IRJEMS International Research Journal of Economics and Management Studies
Published by Eternal Scientific Publications
ISSN: 2583 – 5238 / Volume 3 Issue 5 May 2024 / Pg. No: 234-239
Paper Id: IRJEMS-V3I5P128, Doi: 10.56472/25835238/IRJEMS-V3I5P128

Research Article

Monetary Policy and Unemployment Behavior: The Case of Croatia

[1]Mehdi Mohebi
[1]Research Responsible, Training and Knowledge Development Department, Central Bank of Iran.

Received Date: 23 April 2024 Revised Date: 10 May 2024 Accepted Date: 13 May 2024 Published Date: 27 May 2024

Abstract: *Monetary policy is the main channel through which, in the short-run, real economic variables can be targeted through the Taylore rule, and Central Banks can influence real variables like unemployment and economic growth by implementing sound monetary policy. This relationship happens with the inflation rate mechanism through the Philips Curve; when monetary policy is implemented, it will have an impact on the real production level via the change in unemployment. In this study, an SVAR model of the money market is estimated for the Croatian economy to see how growth will respond to changes in the unemployment rate. According to the results from the empirical model, monetary policy will affect unemployment rates only in the short run by the coefficient of 0.76 and in the long run it fails to explain the variations in the croatia's production and economic growth. In fact, when implementing monetary policy, by 1 percent change in monetary aggregates, the unemployment rate will change by 0.76 percent, and this effect tends to be short-run than the long-run, according to Impulse Response analysis.*

Keywords: *Structural VAR; monetary policy; unemployment; Taylor rule.*

I. INTRODUCTION

Monetary policy is always the most reliable tool used by policy-making authorities to induce economic growth in a nation and also keep a stable path of unemployment and price inflation. Expanding the monetary base in the short run will cause little price increase through demand-side pressure on the goods and services market. However, in the long run, it will provide motivation for producers and, therefore, create economic growth (Bernanke & Gertler (1995)). The strong relationship between unemployment and monetary policy can be driven by the relationship specified in the Philips curve. According to the Phillips curve, in the event of a shock, the rate of joblessness ought to fall to a long-run vertical line. This may explain the ongoing existence of this variable, and it additionally suggests how the average level of unemployment varies with time. Real rates of interest typically rise (fall) in response to changes in nominal interest rates, while consumer price inflation is generally not expected to grow (reduce) in response to changes in nominal interest rates. This might lead to speculative capital inflows (outflows), which would degrade (improve) domestic competitiveness and cause a strengthening (depreciation) in the real rate of exchange. The fact that the interest rate co-moves with the natural rate of unemployment, in the long run, challenges the classical dichotomy that nominal variables do not affect real variables and that inflation and unemployment can be separately analyzed if there is no trade-off between them in the long run (Elbourne, de Haan, (2009)). Monetary policy can affect real variables like production and economic growth through the unemployment rate. If the policies expand the money base and liquidities, it will then increase inflation and due to wage illusion, firms will employ more labour, increase production, and reduce unemployment. The inherent relationship of monetary policy as a driving factor of inflation and unemployment is investigated in this study to see how unemployment will respond to monetary policy in Croatia.

To estimate the relationship between unemployment and monetary policy and analyze the short-run and long-run effects, the macroeconometrics structural VAR tool has been engaged to estimate the effects of monetary policy on unemployment. In previous studies, the ordinary econometrics tools used to study the influence of monetary policy on real variables failed to consider the role of shocks and short-run effects. In the current study, the role of monetary policy on unemployment is investigated, and according to Impulse Responses solved by the specified model, the monetary policy influences unemployment just for short periods with a coefficient of 0.76. The identification of the model is an essential part of estimating structural VAR, and it is identifiable by specific restrictions according to the actual behavior of unemployment in the presence of monetary shocks. By applying restrictions like the ones followed by Sims (1999) and Blanchard and Perotti (2002), the model became fully identifiable, and therefore we can trust the estimated results. The analysis of the shocks reflects that the impulses to the model will last only for short periods of time, and they will decay in a longer horizon. Therefore, the impact of monetary policy on unemployment is transitional, and we can argue that the effects will not explain the behavior of unemployment in the long run. The rest of the paper is ordered as follows: the first section is dedicated to the literature review,

section three discusses features of the data used in the study, section four discusses the model and estimation results, and the last part is the discussion and conclusion.

II. LITERATURE REVIEW

This section provides a brief literature review regarding the history of the research on monetary policy and the behavior of unemployment. Antonio and Ricardo (2012), through SVAR estimation, analyze that monetary shocks will have, in general, a small but positive effect on GDP and will also affect private consumption and private investment.

Bande-Ramundo, Grela and Garclo (2013) estimate an SVAR model of the Spanish economy to analyze how imposing a policy shock will affect indirect investment, consumption and unemployment rate.

They suggest that there is a direct relationship between the specified shocks and the changes in three variables. They also suggest that in order to sustain economic growth, there should be a sustained increase in real variables like investment to ensure the unemployment rate goes down. Thi, Elissaios and Peter (2019), using monthly data, perform a VAR analysis to investigate the effects of monetary policy on Vietnam's economy.

Leonardo Salazar (2019), taking into consideration the dynamics of the Philips curve, analyzes the role of monetary policy in Chile. The findings refute the natural rate hypothesis and demonstrate a negative co-movement between trend-adjusted production and the true exchange rate. This suggests that competitiveness is adversely impacted during times of real exchange rate appreciation. As a result, businesses raise productivity rather than pricing to balance profits. Using quarterly information on inflation, interest rates, unemployment rates, exchange rates, workforce participation rates, and commodity price indexes along with a Bayesian model averaging the process, Altavilla and Ciccarelli (2009) examined the impact of monetary policy on jobless rates under an uncertain environment in the US and the euro area.

III. METHODOLOGY AND RESULTS

The purpose of this article was to determine how monetary policy shock will influence unemployment through the Structural Vector Auto-Regressive (SVAR) model. Data on a quarterly basis was gathered from the bulletin of the Central Bank of Croatia.

The SVAR is considered the most beneficial macro-econometric tool, proposed by Christopher Sims that in this paper used to estimate the relationship. In order to estimate the effects of variations of broad money on unemployment, identification and isolation of purely exogenous and independent movements or shocks to the variable of interest or M2 are considered, and the reaction of the variable to movements is investigated; the reaction is reflected in the impulse responses. Sims (1986) stated that identification is the process of interpreting data variation that has been historically observed in a way that makes it possible to use the variation to forecast the outcomes of future actions. Suppose the structural model follows the following form;

$$AXt = \beta 0 + \beta 1Xt\text{-}1 + ut \qquad (1)$$

In the model, the vector Xt depends on its own lag and structural shocks ut. These structural shocks are independently distributed. Suppose that X has the following three variables: $Xt = \begin{bmatrix} Broad\ Money \\ Unemployment \end{bmatrix}$, where Broad money is M1 plus M2 and Unemployment is unemployment rate

In such variable specifications, the system will be expressed through the following three equations: BM denotes Broad money, and Unemp denotes the unemployment rate;

$$BM_t + \alpha_{12}Unemp_t = \beta_{10} + \beta_{11}BM_{t-1} + \beta_{12}Unemp_{t-1} + u_{BMt} \qquad (1)$$

$$\alpha_{21}BM_t + Unemp_t = \beta_{20} + \beta_{21}BM_{t-1} + \beta_{22}Unemp_{t-1} + u_{Unempt} \qquad (2)$$

This system can also be expressed in matrix form as follows:

$$\begin{bmatrix} 1 & \alpha 12 \\ \alpha 21 & 1 \end{bmatrix} = \begin{bmatrix} \beta 10 \\ \beta 20 \end{bmatrix} \begin{bmatrix} \beta 11 & \beta 12 \\ \beta 21 & \beta 22 \end{bmatrix} \begin{bmatrix} BMt - 1 \\ Unempt - 1 \end{bmatrix} + \begin{bmatrix} uBMt \\ uUnempt \end{bmatrix} \qquad (3)$$

The diagonal matrix A plays a crucial role in the identification process. This matrix reflects contemporaneous relationships between the three endogenous variables, which is reflected in the SVAR specification. Coefficients α12 and α21 represent contemporaneous relationships between Broad Money and Unemployment and are nonzero elements of matrix A. It is also important that when we have a vector of an autoregressive model with a matrix that is different from the identity in front of Xt, which includes several variables at time t and simultaneous relationships, it is, in fact, the determinant of the structural

model of unemployment. If we pre-multiply this VAR specification by the inverse of matrix A(A-1), then we will get the reduced form VAR;

$$A^{-1}AX_t = A^{-1}\beta_0 + A^{-1}\beta_1 X_{t-1} + A^{-1}u_t$$

G_0 G_1

$$X_t = G_0 + G_1 X_{t-1} + \varepsilon_t \qquad A^{-1}A = I \quad (4)$$

Where vector X depends on its own lag and forecast error Ɛ, the multiplication of this matrix by its inverse gives us the identity matrix. Additionally, the matrix A is also related to the structural shocks and the forecast error as Ɛt = A-1ut. In order to ensure our model is identified and obtain matrix A, we assume our model has the form $X_t = G_0 + G_1 X_{t-1} + \varepsilon_t$, or the following form when expanded,

$$BM_t = g_{10} + g_{11}BM_{t-1} + g_{12}Unemp_{t-1} + e_{BMt}$$

$$Unemp_t = g_{20} + g_{21}BM_{t-1} + g_{22}Unemp_{t-1} + e_{Unempt} \quad (5)$$

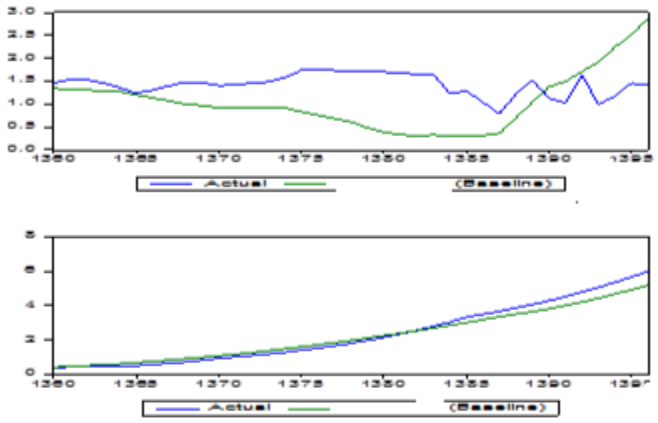
With the estimation of the above system, we obtain 6 coefficients (g), and 2 coefficients are obtained by the 2-variance-covariance matrix of the residuals. We totally have 10 parameters in our structural wage model for estimation, including, 6 coefficients, 2 variances, and 2 co-variances.

In the system Equation 1, we impose $\alpha 12 = 0$ and $\alpha 21 = 0$, which reflect a stable character of Unemployment desire and, therefore, is not affected by shocks to Broad Money.

By restricting our model, we achieve equality between the number of unknown parameters in the structural model and the number of equations estimated via the VAR. Our model will estimate 10 parameters with a set of equations provided in the appendix.

Table 1. Structural VAR estimation results

Dependent Variable: Unemp			
	Coefficient	Std. Error	Prob.
BM shocks	0.76	0.10267	0.0000
R-Squared = 0.909			
F-Statistics = 114.25			
Source: Research Results			



Graph 1. Shocks to money and unemployment based on Baseline and Actual Scenarios

Following Blanchard and Perotti (2002) and Bernanke and Milov (1998), minimal restrictions were imposed to facilitate the identification of the model by estimating the parameters of the structural model by semi-recursive variables with the general model of errors and shocks in the dynamic wage SVAR by Aet = But. The specifications of these equations can have both errors and shocks on the right-hand side. To obtain system responses to shocks, solving the equation is done in relation to et and got et = A-1But or et = Fut, thereby estimating A and B in order of computing F = A-1B. On the right-hand side, the shocks to BM and Unemployment illustrate the change in the left-hand side matrix A consisting of the error term of the original equation system.

Sims (1992) applied the recursive identification approach, while another important macro econometric study on SVAR performed by Blanchard and Perotti (2002) engaged a non-recursive method. Results show that Broad Money shocks in the short run are neutral in increasing production and reducing unemployment, which is according to the impulse-response function for about 2 to 3 periods by a coefficient of 0.76 that is significant at five percent, meaning that one percent expansion or shrinkage money will have resulted in 0.76 percent decrease or increase in the Unemployment rate, but in long-run, it cannot change production and therefore unemployment. Discussion and conclusion In this study, the link between Broad Money (BM) and Unemployment under the specification of the Philips curve is studied. The main finding of this study is that a one percent shock to M2 or Broad money will have resulted in a 0.76 percent change in the unemployment rate in short-run which is an important policy indicator for policymakers like the Central Bank of Croatia that unemployment targeting based on Taylor rule will have resulted in good results if good monetary policy takes place with the tools of money market like derivatives and bonds.

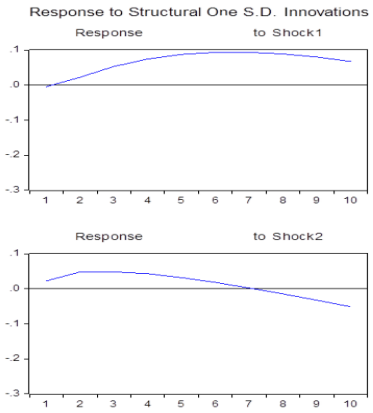
These results imply that monetary policy is neutral in the long run and real variables like production and unemployment cannot be changed by monetary policy, and if that is through the good mechanism of effect, it could change production and unemployment only in the short run and therefore, money is neutral.

IV. DISCUSSION AND CONCLUSION

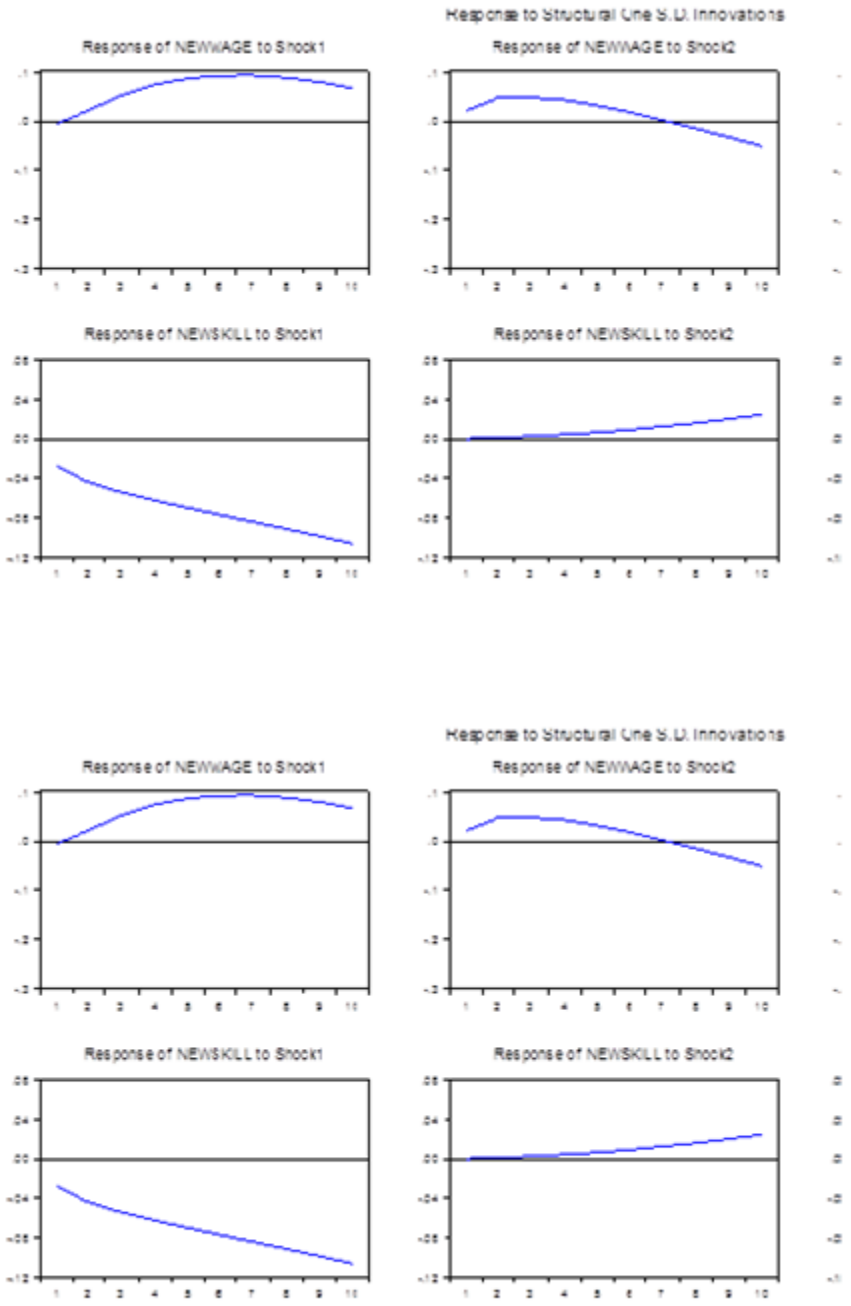
In this study, the link between Broad Money (BM) and Unemployment under the specification of the Philips curve is studied. The main finding of this study is that a one percent shock to M2 or Broad money will have resulted in a 0.76 percent change in the unemployment rate in short-run which is an important policy indicator for policymakers like the Central Bank of Croatia that unemployment targeting based on the Taylor rule will have resulted in good results if good monetary policy takes place with the tools of money market like derivatives and bonds. The channel of monetary policy to unemployment is through interest rate which will assure policy authorities to pay attention to mortgages and derivatives. These results imply that monetary policy is neutral in the long run and real variables like production and unemployment cannot be changed by monetary policy, and if that is through a good mechanism of effect, it could change production and unemployment only in the short run and therefore, money is neutral.

Appendix 1

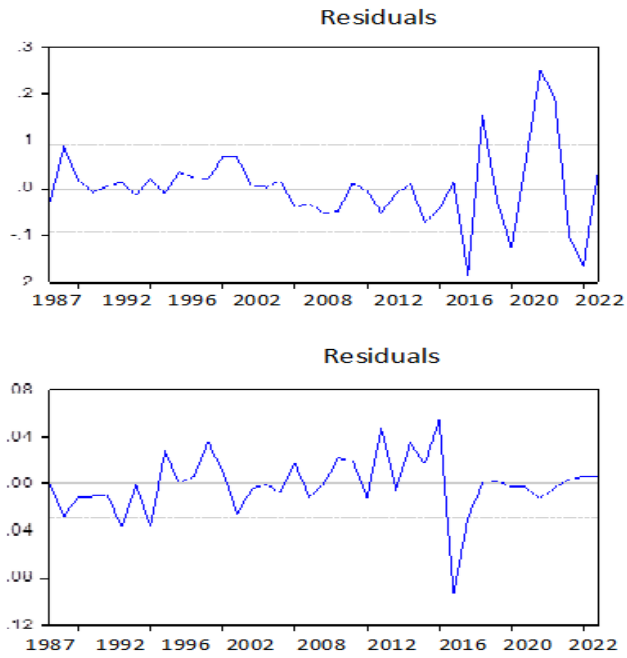
Graph 1. Response of wage to one standard structural shock hit of two endogenous



Graph 2. Response of Unemp to one standard structural shock hit of two endogenous variables



Graph 3: Residuals of endogenous variables in the SVAR model



Interest Conflicts

The author(s) declare(s) that there is no conflict of interest concerning the publishing of this paper.

Funding Statement

The author does not receive any funding for this research.

V. REFERENCES

[1] Arellano, M., Bond, S, (1991). "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations"., Review of Economic Studies, 58, 277-297.
[2] A Komijani, M Mohebi "NAIRU Fluctuations and Economic Growth: Evidences from Developing Countries." European Journal of Scientific Research 98 (3), 310.
[3] Barro, J., Robert, "Human Capital and Growth", (pp. 12-17), American Economic Review: Vol. 91 No. 2, (May 2001).
[4] Blundell, R., Bond, S, (1998). "Initial conditions and moment restrictions in dynamic panel data models", Journal of Econometrics, 87, 115-143.Ball, Laurence; Mankiw, N. Gregory. 2002. "The NAIRU in Theory and Practice", JOURNAL OF ECONOMIC PERSPECTIVES, 16, NO. 4 (FALL). 115-136.
[5] Braninger, Micheal, Pannendberg, Markus, "Unemployment and Productivity Growth, An Empirical analysis within the Augmented Solow Model", Economic Modeling, 19 (2002), 105-120, 2000, March.
[6] Coen, Robert, M., Robert Eisner, John Tepper Marlin, and Suken N. Shah. 1999. "The NAIRU and Wages in Local Labor Markets." American Economic Review, 89 (2): 52-57.DOI: 10.1257/aer.89.2.52.
[7] Bernanke,B.S.,&Gertler,M.(1995).Inside the black box: The credit channel of monetary policy transmission. The Journal of Economic Perspectives, 9(4), 27–48.
[8] Boivin, J.,Kiley, M.T., &Mishkin, F.S. (2010). How has the monetary transmission mechanism evolved over time? In B. M. Friedman & M. Woodford (Eds.), Handbook of monetary economics (Vol. 3, pp. 369–422). Elsevier. Retrieved from http://econpapers.repec.org/bookchap/eeemonhes/3.htm.
[9] Blanchard, Olivier and Danny Quah (1989), "The dynamic effects of aggregate demand and supply disturbances", American Economic Review 79: 655-673.
[10] Blanchard, O. and Perotti, R. (2002) An empirical characterization of the dynamic effects of changes in government spending and taxes on output, Quarterly Journal of Economics, 117, 1329– 68.
[11] Croatian National Bank. (2008). Monetary policy constraints in a small open and euroized economy. Financial Stability, 1, 46. Retrieved from http://www.hnb.hr/publikac/financijska%20stabilnost/efs-1-2008.pdf
[12] Croatian National Bank. (2014). Croatian National Bank Statistical Overview [Data set]. Retrieved December 3, 2014, from http://www.hnb.hr/statistika/h-statistika-statisticki-pregled.htm
[13] Ciccarelli, M., Maddaloni, A., & Peydró, J.-L. (2013). Heterogeneous transmission mechanism: monetary policy and financial fragility in the eurozone. Economic Policy, 28(75), 459–512.
[14] Elbourne, A., & de Haan, J. (2009). Modeling monetary policy transmission in acceding countries: Vector autoregression versus structural vector autoregression. Emerging Markets Finance and Trade, 45(2), 4–20.
[15] Galbraith, James K. 1997. "Time to Ditch the NAIRU." Journal of Economic Perspectives, 11 (1): 93-108.DOI: 10.1257/jep.11.1.93Top of Form.
[16] Monetary Policy." Journal of Economic Perspectives, 11 (1): 33-49.DOI: 10.1257/jep.11.1.33.
[17] Meyer, Laurence, H., Eric T. Swanson, and Volker W. Wieland. 2001. "NAIRU Uncertainty and Nonlinear Policy Rules." American Economic Review, 91 (2): 226-231.DOI: 10.1257/aer.91.2.226.