Shocks to Bank Lending, Risk-Taking and Securitization, and their role for U.S. Business Cycle Fluctuations

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Motivation

- Better understanding of links between financial sector and macro-economy

- Risk-appetite of banks and the macro-economy

  - Widely believe that moral hazard in the financial system caused an increase in risk-taking and excessive lending prior to the crisis

  - Is this driven by changes within the banking system?

    - Loose regulation and supervision, systemic risk-shifting due to bail-out expectations and skewed remuneration schemes (Rajan 2005)

  - Or response to developments outside the banking sector?

    - E.g. the risk-taking channel of monetary policy: Adrian and Shin (2010); Jiménez et al. (2009); Ioannidou et al. (2009); Maddaloni and Peydró (2011)

Motivation

- Fluctuations in securitization activities and the macro-economy

  - Believe that widespread use of securitization has led to excessive lending, both in terms of amount and quality of loans, contributing to subprime mortgage crisis (e.g. Keys et al. 2010; Purnanandam 2011)

  - Are fluctuations caused by developments specific to these markets?

    - Financial innovations which made it easier for banks to transfer risks to investors, e.g. tranching, pooling, liquidity lines to SPV

    - Increased supply of funds by investors from outside the U.S. (e.g. Bernanke 2005; Shin 2009)

Motivation

- Fluctuations in securitization activities and the macro-economy

  - Could also be driven by developments outside securitization markets, e.g. higher housing and lending demand due to an increase in wealth

  - Monetary policy and appetite for securitization products by investors: "search for yield" channel of monetary policy (Borio and Zhu 2008)

- **Separating shocks originating in banking and securitization markets from other shocks in the economy is crucial for understanding how the financial system interacts with the real economy and to determine appropriate policy response**

This paper

- We analyze the link between banking sector, securitization markets and macro-economy with a Structural Vector Autoregressive model for the U.S.

- Estimate macro effects of different shocks affecting the banking sector

  - Shocks to **bank lending**, **risk-taking** and **securitization** that are orthogonal to real economy disturbances and monetary policy innovations

  - Within the SVAR, we also estimate the effects of **monetary policy shocks** on bank lending and securitization markets

- Obtain stylized facts on interplay between banking sector, securitization markets and real economy, as well as macro-economic relevance

Set-up of the benchmark SVAR model

$$Y_t = c + \sum_{i=1}^{n} A_i Y_{t-i} + B\varepsilon_t$$

Real economy	monetary policy	banking variables
Output (y)	Federal funds rate (i)	Bank lending (l)
Inflation (п)		Securitization (s)
		Retained loans (r)

- Estimated in (log) levels with 4 lags over sample period 1970Q1–2008Q4

- Restrictions on B to identify structural shocks: combination of zero and sign restriction

Shock identification

	y	π	i	l	s	r
Real economy shock 1						
Real economy shock 2						
Monetary policy shock	0	0				
Lending shock	0	0	0			
Securitization shock	0	0	0			
Risk-taking shock	0	0	0			

- Real economy and MP shocks have immediate effect on banking variables

  – But shocks in banking and securitization markets do not affect the real economy and monetary policy actions on impact (conservative assumption)

  – Alternatives with immediate response of monetary policy as robustness check

Shock identification

	y	π	i	l	s	r
Real economy shock 1						
Real economy shock 2						
Monetary policy shock	0	0				
Lending shock	0	0	0	+	+	+
Securitization shock	0	0	0	+	+	-
Risk-taking shock	0	0	0	+	-	+

- Financial shocks identified with simple model of bank lending and risk transfer: profit-maximizing banks decide how many loans to extend to firms and households, and how many of these loans they want to securitize

  – Remaining loans are funded on-balance-sheets through deposits

A simple model of bank lending and risk transfer

- The bank faces a demand for loans by firms and households

$$L(r_L - \varepsilon_L) \qquad L'(r_L - \varepsilon_L) < 0$$

- - r_L is the lending rate charged by the bank

- - ε_L is an **expansionary lending shock**

  - Could be caused by an increase in the demand for loans, orthogonal to current economic activity (e.g. expected economic activity)

  - A supply-side interpretation is also possible (e.g. lower monitoring costs due to technological progress)

A simple model of bank lending and risk transfer

- The bank faces a demand for securitized loans by investors

$$S\left(r_S + \varepsilon_S, r_F\right) \qquad \frac{\partial S}{\partial\left(r_S + \varepsilon_S\right)} > 0 \; , \; \frac{\partial S}{\partial r_F} < 0$$

  - r_S is the return on securitized loans and r_F is the risk-free interest rate set by the central bank (opportunity cost and so-called "search for yield")

  - ε_S is an **expansionary securitization shock**

    - Financial innovation that improves securitization technologies (e.g. tranching, pooling, liquidity lines to SPV), increased supply of funds by foreign investors, higher risk-appetite or underpricing of credit risk by investors, Basel and favorable treatment of securitization, …

A simple model of bank lending and risk transfer

- The costs of retaining a unit of loan on-balance sheet consist of two parts

  - Cost of financing the loan with (insured) deposits: risk-free policy rate r_F

  - Extra (direct and indirect) costs of holding loans on balance sheet:

$$r_B\left(L - S, \varepsilon_B\right) \qquad \frac{\partial r_B}{\partial(L-S)} > 0 \ , \ \frac{\partial r_B}{\partial \varepsilon_B} < 0$$

  - Marginal cost of on-balance financing increases in amount of retained loans

  - ε_B is an **expansionary risk-appetite shock**: decline in liquidation risk, changes in capital requirements or cost of capital, underpricing default risk by debtors, skewed compensations of bank managers and traders, bail-out expectations,...

A simple model of bank lending and risk transfer

- Period 0: lending (L) and securitization (S) decisions take place

  - Securitization via an SPV which issues securities with face value S to investors

  - Remaining loans are financed by borrowing L – S at rate $r_F + r_B$

- Period 1: SPV pays management fee $(r_L - r_S)S$ to the bank, while investors receive a net return of $r_S S$

- Profit function of the bank at period 1

$$\Pi(L,S) = (1 + r_L)(L - S) + (r_L - r_S)S - (1 + r_F + r_B)(L - S)$$

A simple model of bank lending and risk transfer

- Assuming linearity for all relationships, Maximizing profits delivers following effects of shocks in equilibrium:

	Lending	Securitization	Retained loans
Lending shock	+	+	+

A simple model of bank lending and risk transfer

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	Lending	Securitization	Retained loans
Lending shock	+	+	+
Securitization shock	+	+	-

A simple model of bank lending and risk transfer

- Assuming linearity for all relationships, Maximizing profits delivers following effects of shocks in equilibrium:

	Lending	Securitization	Retained loans
Lending shock	+	+	+
Securitization shock	+	+	-
Risk-taking shock	+	-	+

A simple model of bank lending and risk transfer

- Assuming linearity for all relationships, Maximizing profits delivers following effects of shocks in equilibrium:

	Lending	Securitization	Retained loans
Lending shock	+	+	+
Securitization shock	+	+	-
Risk-taking shock	+	-	+
Monetary policy shock	+	+/-	+

Benchmark SVAR model and shock identification

$$Y_t = c + \sum_{i=1}^{n} A_i Y_{t-i} + B\varepsilon_t$$

	y	п	i	l	s	r
Real economy shock 1						
Real economy shock 2						
Monetary policy shock	0	0				
Lending shock	0	0	0	+	+	+
Securitization shock	0	0	0	+	+	-
Risk-taking shock	0	0	0	+	-	+

Lending shock
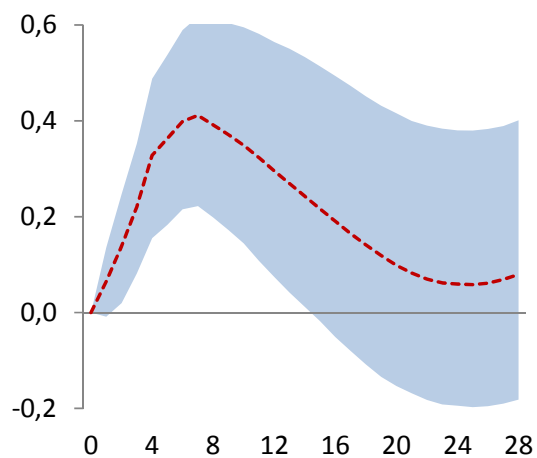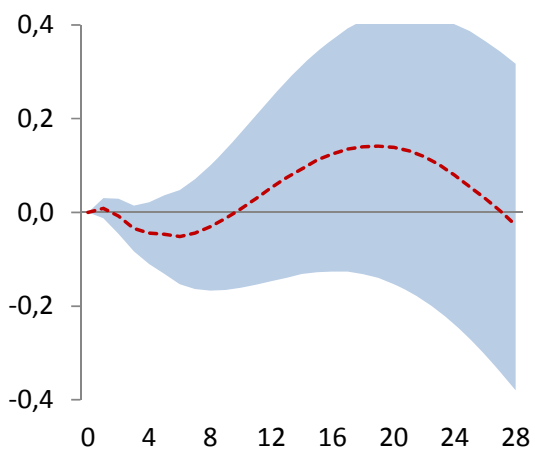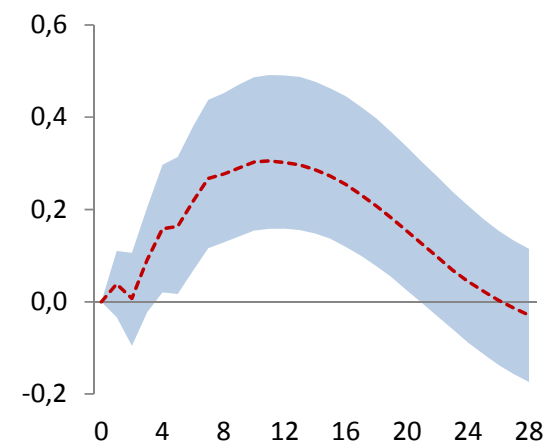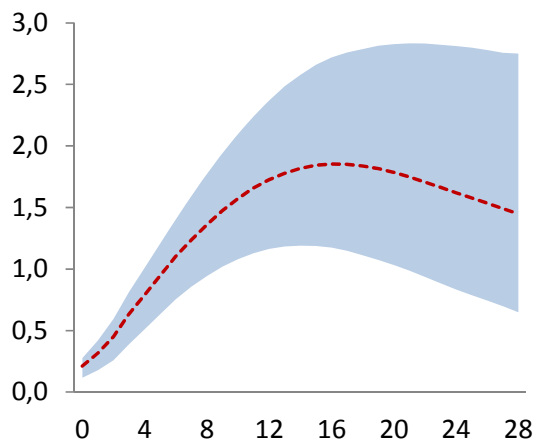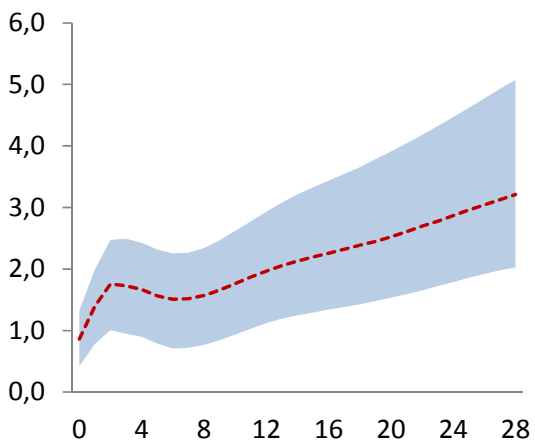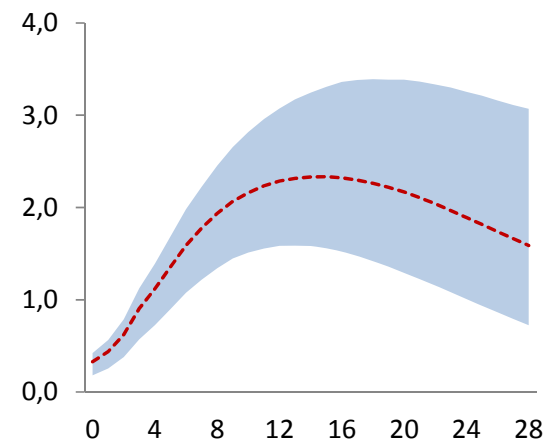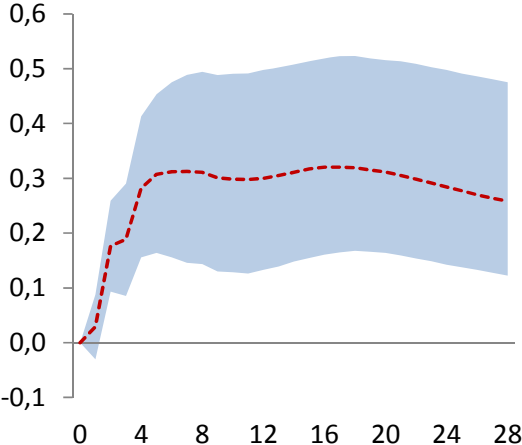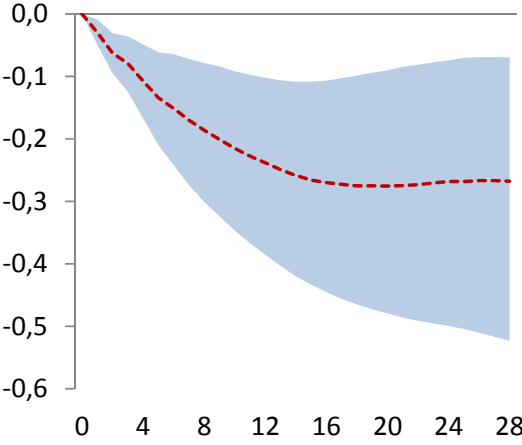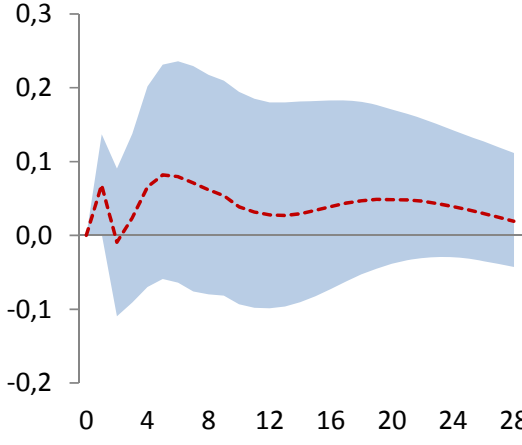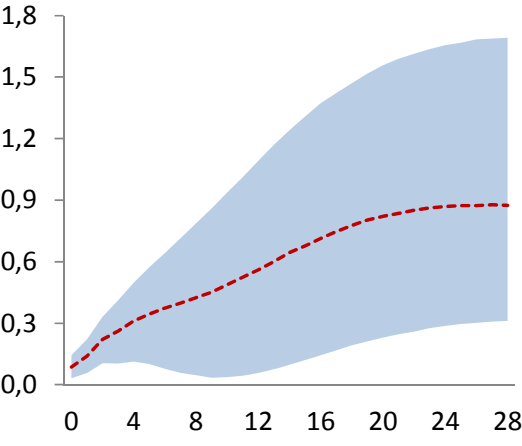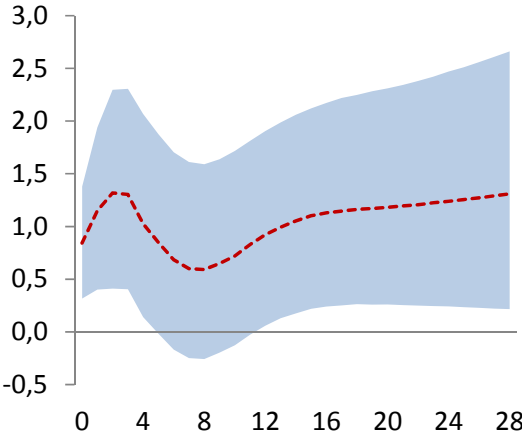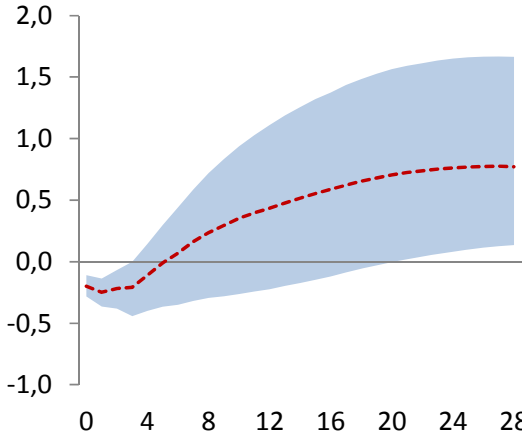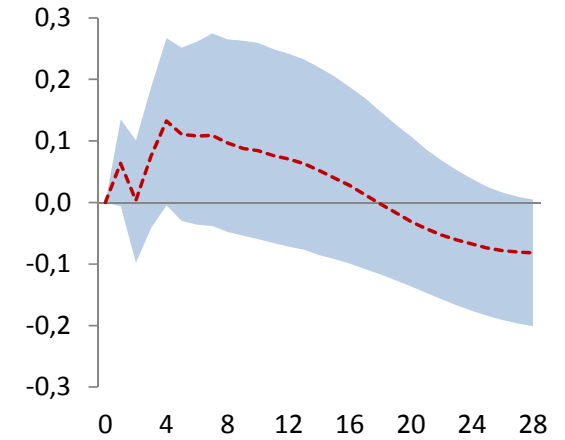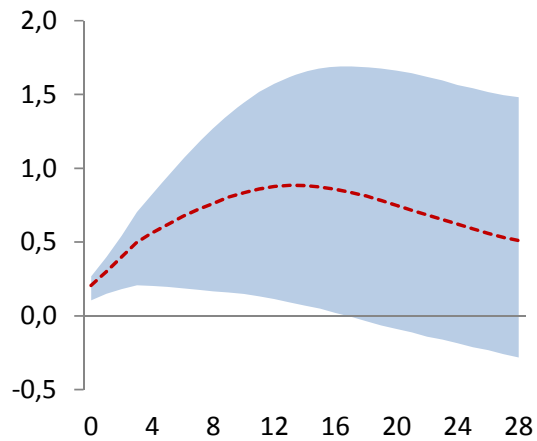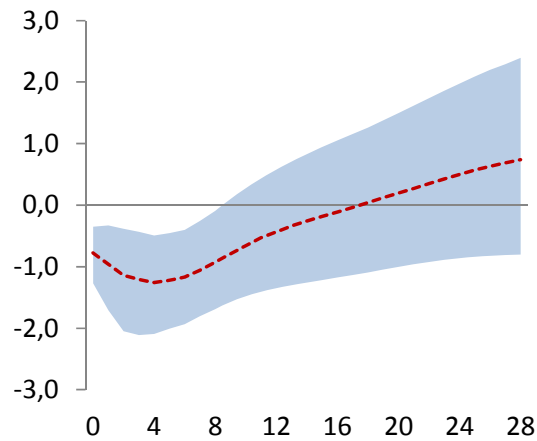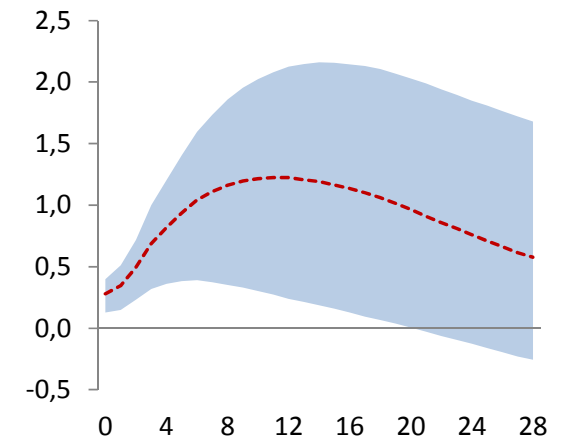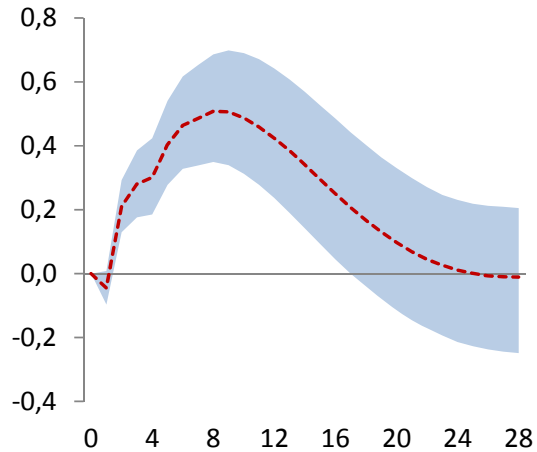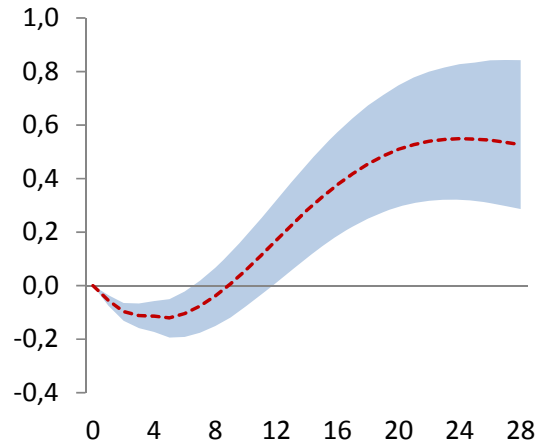
Securitization shock
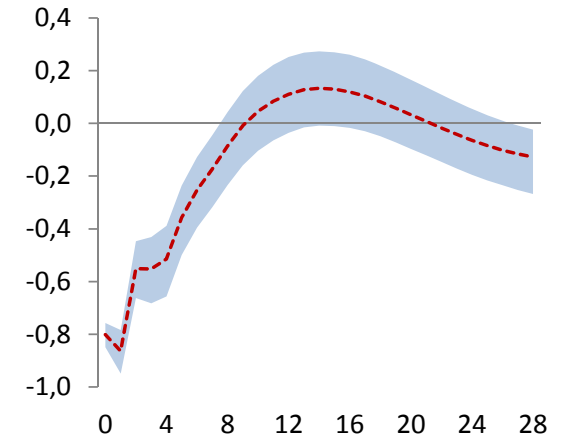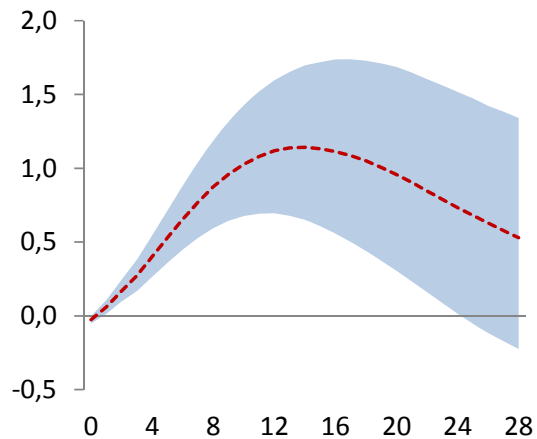
Risk-taking shock
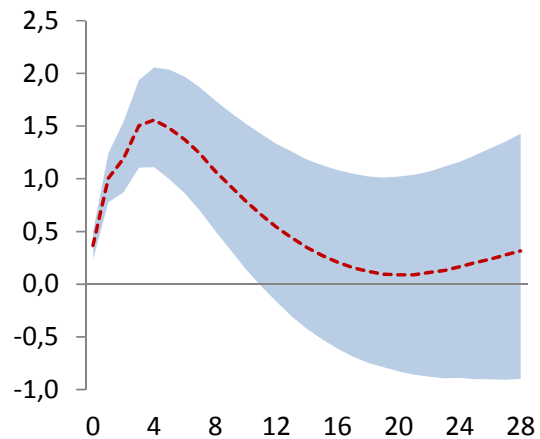
Monetary policy shock
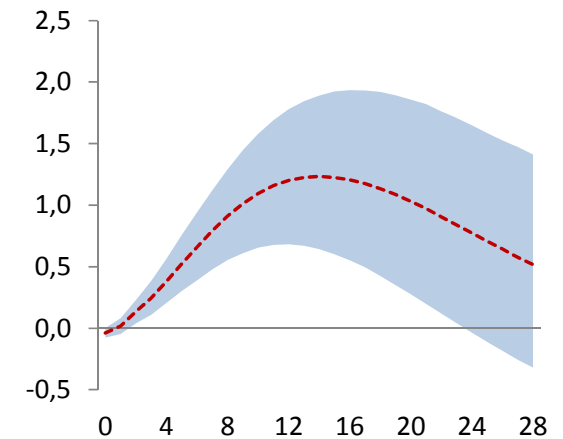
Macroeconomic relevance – Real GDP fluctuations

Lending shocks — median = 11,3%
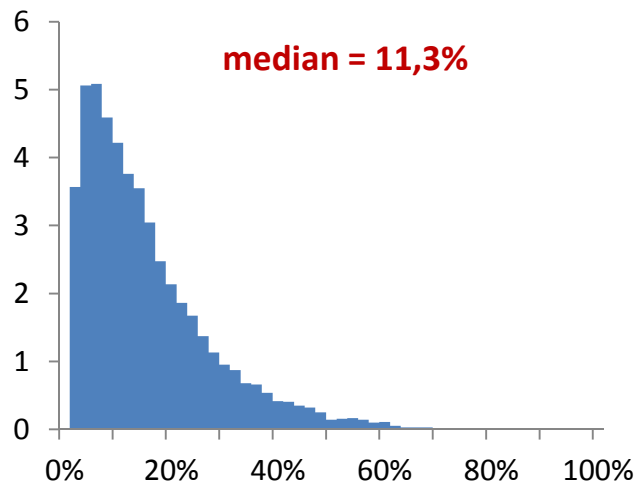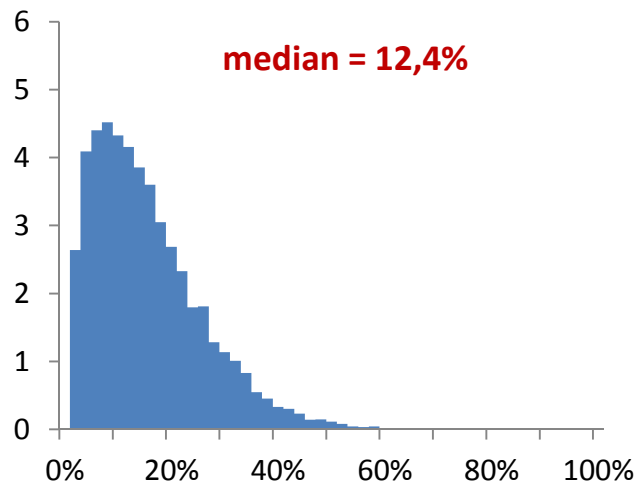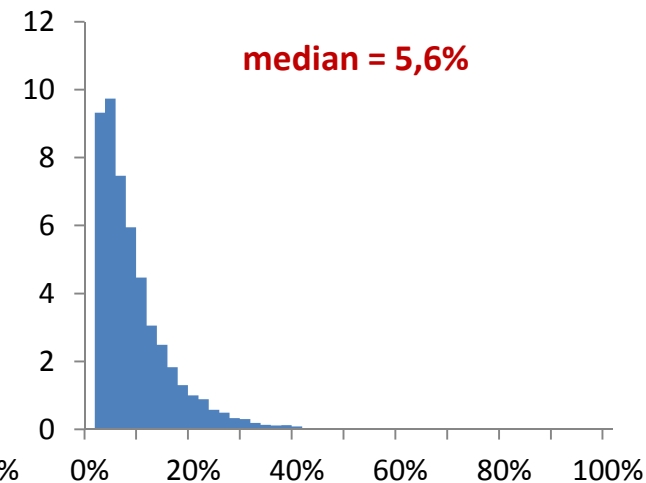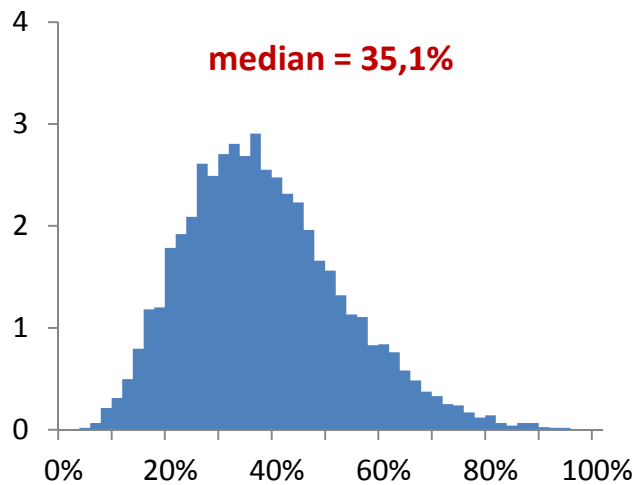
Securitization shocks — median = 12,4%
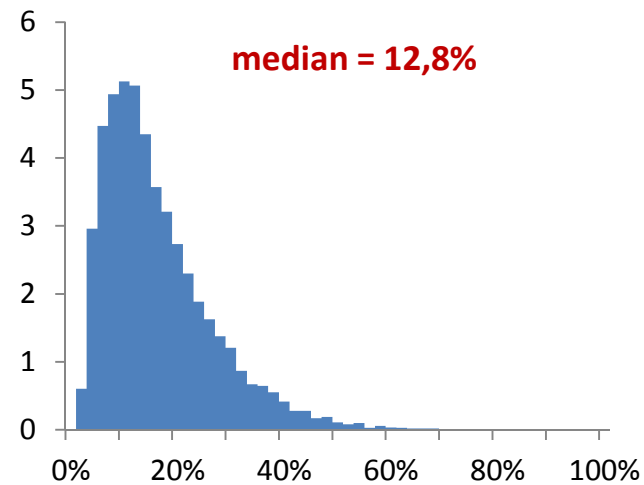
Risk-taking shocks — median = 5,6%

Sum of bank market shocks — median = 35,1%
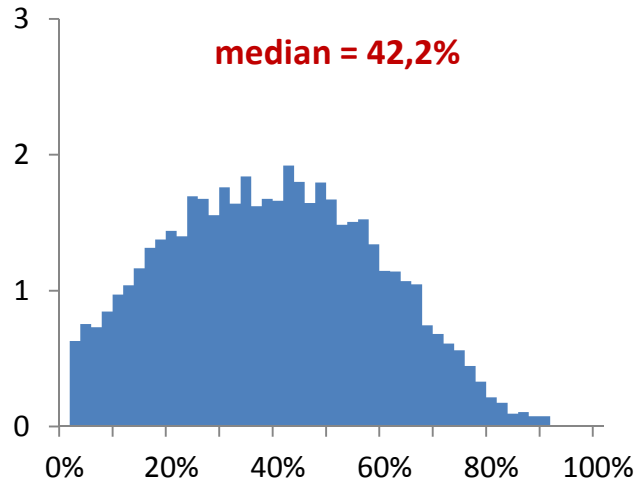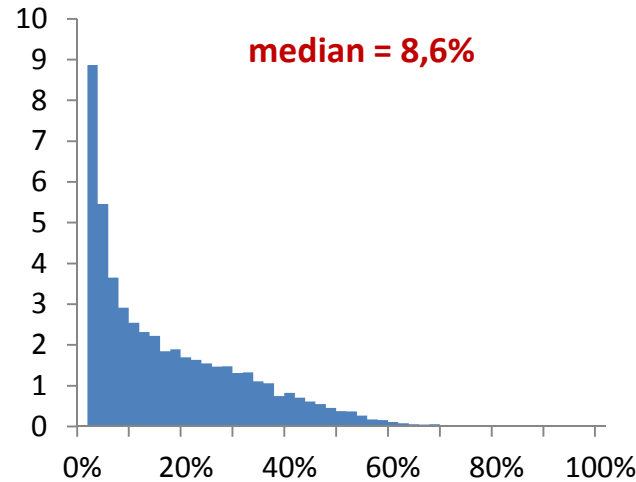
Monetary policy shocks — median = 12,8%
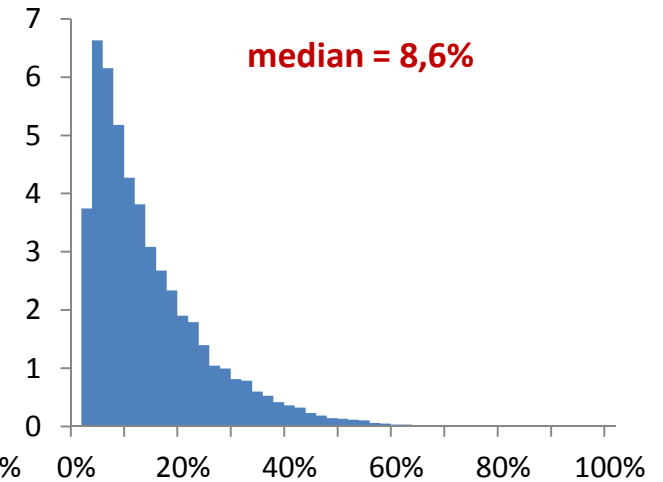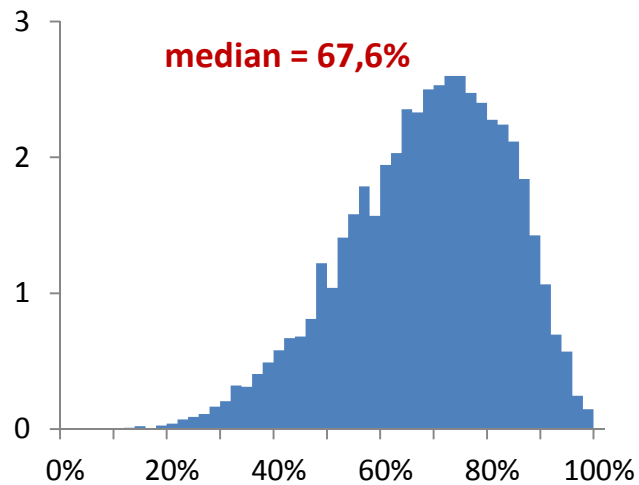
Fluctuations in securitization activities
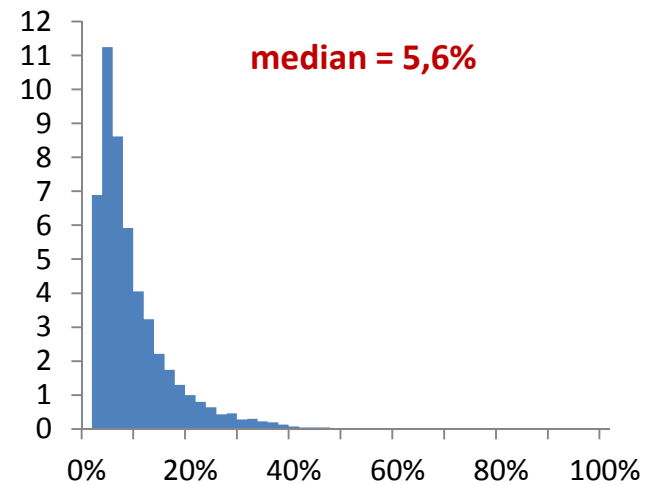
Fluctuations in retained loans

Lending shocks
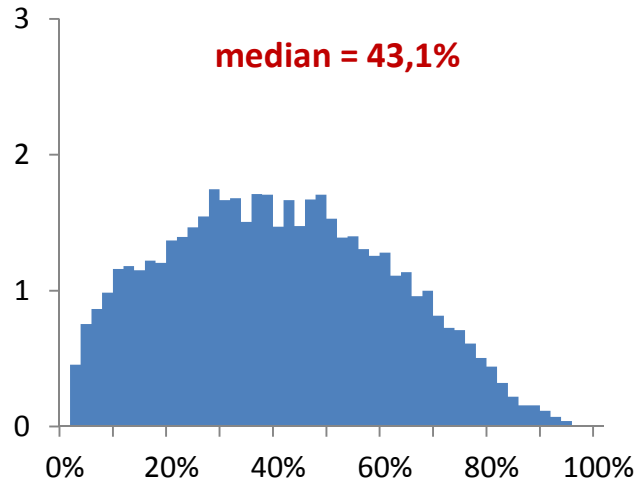
median = 43,1%

Securitization shocks

median = 5,9%

Risk-taking shocks

median = 11,8%

Sum of bank market shocks

median = 70,2%

Monetary policy shocks

median = 10,4%
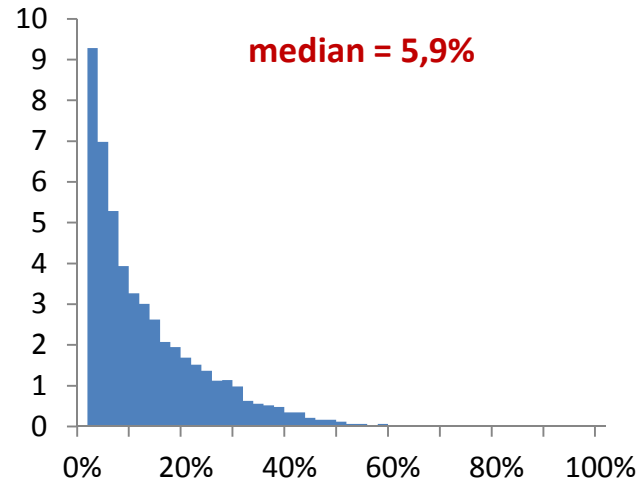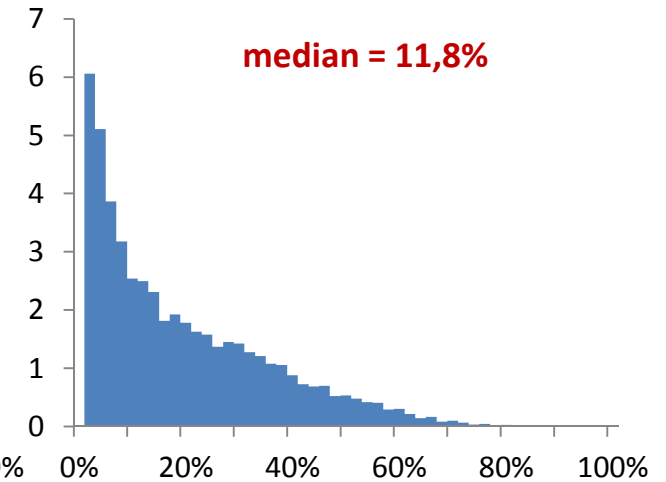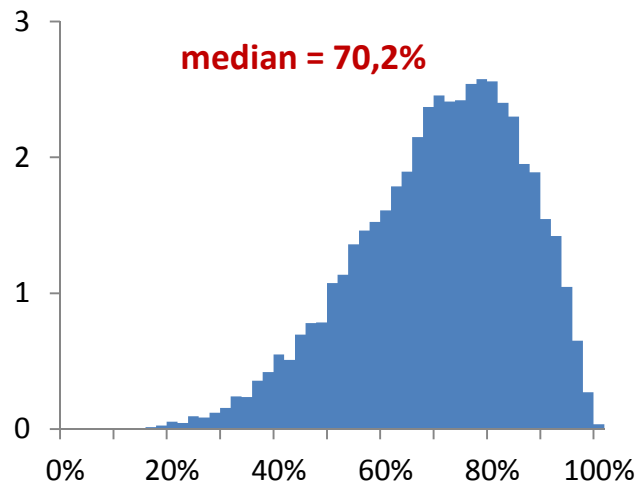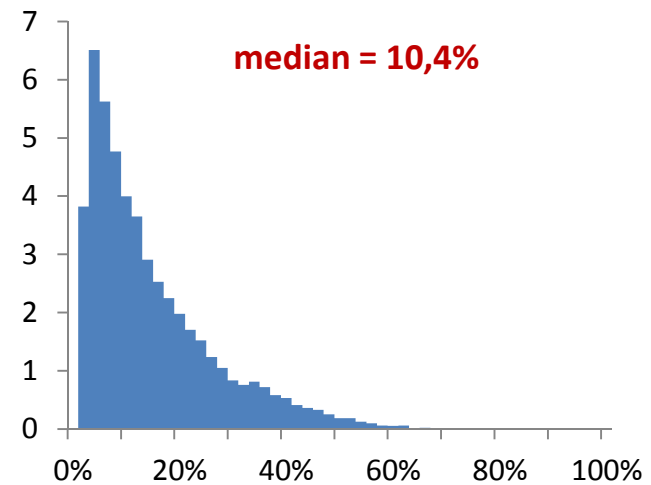
Conclusions

- All three types of shocks specific to banking and securitization markets have a significant effect on economic activity, but pattern is very different

    - Securitization shock has pattern of productivity shock, while risk-taking (and also lending) shock only has a temporary impact on economic activity

    - Macroeconomic relevance important: explain around 35% of output variability

    - Volatility in securitization markets only by less than 10% driven by securitization shocks, and retained loans hardly 12% by risk-taking shocks

- There is dominating "search for yield" effect after a monetary policy shock

    - Monetary policy shocks not important to explain securitization (6%) and retained loans (10%) volatility