Changes in the transmission mechanism of monetary policy in Romania

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- How have the transformations that the Romanian economy underwent affected the transmission of monetary policy shocks?

- Are the perceived changes rather a result of variations in volatilities or were there significant changes in the systematic part of the system?

- Are the results robust to different identification methods?

- How do the results compare to those produced by a static VAR?

- Conclusions, possible drawbacks, further improvements.

- **Time-Varying Parameter VAR (TVP-VAR)**

- $Y_t = X'_t B_t + A_t^{-1} \Sigma_t \varepsilon_t$ ⠀⠀⠀ $\text{Var}(\varepsilon_t) = I_n$
- $B_t = B_{t-1} + \gamma_t$ ⠀⠀⠀⠀⠀⠀⠀ $\text{Var}(\gamma_t) = Q$ ⠀←⠀⠀⠀ VAR coefficients
- $a_t = a_{t-1} + u_t$ ⠀⠀⠀⠀⠀⠀⠀⠀ $\text{Var}(u_t) = R$ ⠀←⠀⠀⠀ contemporaneous interactions
- $\ln(h_t) = \ln(h_{t-1}) + \eta_t$ ⠀⠀⠀ $\text{Var}(\eta_t) = Z$ ⠀←⠀⠀⠀ stochastic volatilities

- $A_t = \begin{pmatrix} 1 & 0 & 0 & 0 \\ a_{21,t} & 1 & 0 & 0 \\ \vdots & \ddots & \ddots & 0 \\ a_{n1,t} & \dots & a_{nn-1,t} & 1 \end{pmatrix}$; $\Sigma_t = \begin{pmatrix} h_{1,t} & 0 & \dots & 0 \\ 0 & h_{2,t} & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \dots & 0 & h_{n,t} \end{pmatrix}$; $V = \text{Var}\begin{pmatrix} \varepsilon_t \\ \gamma_t \\ u_t \\ \eta_t \end{pmatrix} = \begin{pmatrix} I_n & 0 & 0 & 0 \\ 0 & Q & 0 & 0 \\ 0 & 0 & R & 0 \\ 0 & 0 & 0 & Z \end{pmatrix}$

- Cogley, Sargent (2001)

- Cogley, Sargent (2005)

- Primiceri (2005)

- Canova, Gambetti (2008)

- Baumeister, Durinck, Peersman (2008)

- Canova, Pérez Forero (2012)

Series: - annual growth rate of the *Industrial Production Index*;

- *Inflation Rate*, computed as the percentage change of HICP from the corresponding month of the previous year;

- *ROBOR 3M* (Short-Term Interbank Offer Rate);

- nominal exchange rate *EUR/RON*.

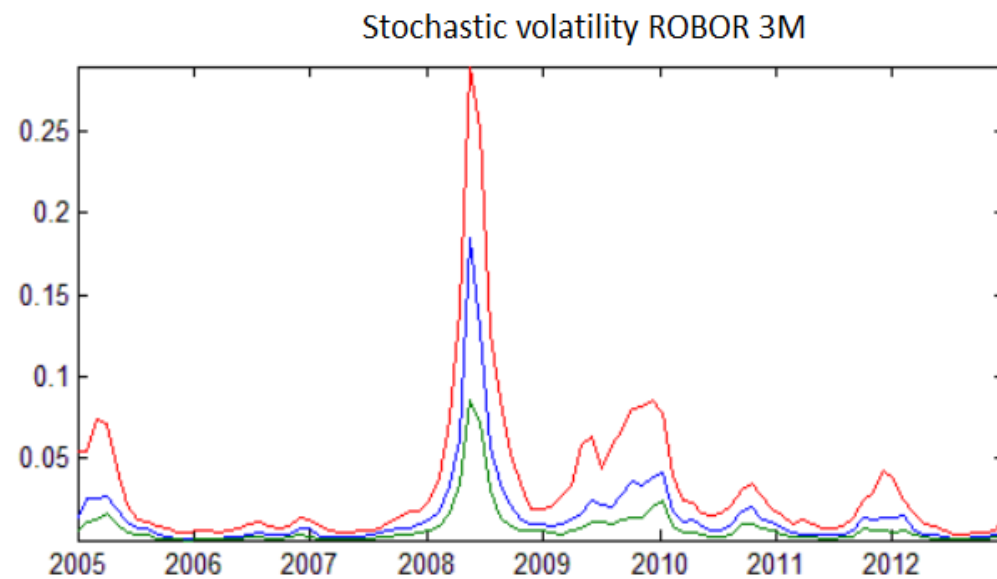**Sample length**: 135 monthly observations, spanning the interval 2002M1 – 2012M3
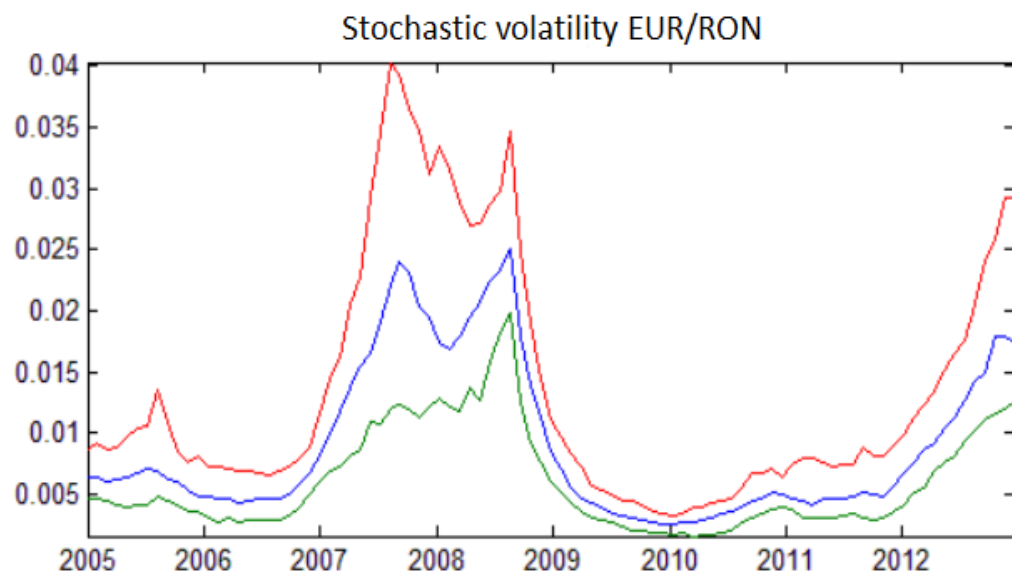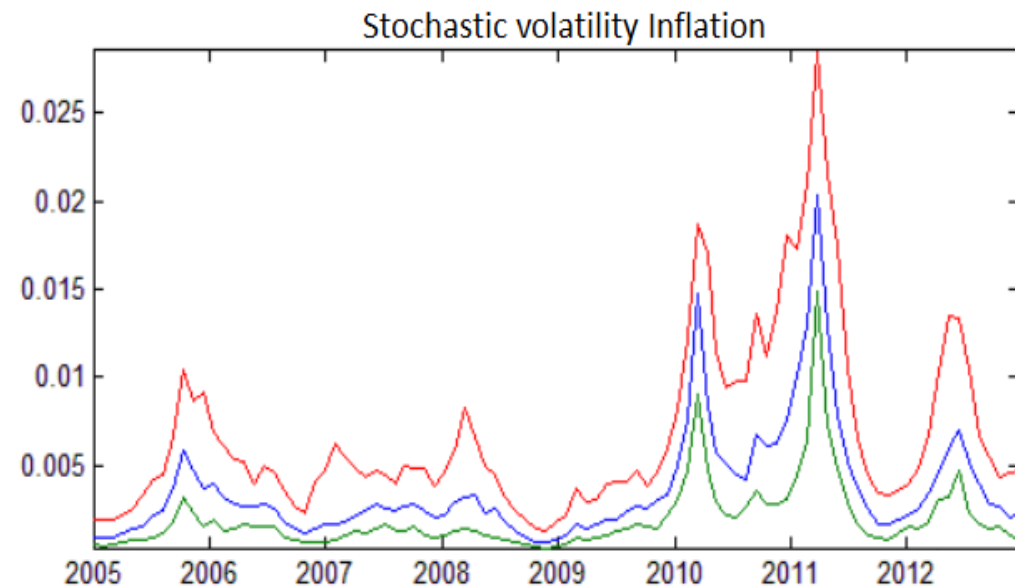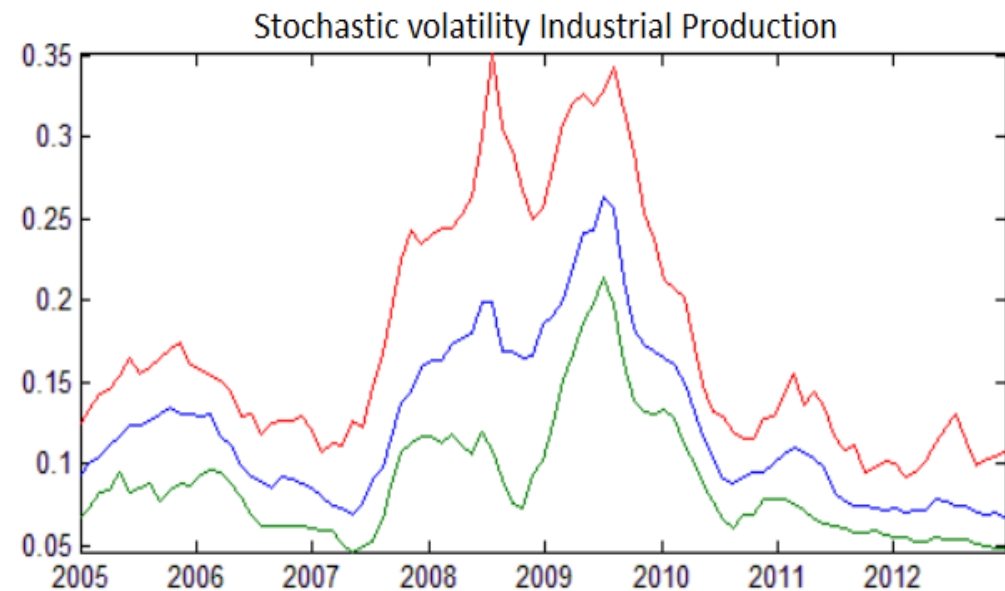
The model was estimated under a **Bayesian framework**

The first 40 data points were used to generate **starting values** for the algorithm

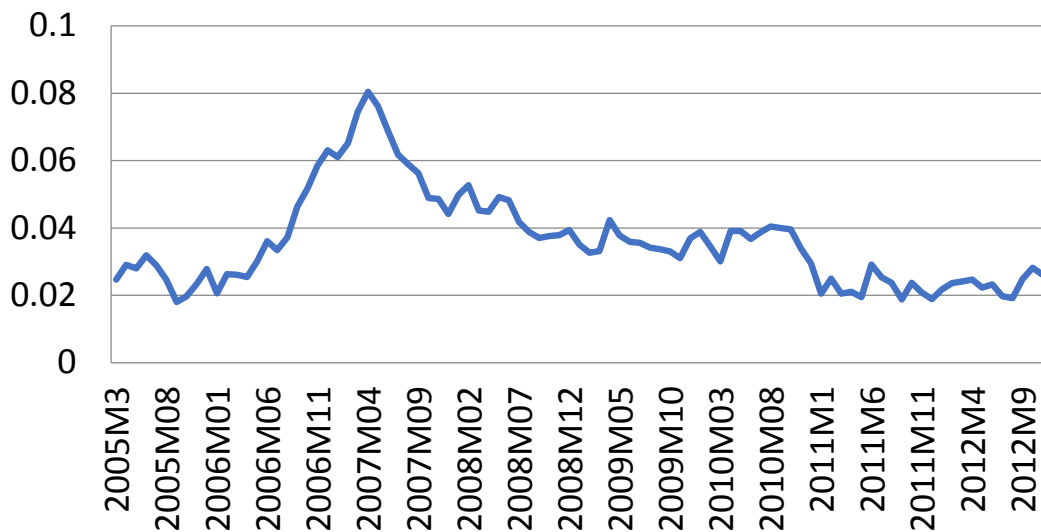The monetary policy shock was identified using **sign restrictions**

Number of lags used in the estimation: two

Stochastic volatilities

Contemporaneous interactions
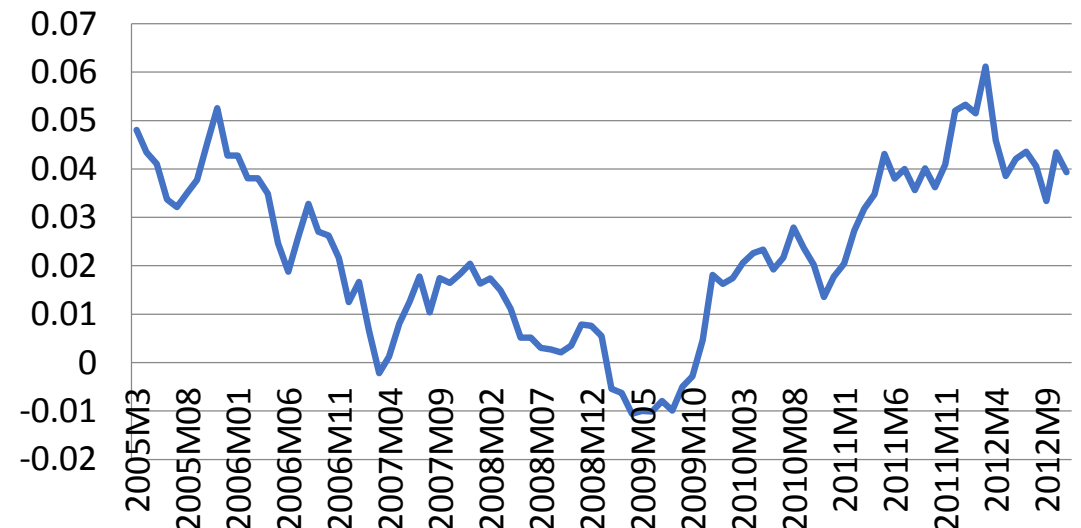
Industrial Production - ROBOR 3M

- Strong contemporaneous impact of a change in inflation on the short-term interest rate;

- Week contemporaneous responses of ROBOR 3M to changes in industrial production and the exchange rate.
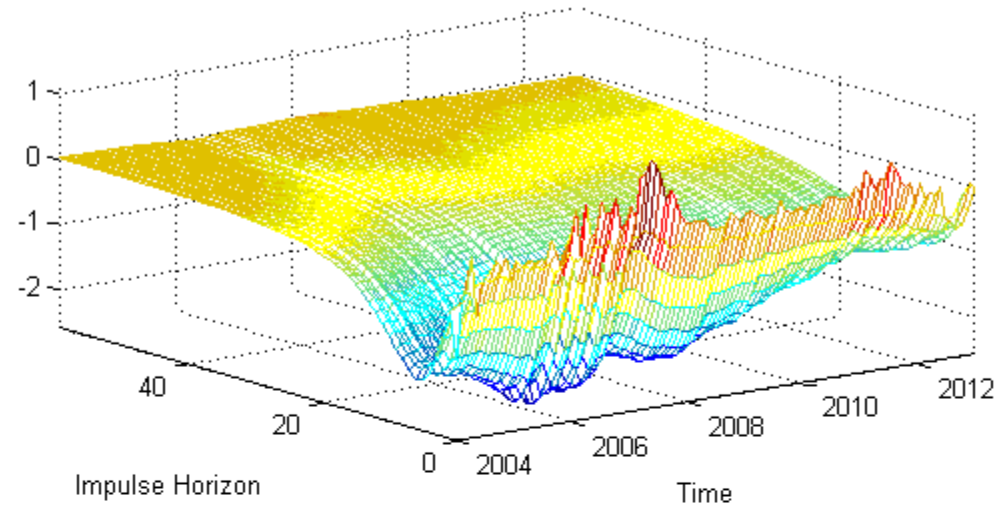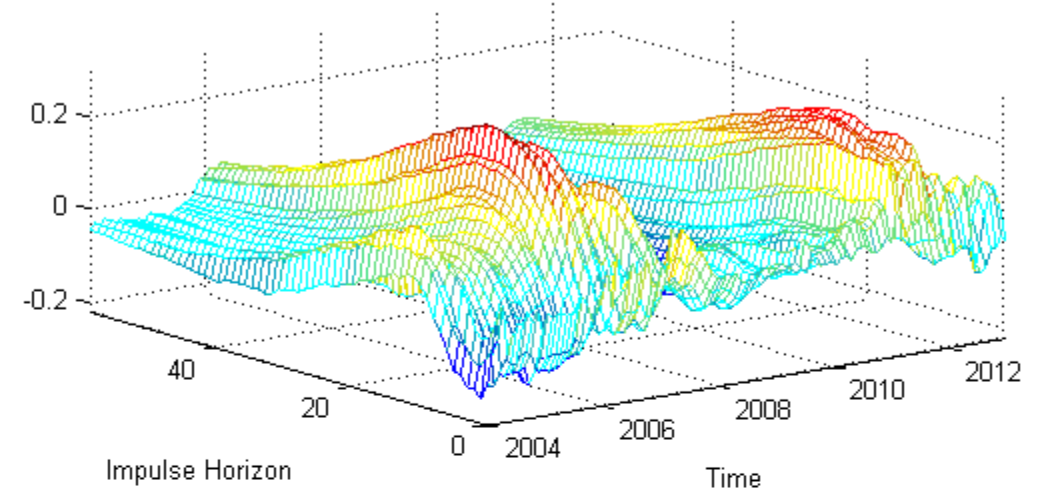
Inflation Rate - ROBOR 3M

EUR/RON - ROBOR 3M

Impulse Responses to a Monetary Policy Shock
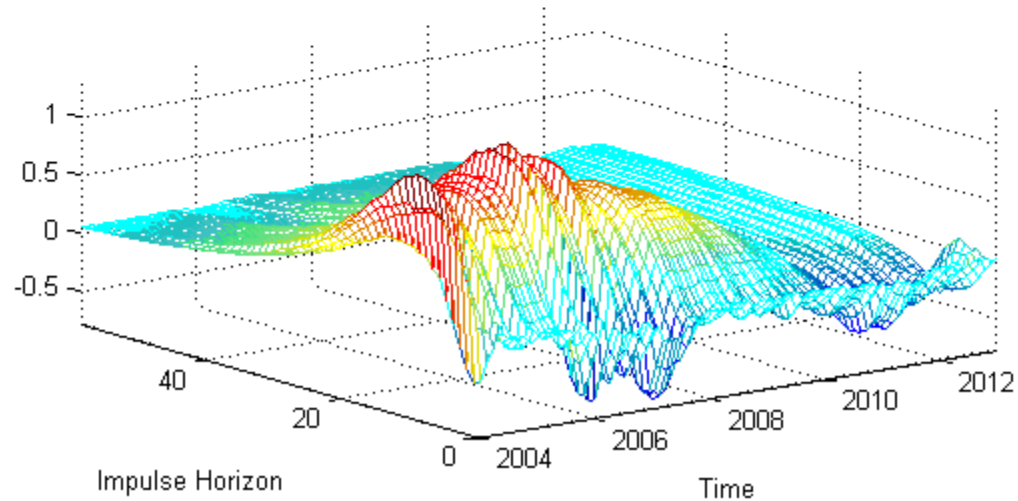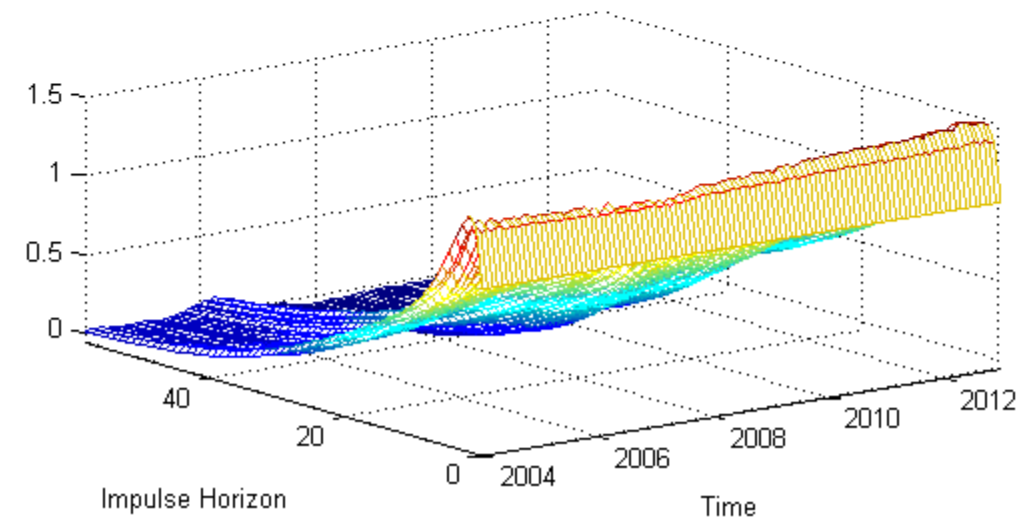
1ˢᵗ Issue: Is the model sensitive to the identification procedure?

- Estimate the same model using recursive ordering for identification
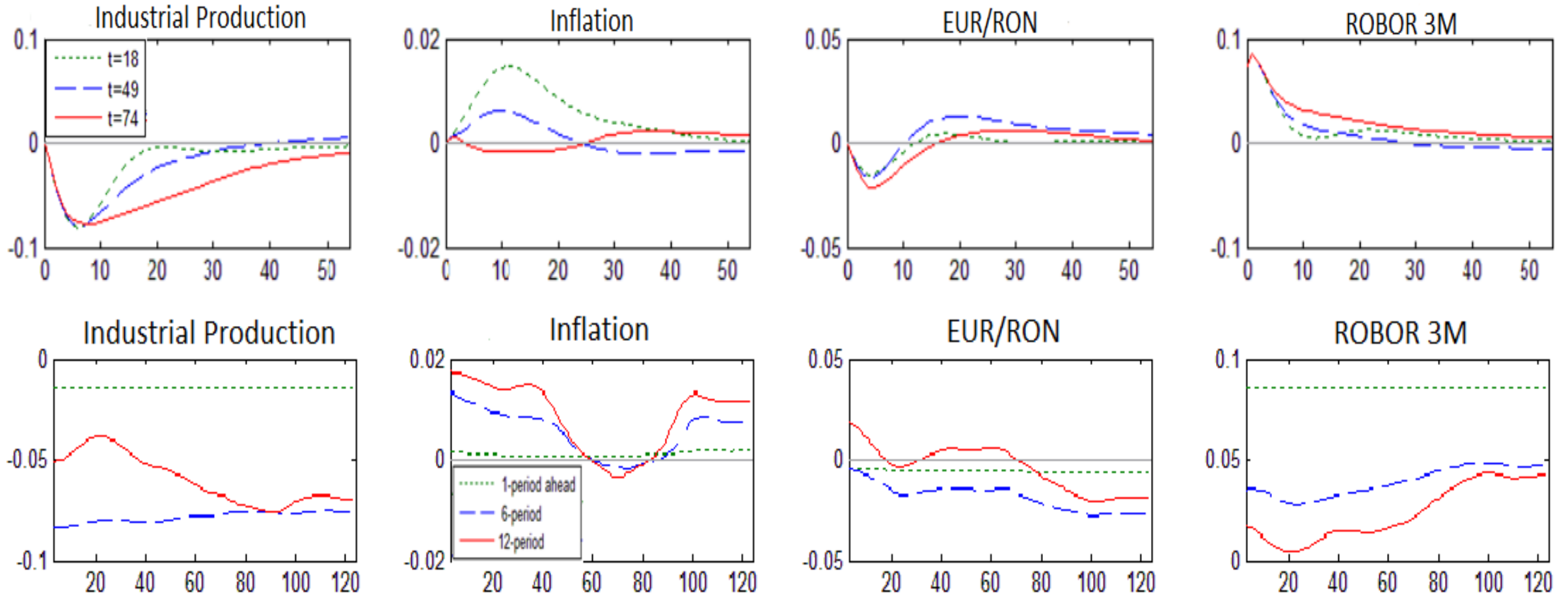
- 2nd Issue: Is stochastic volatility important in correctly assessing changes in the transmission mechanism of monetary policy?
- Estimate a TVP-VAR model with constant volatility of the innovations
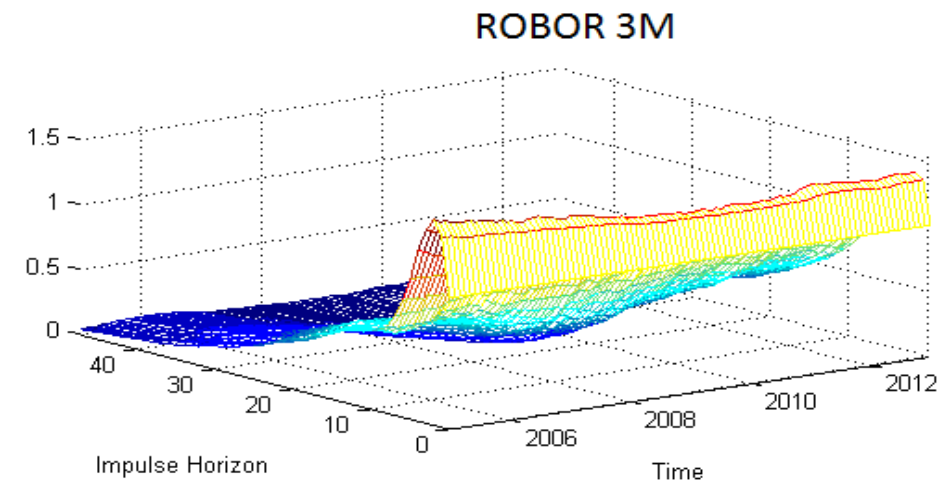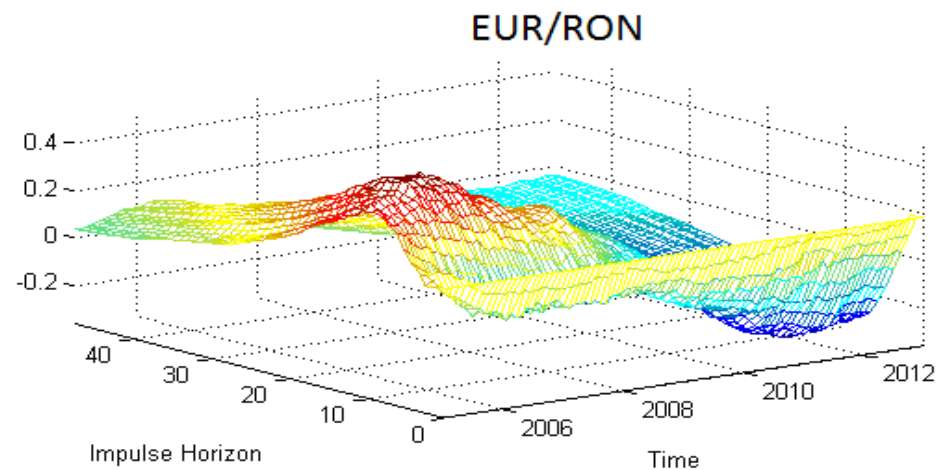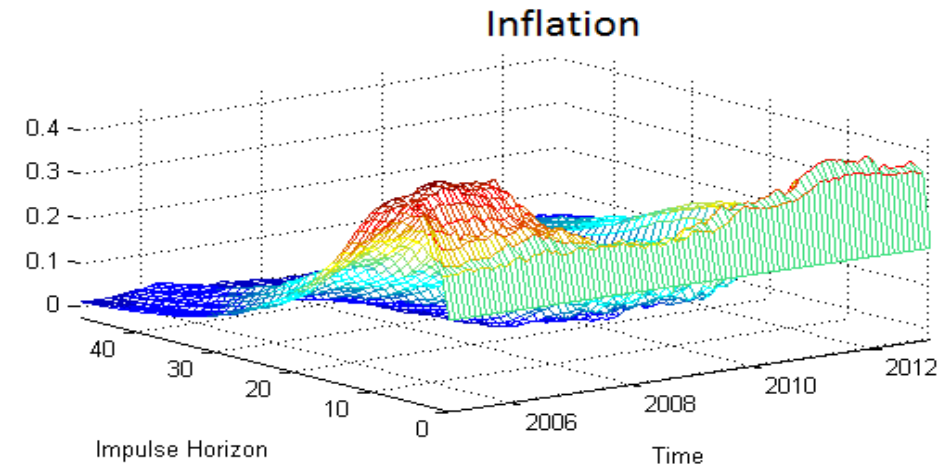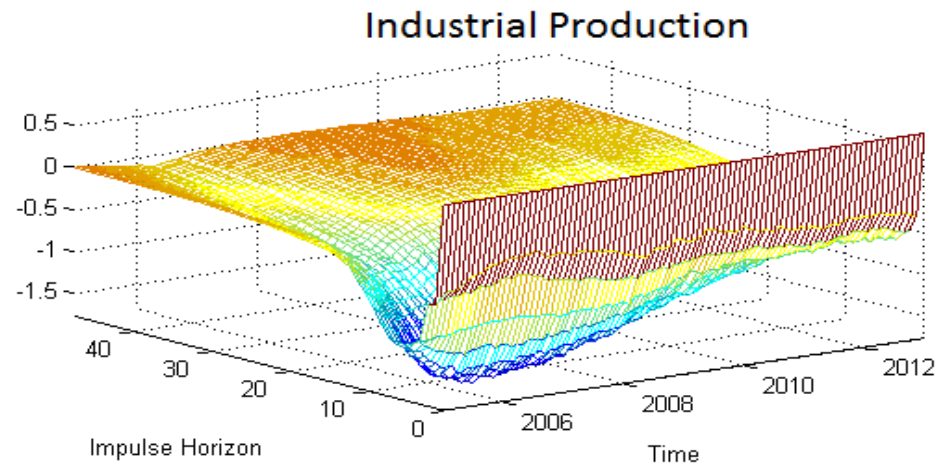
- 3rd Issue: How do the results compare to those obtained using a constant-parameter VAR with sign restrictions used to identify the monetary policy shock?
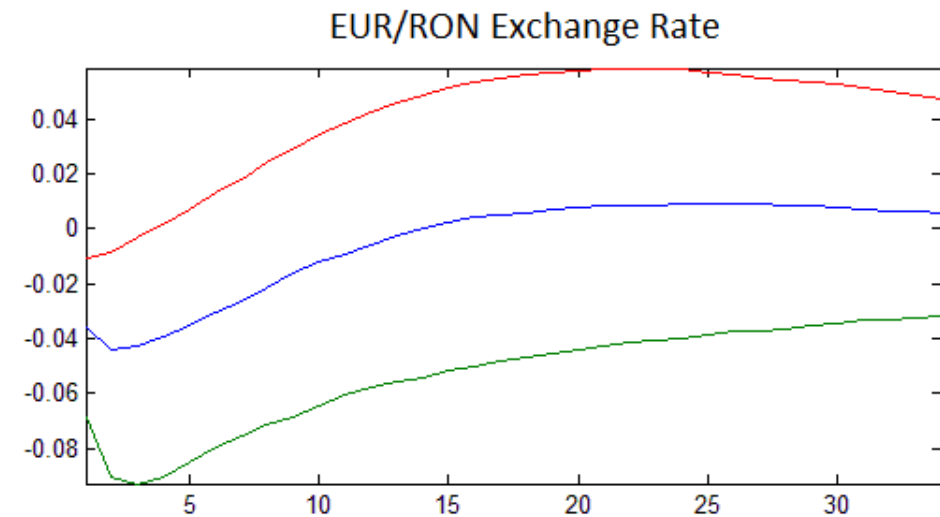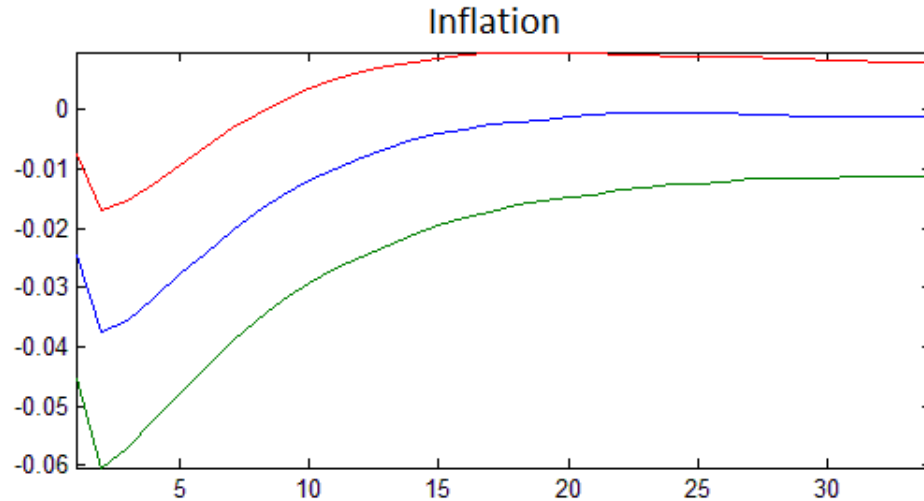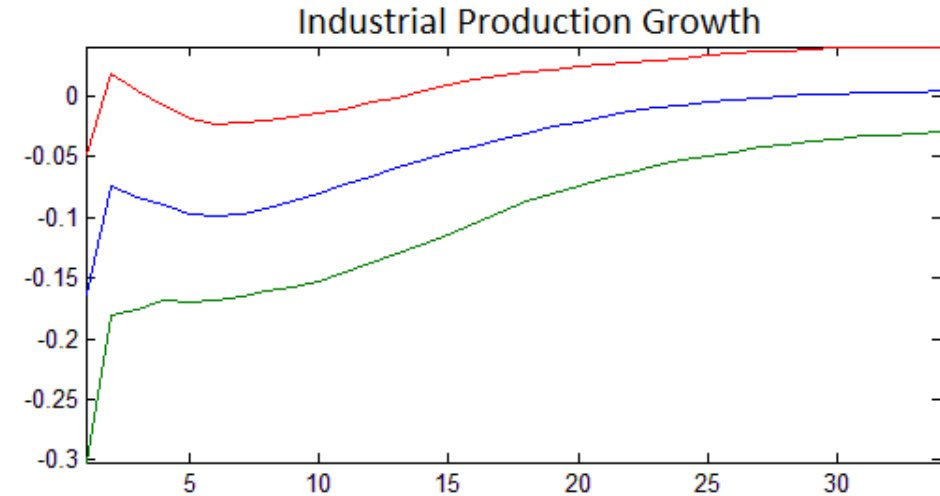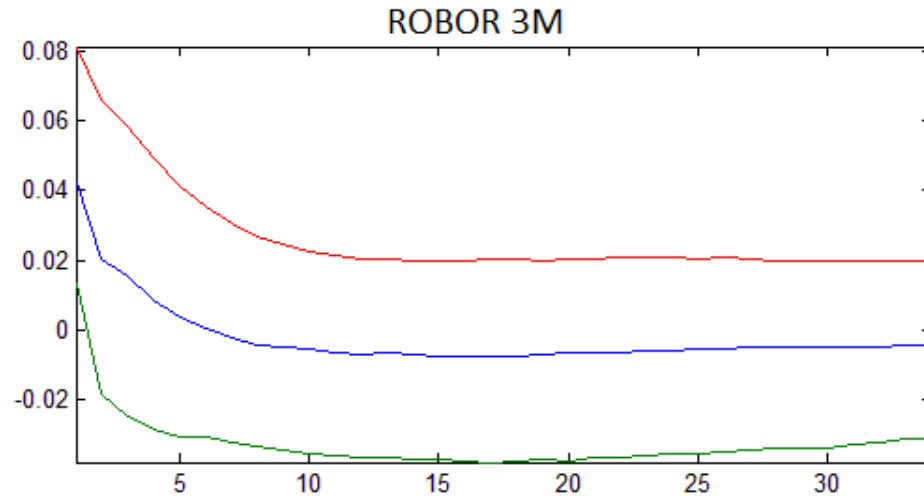
- the responses to unsystematic monetary policy actions were greatly impacted by the economic crisis that affected Romania starting with 2009;

- the transmission of monetary policy shocks to the inflation rate almost vanished during 2010 and 2011;

- The response of the inflation rate was, by far, the most persistent;

- The results were relatively robust across different identification procedures;

- The estimation of a TVP-VAR with constant volatility of innovations confirms the existence of changes in the systematic part of monetary policy;

- The static SVAR indicates a relatively different behavior of the inflation rate and the exchange rate, perhaps due to the averaging of estimates across states;

Possible drawbacks:

- Lack of formal tests to discriminate between models;

- Monthly data were used instead of the more usual quarterly data;

- Shocks in ROBOR were not very accurate proxies for monetary policy shocks in the interval included in the analysis; for example, the high volatility of 2008-2010 was largely independent of any monetary policy decision;

- The Industrial Production is not a very good proxy for output, since its weight in GDP is less than 30%;

Topics for future improvements:

- Fit a Markov-Switching VAR to the same data, to test if a structural break in the parameters, caused by a shift in regimes, was responsible for the change in the behavior of impulse responses, or the smoothing implied by TVP-VAR is a more realistic assumption;

- Assess changes in the systematic part of the monetary policy: an explicit estimation of a Tylor-type rule with time-varying parameters would highlight how the behavior of the National Bank towards fighting inflation and promoting economic growth evolved in time.

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