and firms

Monetary policy shock

What difference do banks and financial frictions make?

Compare the following models:

- The benchmark model with financial frictions and sticky rates
- A version with financial frictions but flexible rates
- A version without financial frictions and with only one interest rate



The banking attenuator effect

Sticky rates attenuate the effects of monetary policy shocks

without banks

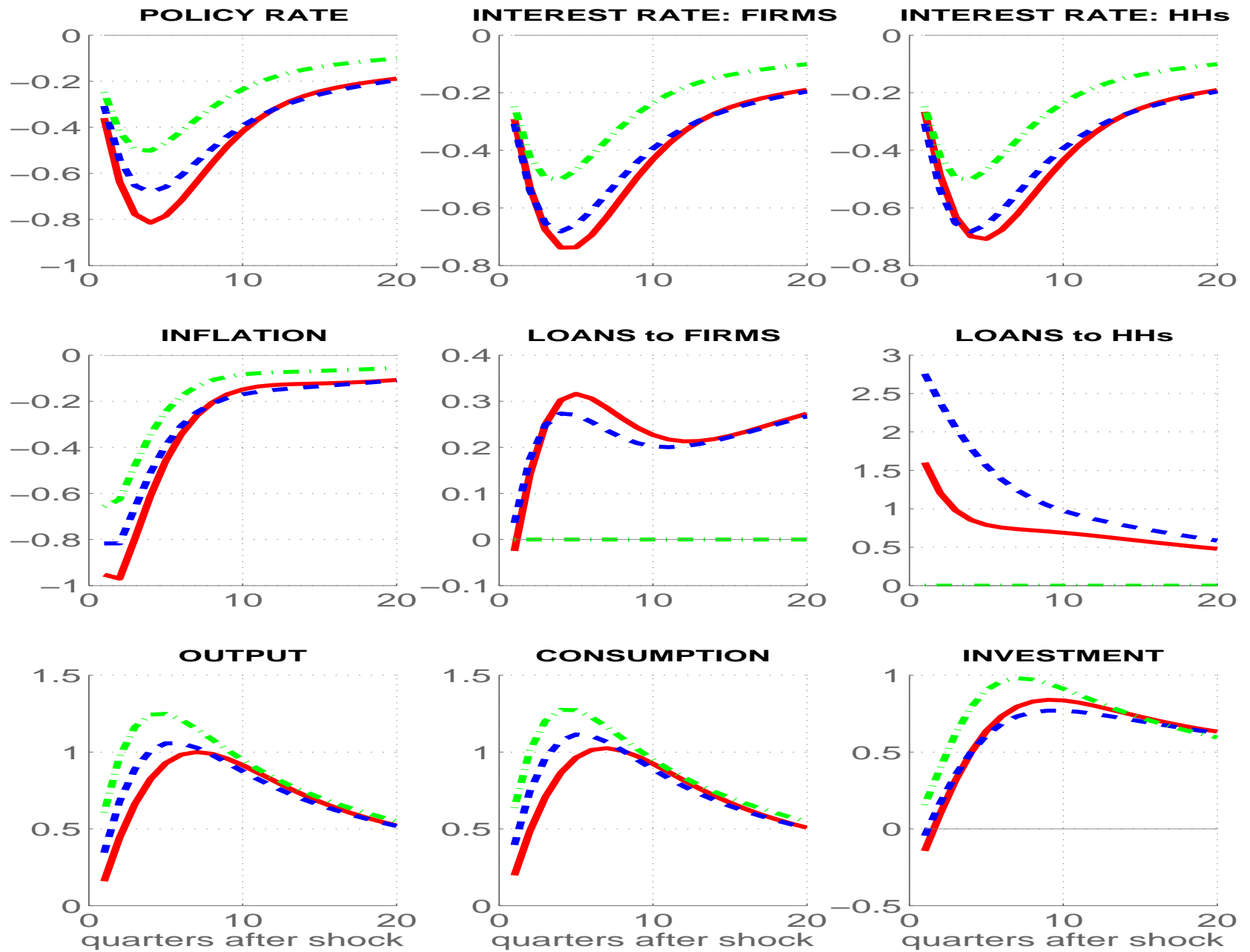
$$B_t \leq m E_t \left[\frac{Q_{t+1}^h h_t}{R_t \uparrow \uparrow} \right]$$

with banks

$$B_t \leq m E_t \left[\frac{Q_{t+1}^h h_t}{R_t^B \uparrow} \right]$$

Technological expansionary shock

Consider a positive shock to technology that increases output (at the peak) by 1.0 per cent from the steady state



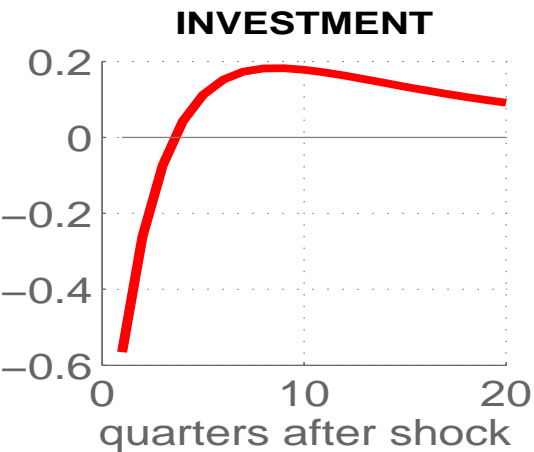
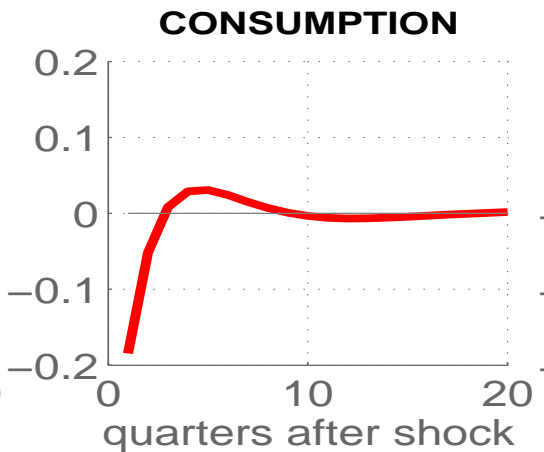
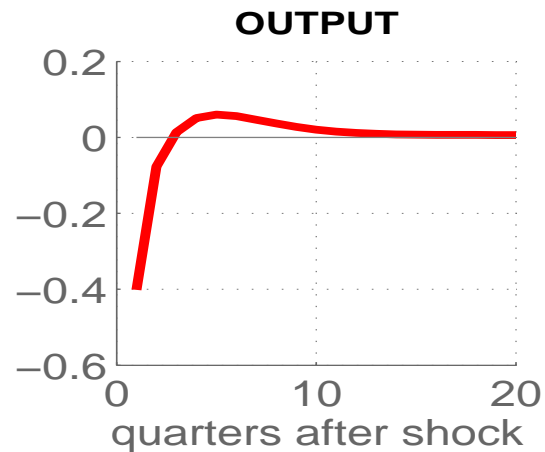
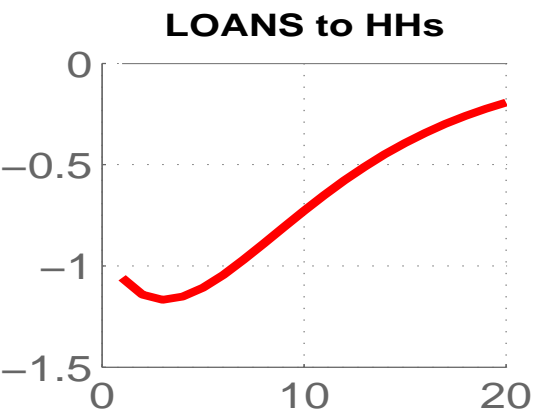
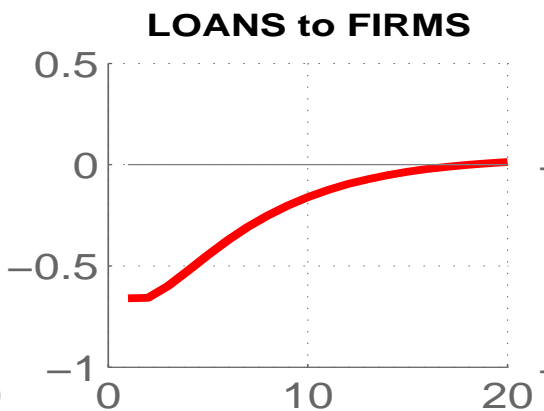
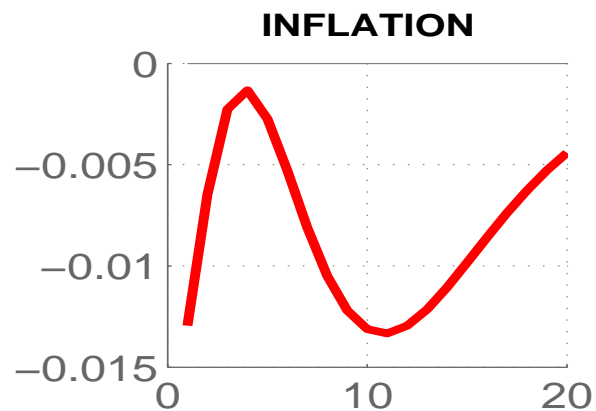
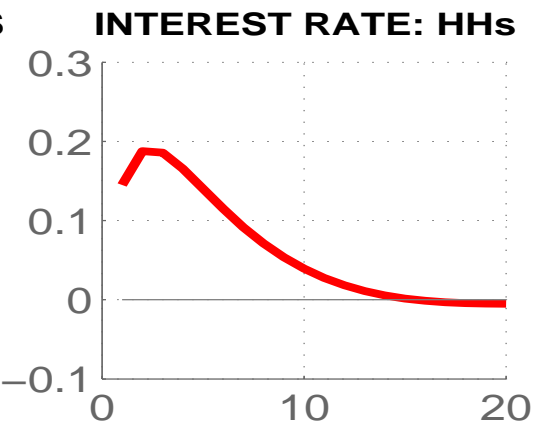
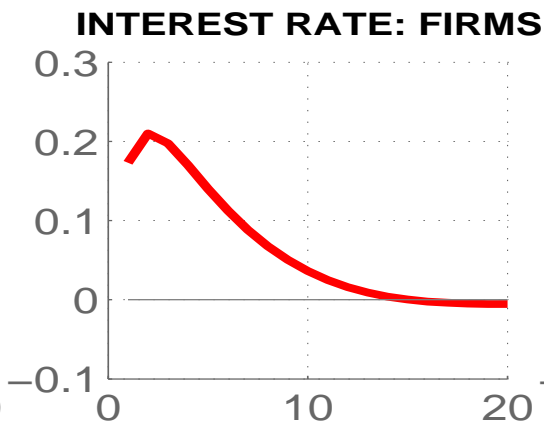
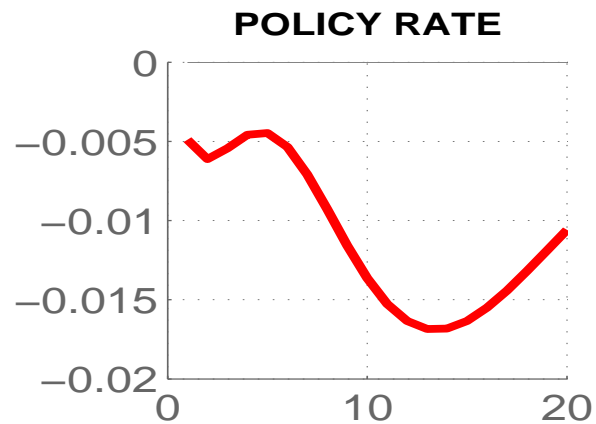
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Financial “turmoil” scenario

Unexpected reduction in loans supply to households and firms implemented by increasing collateral requirements

Unexpected increase in bank rates on loans to households and firms implemented by increasing markups

All independent of monetary policy

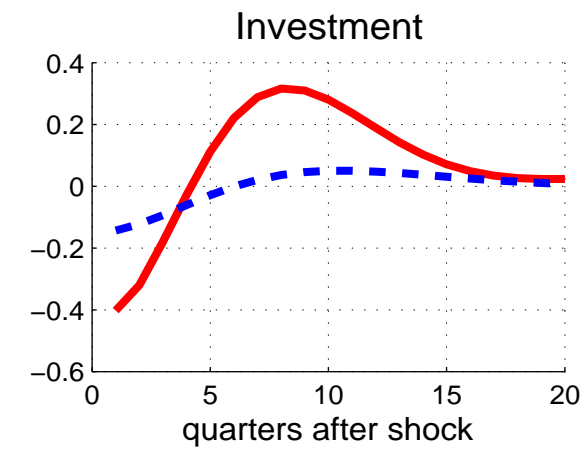
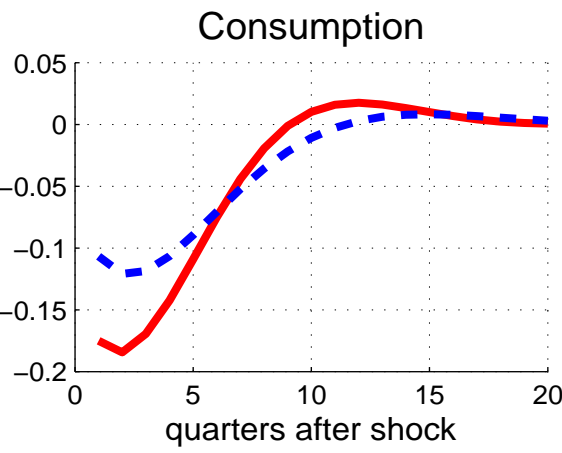
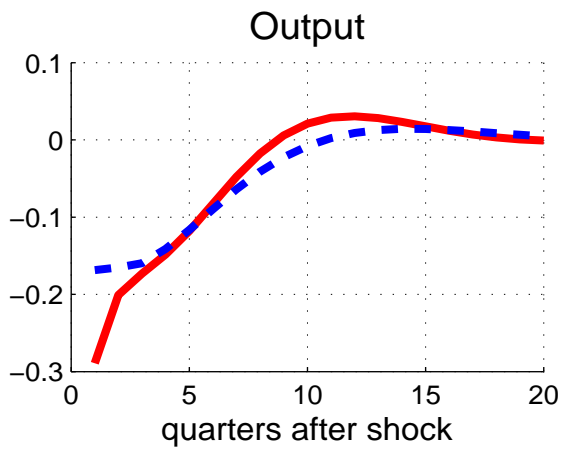
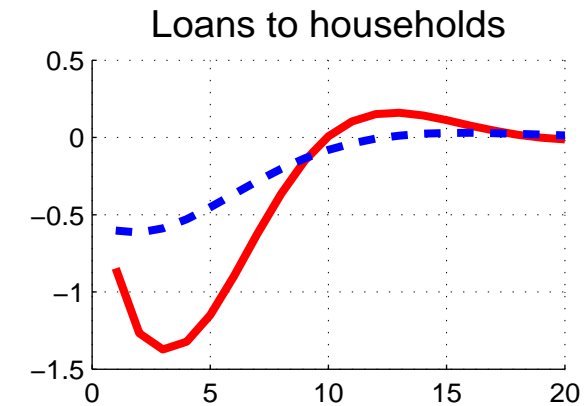
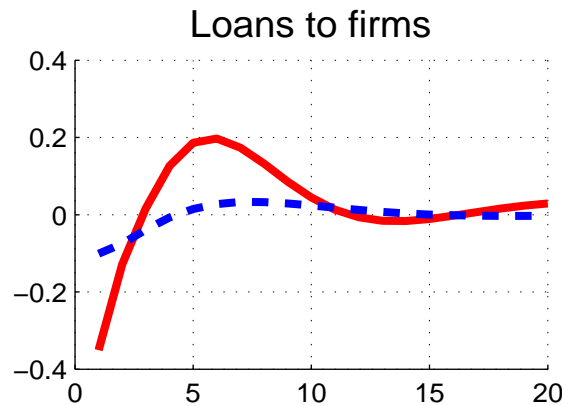
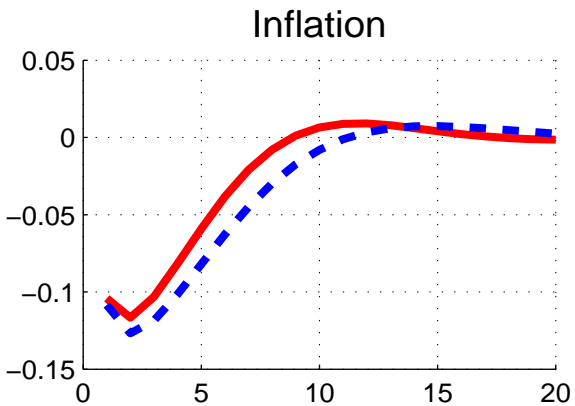
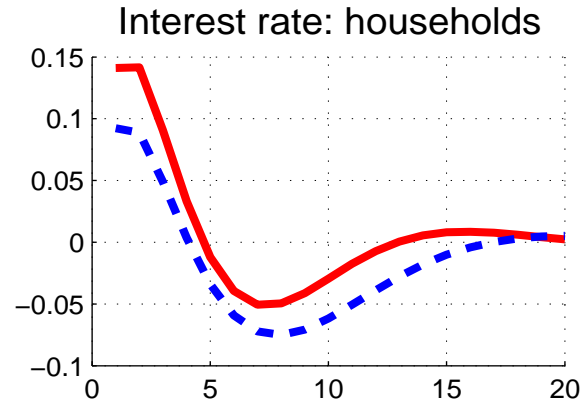
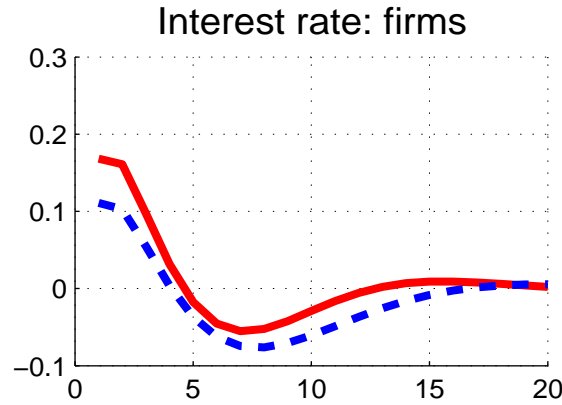
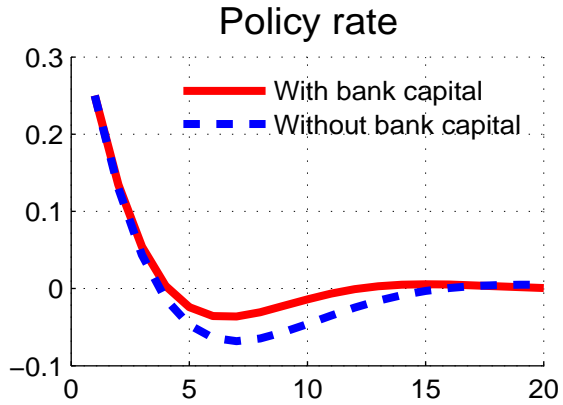


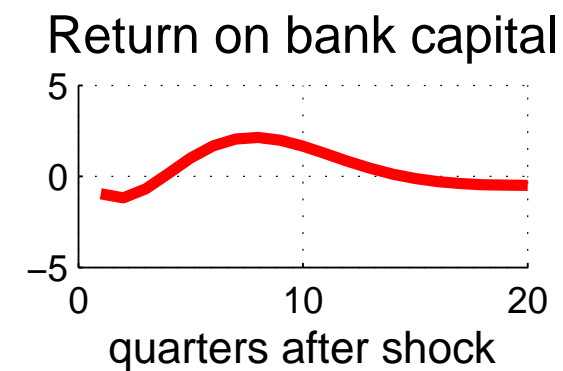
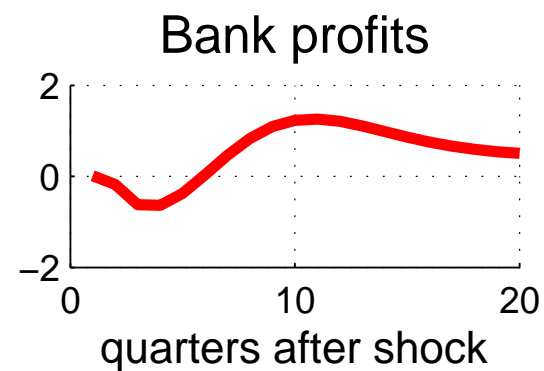
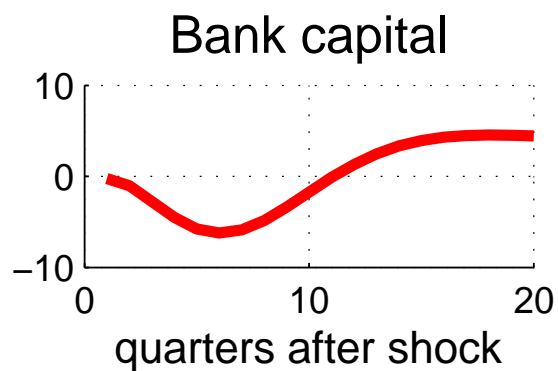
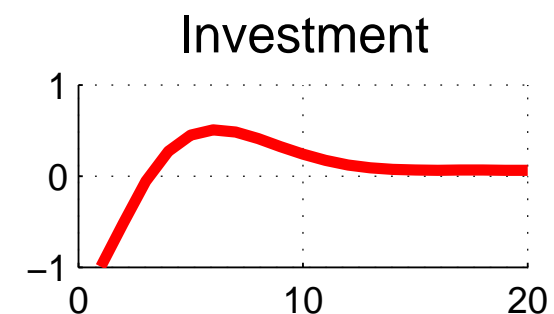
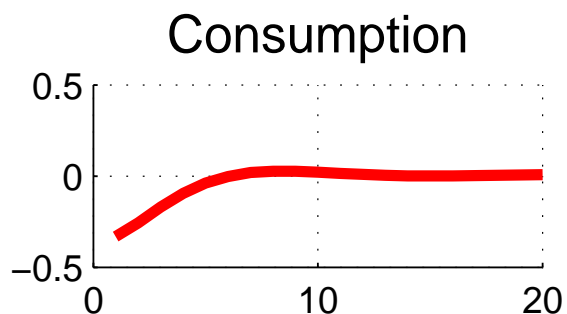
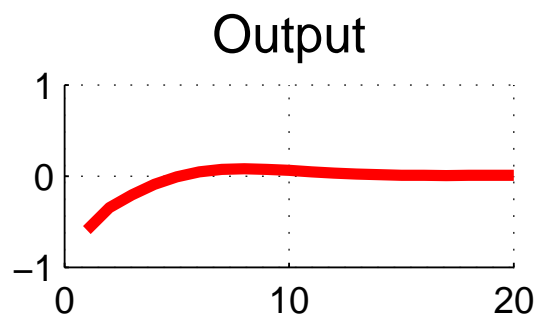
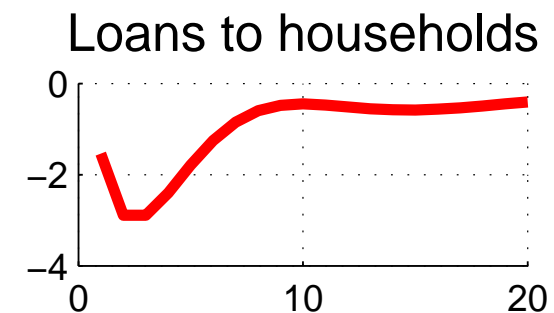
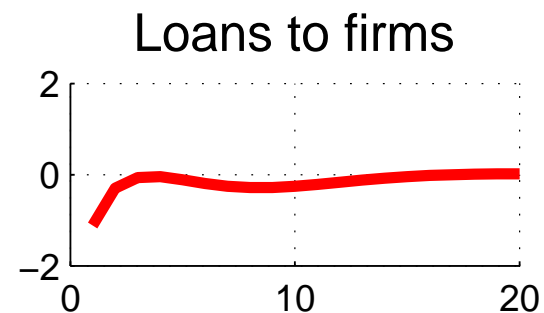
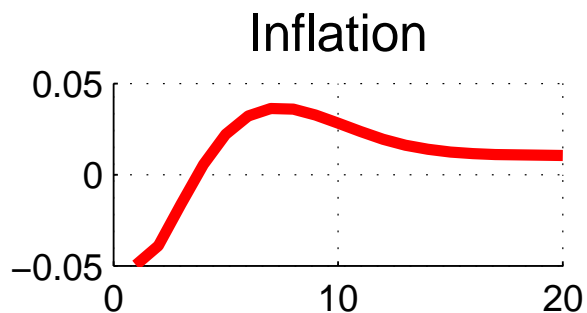
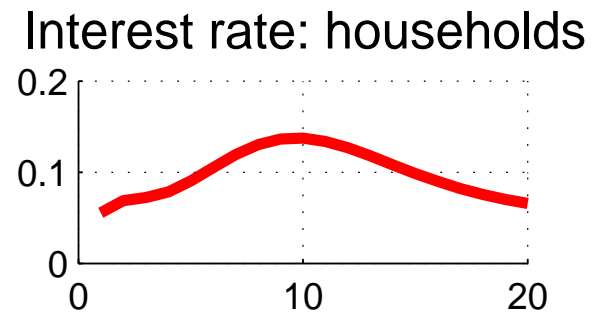
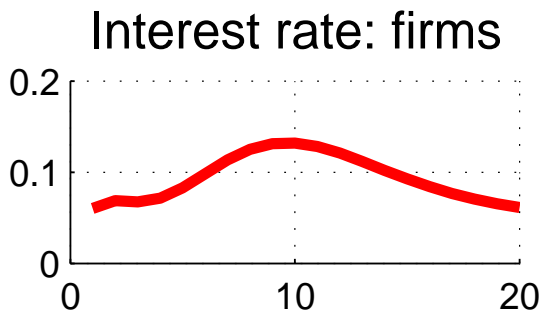
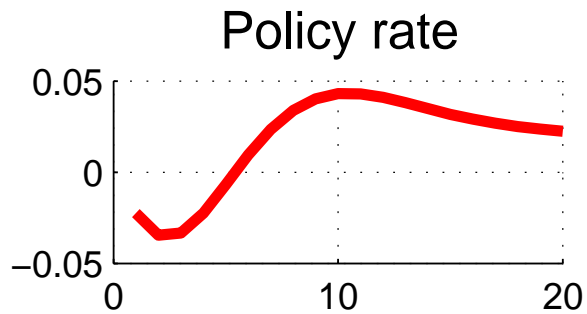
The role of bank capital in the transmission of monetary policy and financial “turmoil” shocks

- We consider the version of the model in which bank capital is used, together with deposits and borrowing from the central banks, to produce bank loans

Production function for loans

$$B_t = f(D_t + M_t, K_t^{bank}) \quad \Rightarrow \quad MC_t^{bank} = f(R_t^{IB}, r_t^{K_b})$$





Conclusions and plans for the near future

- Banks play a stabilizing role w.r.t demand shocks (attenuator effect), but only in the short-run. They improve the propagation mechanism of supply shocks
- A financial turmoil shock induces negative effects on output and investment; effects are more severe if tightening hits firms. No effects on inflation
- With bank capital the effects of monetary policy shocks are larger
- Take the model to the data using Bayesian methods
- Introduce fixed vs. variable rates and loans with different maturities