Emerging Markets Queries in Finance and Business

Household sector and monetary policy implications. Evidence from Central and Eastern European countries

Anca Elena Nucu*
*a"Alexandru Ioan Cuza" University of Iasi, Department of Business Administration, Carol I Avenue, no.11, Iasi, Romania 700506

Abstract

Amid recent financial crisis, has increased the risks related to the sustainability of the households’ banking loans. The purpose of this paper is to analyze the bi-dimensional causality relationship between household sector and monetary policy in the experience of acceding countries Bulgaria, Czech Republic, Latvia, Lithuania, Hungary, Romania between 2007M01-2012M04. Using a Vector Autoregressive Model, we analyze the impact of short term interest rate on loan to deposit ratio for households. Our empirical results suggest that the excessive built-up of financial imbalances related to the households behavior is properly taken into consideration by monetary policy only in Czech Republic, Hungary, Poland and Romania.

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1. Introduction

The share of household loans in total bank loans has increased significantly during recent years. From the monetary policy standpoint, a reduction in the policy rate could lead to an unsustainable increase in debt, thereby raising the risk of undershooting the target inflation rate in the future Subhaij, 2009. Santoso and Sukada, 2008 states that there are a lot of channels by which monetary policy influences households sector: interest rate channel, credit channel, exchange rate channel and wealth channel. In this paper, we focus

* Corresponding author. Tel.:+4-074-007-9731;
E-mail address:nucu.anca@yahoo.com.
exclusively on interest rate channel, because higher indebtedness, as we can observe in last decades, increase the sensitivity of households’ behaviour to changes in interest rates.

Using a Vector Autoregressive VAR approach, we analyze the impact of monetary policy on loan to deposit ratio for households in the experience of acceding countries between 2007M01-2012M04.

The remainder is organized as follows. The next section briefly surveys the major contributions of the literature review. Section 3 lays out the data and the methodology used. Section 4 evaluates the empirical results. Section 5 brings the main conclusions and future research.

2. A brief literature review

A strand of literature analyses the implications of rising household debt for monetary policy and the authors can be separated in two camps: the first camp argues that higher level of household debt increases the efficiency of monetary policy because it enhances the sensitivity of households to changes in key policy rate; the second camp states that excess household indebtedness may constrain the effectiveness of monetary policy because fewer households are able to borrow for consumption. There are a lot of studies which analyse how households are affected by and, in turn, affect monetary policy through different transmission in U.K. Much less, however, has been written about the households sector and monetary policy in acceding countries and the studies rely more on the qualitative rather than quantitative. This may be due to the unavailability of high frequency micro-level data.

From the empirical standpoint, Perrson, 2009 and Dey et al., 2008 pointed out that micro-level data would capture better the features of household sector, but this information is restricted.

Flamini and Fracaso, 2009, in a basic New Keynesian framework, show that household’s preferences can play an important role in determining optimal interest rate inertia. On the other hand, Filardo, 2009 states that a rise in household debt, in and by itself, is not a sufficient reason to call for a monetary policy response.

We consider that the negative implications of rising the households debt on financial stability call for a proactive attitude of monetary policy promoted by central banks.

3. Methodology

We analyse the relationship between short term interest rate and loan to deposit ratio for households in the experience of several Central and Eastern European countries: Bulgaria, Czech Republic, Latvia, Lithuania, Hungary, Poland and Romania, between 2007M01 and 2012M04. The start of the estimation sample is governed by data availability. The time series were taken from Datastream database. The short term interest rate is measured as three month interbank money market rate and serves as a proxy for monetary policy interest rate. Loan to deposit ratio for households is seasonally adjusted and is computed as follows:

\[
\text{Loan to deposit ratio} = \frac{\text{Total loans for households}}{\text{Total deposits of households}} \times 100
\]  

For Bulgaria and Lithuania, we consider that the shocks come from LIBOR EUR 3 months interest rate.

We use a multivariate modelling approach in order to analyze the relationship between money market interest rate and loan to deposit ratio based on the VAR model of order p:

\[
Y_t = \nu + A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + u_t
\]

where the vector \(Y_t\) includes the variables of interest, \(\nu\) are the vectors of intercepts and \(A_i\) are the fixed VAR coefficient matrices. \(u_t=(u_{1t},...,u_{kt})'\) is an unobservable error term. It is assumed to be a zero-mean independent white noise process with time-invariant, positive definite covariance matrix \(E(u_t'u_t')=\Sigma_u\).
The process is stable if

\[ \text{det}(I_k - A_1 z - \ldots - A_p z^p) \neq 0, \text{ for } |z| \leq 1 \]  

(3)

which means that the polynomial defined by the determinant of the autoregressive operator has no roots in and on the complex unit circle.

We have tested the potential long run relationships between these two variables using the Johansen cointegration test. In the case of cointegrated variables, we have performed a Vector Error Correction Model (VECM) with the following standard representation:

\[ \Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \ldots + \Gamma_{p-1} \Delta Y_{t-p+1} + u_t \]  

(4)

where

\[ \Pi = -(I_k - A_1 - \ldots - A_p), \Gamma_i = -(A_{i+1} + \ldots + A_p), \text{ for } i=1,\ldots,p-1 \]  

(5)

For checking if the selected VAR or VECM model provides the best representation of the time series set, we have disentangled the followings: descriptive analysis of residuals, diagnostic tests of the residuals and stability analysis.

We adopt a fully astructural approach and simulate one unit-shock to the residuals of the VAR, assuming that structural shocks are orthogonal. Under the orthogonalization by the Cholesky decomposition, a one unit shock in \( \varepsilon_t \) has the interpretation of a shock of a magnitude of one standard deviations of the original variable \( Y_t \). The relationship between the vector of structural shocks \( \varepsilon_t \) and the vector of VAR innovations \( u_t \) is as follows:

\[ u_t = B^* \varepsilon_t \]  

(6)

where \( B \) is a lower triangular matrix obtained from a Cholesky decomposition of the covariance matrix \( \Sigma_u \), such that \( BB^* = \Sigma_u \). The orthogonalized shocks are given by

\[ \varepsilon_t = B^{-1} u_t \]  

(7)

Taking into consideration that the effects of shocks are easily seen in terms of moving average representation:

\[ y_t = \Phi_0 \varepsilon_t + \Phi_1 \varepsilon_{t-1} + \Phi_2 \varepsilon_{t-2} + \ldots \]  

(8)

we obtain the following form:

\[ y_t = \omega_0 \varepsilon_t + \omega_1 \varepsilon_{t-1} + \ldots \]  

(9)

where \( \omega = \Phi B, \omega_0 = B \). \( \Phi B \) are the matrices of impulse response function.
4. Empirical results

For all analysed countries, the short term interest rate follows a unit root process, being characterized as I(1) series. Also, in level the ADF test’s null hypothesis couldn’t be rejected for loan to deposit ratio in all countries, except Hungary and Poland, where the series are stationary.

The whole dataset ranges from 2007M01 till 2012 M04. Taking into consideration that we suspect possible structural breaks due to the impact of financial crisis, we have performed several chow tests for stability. The chow tests yield robust results concerning one significant break during 2008 in all analyzed countries p-value< 0.05. In line with other studies Gerke et al, 2008; Rosenkranz, 2009 we have compared the estimated impulse responses of different subsamples and we have found that the results remain valid. Furthermore, data points ranging from 2008M08 till 2012 M04 would simply not be enough to perform a the analysis. Therefore, we concluded that data set still remains adequate for structural analysis.

We have estimated a VECM of order one for Poland and Hungary with one cointegrating relationship, a VAR of order two for Bulgaria and Latvia and, respectively, a VAR of order three for Czech Republic, Lithuania and Romania. In order to establish the number of lags, we have considered first the benchmark case. After, we have estimated several models with different numbers of lags as suggested by information criteria and we have selected the model which fulfills most of the checking criteria. To facilitate the comparison between impulse responses obtained for different countries, we consider Hall's percentile bootstrap confidence intervals based on 1,000 replications.

Table 1. The summary of impulse response analysis

<table>
<thead>
<tr>
<th>Country</th>
<th>Interest rate (Loan/Deposit (households))</th>
<th>The peak</th>
<th>Periods after shock (months)</th>
<th>Statistically significant response</th>
<th>Loan/Deposit (households)</th>
<th>Interest rate</th>
<th>The peak</th>
<th>Periods after shock (months)</th>
<th>Statistically significant response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>+</td>
<td>3.905552</td>
<td>12</td>
<td>YES</td>
<td>+</td>
<td>0.217831</td>
<td>16</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>-</td>
<td>(0.235498)</td>
<td>10</td>
<td>YES</td>
<td>+</td>
<td>0.271563</td>
<td>11</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>-</td>
<td>(0.789237)</td>
<td>6</td>
<td>NO</td>
<td>+</td>
<td>0.057160</td>
<td>7</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Latvia</td>
<td>+</td>
<td>3.507954</td>
<td>12</td>
<td>NO</td>
<td>+</td>
<td>0.487710</td>
<td>9</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>+</td>
<td>1.490078</td>
<td>13</td>
<td>NO</td>
<td>+</td>
<td>0.590084</td>
<td>4</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>-</td>
<td>(5.785339)</td>
<td>8</td>
<td>YES</td>
<td>+</td>
<td>0.035873</td>
<td>6</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>-</td>
<td>(5.98994)</td>
<td>8</td>
<td>YES</td>
<td>+</td>
<td>0.761253</td>
<td>10</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

Note: + denotes positive response, - denotes negative response
Source: author’s estimation

Table 1 reports the impulse responses of loan to deposit ratio for households to interest rate shocks and of interest rate to credits or deposit shocks. The findings suggest that an unexpected increase in interest rate drives loan to deposit ratio down in all analyzed countries, except Bulgaria, Lithuania and Latvia. Although the central forecast for loan to deposit ratio is negative, the results are statistically significant only in the case of Czech Republic, Poland and Romania. In the case of Czech Republic, a positive monetary policy shock drives loan to deposit ratio down, reaching the negative peak 0.235498 after, roughly, ten months. Under a monetary policy shock, loan to deposit ratio decrease in Romania and Poland and the negative peaks are 5.98994, respectively 5.785339 after 8 months. In Bulgaria and Lithuania, an increase in LIBOR EUR 3 months interest
rate leads to an increase in loan to deposit ratio after, roughly, one year, but the results are statistically significant only in the case of Bulgaria. For Lithuania and Latvia, the error bands are quite wide and the responses are indistinguishable from zero. Therefore, we can conclude that changes in LIBOR 3 months interest rate are not in accordance with domestic economic conditions from Bulgaria and Lithuania, like it is highlighted in other studies Minea and Rault, 2009. Our results suggest that in countries which lost their monetary policy autonomy, households face the problem of informational asymmetry.

Also, our empirical suggest that there is a positive causality between loan to deposit ratio for households and short term interest rate. But, only in slightly more than half of the countries do we find the effect of loan to deposit ration on money market interest rate to be statistically significant.

Overall, our results suggest that under a monetary policy shock, only in the case of Czech Republic, Hungary, Poland and Romania, the loan to deposit ratio moves into the expected direction. In the above countries, the build-up of household debt is properly monitored by the monetary policy.

In line with other studies Goodhart et al., 2007 we argue that this relatively low number of statistically significant impulse responses might be due to the low power of the significance test as a result of the short sample period.

Table 2. The forecast variance error decomposition of loan to deposit ratio and short term interest rate

<table>
<thead>
<tr>
<th>Country</th>
<th>Months ahead</th>
<th>Percent of loan to deposit ratio explained by</th>
<th>Percent of short term interest rate explained by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Own innovations</td>
<td>Short term interest rate</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>6</td>
<td>61.89915</td>
<td>38.10085</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>33.94121</td>
<td>66.05879</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>31.91557</td>
<td>68.08443</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>6</td>
<td>84.30383</td>
<td>15.69617</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>83.66711</td>
<td>16.33289</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>82.30639</td>
<td>17.69361</td>
</tr>
<tr>
<td>Hungary</td>
<td>6</td>
<td>83.81621</td>
<td>16.18379</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>83.81506</td>
<td>16.18494</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>83.81895</td>
<td>16.18105</td>
</tr>
<tr>
<td>Latvia</td>
<td>6</td>
<td>61.18230</td>
<td>38.81770</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>40.94849</td>
<td>59.05151</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>31.14391</td>
<td>68.85609</td>
</tr>
<tr>
<td>Lithuania</td>
<td>6</td>
<td>86.54942</td>
<td>13.45058</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>72.71109</td>
<td>27.28891</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>60.95018</td>
<td>39.04982</td>
</tr>
<tr>
<td>Poland</td>
<td>6</td>
<td>99.23259</td>
<td>0.76741</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>98.18376</td>
<td>1.81624</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>98.44578</td>
<td>1.55422</td>
</tr>
<tr>
<td>Romania</td>
<td>6</td>
<td>98.07643</td>
<td>1.92357</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>97.76676</td>
<td>2.23324</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>97.64922</td>
<td>2.35078</td>
</tr>
</tbody>
</table>

Source: author's estimation
Table 2 reports the variance decomposition results of 6-months, 12-months and 24-months horizon ahead forecast error variances of each variable from the analyzed countries. As expected, the variation in loan to deposit ratio 6, 12 and 24 months ahead is mainly explained by loan to deposit ratio itself, but short term interest rate explain a significant part of its change. In all countries by month 12 ahead, the behaviour has settled down to a steady state, where a smaller percentage of the error variance in the series of all indices is attributable to own shocks. The results of forecast variance error decomposition for short term interest rate are similar to those of loan to deposit ratio.

The main caveat of our study is the short sample period. Also, the results are flawed by the differences in the definition of total credit across countries.

5. Conclusions

In this paper we have disentangled the bi-dimensional causality relationship between household sector and monetary policy in the experience of several Central and Eastern European countries between 2007M01-2012M04, using a VAR model in the case of Bulgaria, Czech Republic, Latvia, Lithuania and Romania and, respectively, a VECM in the case of Hungary and Poland.

Our empirical estimation highlights that a monetary policy shock drives loan to deposit ratio down in Czech Republic, Hungary, Poland and Romania, but for Hungary the results are statistically insignificant. In Bulgaria and Lithuania, an increase in LIBOR EUR 3 months interest rate leads to an increase in loan to deposit ratio after, roughly, one year, but the results are statistically significant only in the case of Bulgaria. Moreover, our empirical suggest that there is a positive causality between loan to deposit ratio for households and short term interest rate. But, only in slightly more than half of the countries do we find the effect of loan to deposit ration on money market interest rate to be statistically significant.

Future research is called for. A first development is to exploit the large cross section dimension of our country sample and repeat the impulse response analysis based on fixed effects panel VAR as in Goodhart et al., 2007. A second development should take into consideration more variables such as economic growth and inflation in order to capture a stylized model of monetary policy implication on household sector.

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References


