

# Monetary Policy and Unemployment: The Case of Romania

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The paper aims to analyze the monetary transmission model between the monetary policy and the labor market variable of unemployment. The results of the data show that, the external shocks have an important impact especially on the Romanian interest rates but also on the domestic production; however, the impact is not significant on unemployment, which proves the resilience of the domestic labor market. The central bank policy rate has a stabilizing effect on the unemployment rate in case of an increase in the euro area policy rate.

*Keywords:* structural vector autoregression (SVAR), monetary policy, labor force, unemployment rate

## Introduction

Monetary policy is one of the tools used by authorities to stabilize prices, increase output, and reduce unemployment. If unemployment rate increases, the monetary policy will tend to be expansionary, as authorities will cut interest rates which will increase credit and supply of money that will stimulate business and this in turn will increase demand and create jobs.

In order to assess the impact of the monetary policy and external shocks on the Romanian's economic variables it is performed using a structural vector autoregression (SVAR).

## Literature Review

There is a nexus between monetary policy, employment, and unemployment as monetary policy shocks invoke lagged, humpshaped reactions of output, employment and unemployment in each of the analyzed countries (Przemysław, 2017a)<sup>1</sup>.

The paper describes and implements Bayesian moment matching and impulse response matching procedures for policy analysis using DSGE models (Kai, Keith, & Tobias, 2006)<sup>2</sup>.

The effects of monetary policy shocks in the three emergent EU members: Czech Republic, Hungary, and

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Poland, are similar across countries and not dissimilar to what is found for more advanced European economies (Anzuini & Levy, 2007)<sup>3</sup>.

The comparison between transmissions of monetary policy shocks in the one sector “textbook” model relative to the augmented model in both a representative agent (RANK) and heterogeneous agent (HANK) settings highlights the role of capital income in the transmission of monetary policy shocks in these models. When the labour share moves counter-cyclically partial equilibrium, decompositions of monetary policy transmission show a significant contractionary role for capital income (Lenney, 2022)<sup>4</sup>.

A Bayesian model is applied to assess the impact of the monetary policy on real economy. The results show a high degree of dispersion across models in both policy rule parameters and impulse response functions and that the recessionary effects on the two economies are similar between the euro area and the US, with a different role played by the participation rate in the transmission mechanism. If the model does not consider uncertainty as a parameter of the model, the results may be misleading about the transmission mechanism as well as about the differences between the euro area and the US (Altavilla & Ciccarelli, 2009)<sup>5</sup>.

## Methodology

### Data

The dataset ranges from 2007 to 2018 having a monthly frequency, which allows the capture of potential fluctuations.

The data's sources are: <https://ec.europa.eu/eurostat/data/database> and BIS Statistics Warehouse, each series containing 144 observations.

### Analytical Framework

The model investigates the effects of monetary policy and external shocks on Romanian's economic variables using a vector autoregressive (VAR) approach.

$$Y_t = [u_t, \pi_t, p_t, P^E, M^E, R^E, r_t, x_t] \quad (1)$$

with the shock vector:

$$\varepsilon_t = [\varepsilon_t^u, \varepsilon_t^\pi, \varepsilon_t^p, \varepsilon_t^{P^E}, \varepsilon_t^{M^E}, \varepsilon_t^{R^E}, \varepsilon_t^r, \varepsilon_t^x] \quad (2)$$

where:

- foreign variables:
  - $P^E$ —EURO real industrial production index,
  - $M^E$ —EURO central bank policy rate,
  - $R^E$ —EURO short term interest rate,
- domestic variables:

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- $u$ —the unemployment rate,
- $\pi$ —the Harmonized Consumer Price Index (HICP),
- $p$ —real industrial production index
- $m$ —the central bank policy rate,
- $r$ —the short-term interest rate,
- $x$ —the nominal effective exchange rate.

*The unemployment rate* is seasonally adjusted and computed as a percentage of the active population. *The harmonized index of consumer prices* that measures the change over time of the prices of consumer goods and services acquired by households is used as a proxy for the inflation rate. *The real industrial production index*, percentage change on previous periods, is seasonally adjusted and serves as proxy for the country's output and captures the development in the economic activity.

*The nominal effective exchange rate* is an index based on a trade-weighted average of bilateral exchange rates and it provides a summary indicator of the overall strength or weakness of a country's currency.

The three-month ROBOR is a representative short-term interest rate series for *the domestic money market* which is calculated as the average interest rate for loans in national currency granted on the interbank market. Within the euro area the three-month EURIBOR is the benchmark rate of the *external money market*.

All the variables, apart from the interest rates, are expressed in logarithms in order to assure the proper interpretation of the results.

To assess the effect of the external and monetary policy shocks on the model variables we used a function of the vector autoregressive (VAR), impulse response that requires the ordering of the variable in the model. The ordering of the variables in the VAR is determined using the Granger Causality test and also considering the slow-moving macroeconomic variables: unemployment, inflation, and production, are ordered before the fast-moving financial variables: interest and exchange rates, as changes in the macroeconomic variables have an immediate impact over the financial variables, while the financial variables have a delayed impact over the macroeconomic variables. Considering the fact that the Romanian economy is small compared with the economy of the EURO area, the external variables are not significantly impacted by the shocks applied to the domestic variables. The final order of the variable is specified in Equation (1).

The analysis was performed using a structural vector autoregression (SVAR) that uses restrictions and estimation of structural matrices to transform VAR errors into uncorrelated structural shocks. Using the Cholesky decomposition the parameters of the SVAR are estimated applying short-run restrictions regarding the assumptions about the structure of contemporaneous feedback of variables in the SVAR, a lower triangular matrix with the diagonal elements normalized to ones, and the assumptions about the correlation structure of the errors, a  $9 \times 9$  diagonal matrix. The implications of the ordering and short run restrictions are: The EURO real industrial production index is not affected contemporaneously by the shocks of the other variables, EURO central bank policy rate is affected contemporaneously only by the shock applied to the EURO real industrial production index, EURIBOR reacts contemporaneously to shocks applied to EURO real industrial production index and EURO central bank policy rate, the real industrial production index for Romania is impacted contemporaneously by EURO real industrial production index, EURO central bank policy rate, and EURIBOR, HICP reacts contemporaneously to EURO real industrial production index, EURO central bank policy rate, EURIBOR as well as the real industrial production index for Romania, unemployment is impacted contemporaneously by all variables except nominal effective exchange rate, Romania's central bank policy rate

and ROBOR, and nominal effective exchange rate does not react contemporaneously to Romania's central bank policy rate and ROBOR while the Romania's central bank policy rate reacts to all variables except ROBOR. ROBOR reacts contemporaneously to all variables within the model.

All variables in the VAR should be stationary; therefore we test the data using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results applied to the series in level show that the null hypothesis cannot be rejected; therefore the series are not stationary. However, as shown in Table 1, they are stationary in first difference; therefore the VAR will use the variables in first difference of.

Table 1

*Data Stationarity*

Variable	ADF	PP
EURO real industrial production index	-4.29 (0.00)	-12.1 (0.00)
EURO central bank policy rate	-6.73 (0.00)	-6.81 (0.00)
Three-month EURIBOR	-5.03 (0.00)	-5.03 (0.00)
Real industrial production index	-12.23 (0.00)	-19.14 (0.00)
HICP	-9.42 (0.00)	-9.42 (0.00)
Unemployment	-19.11 (0.00)	-18.1 (0.00)
NEER	-9.1 (0.00)	-9.08 (0.00)
Central bank policy rate	-3.73 (0.02)	-7.76 (0.00)
Three-month ROBOR	-10.97 (0.00)	-10.98 (0.00)

Source: Author calculation.

Impulse responses trace out the responsiveness of the dependent variables in the VAR to shocks to each of the variables. So, for each variable from each equation separately, a unit shock is applied to the error, and the effects upon the VAR system over time are noted.

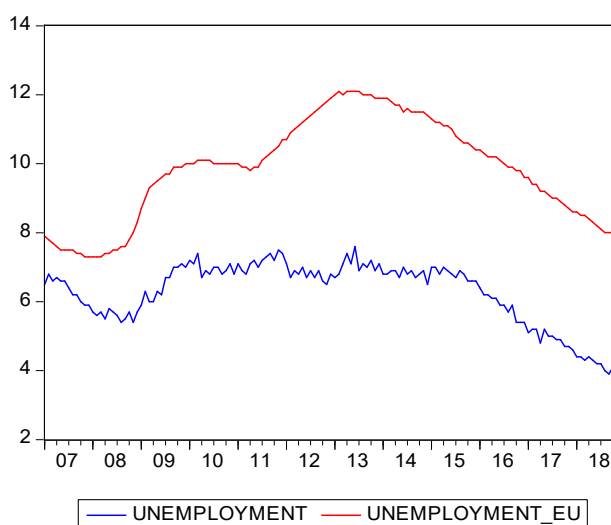


Figure 1. Unemployment evolution. Source: EUROSTAT data.

The impulse responses of endogenous variables to the one standard deviation shock within 20 months horizon and with two standard deviations bootstrapped confidence bands are determined for each variable of model.

Figure 2 represents the impulse responses to the shock applied to the external demand, characterized by a significant increase of the interest rates in the EURO area (both central bank interest rate as well as EURIBOR). This is due to the accommodative monetary policy practiced within the EURO area as a result of the economic crises. The increase in the external production index has a material negative correlation with the domestic interest rates. The domestic production index increases; the domestic rate appreciates while there is a decrease in unemployment (delayed by four months). The impact on inflation is not significant.

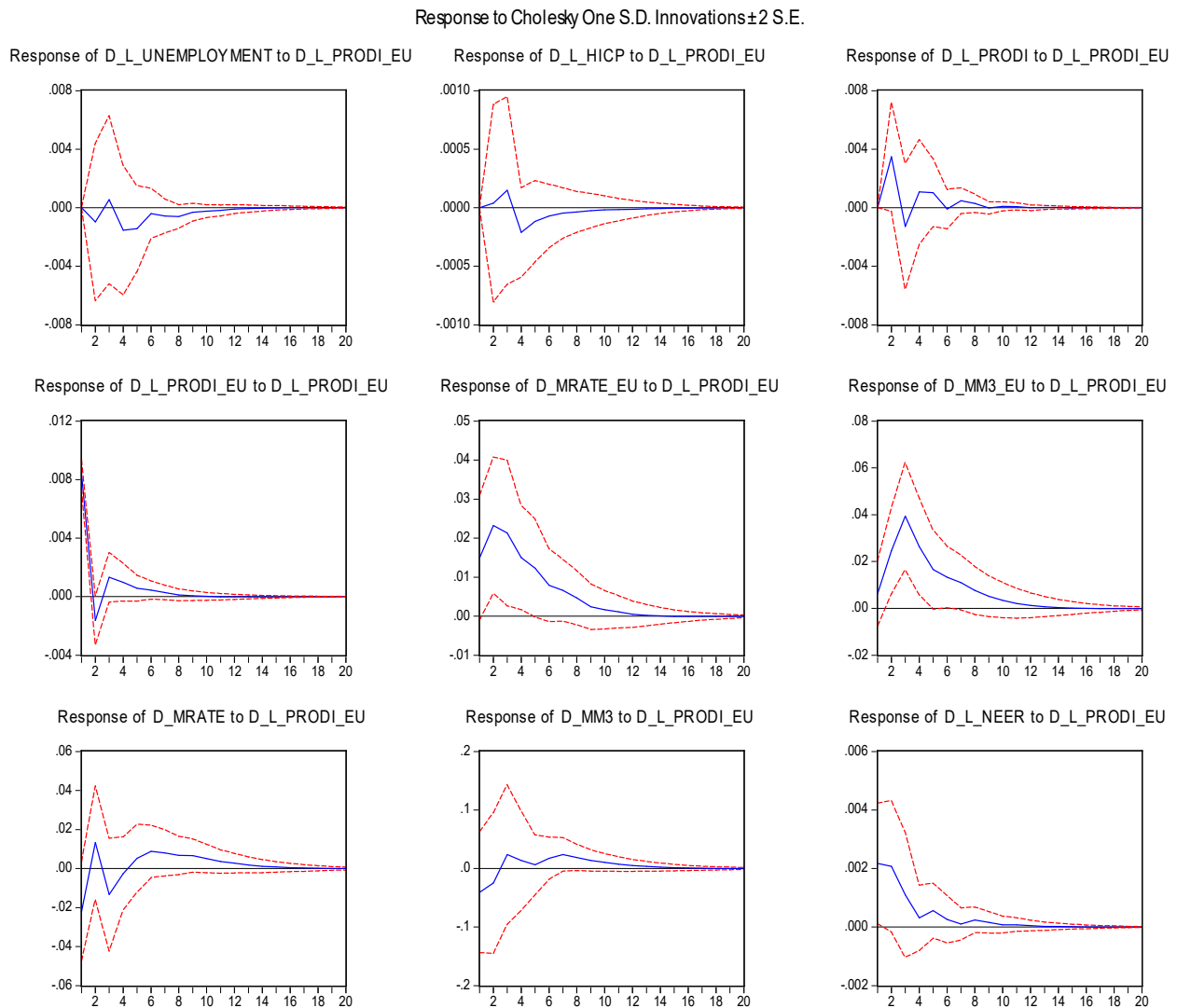


Figure 2. Impulse response to one pp shock in external demand.

The impulse response functions to the increase of the external central bank interest rate shown in Figure 3 show a significant increase in three-month EURIBOR and ROBOR as well as an appreciation (delayed by two months) of the domestic central bank rate. Albeit immaterial, there is an increase of the domestic and external

production indices that can be explained by the sharp contraction of interest rates that started in 2008 following the economic crises. The external policy rate supports the development of the euro area economic activity that has contracted after the financial crisis and it does not yet give signs of accelerated growth. The unemployment rate registers therefore a negligible decrease while the positive impact on the nominal exchange rate is also negligible. The impact over inflation rate is insignificant. The responses to the applied shock gradually die away within six months.

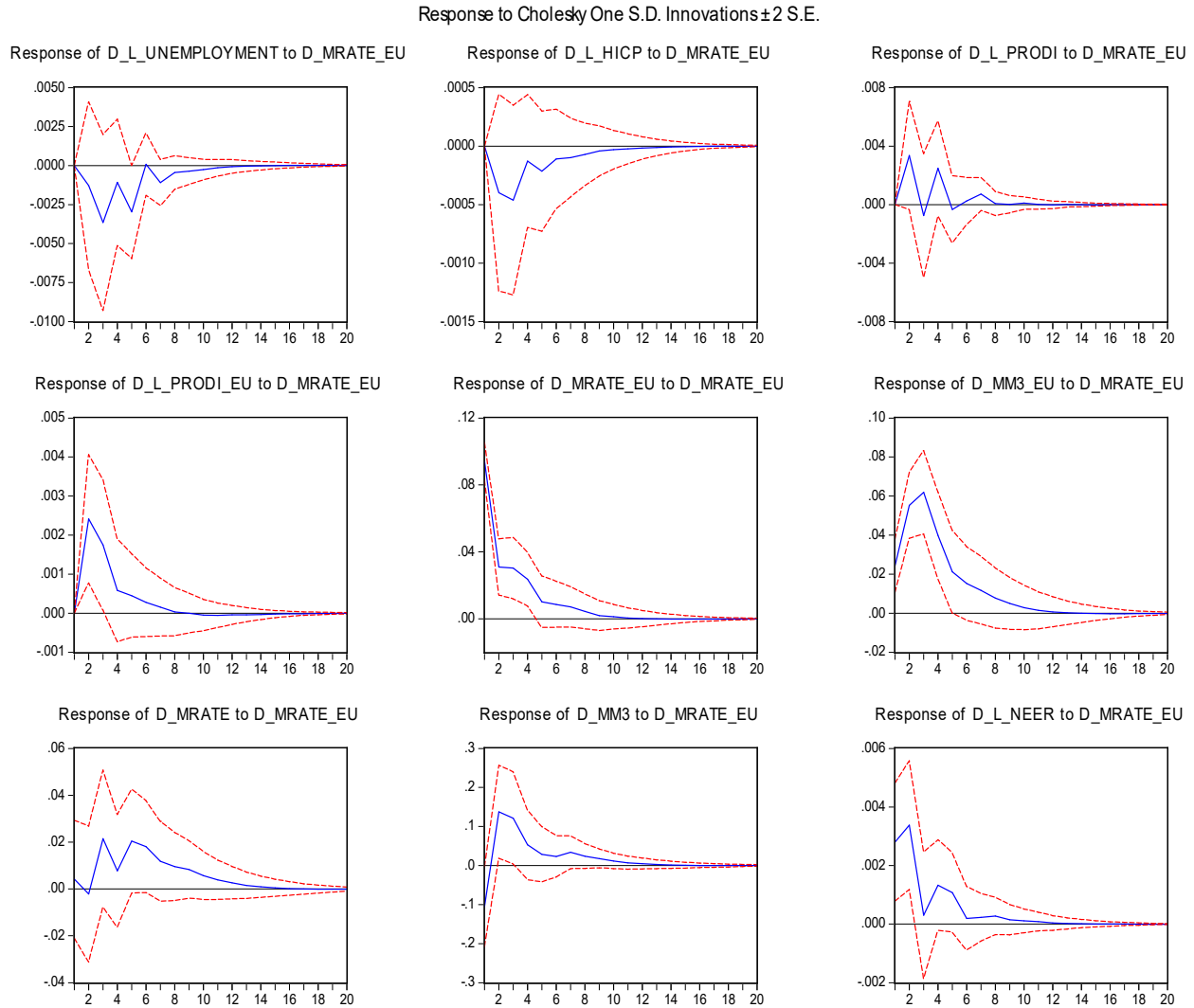


Figure 3. Impulse response to one pp shock in external interest rate.

The shock applied to the three-month EURIBOR generates an initial positive response in ROBOR and a decrease in domestic central bank policy rate. The external central bank rate increases while the response reverts to the pre-shock value after six months. The impact over the nominal exchange rates, the production indexes as well as unemployment is immaterial and similar to the impact of the shock applied to the central bank rate. Inflation is not significantly impacted by the change in EURIBOR.

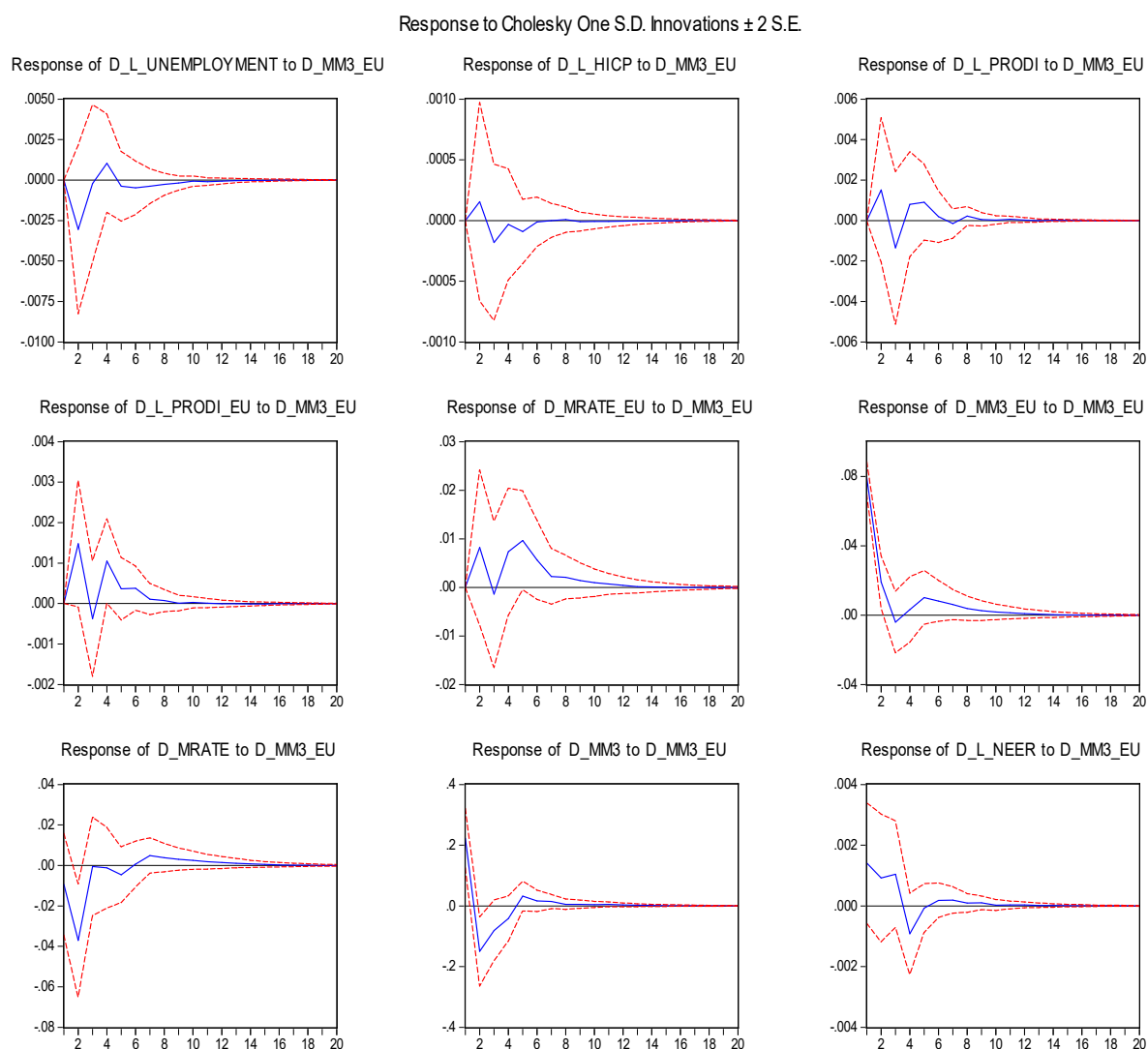


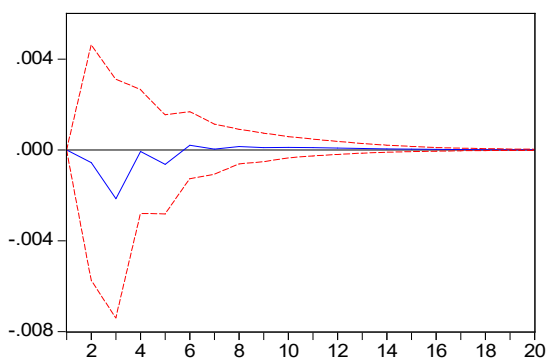
Figure 4. Impulse response to one pp shock in three-month EURIBOR.

An increase of the domestic central bank policy rate generates a strong positive response in ROBOR that reverts to its pre-shocked value in six months. The impact over production index (increases) and exchange rate (decreases) is immaterial. For the rest of the variables there is no material direct impact.

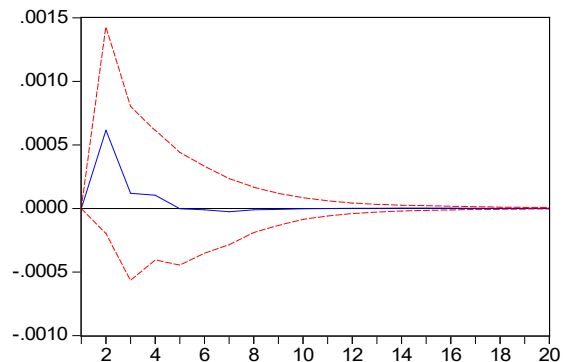
An increase in the three-month ROBOR generates an increase of the domestic central policy rate and a contraction (delayed by two months) of the domestic production index. The domestic output is negatively correlated with the domestic interbank rate that was (in the analyzed period) the reference rate for the interest rates on bank loans. This triggers an increase in unemployment rate with a delay of three months. There is a negative negligible initial impact on the exchange rate followed by an immaterial increase.

Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.

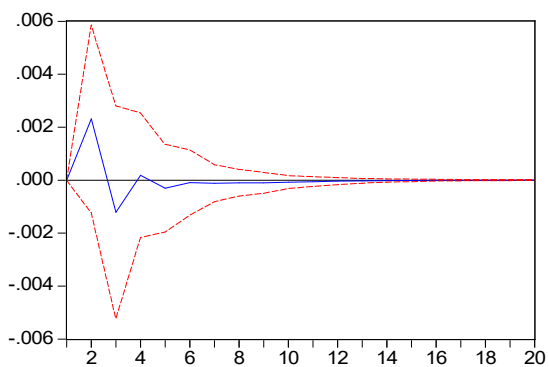
Response of D\_L\_UNEMPLOYMENT to D\_MRATE



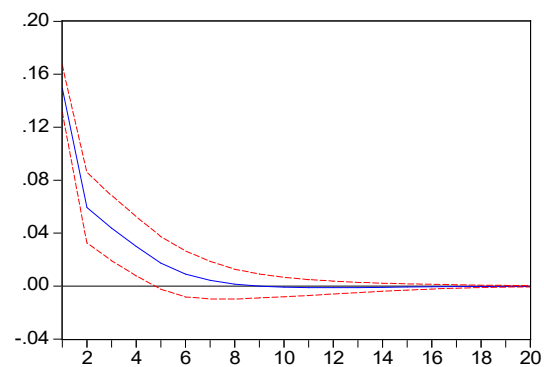
Response of D\_L\_HICP to D\_MRATE



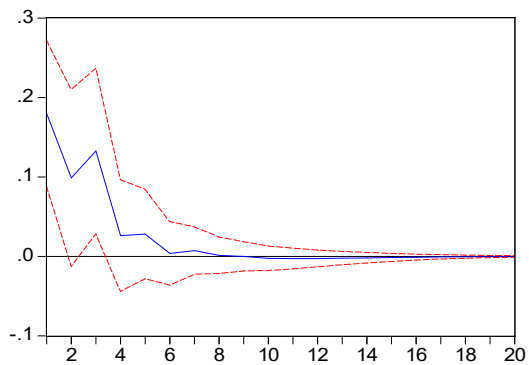
Response of D\_L\_PRODI to D\_MRATE



Response of D\_MRATE to D\_MRATE



Response of D\_MM3 to D\_MRATE



Response of D\_L\_NEER to D\_MRATE

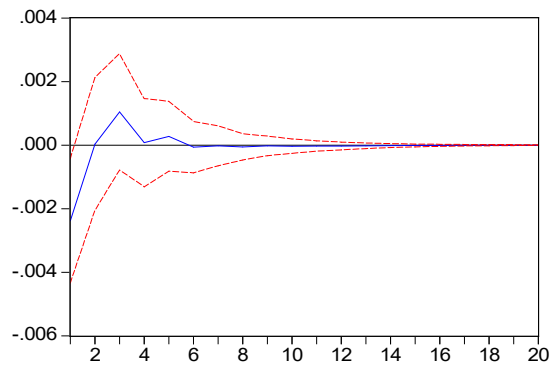


Figure 5. Impulse response to one pp shock in the domestic rate.



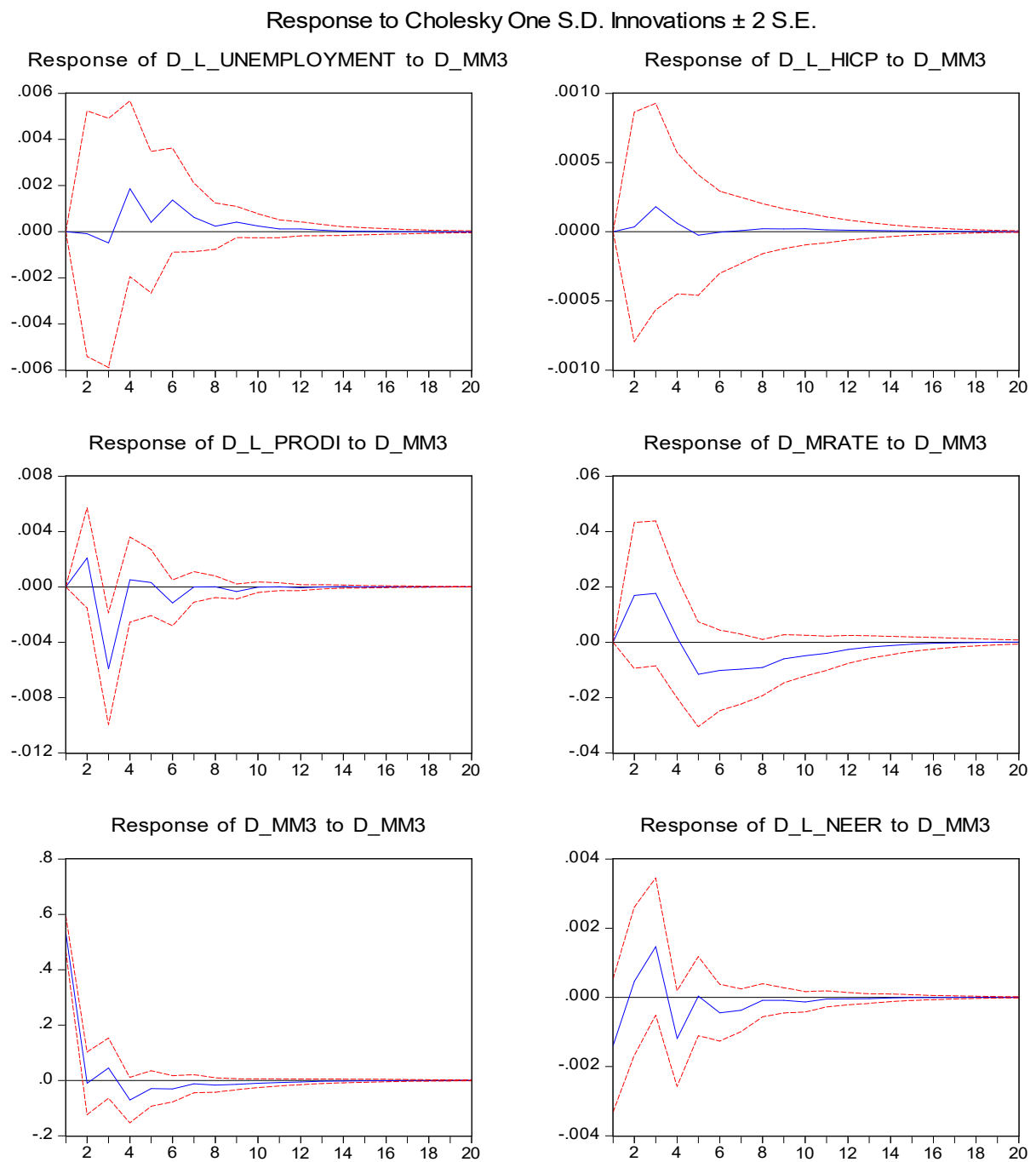


Figure 6. Impulse response to one pp shock in three-month ROBOR.

## Conclusions

The paper investigates the impact and transmission mechanism of the external and domestic shocks on economic and financial variables in Romania, including assessing if there is a correlation between the domestic central bank policy rate and the labor variable of unemployment rate. The assessments have been performed using the vector autoregression function of impulse response. The main findings are summarized as follow.

The external shocks have an important impact especially on the domestic interest rates but also (on a smaller scale) on the domestic production. An increase in external demand generates an increase in the domestic production sector, as the EURO area is an important trading partner for Romania. This triggers a response in unemployment; however, the impact is not significant, which proves the resilience of the domestic labor market.

Although the influence of the domestic central bank policy rate on the domestic production and unemployment is not observed directly, it is transmitted via three-month ROBOR, which impacts both production and unemployment. Moreover, the central bank policy rate has a stabilizing effect on the unemployment rate in case of an increase in the euro area policy rate.

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