



NATIONAL BANK OF ROMANIA

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Investigating interactions between the real estate market and mortgage lending

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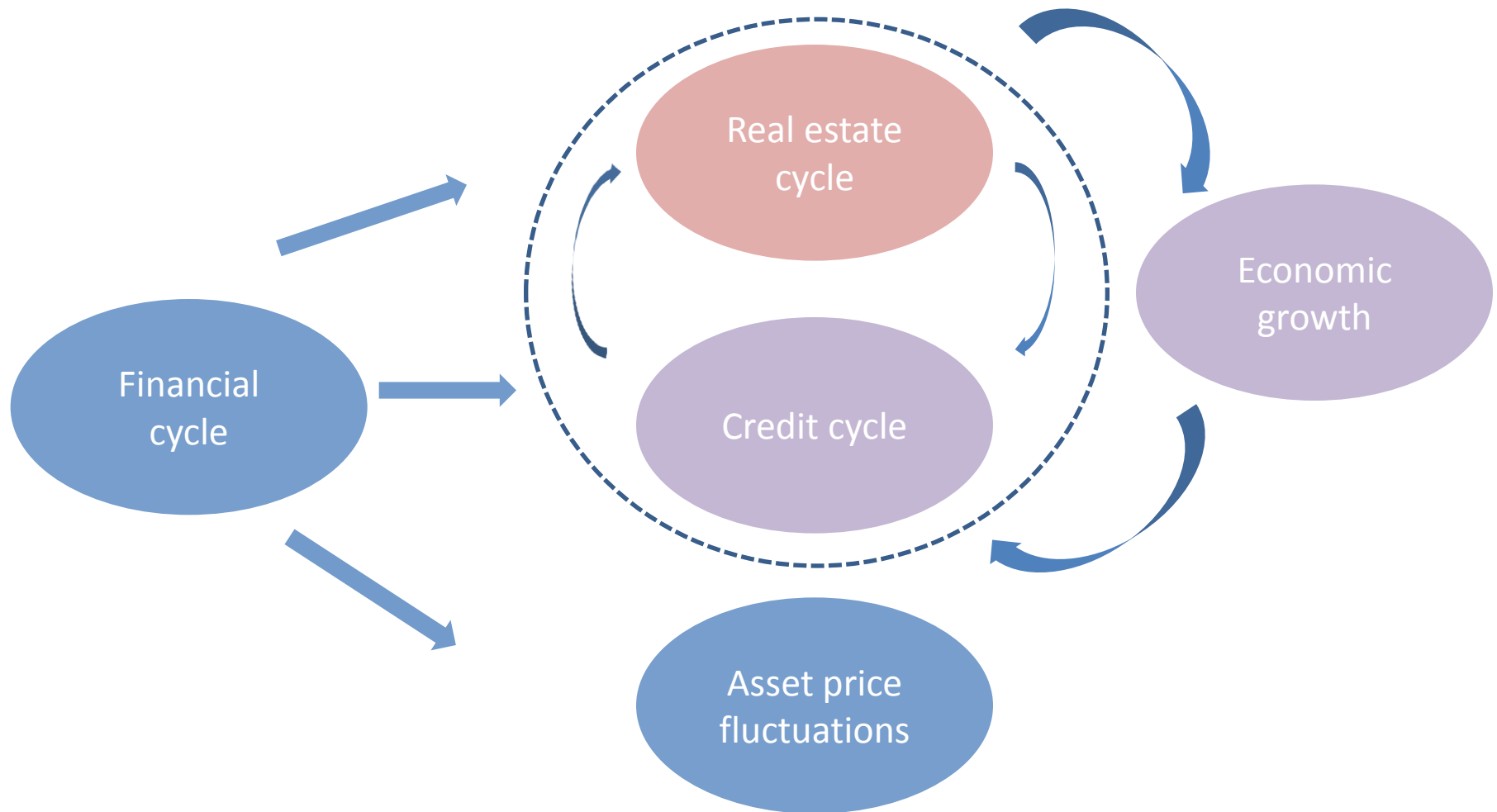
National Bank of Romania

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Outline

- I. The real estate cycle as a component of the financial cycle
 - a. How to measure the RE cycle?
 - b. How does the RE cycle look like?
- II. Interactions between real estate market and mortgage lending
 - a. House prices and mortgage lending
 - b. RE index and mortgage lending
- III. Main takeaways

I. The real estate (RE) cycle as a component of the financial cycle



I. Indicators to measure the RE cycle

- Do house prices tell the whole story?
- Can use a RE index alternatively to residential prices?
- We measure the real estate cycle using:
 - A. House price index**
 - B. Real estate index (RE index):**
 - i. PCA method of aggregation
 - ii. Variables:
 - GVA in construction sector
 - Employment in construction sector
 - Employment in real estate sector
 - Intention to purchase a house in 12 months time
 - GDP per capita (proxy for disposable income)

I. Methods to assess the RE cycle

- **Turning-point analysis (Harding and Pagan, 2002):** identifies peaks and troughs in time series
- **Unobserved components model (UC) estimated with Kalman filter.** The trend (τ) is a random walk and the cycle (C) is modeled as an AR(2) process

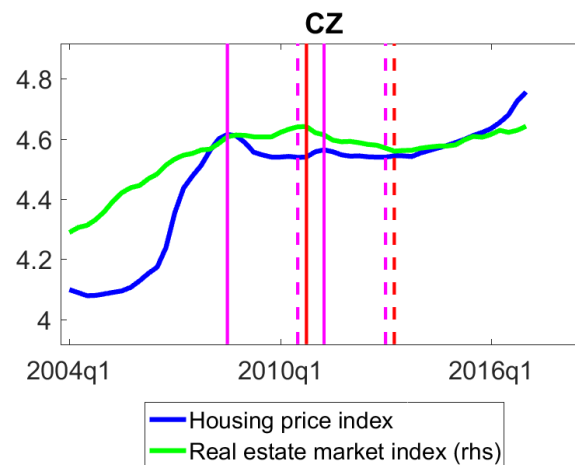
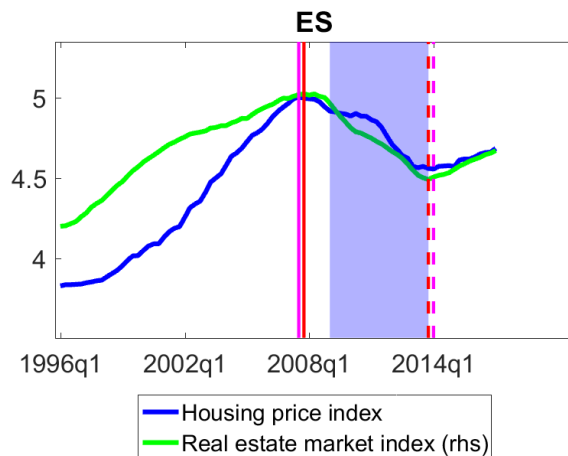
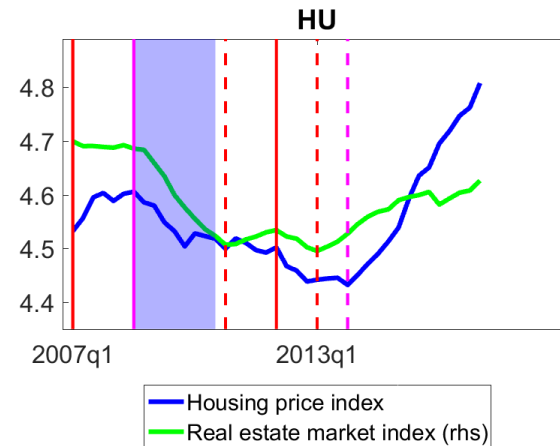
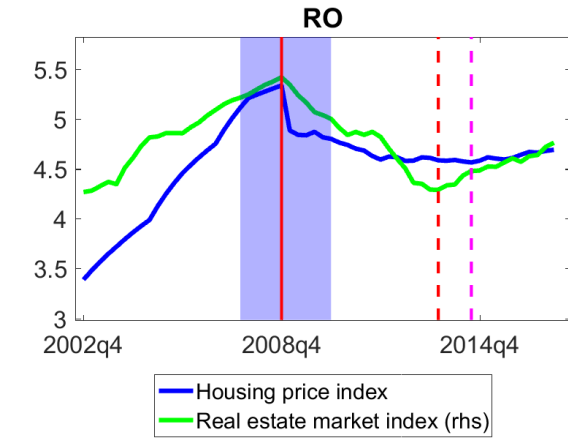
$$Y_t = \begin{pmatrix} 1 & H & 0 \end{pmatrix} \begin{pmatrix} \beta_t \\ C_t \\ \tau_t \\ C_{t-1} \end{pmatrix} \text{ Observation Equation}$$

$$\begin{pmatrix} \beta_t \\ C_t \\ \tau_t \\ C_{t-1} \end{pmatrix} = \begin{pmatrix} \mu \\ c \\ 0 \\ 0 \end{pmatrix} + \begin{pmatrix} F & 0 & \rho_2 \\ \rho_1 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix} \begin{pmatrix} \beta_{t-1} \\ C_{t-1} \\ \tau_{t-1} \\ C_{t-2} \end{pmatrix} + \begin{pmatrix} v_t \\ v_{1t} \\ v_{2t} \\ 0 \end{pmatrix} \text{ Transition Equation}$$

- **Hodrick-Prescott (HP) filter ($\lambda = 1600$)**
 $y_t = \tau_t + C_t$, and λ is the smoothing parameter

$$\min_{\tau_t} \sum_{t=1}^T ((y_t - \tau_t)^2 + \lambda((\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}))^2)$$

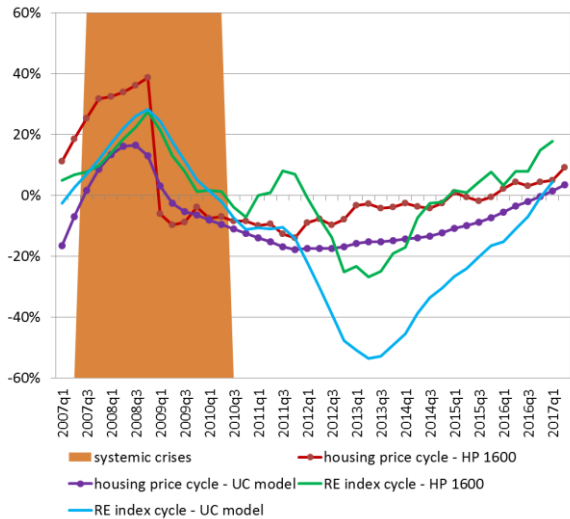
I. What do the indicators tell about the RE cycle?



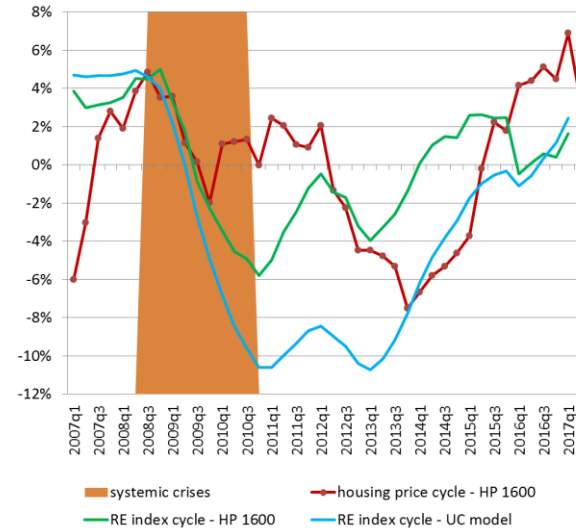
Note: The purple lines indicate turning points for housing prices and red lines indicate turning points for the RE index. The continuous lines mark the peaks and the interrupted lines mark the troughs. The shaded areas represent systemic crises, as defined by Heads of Research Network.

I. How does the RE cycle look like?

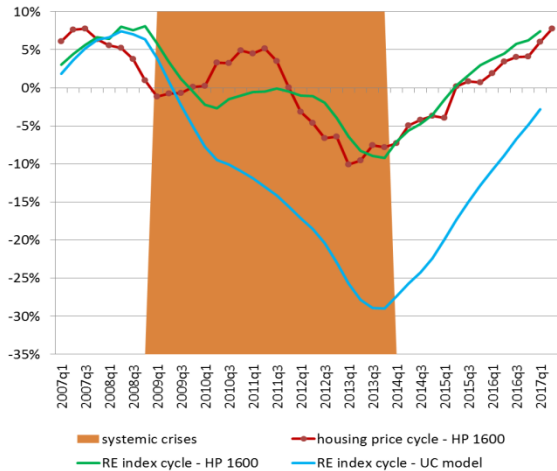
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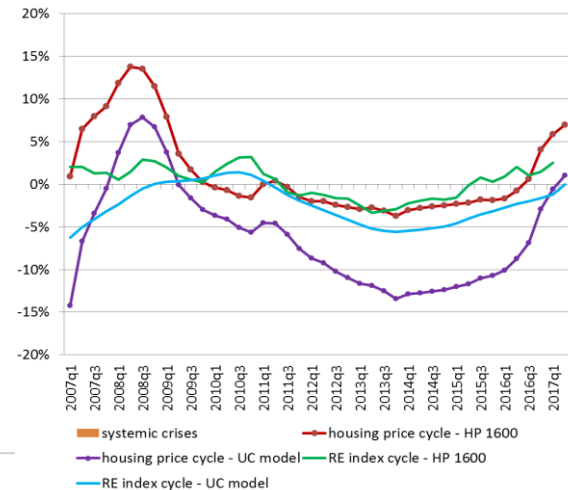
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II. Characteristics of the RE cycle

Results - 18 EU countries, period 1995q1-2017q2					
House prices	<i>Expansion phase - length (no. quarters)</i>	<i>Contraction phase - length (no. quarters)</i>	<i>Expansion phase - average amplitude (%)</i>	<i>Contraction phase - average amplitude (%)</i>	<i>Expansion vs contraction - amplitude ratio</i>
<i>average</i>	27	15	139	(15)	10
<i>standard deviation</i>	19	8	166	13	12
RE index	<i>Expansion phase - length (no. quarters)</i>	<i>Contraction phase - length (no. quarters)</i>	<i>Expansion phase - average amplitude (%)</i>	<i>Contraction phase - average amplitude (%)</i>	<i>Expansion vs contraction - amplitude ratio</i>
<i>average</i>	27	11	59	(14)	5
<i>standard deviation</i>	12	6	59	17	5

Results on average length of contraction and expansion phases are in line with literature on real estate cycles: Bracke (2011), Drehmann et al. (2012).

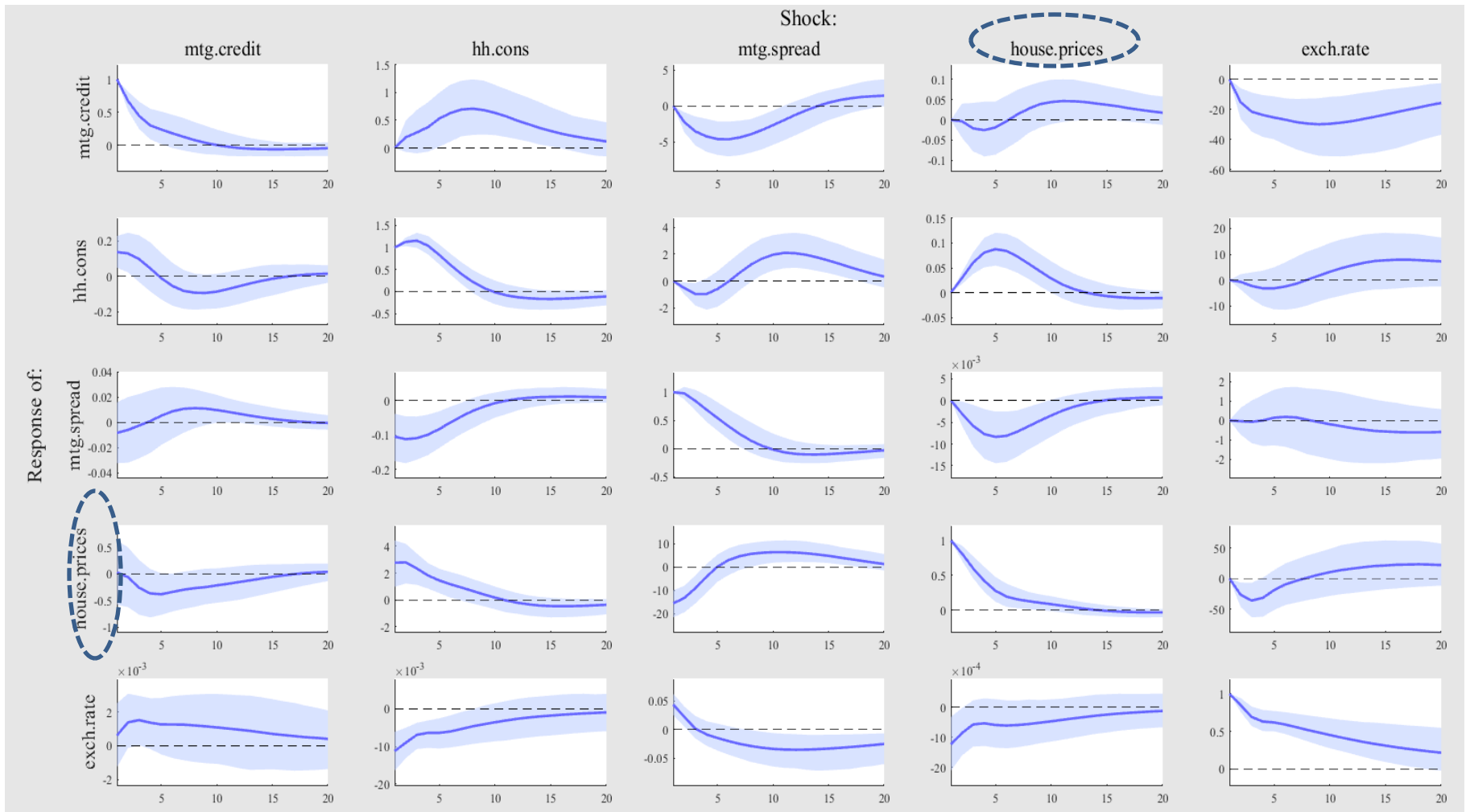
II. Interactions between real estate market and mortgage lending

- Feedbacks between housing prices, monetary policy and the real economy are extensively explored in literature using VAR models (Robstad, 2014 and Musso et al, 2010);
- **Credit frictions** have long been considered to play an important part in the transmission of **housing price** developments to **consumption** (Iacovello, 2002, Iacovello and Minetti, 2007).

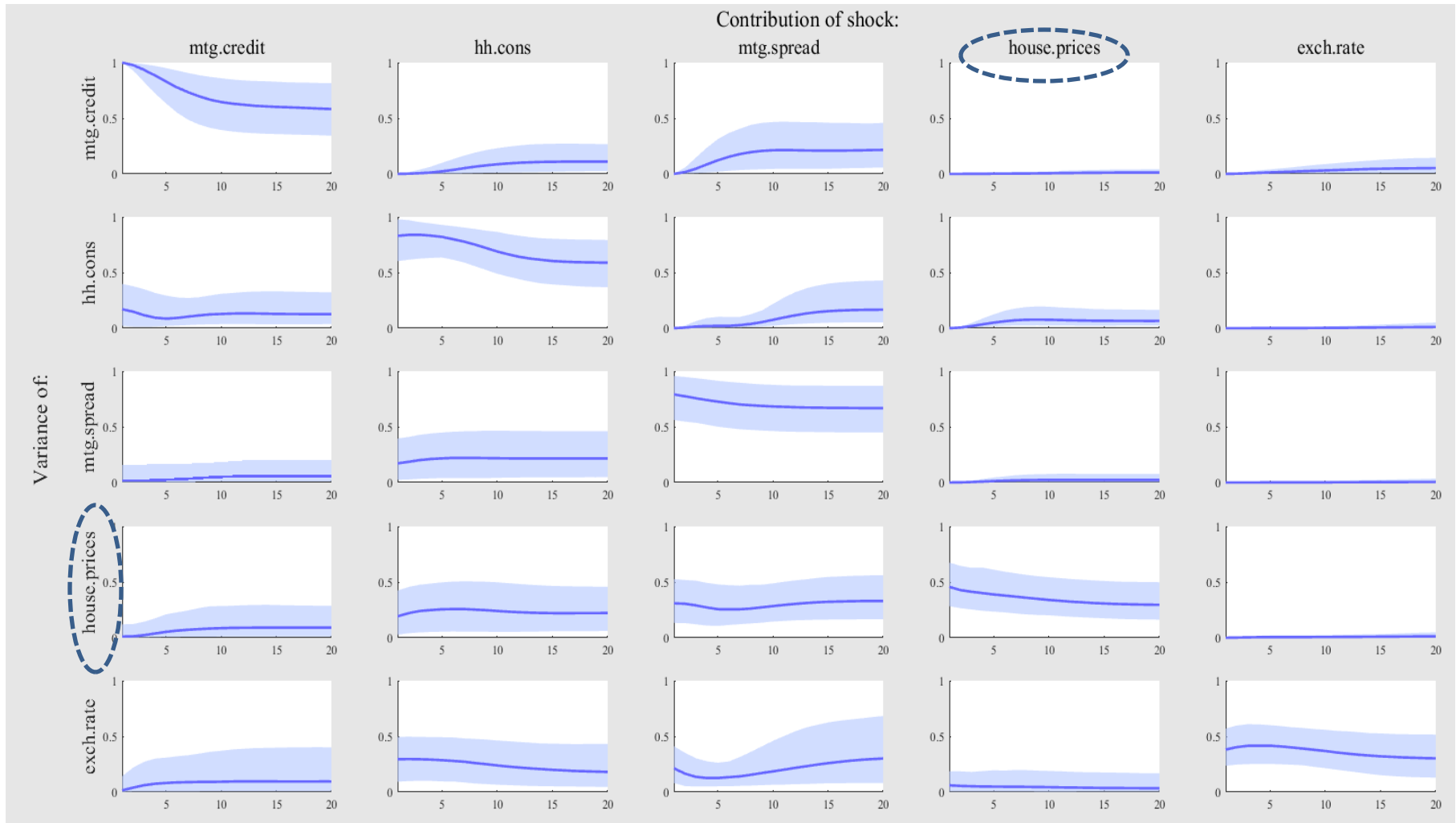
II. Interactions between real estate market and mortgage lending

- **Bayesian Structural VAR model:**
 - **priors:** Normal diffuse prior (*alternative Normal Wishart prior*)
 - **decomposition method:** triangular factorization (*alternative Choleski factorization*)
- **Specification for 2 models - ordering of variables:**
 1. Mortgage credit, *deviation from trend (mtg.credit)*
 2. Household consumption, *y-o-y growth (hh.cons)*
 3. Mortgage interest rate spread (“external finance premium”) (*mtg.spread*)
 4. **House prices** , *y-o-y growth (house.prices)* – **model 1**
 RE index, *y-o-y growth (re.index)* – **model 2**
 5. Exchange rate, *log values (exch.rate)*

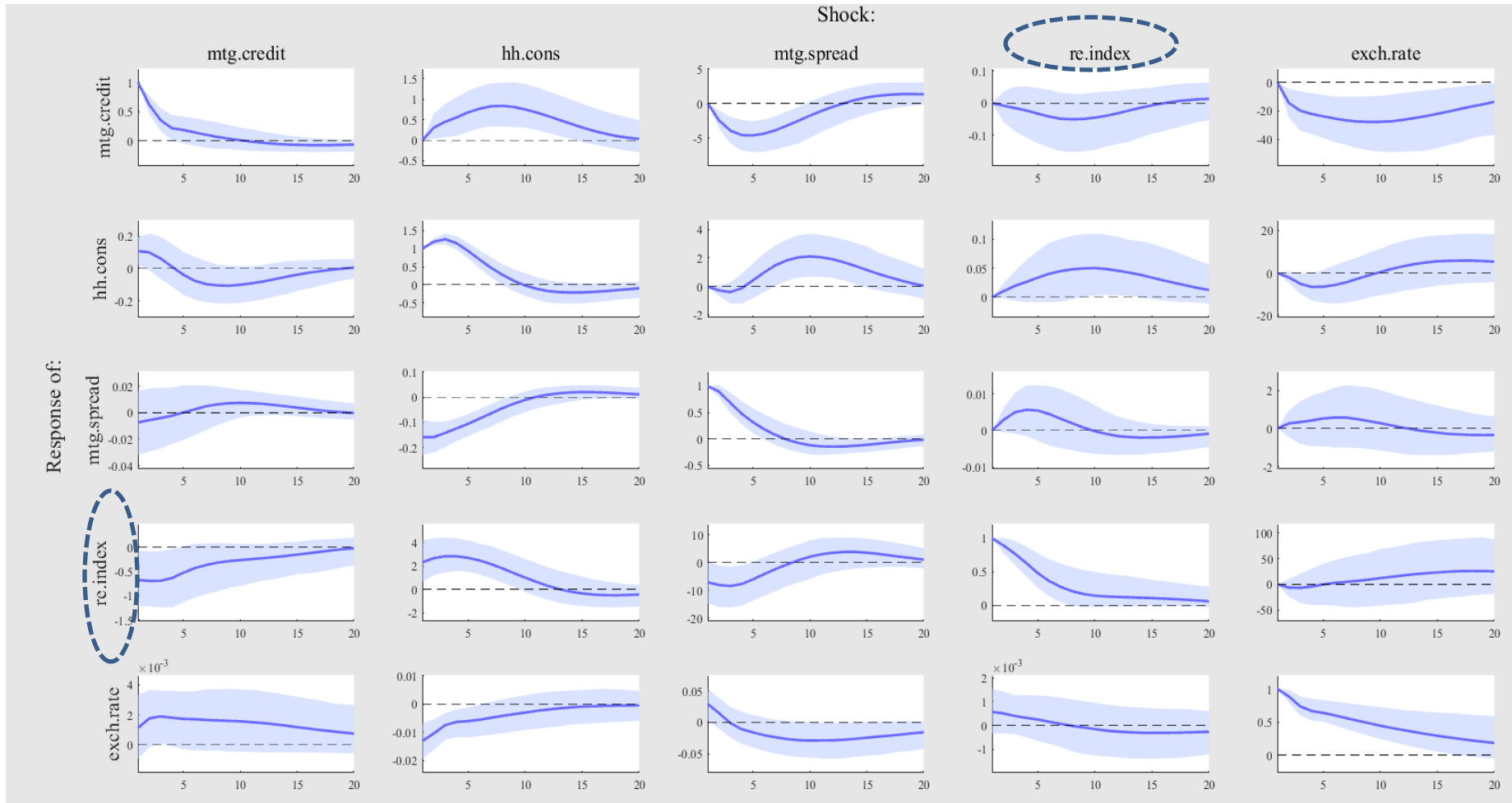
II. Interactions between real estate market and mortgage lending (model 1)



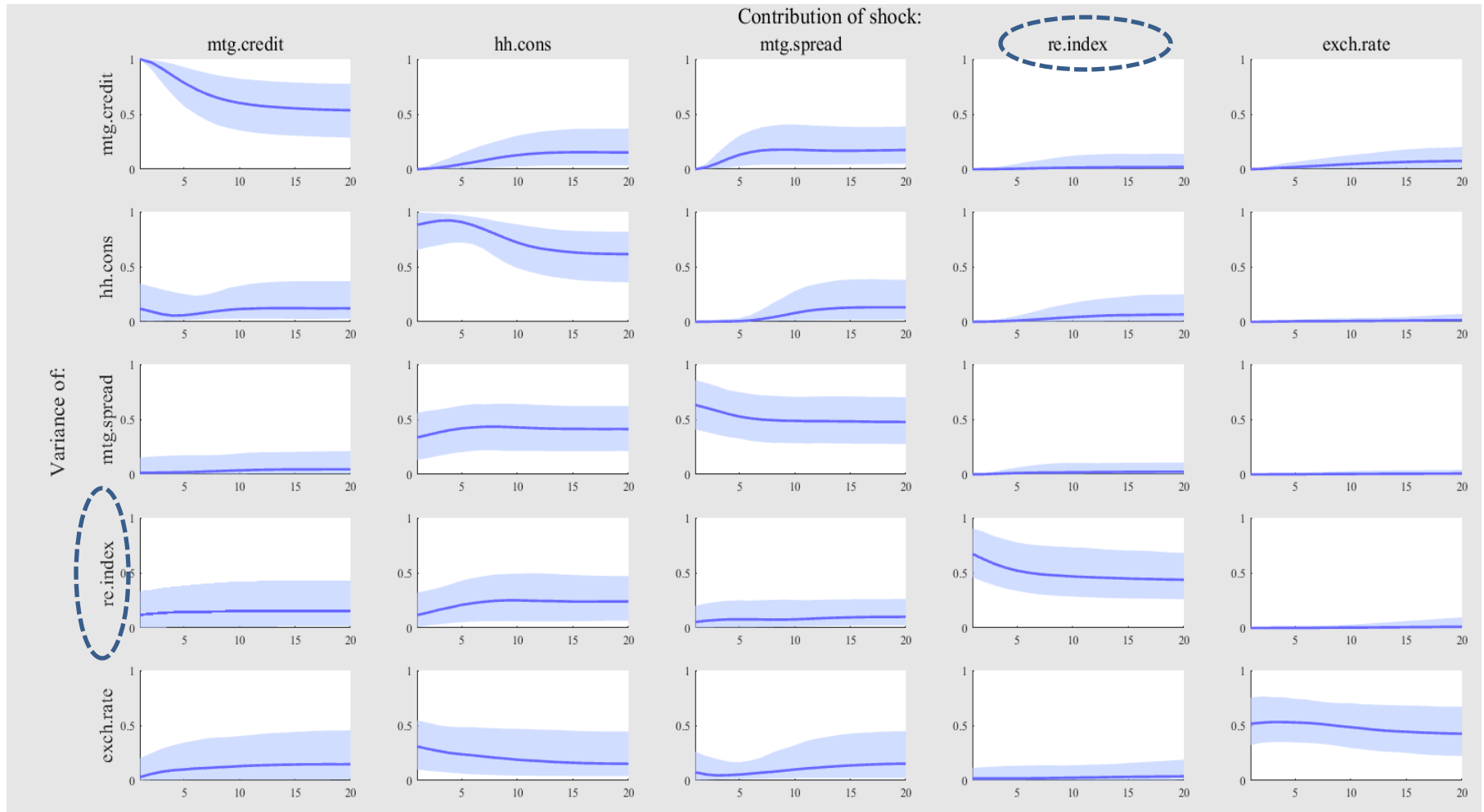
II. Interactions between real estate market and mortgage lending (model 1)



II. Interactions between real estate market and mortgage lending (model 2)

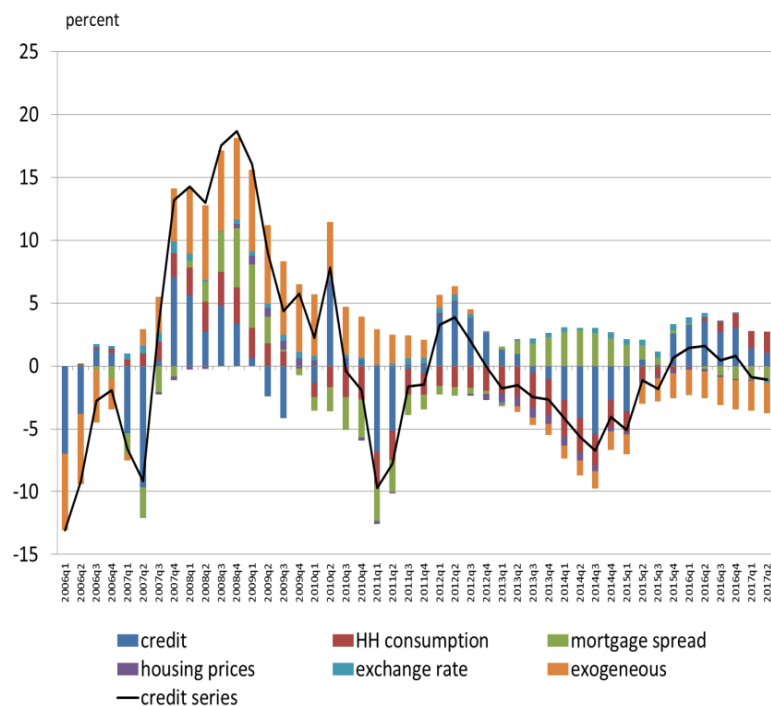


II. Interactions between real estate market and mortgage lending (model 2)

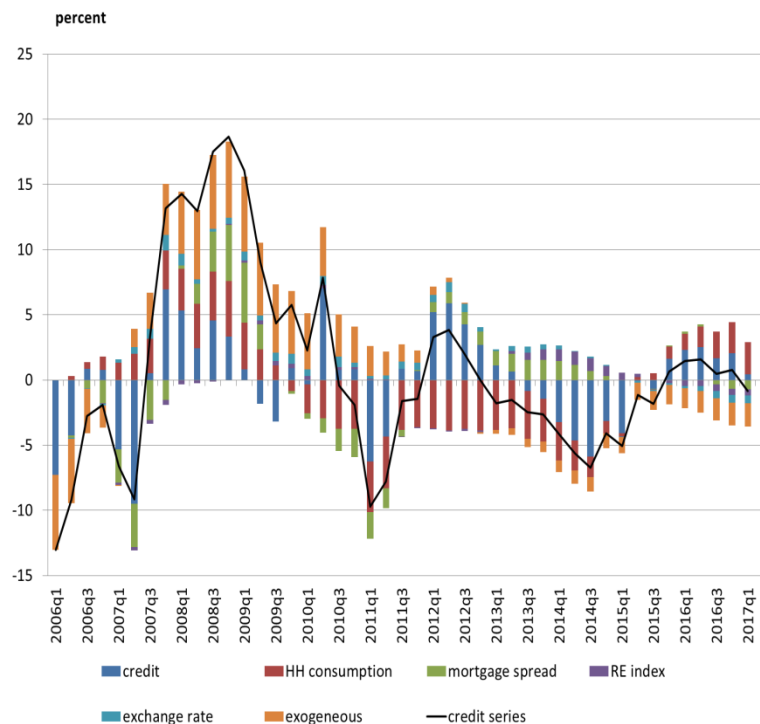


II. Interactions between real estate market and mortgage lending

Mortgage credit (model 1)

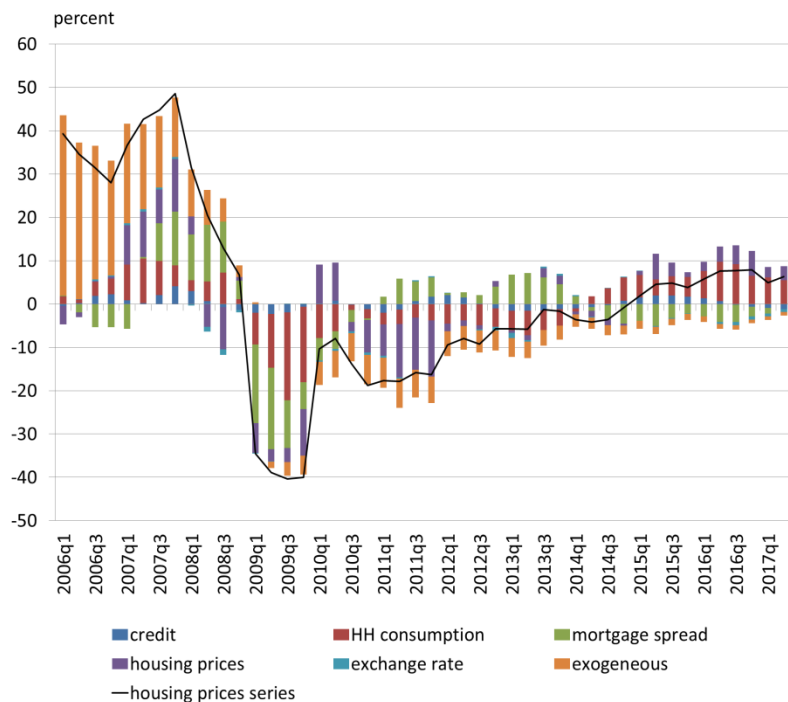


Mortgage credit (model 2)

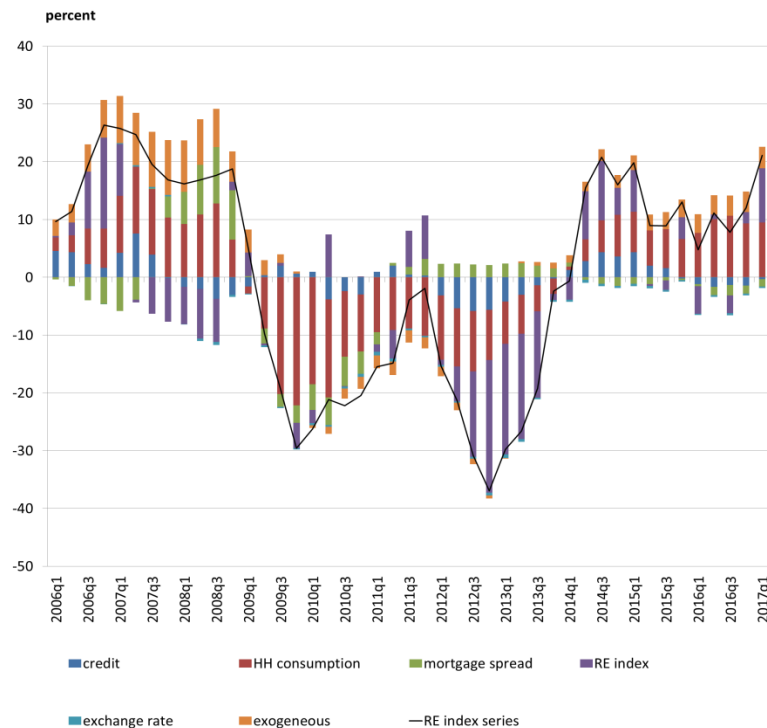


II. Interactions between real estate market and mortgage lending

Housing prices (model 1)



RE index (model 2)



III. Main takeaways

- The RE index could be a good alternative to house prices in the evaluation of the real estate cycle for countries which lack long and/or stable time series on residential prices.
- Nevertheless, the RE index incorporates indicators which tend to react slower or less intensively than housing prices to exogenous shocks, which may imply a lower prediction power for policy makers.
- In Romania, the interaction between credit and housing prices is weak.
- House prices are more likely to be driven by household consumption and credit standards, than by mortgage credit.
- Household consumption is particularly influenced by house prices, very mildly by the RE index, while mortgage credit exerts a modest influence.



Thank you!

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