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Empirical Assessment of the Eurozone Monetary Policy Transmission in Latvia

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Abstract

The purpose of the paper is to evaluate the international transmission effects of euro area monetary policy shocks on the main economic and financial variables in Latvia in period from 2000 to 2014. Empirical assessment is made using a standard structural vector autoregression (SVAR) model of the euro area, augmented by the Latvian variables of interest (real GDP per capita, annual inflation and money market interest rate, and consecutively by additional variables: real private consumption per capita, investments, exports and imports, various loan interest rates and real wages). The estimated SVAR model shows that a negative monetary policy shock in the euro area has a strong and persistent effect on Latvian economy via interest rate and foreign demand channels. The main results shown by impulse response functions suggest that the estimated reaction of Latvian variables is several times stronger than the reaction of euro area aggregates. Volatility of reactions can be explained by the small size and high openness level of Latvian economy.

Keywords: Monetary transmission; Euro area; Structural VAR

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1. Introduction

In the beginning of 2014 Latvia joined the Eurozone. That was an important step in integration with European countries. Before that Latvia was a small transition economy with hard peg of national currency, big amount of debt denominated in euros and changing composition of exporting partners. As a result of integration process one can expect a strong reaction of Latvian economy to the monetary policy of European Central Bank (ECB) in historical perspective and even more in future.

The international transmission effects of a foreign monetary policy shock on a domestic economy are ambiguous. One of an important international transmission effects is the income absorption effect, which captures the change in foreign demand for domestic products due to changes in foreign economic activity. In case of restrictive monetary policy actions, decrease in the demand in foreign country will cause a decrease in demand of domestic products. Other international transmission channel works through interest rates: euro area interest rates have influence on domestic interest rates. This channel can work via domestic borrowing in foreign currencies, too. One more international transmission effect goes through the exchange rate channel, but there is no long-term effect of monetary policy under the fixed exchange rate. Thus the emphasis is laid on interest rate and demand channels.

The main goal of the paper is to evaluate how monetary shocks of the euro area are transmitted to the main macroeconomic and financial variables in Latvia.

For the empirical analysis the structural vector autoregression (SVAR) model is used. This is the most frequently exploited method for such purposes. This methodology is chosen because it allows us to place minimal restrictions on how euro area monetary shocks affect the domestic economy, and the results obtained can be easily compared with ones obtained by other authors for different countries. Aarle et.al. (2003) used SVAR model for the study of transmission of monetary and fiscal policies in the euro area via identification of various structural shocks. They conclude that impact of various shocks depend on the affected country. Weber et.al. (2011) used SVAR model looking for empirical evidence on whether euro area monetary transmission has changed over the time. They found possible break just around 1999, and no significant differences later.

Errit and Uuskula (2014) used SVAR model for the analysis of euro area monetary policy transmission in Estonia. They concluded that the increase in the euro area money market interest rate significantly increased the Estonian market interest rate, and euro area monetary policy shock had strong and sluggish effects on the housing loan and consumer credit interest rates. But they found that trade channel was weak, effect of domestic demand was much stronger than impact of foreign demand.

As SVAR model has limitations in number of variables included in the model, at the beginning the benchmark model from 7 variables is designed. The following typical variables is used: money market interest rate, inflation and GDP both for Latvia and euro area and one additional Latvian economic or financial variable (private consumption, exports, imports, investments, real wages and various types of loan interest rates). The identification scheme is quite similar to previously mentioned and list of other publications (Elbourne, Haan, 2005; Errit and Uuskula, 2014; Giovanne and Shambaugh, 2008): the interest rate has no contemporaneous effect on economic variables, and Latvian variables do not influence the European variables. The contemporaneous effect of euro area interest rate on Latvian interest rate is expected, but no contemporaneous effect on real economy variables (GDP, inflation and additional variable). So the benchmark analysis is close to the approach exploited in Errit and Uuskula (2014). Because of a lot of similarities in history of Estonia and Latvia it is interesting to compare transmission of monetary shocks between these economies.

The paper is organized as follows. Section 2 describes the data used in the analysis, and specification issues of the models. Section 3 summarizes main findings and results from modeling. The conclusions and recommendations are presented in Section 4.

2. The Model and data

The baseline VAR model specification can be written in matrix form as

$$y_t = c + A(L)y_{t-1} + Bx_t + u_t \quad (1)$$

where y_t is the vector of endogenous variables, c is the vector of constants, x_t is the vector of exogenous variables and u_t is the vector of serially uncorrelated disturbances with zero mean and time invariant covariance matrix. *A(L)* denotes a matrix polynomial in the lag operator *L*, and *B* is a coefficient matrix.

In the benchmark model the vector y_t of macroeconomic variables that are included in the SVAR model consists of four domestic variables and three euro area variables.

$$y_t' = \left(dy_t^{LV} \quad dpc_t^{LV} \quad \text{infl}_t^{LV} \quad i3m_t^{LV} \quad dy_t^{EA} \quad \text{infl}_t^{EA} \quad s_t^{EA}\right) \quad (2)$$

where dy_t denotes percentage growth rate of per capita real gross domestic product (first difference of the logarithm), dpc_t denotes percentage growth rate of per capita real private consumption, $infl_t$ denotes the annualized quarter-to-quarter GDP deflator based inflation rate, $i3m_t$ is three-month money market interest rate. Superscripts LV and EA denote the Latvian and the Euro Area variables respectively. To get a broader picture of monetary transmission in Latvia, several models are estimated, where the private consumption was consecutively replaced to other variables of interest: exports and imports, investment, employment and real wages and various loan rates.

The estimation is based on quarterly data from 2000 to 2014. The length of time series is restricted by availability of good quality time series for Latvia. Other reason is – to avoid significant break point around 1999 what was found by Weber et.al. (2011). Time series for the Euro area were taken from Eurostat database, the Latvian variables were mainly collected from Eurostat, but additional data series are from the Bank of Latvia data base and National Statistical Bureau.

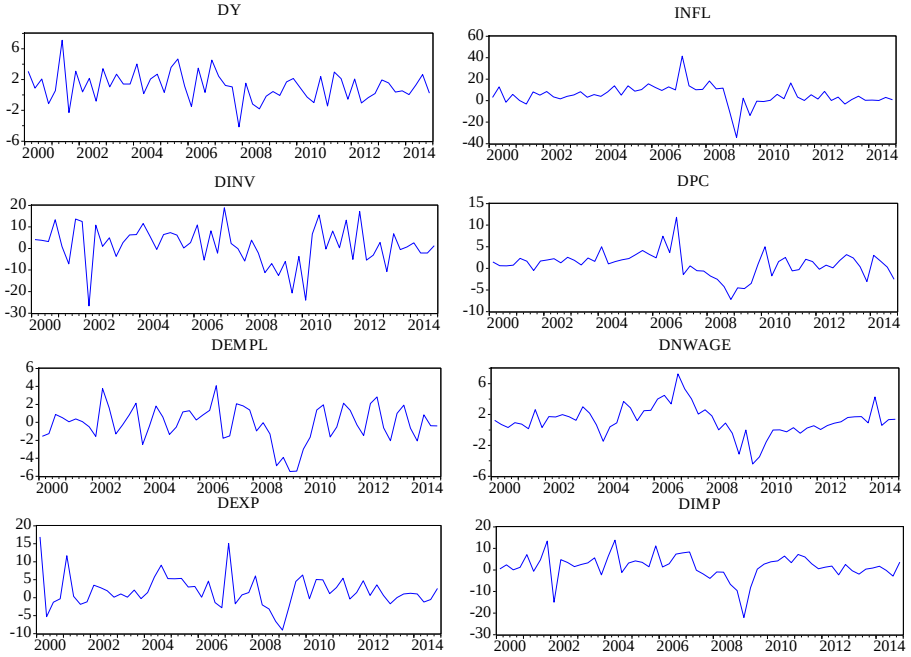

Fig. 1. Time series of Latvian economic variables, all variables in first differences, measure unit on vertical axis: %.

Figure 1 plots the main Latvian economic variables used in the SVAR model. $dinv_t$ denotes investments, $dxep_t$ and $dimp_t$ are real exports and real imports respectively, $dempl_t$ is employment, $dnwage_t$ denotes real net wage. All variables are transformed as first differences of the log.

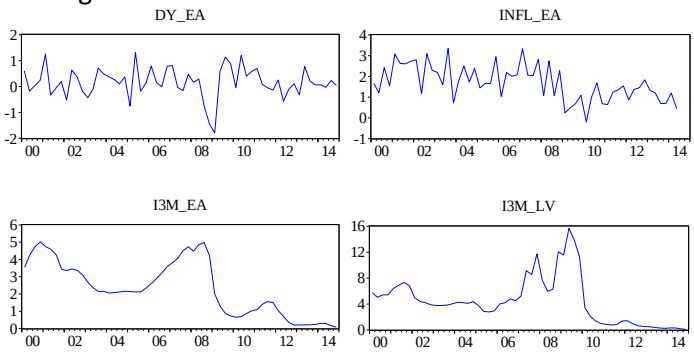

Fig.2. Time series of euro area variables, and Latvian three-month money market interest rate (source: Eurostat)

As according to the theory all variables included in the VAR model should be stationary, the Augmented Dickey Fuller (ADF) test was applied. In all cases the unit root was rejected, and stationarity condition is met.

Figure 2 plots the Euro area variables used in all SVAR models and Latvian interest rate. The tests of stationarity (ADF) reject the unit root for GDP and inflation of the Euro area, but both the Euro area and Latvian short-term interest rates contain the unit root. The same problem was found in Errit and Uuskula (2014), they used the time trend and assumed stationarity. The interest rate variables without any transformation are used.

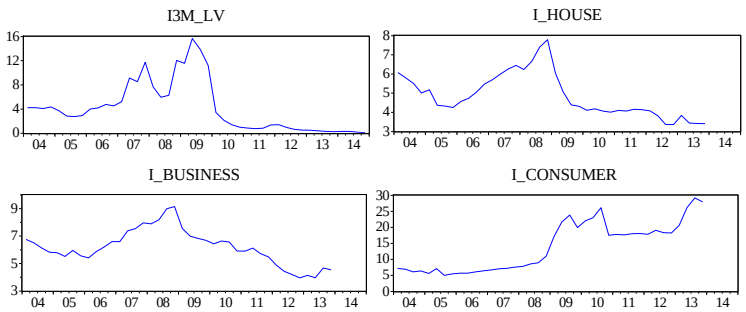

Fig.3. Time series of various credit rates in Latvia (source: Bank of Latvia)

Figure 3 plots the Latvian three month nominal money market interest rate and three credit rates: interest rates on loans to non-financial corporations (new business) and interest rates on loans to households (new business) for house purchase and for consumption. Already visual inspection of Latvian interest rates on different loans shows significant differences. Therefore it is not surprisingly that empirical evidence of transmission via these interest rates was not found.

Monetary policy shocks in the Euro area are identified using short-run restriction scheme based on Taylor rule: interest rate has no contemporaneous effect on economic variables. Additionally natural restriction for small economy is introduced – no feedback from Latvian variables to the Euro area variables. The same identification scheme was kept for all changing variables.

The lag length for models was determined by use of standard information criteria. It appears that mostly it is enough to use two lags. All models were tested for autocorrelation and heteroskedasticity in the residuals, no problems remained. The Jarque-Bera test showed no problems with normality

assumption. The parameter stability was tested by the CUSUM and CUSUM squares tests and the recursive coefficient estimation (the results of these tests and ADF tests are available upon request).

3. Findings and Results

In this section the estimated effects of the Euro area monetary policy on domestic variables within the aforementioned specifications are discussed.

A stationary set of time series in a VAR setting allows several applications: Granger causality tests, derivation of impulse response functions, or the forecast error variance decomposition. In this paper the main results are presented as the impulse response functions (IRF), which display the reaction of a variable over time to a shock of the other variables in the system. In all figures below on horizontal axis the number of quarters after the euro area monetary policy shock are shown.

The impulse response patterns in this paper are broadly in line with standard results in the literature (for instance, Errit and Uuskula, 2014).

Figure 4 illustrates the monetary policy shock in the Euro area on Latvian and Euro area GDP growth rates, inflation, and Latvian interest rate. As expected Latvian GDP follow a hump-shaped response. A standard deviation increases in the Euro area interest rate dies out approximately after 12 quarters (3 years). Maximum effect was reached at third quarter after the innovation. Reaction of Latvian GDP is significantly stronger than that of the Euro area's GDP.

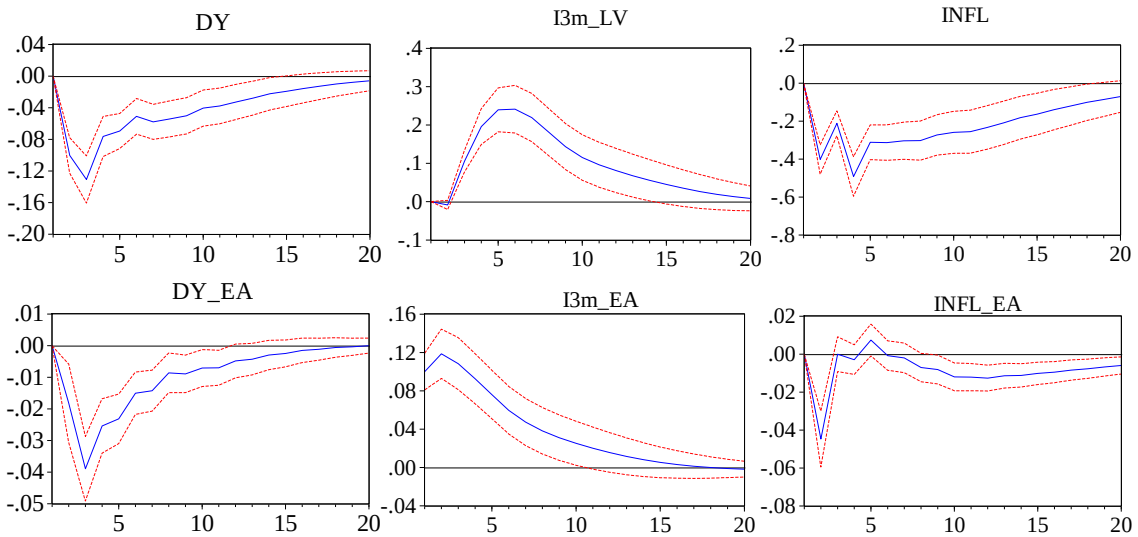

Fig.4. Impulse response function results for basic variables.

Several other variables of interest were chosen for testing the reaction to the Euro area monetary shock. Impulse reaction functions of private consumption, investments, imports and exports, employment and real net wages were obtained from separate SVAR models. The identification scheme was identical for all cases.

Reaction of exports (*dexp*), imports (*dimp*), employment (*dempl*), real wages (*dnwaages*), corporate investments (*dinv*) and private consumption (*dpc*) is presented in Figure5. The results were obtained by running SVAR model several times consequently. The same identification scheme was kept, only

one variable was replaced by next one step-by-step. All models were tested; if it was necessary additional dummy variables were introduced.

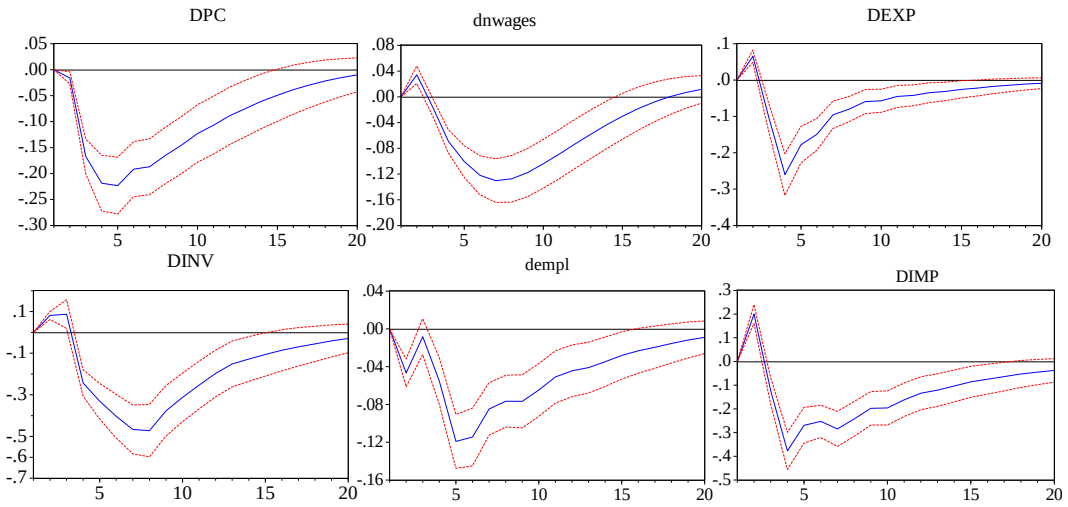

Fig.5. Impulse response function results of additional Latvian macroeconomic variables to a contractionary monetary policy shock in the euro area.

In Figure 5 the reaction of all variables is seen as a hump-shaped. Drop in corporate investments is bigger than in private consumption. Their lowest levels are reached around 5 to 8 quarters after the shock. IRF results show that reaction of imports is slightly bigger than reaction of exports. As a result the question about demand channel's effectiveness stays opened.

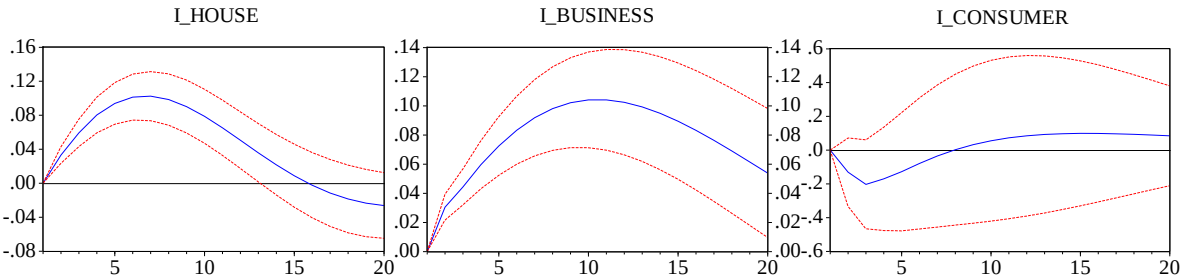

Fig. 6.Estimated impulse response of various credit rates to a contractionary monetary policy shock in the euro area

The reaction of various credit interest rates is presented in Figure 6. This paper's conclusion is similar to Giannone et. al (2012). They found for the Euro area that the reaction of consumer credit rates, housing and corporate loans rates is substantially weaker than the reaction of money market interest rate. The same result was obtained for Latvian rates.

Finally the robustness of results was checked. The results were compared for different lag lengths, several subperiods (to evaluate the effect of recent crisis) and various numbers of variables. It appeared that to avoid the price puzzle (typical problem for VAR type models) it is necessary to include dummy variables for the period of recent financial and economic crisis. The same result was found in Errit and Uuskula (2014) for Estonia.

4. Conclusions and recommendations

In this paper the transmission mechanism of the Euro area monetary shocks in Latvia is analyzed within SVAR approach.

The monetary policy shock in the Euro area has strong effects on Latvian economic indicators. For identically identified shocks reaction of Latvian variables is stronger than for the same variables in euro area.

A standard deviation increase in the Euro area three month money market's interest rate further increases Latvian money market's interest rate by a maximum of 28bp points approximately after 5 quarters. The effect on Latvian GDP is significant and dies out slowly. The reaction of loan type interest rates (new business, loans denominated in euros) appeared to be weaker than reaction of Latvian money market's interest rate. The reaction of consumer credit rates appeared to be non-significant.

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