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New Keynesian Macroeconomics: Empirically tested in the case of Republic of Macedonia

NEW KEYNESIAN MACROECONOMICS: EMPIRICALLY TESTED IN THE CASE OF REPUBLIC OF MACEDONIA

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Abstract

In this paper we test New Keynesian propositions about inflation and unemployment trade off with the New Keynesian Phillips curve and the proposition of non-neutrality of money. The main conclusion is that there is limited evidence in line with the New-Keynesian theory. Money and growth are cointegrated series and that money growth influences the economics growth with one quarter lag. Cointegration means also that if the two series are cointegrated they have long run equilibrium. St.Louis model in the paper showed overall that increase in money growth leads to decrease in the economy growth. But the effect in the equation at three quarters lag is positive. The NAIRU rate in the unemployment inflation trade off model is almost similar as high to the actual unemployment. In the New Keynesian Phillips curve not surprisingly, there appears to be no statistically significant relationship between inflation and Unemployment –even in the classical Philips curve and in adaptive expectations Philips curve by Modigliani- Papademos (1975). Or the Friedman-Phelps- Lucas expectations-augmented one between the difference of actual and expected inflation rate and the gap between actual and the natural rate of unemployment presented in the next equation.

Keywords: New-Keynesian Macroeconomics, NAIRU, Money and output trade off

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"If you were going to turn to only one economist to understand the problems facing the economy, there is little doubt that the economist would be **John Maynard Keynes**. Although Keynes died more than a half-century ago, his diagnosis of recessions and depressions remains the foundation of modern macroeconomics. His insights go a long way toward explaining the challenges we now confront."- **N. Gregory Mankiw** (2008) a professor of economics at Harvard. He was an adviser to President Bush and advised Mitt Romney in his campaign,2012 for the Republican presidential nomination.

Introduction

In this paper we will investigate the issue of inflation and unemployment trade off and the money and output. In the part where we use data we will investigate this relation with data for Macedonian macroeconomic aggregates[3]. Since, 1991 Macedonia has gone from command to a market economy (process called transition). This resulted in high level of poverty and unemployment. Unemployment was a problem even before 1990, in 1970 in Macedonia were registered 20% unemployed, and in 1991 already there were 24% unemployed but the situation with the unemployment later further deteriorated.

Some factors that contributed to the high levels of unemployment are: low export intensive economy, low level of FDIs, decline of economic activity, large informal economy, inefficient labor market policies weak law enforcement and rigid labor legislation. In one study for transition vs OECD countries(Cazes,2002), was tested whether policies that promote social dialogue, extending it to pay higher attention to employment promotion and unemployment reduction and to ensure more labor market stability, are to be on political agenda rather than just a pure deregulation. And the results were that social dialogue is more efficient than just pure deregulation. Later in the section Money and Output we are testing the monetary policy efficiency in a small economy like Macedonia.

[3] Data used in this paper cover the period from 2004.1 to 2009.4 quarterly data .Data on inflation (CPI) unempolyment, M2(monetary aggregate), and GDP(Gross Domestic Poduct).

The research here includes money supply as a conventional channel of monetary policy and how does money supply affects growth of GDP. We employ VAR technique and OLS technique for estimations.

New-Keynesian Macroeconomics: Inflation-Unemployment trade offs

Alben Phillips (1958) in his paper concluded that there exist stable relationship between rate of change of money and unemployment for almost 100 years. That means that wages are stationary $\left(\frac{dw}{w}=0\right)$ at certain level of unemployment[4].There is countercyclical "loop" meaning that $\frac{dw}{w}\uparrow$ when $\frac{du}{t}\downarrow$ and opposite case when $\frac{dw}{w}\downarrow$ when $\frac{du}{t}\uparrow$ .Lipsey (1960) introduced new theoretical relationship between $w=\frac{dw}{dN}=k\times\left[\frac{N^d-N^s}{N^s}\right]$

Where N^d is demand for labor and N^s is a labor supply. , this relationship tells that the change in money wage rate is proportional to excess demand for labor. Now the key transformation form Phillips –Lipsey to Samuelson Sollow (1960) curve is done through *mark-up* pricing

$$P_t=(1+a)\frac{W_tN_t}{Q_t}$$

On the next equation nominal GDP is equal to 1+a times nominal wage. $P_tQ_t=(1+a)W_tN_t$

Now $laboproductivity=\frac{Q_t}{N_t}$.By substituting we get $P_t=(1-a)\frac{W_t}{laborproductivity}$

In logarithms we get $\log P_t=\log(1+a)+\log W_t-\log laborproductivity_t$

$$\frac{\Delta P_t}{P_t}=\frac{\Delta W_t}{W_t}-\frac{\Delta laborproductivity_t}{laborprroductivity_t}$$

[4] It was 5 ½ % for the United Kingdom for the period 1861-1957

So the inflations is negatively associated with productivity and is positively associated with wage growth. Next morel general Phillips curve is being introduced

$$w = \pi^e + bu^{-1} + \beta labor productivity,\ b > 0,\ 0 \le \beta \le 1$$

Here π^e is assumed to be stable and to be zero. Next it is being assumed modern Phillips curve $\pi = \pi^e + bu^{-1} - (1-\beta) labor productivity$.

Friedman-Phelps Phillips curve was about the short run trade -off between unemployment and inflation and that on the short run, expectations shift the short run Phillips curve which is depicted in the following expression: $\pi = f(u) + \pi^e$

Now, from Friedman's accelerationist hypothesis $(1-\theta)\pi_{t-1} = (1-\theta)\pi^e_{t-1} - b(1-\theta)(u_{t-1} - u^*)$

If we subtract from the original equation: $\pi_t = \pi_{t-1} + b(1-\theta)(u_{t-1} - u^*) - b(u_{t-1} - u^*)$

So when inflation is fully anticipated: $\pi_t = \pi^e_t, \pi_t = \pi_{t-1}, \text{ and } u_t = u_{t-1}.$

By substituting: $\pi_t - \pi_{t-1} = -b\theta(u_t - u^*) - b(1-\theta)(u_t - u_{t-1})$

$But\ \pi_t = \pi_{t-1} \Rightarrow \pi_t - \pi_{t-1} = 0 \ \ and\ u_t = u_{t-1} \Rightarrow u_t - u_{t-1} = 0.$

$So\ 0 = -b\theta(u_t - u^*)$ and $u_t = u^*.$

This expression implies that unemployment reverts to the natural rate at the long run Phillips curve once inflation is fully anticipated. In 1975, Modigliani and Papademos (1975) introduced the anagram NIRU, meaning "Non-Inflationary Rate of Unemployment", into the debate over the monetary policy and its consequences to inflation and unemployment.

…..(NIRU) It is defined as a rate such that, as long as unemployment is above it, inflation can be expected to decline - except perhaps from an initially low rate. The existence of NIRU is implied by both the "vertical" and the "nonvertical" schools of the Phillips curve" [Modigliani and

Papademos, 1975: 141-142].later other authors used the term NAIRU (nonaccelerating - inflation rate of unemployment) like Tobin, and Baily (1977)[5].

The Role of Monetary Policy and Inflation and Unemployment

The term "natural rate of unemployment" was used by Milton Friedman in order to express the idea that high levels of unemployment in a society could not be pegged by monetary policy, and that it is a result of real economic forces only[6].

> "The „natural rate of unemployment", in other words, is the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is embedded in them the actual structural characteristics of the labour and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering informationabout job vacancies and labour availabilities, the costs of mobility and so on" [**Friedman, 1968:8**].

So, we can say that for Friedman the natural rate of unemployment is the outcome of imperfections, frictions and rigidities either in the labour market that prevents a Walrasian general equilibrium market-clearing position in the economy.

Positively sloped Phillips curve

> "Just as the natural-rate hypothesis explains a negatively sloped Phillips curve over short periods as a temporary phenomenon that will disappear as economic agents adjust their expectations to reality, so a positively sloped Phillips curve over somewhat longer periods may occur as a transitional phenomenon that will disappear as economic agents adjust not only their expectations but their institutional and political arrangements to a new reality." (**Friedman 1976, Nobel prize lecture**)

[5] Other authors such as Okun (1978) do not make an explicit distinction between NAIRU and the natural rate of unemployment

[6] In his presidential lecture to the American economic association in Washington D.C., Friedman discussed monetary policy limitations.

Friedman in 1976 Nobel Prize lectures offered the possibility of positively sloped Phillips curve. According to Friedman increasing volatility and increasing government intervention within the pricing system are the major factors to increase the unemployment, not high volatility or high intervention. So this requires contracts to be renegotiated to shorter lengths. This is why monetary policy influences the real variables: Imperfect information on the labour market, second monetary policy deals with nominal variables while the rate of unemployment is real phenomenon.

Money and output

In the next table we summarize the three alternative views of monetary policy Real business cycle model, New classical model, and New Keynesian model.

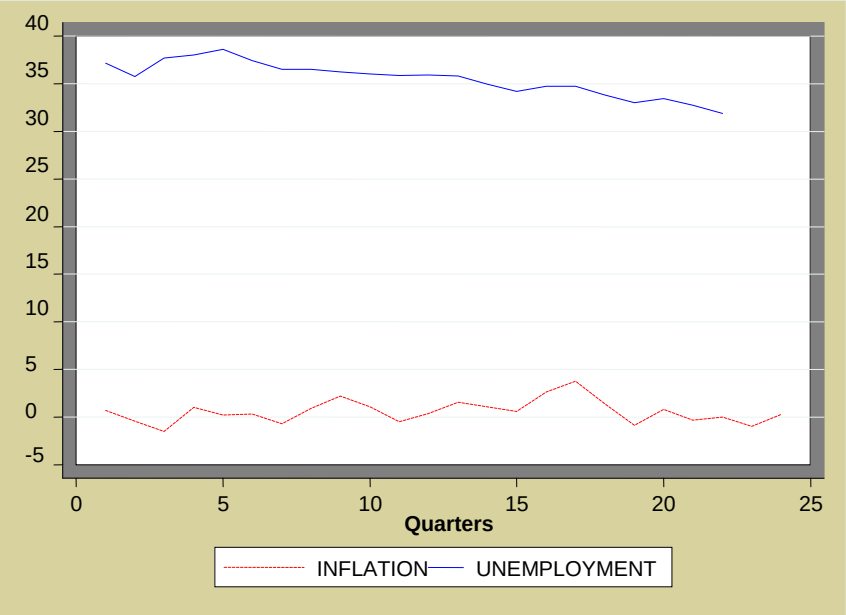
<table>
<tr><th colspan="4">Summary of Monetary Policy and Output: Three Alternatives</th></tr>
<tr><td colspan="4">Is current Output Affected by an…</td></tr>
<tr><td rowspan="2">Alternative</td><td>Unexpected change in money supply?</td><td>Expected change in money supply?</td><td>Is Activist policy desirable?</td></tr>
<tr><td rowspan="2">Real Business cycle model</td><td>No</td><td>No</td><td>No</td></tr>
<tr><td colspan="3">Prices are perfectly flexible, so monetary policy cannot affect real money balances or output in the short run</td></tr>
<tr><td rowspan="2">New classical model</td><td>Yes</td><td>No</td><td>No</td></tr>
<tr><td colspan="2">Only expected changes in the money supply affect output.</td><td>Monetary policy affects output and the real interest rate only by "fooling" households and firms.</td></tr>
<tr><td rowspan="2">New Keynesian model</td><td>Yes</td><td>Yes</td><td>Rarely</td></tr>
<tr><td colspan="2">Both unexpected and expected changes in the money supply affect output, although effects of unexpected changes are greater.</td><td>Frequent changes in monetary policy can reduce the credibility of the monetary authority.</td></tr>
</table>

About the credibility of central banks, both models New Classical and New Keynesian School argued that is the important problem in the early 1990's.Credibility in some research (Geraats,

2002)[7],is measured as low past inflation outcomes. Macroeconomic performance based on the variability of inflation and output reveals that credibility and to a lesser degree transparency improves macroeconomic performance. Recent evidence supports the New Keynesian view.

Empirical investigation of unemployment and inflation trade off

On the next graph we present the movement of inflation and unemployment. Here we use quarterly data from 2004 quarter 1 to 2009 quarter 4 [8] . Data are collected from Econstats™.



Source: IMF IFS and EconStats™

On the graph we can see persistent unemployment and moderate low inflation. The low infation is associated with the primary goal of National bank of Republic of Macedonia which is price stability. The persistent unemployment is because there are no posts (involuntary unemployment) or due to lack of qualifications necessary to be employed (structural unemployment). The mismatch between the skill requirements of newly created jobs and effective skills owned by the workers has become a substantial problem (Svejnar, 2002). Consequently, the labor markets in

[7] Geraats, M.Petra, (2002), ***Central bank transparency***, The Economic Journal, (112), Royal Economic Society

[8] http://www.econstats.com/ifs/NorGSc_Mac2_M.htm

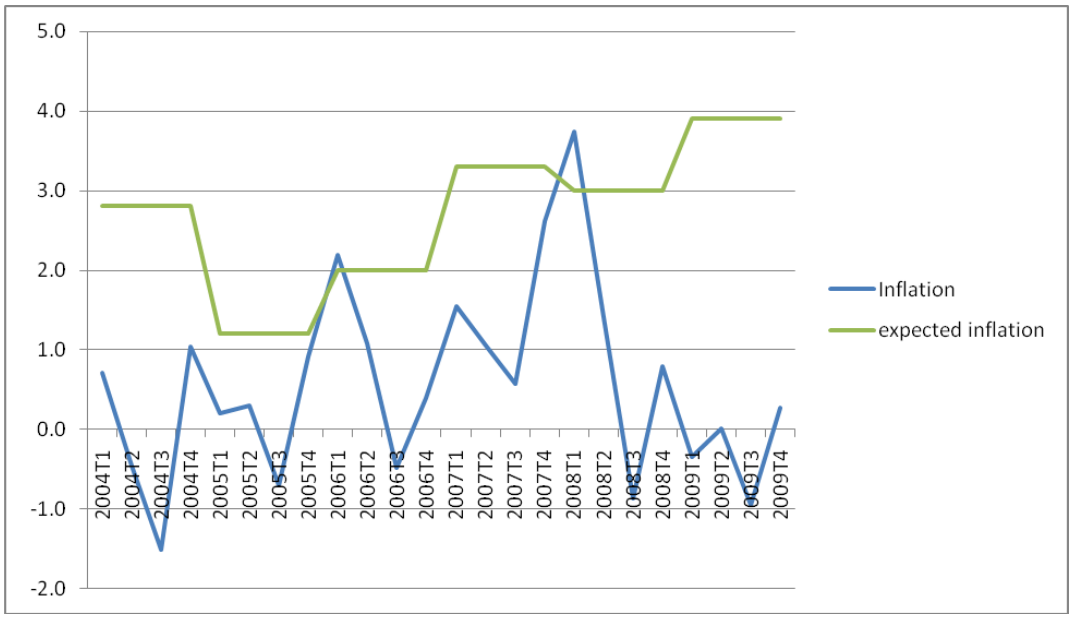
early transition became less dynamic with a relatively stagnant unemployment pool leading to increases in unemployment and especially longterm unemployment (Cazes and Nesporova, 2003).Now in this paper we try to test the applicability fo NAIRU (Non-Accelerating-Inflation Rate of Unemployment), which refers to the level of unemployment below which inflation rises. Fridman and Phelps at the end of 1960's established that the Philips curve is vertical in the long run as a feature of the Walrasian. In the next Table are presented the Inflation and Unemployment in percentages quarterly data.[9]

Quarters	Inflation	Unemployment	Expected inflation
2004T1	0.7	37.1	2.8
2004T2	-0.5	35.8	2.8
2004T3	-1.5	37.7	2.8
2004T4	1.0	38.0	2.8
2005T1	0.2	38.6	1.2
2005T2	0.3	37.4	1.2
2005T3	-0.7	36.5	1.2
2005T4	0.9	36.5	1.2
2006T1	2.2	36.2	2
2006T2	1.1	36.1	2
2006T3	-0.5	35.9	2
2006T4	0.4	35.9	2
2007T1	1.5	35.8	3.3
2007T2	1.0	35.0	3.3
2007T3	0.6	34.2	3.3
2007T4	2.6	34.7	3.3
2008T1	3.7	34.8	3
2008T2	1.4	33.8	3
2008T3	-0.9	33.0	3
2008T4	0.8	33.5	3
2009T1	-0.3	32.7	3.9
2009T2	0.0	31.9	3.9
2009T3	-1.0	n.a	3.9
2009T4	0.3	n.a	3.9

Source: IMF IFS and EconStats™ and NBRM (for the expected inflation data)

[9] Data on inflation are derived from CPI indexes and converted into percentages

On the next graph are presented the movements in the period 2004.1 to 2009.4 of actual inflation and expected (projected) inflation by the National bank of Republic of Macedonia.



Source: Econstats^{TM}, and NBRM (reports of projected inflation)

The classic Philips curve:

$(\pi_t) = f(U_t)$

$$\pi_t = 4.39 - 0.1225U_t$$

Standard errors (8.816) (0.247)

We can compute the underlying natural rate of unemployment as:

$$U^n = \frac{\hat{\beta}_1}{-\hat{\beta}_2} = \frac{4.39}{0.1225} = 35.84 \quad R^2=0.0298$$

From the results above we can observe that estimated coefficients have the expected signs, but they are both highly statistically insignificant. Moreover, the coefficient of determination is close to zero, which indicates a low explanatory power of the applied linear regression model.

Therefore, we argue that NAIRU concept is far from being applicable in the case of Macedonian labour market. The NAIRU concept applies for mature market economies, not for a young labour market like that in Macedonia set up just at the beginnings of 1990's. And most of the transition countries including Macedonia in the beginning of establishing the labour market had experienced high inflation rates which cannot be explained by the unemployment.

Most of the NAIRU literature emphasises its importance as a long-run concept (Hahn, 1995; Ball, 1999; Ball and Mankiw, 2002). In the short-run, unemployment can deviate from the NAIRU, but in the long run is assumed to return to a unique NAIRU.

The simple adaptive expectations Phillips Curve(Modigliani-Papademos,1975**)**:

$(\pi_t) = f(\pi_{t-1}, U - U^*)$

$$\pi_t = -0.015 - 0.96\pi_{t-1} - 0.40(U - U^*)$$

Std.errors (0.256) (0.339) (0.205) R^2=0.54

Not surprisingly, there appears to be no statistically significant relationship between inflation and Unemployment –even in the classical Philips curve and in adaptive expectations Philips curve by Modigliani- Papademos (1975). Or the Friedman-Phelps- Lucas expectations-augmented one between the difference of actual and expected inflation rate and the gap between actual and the natural rate of unemployment presented in the next equation.

The simple expectations augmented Phillips Curve(Friedman, 1968-Phelps, 1967**)**[10]:

$(\pi_t) = f(\pi_t^e, U_t - U^*)$

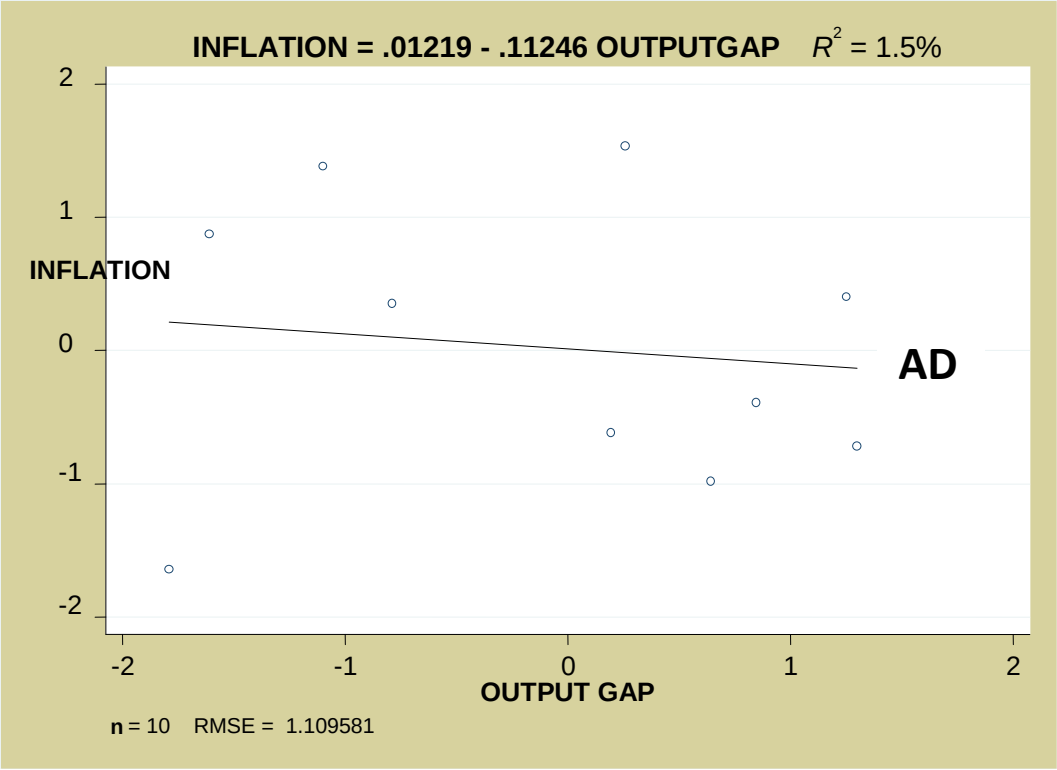
$$\pi_t = 0.932 - 0.294\pi_t^e - 0.34(U - U^*)$$

Std.errors (0.97) (0.285) (0.327) R^2=0.157

[10] Graphical depictions of these relationships can be seen in Appendix 1

INFLATION AND OUTPUT GAP TRADE-OFF IN MACEDONIA

According to New-Keynesian theories, fluctuations in output and employment rise because of fluctuations in nominal aggregate demand (Ball, Mankiw, Romer, 1988).



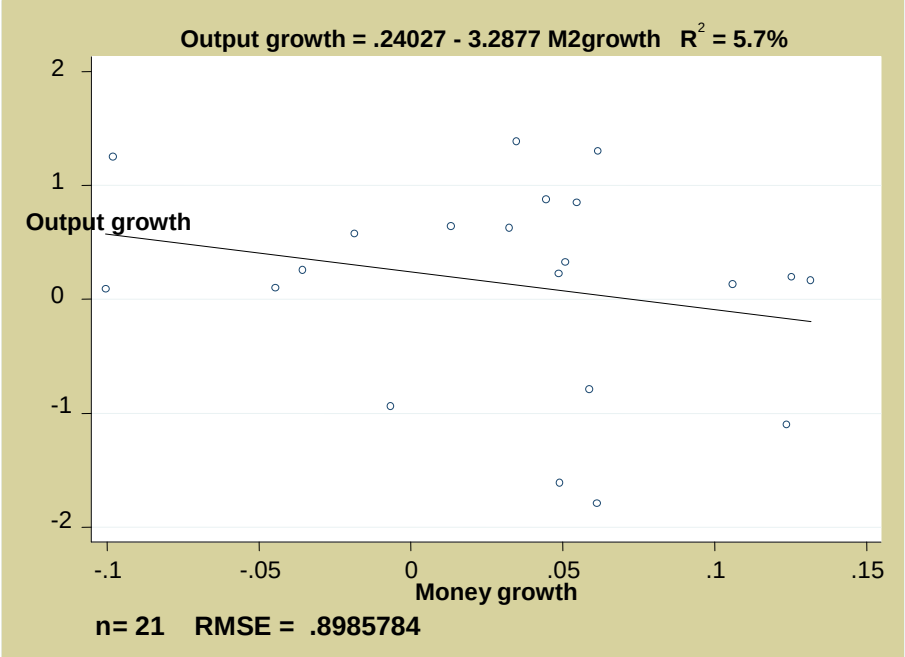
Output is demand determined, according to a Keynesian view prices below Walrasian levels, raise output, same as when decreases in demand decrease output.

MONEY AND OUTPUT

Next we consider whether money is neutral in the short run. The most obvious thing to do is to run a regression of current output on the current money supply (all in log differences or growth rates).

$$\Delta \log(y_t) = b\Delta \log(m_t) + \varepsilon_t$$

This is often called St.Louis equation because it was used by the St. Louis FED economists in 1960's. Graphical representation is depicted in the next scatter with fitted values line.



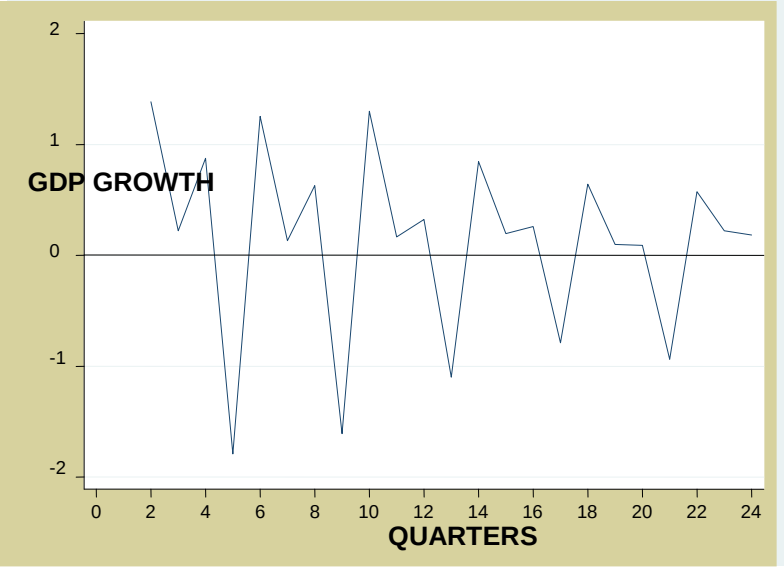
STATIONARITY OF THE VARIABLES

In this section we do a unit root testing for the variable economic growth. The result of the ADF (Augmented Dickey-Fuller tests) test[11] is presented in the next table.

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-8.439	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.0000				

[11] From the above table we can clearly note that the Mac Kinnon p-value is 0.000 if we reject the null hypothesis that the tested series is generated by non-stationary process.

The null hypothesis is that the variable contains a unit root, and the alternative is that the variable was generated by a stationary process. From the table we clearly can reject the null of unit root for the economic variable and accept the alternative of stationary process. On the next graph, stationarity of the economic growth variable is being depicted.

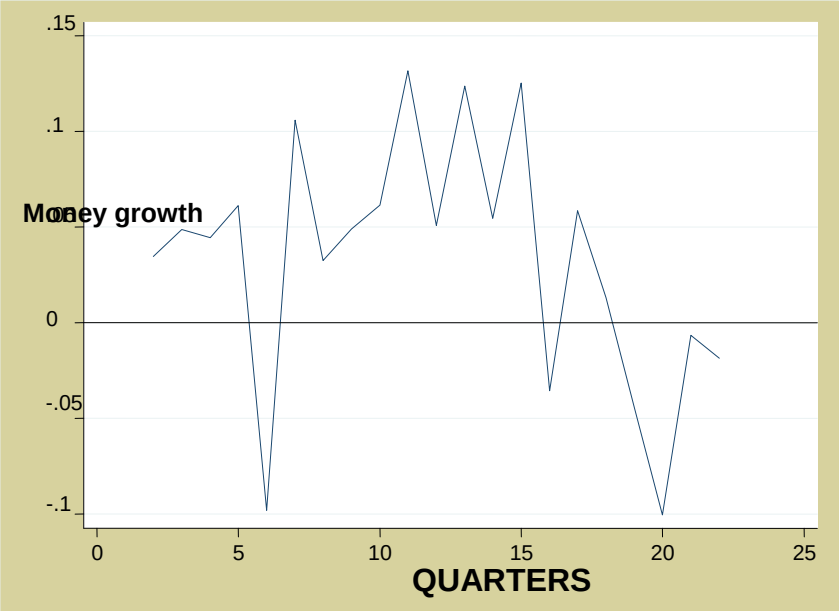


In this section we do a unit root testing for the variable Money growth. The result of the ADF (Augmented Dickey-Fuller tests) test[12] is presented in the next table.

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.767	-3.750	-3.000	-2.630
MacKinnon approximate p=0.0033				

On the next graph, stationarity of the Money growth variable is being depicted.

[12] From the above table we can clearly note that the Mac Kinnon p-value is 0.0033 if we reject the null hypothesis that the tested series is generated by non-stationary process.



we assume $\{\varepsilon t\}$ is a sequence of uncorrelated random variables having zero mean and variance σ^2, unless stated otherwise.

A (weakly) stationary time series has a constant mean, a constant variance and the covariance is independent of time. Stationarity is essential for standard econometric theory. Without it we cannot obtain consistent estimators. A quick way of telling if a process is stationary is to plot the series against time. If the graph crosses the mean of the sample many times, chances are that the variable is stationary; otherwise that is an indication of persistent trends away from the mean of the series.

VAR MODEL

Vector autoregression (VAR model) is possible to deal with dynamic relationships between macroeconomic variables, where causality may be mutual According to Sims, if there is true simultaneity among a set of variables, there should not be any a priori distinction between endogenous and exogenous variables. It is in this spirit that Sims developed his **VAR** model.[13]

Now we will estimate two equations:

[13] **Gujarati**, **D**. **Basic Econometrics**, (McGraw Hill, **2003**) 4th edition (GJ).

$$GDPgrowth = \alpha + \sum_{j=1}^{k} \beta_j GDPgrowth_{t-j} + \sum_{j=1}^{k} \gamma_j Moneygrowth_{t-j} + u_{1t}$$

$$Moneygrowth = \alpha + \sum_{j=1}^{k} \theta_j GDPgrowth_{t-j} + \sum_{j=1}^{k} \gamma_j Moneygrowth_{t-j} + u_{1t}$$

Here u's are impulses or innovations or shocks in the VAR language.

VECTOR AUTOREGRESSION ESTIMATION BASED ON 2 LAGS

In the next Table it is presented VAR estimation of the above equations [14]

DEPENDENT VARIABLE Growth of GDP				
Variable	**coefficient**	**Standard errors**	**Z-value**	**Probability of type I error**
Growth of GDP (-1)	-0.60	0.20	-2.99	0.00
Growth of GDP (-2)	-0.34	0.21	-1.62	0.11
M2growth (-1)	4.76	2.47	1.93	0.05
M2growth (-2)	-3.63	2.42	-1.50	0.13
Constant	0.11	0.18	0.61	0.54
DEPENDENT VARIABLE Money growth(M2growth)				
Variable	**coefficient**	**Standard errors**	**Z-value**	**Probability of type I error**
Growth of GDP (-1)	0.02	0.02	1.26	0.21
Growth of GDP (-2)	-0.03	0.02	-1.72	0.09
M2growth(-1)	0.33	0.20	1.61	0.11
M2growth(-2)	0.20	0.20	0.98	0.33
Constant	0.02	0.01	1.14	0.25

Below are given the general statistics for the two equations.

[14] We can estimate the two equations by SURE method also.

Sample: 2004.1 – 2009.4	**No. of obs = 19**	
Log likelihood =11.6603	**(Akaike info criteria) AIC=-0.17477**	
FPE =0.002952	**(Hanann-Quin info criteria) HQIC=-0.09064**	
Det(Sigma_ml) =0.001005	**(Schwarz-Bayes criteria) SBIC=0.322304**	
Equation	**RMSE(Root mean squared error**	**R(squared) of the regression**
GDPgrowth	**0.723774**	**0.4974**
Money growth	**0.059705**	**0.4169**

From the above results we can see that Money growth influences positive on economic growth on 1 lag, but negatively on 2 lags while GDP growth influences negatively and statistically significant at two lags. While in the autoregressions growth of GDP on 1 lag negatively influences current GDP growth, and monetary growth influences its current value negatively at minus 2 lags.

Granger causality test

Next procedure is to test the causality to see whether GDP growth influences money growth or is it opposite that money growth influences GDP growth or the two variables influence each other.

According to Gujaraty(2003) R.W.Hafer used the Granger test to find out the causality between GDP and money supply(M2). He used the growth rates of the variables, and we also use the growth rates of the two variables.

"Granger causality" tests - or more correctly perhaps, Granger non-causality tests - are statistical tests of "causality" in the sense of determining whether lagged observations of another variable have incremental forecasting power when added to a univariate autoregressive

representation of a variable. The test itself is just an F-test (or, as above, a chi-squared test) of the joint significance of the other variable(s) in a regression that includes lags of the dependent variable.In the next table we present Granger causality Wald test results.

First estimated equation excludes Money growth, null hypothesis here is that only lagged values of GDP growth influence the GDP growth, and M2 growth does not influence the GDP growth.

Granger causality Wald test

Null hypothesis is that excluded variable does not Granger cause the variable in the equation.

Equation	**Excluded**	χ^2	**Degrees of freedom**	**Pvalue of χ^2 test**
GDPgrowth	**Money growth**	4.8766	2	0.087
Money growth	**GDPgrowth**	7.6854	2	0.021

From the above results we reject the null hypothesis that money growth does not influence the GDP growth at 10% level of significance, while we can't reject at 1% and 5% conventional levels of significance. While in the second equation where the null hypothesis is that Money growth is supposedly influenced only by its own lagged values and not by the GDP growth variable, we reject the null at 5% and 10% levels of conventional significance and not on 1%.

So in a way the causality runs in both directions from GDPgrowth $\longrightarrow$ M2 growth and from M2growth $\longrightarrow$ GDPgrowth. But this test has some drawbacks for which the literature must be consulted.

ST. LOUIS EQUATION

St.Louis equation show that all of the GDP response to change in money occurs in about a year[15]

GDPgrowth	**Coefficient**	**Robust standard errors**	**t**	**p-value**
M2growth(-1)	2.30	4.66	0.49	0.63
M2growth(-2)	-13.03	9.43	-1.38	0.19
M2growth(-3)	14.28	8.67	1.65	0.13
M2growth(-4)	-6.08	2.76	-2.21	0.05
t	0.00	0.06	-0.03	0.97
_cons	-0.10	0.95	-0.10	0.92

In our equation contrary to traditional St.Louis equation only the sign is different (-) instead of (+) and it is expectedly that the changes in money growth influence the GDP growth in one year.

If we add the coefficients on the lagged M2 values we get 2.30-13.03+14.28-6.08= -2.53.Meaning that if the monetary aggregate M2 increases about 1%, GDP will lower on average about 2.53 %.

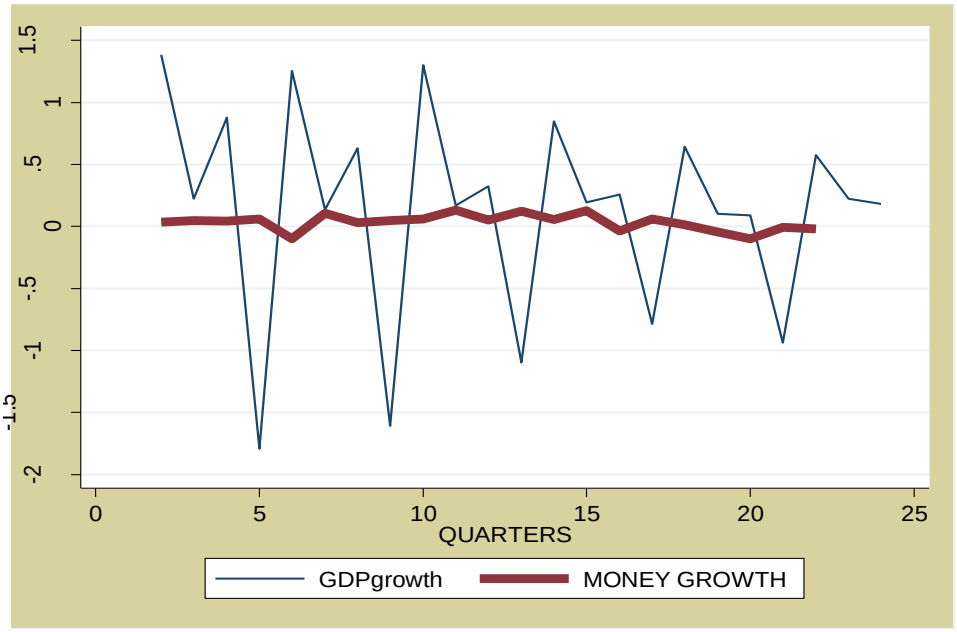
According to Romer (2006) the relationship between money and output is negative and it will lower the output , because the positive monetary shock will increase the demand for money but it will increased the money stock and interest rates, which will lead to output reduction. We test the stationarity of the saint Louis equation. We save the residuals from the equation and then we perform Unit root test on them.

[15] "The relationship between the growth of the economy and the growth of the money supply is just no longer there"-Lyle E.Gramley former governor of the Federal Reserve board , Kansas City (1980-85)

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-5.874	-3.750	-3.000	-2.630
MacKinnon approximate p=0.000				

The two series do not contain unit root and are **cointegrated**[16].

Cointegration refers to the fact that two or more series share an stochastic trend (Stock & Watson). Engle and Granger (1987) suggested a two step process to test for cointegration (an OLS regression and a unit root test), the EG-ADF test.



[16] P-value is 0.000

CONCLUSION

From the empirical part we can see that the NAIRU concept is far from being applicable in the case of Macedonian labour market. The causality runs in both directions from GDP growth to M2 growth and from M2 growth to GDP growth, but this test has some drawbacks for which the literature must be consulted. And the money growth and GDP growth are cointegrated times series they share a stochastic trend.

There are many explanations why NAIRU concept is not applicable in the economy such as Macedonian. If we go back and see some important empirical investigations in this field we can conclude that the well-known trade-off between unemployment and inflation works only under some specific conditions. One of explanation is that relationship between unemployment and inflation is applicable only in large economy that is based on well-established market economy underpinnings, especially in labor and capital market, in the long time series. Macedonian as a post-transition economy is not a part of that group of countries. In that context, the Macedonian central bank is not able to moderate the level of inflation compere to unemployment as that can does Fed.

Some empirical investigations of St.Louis equation show positive and statistically significant correlation between money supply and economic growth. The result that we obtain in our regression is quite different. Namely, when the money supply increases that leads to decrease in the economy growth, the exception from this is the effect of money supply growth to output at three quarters lag, which is positive. In this direction, we can conclude that the monetary policy in Macedonian is not effective, and consequently the Macedonian central bank is not able to implement monetary policy in order to influence on the economic growth.

APPENDIX 1 : A VISUAL APPROACH – SCATTER PLOTS

Three scatter plots, showing quarterly data from the late 2004.1-2009.4 are included in the appendix below to show the types of functional relationships that were empirically investigated here.

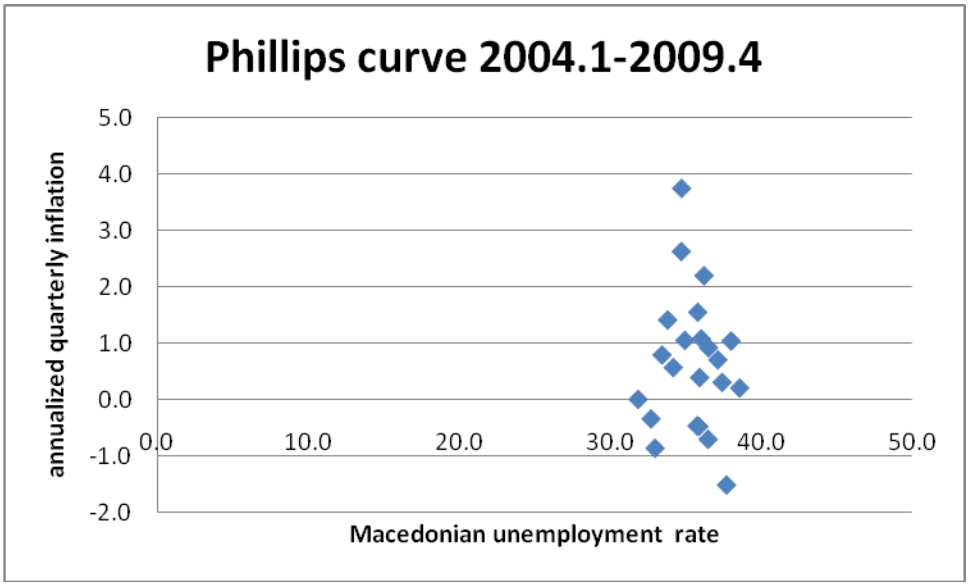


Figure 1 A graphical depiction of $(\pi_t) = f(U_t)$

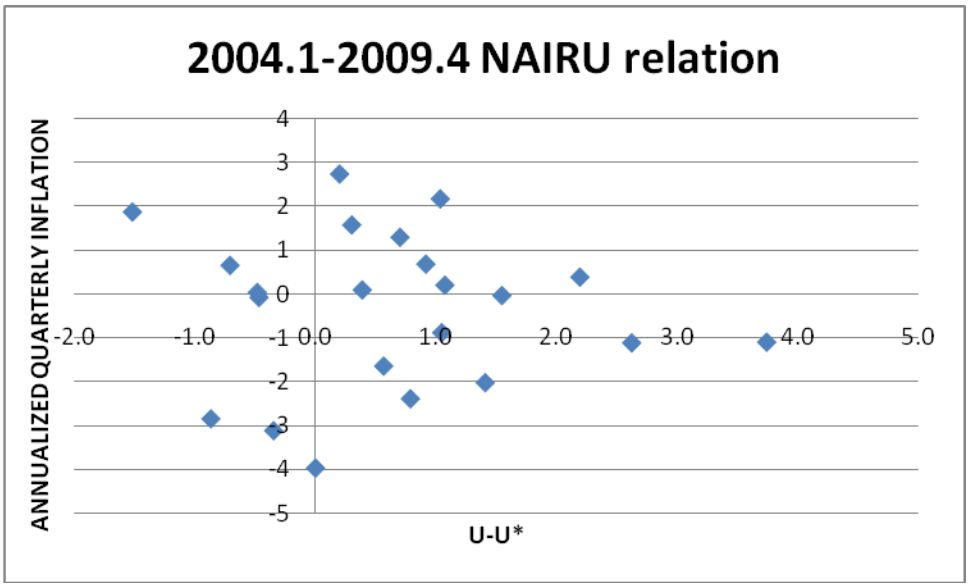


Figure 2 A graphical depiction of $(\pi_t) = f(\pi_{t-1}, U - U^*)$

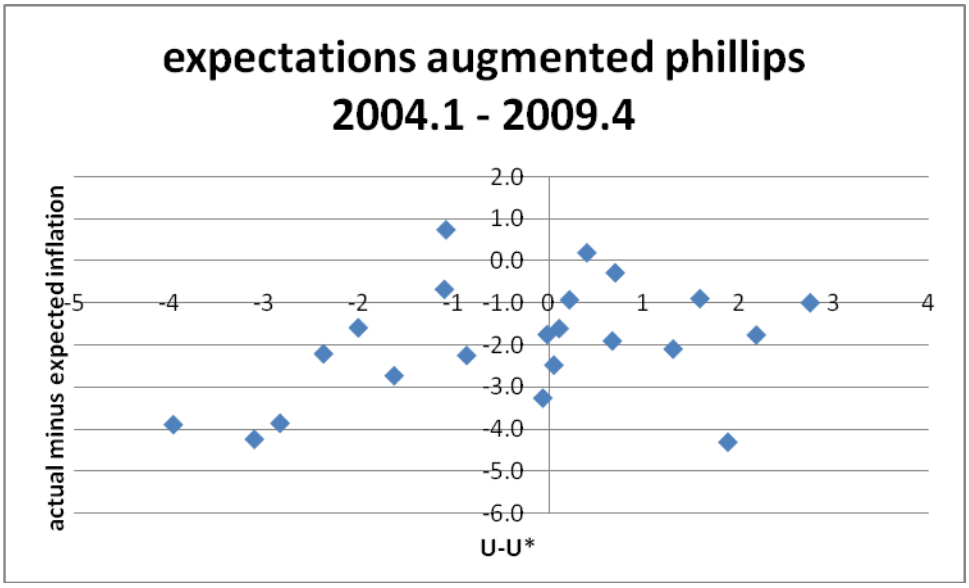


Figure 3 A graphical depiction of $(\pi_t) = f(\pi_t^e, U_t - U^*)$

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