NAIRU estimates in transitional economy with extremely high unemployment rate: the case of the Republic of Macedonia

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Abstract

The paper provides time-varying NAIRU estimates for Macedonian economy for the period 1998-2012, which were obtained using Ball and Mankiw (2002) approach and additionally supplemented with iterative procedure proposed by Ball (2009). The results revealed that the Macedonian NAIRU has the hump-shaped path: the estimated NAIRU is 23.5 percent in the second quarter of 1998, peaks at 28.3 percent in the last quarter of 2005 and falls to 23.6 percent in the last quarter of 2012. The estimation is based on the corrected LFS unemployment rate for the employment in the grey economy.

Key words: NAIRU, unemployment, inflation, Macedonia.

JEL classification: J64, E24.

1. Introduction

The non-accelerating inflation rate of unemployment (NAIRU hereafter) is along with the output gap, the reference point for macroeconomic policies. There is close link between, on one hand the deviations of actual unemployment from equilibrium rate of unemployment (the NAIRU) and, on the other hand, the output gap representing the cyclical fluctuations on the economy's total output and around its potential level. This link is explicitly captured in the production function which when used to estimate potential output must include the equilibrium labour force. One option is to estimate the given equilibrium using the NAIRU concept (Gylanik and Hucek, 2009). Therefore the NAIRU is the key indicator in describing the cyclical position of the economy – the basis on which policy instruments are set. The NAIRU's implications for economic policy is nicely discussed in Gordon (1997).

In the case of the Republic of Macedonia (Macedonia hereafter), another reason to analyze unemployment is its extremely high level existence (since the transition, the unemployment rate has been constantly over 30%), which is one of the country's key economic problems. Estimating the NAIRU in the Macedonian economy could bring a clearer understanding of the extent to which unemployment is the result of cyclical disequilibrium or structural disproportions in the labour market.

The main goal of this paper is to provide estimation of the macroeconomic indicator NAIRU for Macedonian economy and to verify their applicability against output gap. The NAIRU estimates are not available for Macedonia, thus making the empirical results the main contribution of the paper. This approach is opposite to the current Macedonian academic thinking which considers NAIRU as not applicable in the Macedonian economy. Miljovski, and Stojkov (2012) questioned the applicability of NAIRU in the country and they pointed out as the main reasons behind limmited applicability of the concept the methodological problems in quantifiyng the potential output and output gap, the profound demographic, political and socio economic changes, and the shallow time dimesnion of the available series. Simmilarly, Fiti et al. (2013) recommends that the official unemployment rate in the country (obtained through ILO's Labour Force Survey) should

be corected for the influence of the grey economy in order adequate NAIRU estimates to be achived.

The present paper used the procedure for NAIRU estimation based on the Ball and Mankiw (2002) approach, which estimates the time-varying NAIRU as far better alternative than the constant estimation (Hogan 1998, showed that the assumption of a constant NAIRU reduced the ability of a Phillips curve to explain the inflation observed in USA). In addition, the time-varying NAIRU estimates are improved with the iterative procedure proposed by Ball (2009). Two variables are used in the procedure: unemployment rate and inflation rate. Instead of Labour Force Survey (LFS hereafter) unemployment rates, the present paper used corrected unemployment rates for the employment in grey economy. The correction makes an average reduction of the LFS unemployment rates of 25 percent. The analysis is based on the quarterly data in the period 1998-2012. The period is relatively short due to availability of data. LFS started to be implemented by the Macedonian State Statistical Office since 1997.

The main result of this paper is that NAIRU in Macedonia has followed hump-shaped path: the estimated NAIRU is 23.5 percent in the second quarter of 1998, peaks at 28.3 percent in the last quarter of 2005 and falls to 23.6 percent in the last quarter of 2012. This dynamics reveals the abbility of NAIRU to present the cyclical misbalances in a national economy. Specifically, the paper finds the negative correlation between the employment gap and output gap in Macedonia for the period 2003-2012.

The paper is organized as follows. The next section discusses the analytical value of NAIRU. Section 3 presents the stylized facts about unemployment in the Republic of Macedonia. Section 4 makes correction of LFS unemployment rates for grey economy activities. Section 5 explains strategy for NAIRU estimation. Section 6 presents the empirical results and checks their applicability. The last section brings the main conclusion.

2. **Analytical Value of NAIRU**

In literature, quite often instead of using the term natural rate of unemployment there is used the term NAIRU (Non Accelerating Inflation Rate of Unemployment). Using these two terms as

synonyms is more for practical reasons. Although, there are differences between these two concepts, in this paper both terms are taken as synonyms and hereafter there will be used the term NAIRU, which is a term used by new Keynesians. (Snowdon, Vane and Wynarczyk 1994; Blanchard and Katz 1997).

Although is the concept of NAIRU quite disputed, the fusion between inflation and unemployment is theoretically quite well defined. Namely, when the actual unemployment is below NAIRU, there is pressure on the inflation rate to rise, and vice versa, when the actual unemployment is above NAIRU there is pressure on the inflation rate to drop. The concept of the NAIRU has taken in consideration the inverse relationship between inflation and unemployment (Phillips curve in the short term). But, NAIRU is long-term concept. Phillips curve increased by expectations, connects the current deviations of inflation from the expected rate of inflation, as a function of deviations of actual unemployment from the NAIRU. Changes in monetary policy push unemployment and inflation in two opposite directions. Adjustment between unemployment and inflation, whose changes are influenced by monetary policy, is at the core of this concept (Weiner 1993; Ball and Mankiw 2002).

Today there is a general view that the NAIRU exists, but that it changes over time. Significant research about variation of NAIRU over time has made Robert Gordon. By analyzing a period longer than 40 years, he concluded that the NAIRU in the United States varies in a narrow range from 5.7% to 6.4% (Gordon 1997). Changes in the NAIRU are consequence of: first, changes in the demographic structure of the labor force; second, changes in productivity of labor, that causes the effect known as "wage-aspiration effect" and third, increase in the competitiveness of the labor market and market of goods and services (Stiglitz 1997)

Theories that explore the determinants of the NAIRU can be divided into two groups: first, institutional theories which locate the main reason for higher unemployment rates in low wage flexibility of the labor market, that disables its fast cleaning and creates involuntary unemployment and second, hysteresis theories that explain that the natural rate of unemployment is determined by the rate of unemployment in the previous period (Blanchard and Wolfers 1999, Blanchard and Summers 1987, Phelps and Zoega 1998).

New Keynesians believe that NAIRU is very useful analytical concept. Its usefulness may be located in the following aspects: first, through NAIRU there can be understood the causes of inflation; second, NAIRU is a very good empirical basis for predicting changes in the inflation rate and third, NAIRU is a general guide for policy makers in conceptualization of economic policies (Stiglitz 1997)

Nobel laureate Stiglitz believes that changes in unemployment are good "announcer" of the movement of inflation. He explains it with the following facts about the U.S. economy: First, since 1960 inflation grew in 26 of 32 quarters when unemployment rate was below 5%, but inflation decreased in 24 of 27 quarters when unemployment was below 7%. Second, when unemployment rate is held by one percentage point below the NAIRU one year, the result is an increase in inflation by 0.3 to 0.6 percentage points. Third, minimum 20% of changes in inflation can be explained by changes in unemployment (Stiglitz 1997). This indicates a very strong link between inflation and unemployment. New Keynesians consider that changes in inflation are not independent from the level of unemployment. The likelihood of inflation during the year is greater if the level of unemployment at the beginning of the year is reduced. Hence, economists should not ignore this concept, insofar as, the fact that at least 20% of changes in inflation are explained by changes in unemployment should not be neglected.

Studies show that the concept of NAIRU is applicable in the U.S. and developed market economies. But it remains an open question whether this concept is applicable in countries in transition. Studies indicate that in some transition countries such as Latvia, the concept of NAIRU is applicable (Gravelis 2007). In Russia, the actual unemployment rate converges to the NAIRU. This suggests that unemployment is structural rather than cyclical (Bragin and Osakovski 2005). The sequel will analyze the applicability of the NAIRU in the labor market in Macedonia.

### 3. Stylized facts about unemployment in Macedonia

The Republic of Macedonia has one of the highest unemployment rates in Europe. The unemployment rate at independence in 1991 was 26%, it continuously increased during transition period and reached the highest level of 37,3% in 2005. However, the increase in unemployment

is not only characteristic for the transition period. Upward trend has been continuing to exist in the last fifty years, when the unemployment rate of 9.5% in 1959 rose to over 30% in the transitional period.

The unemployment rate in Macedonia is far above the average of European Union, but also far higher than the unemployment rate in the new EU member states and candidate countries for EU membership. Unemployment rates in EU 27 is maintained below 10%, although there are countries where unemployment is double digit, but still much lower than that in Macedonia.

The fact is that in the Republic of Macedonia the trend of unemployment for the whole period before transition and during transition was upward, and in the middle of the first decade of this century the unemployment rate stabilized at around 35%.

Figure 1. Unemployment rate in Macedonia, 1959 – 2008
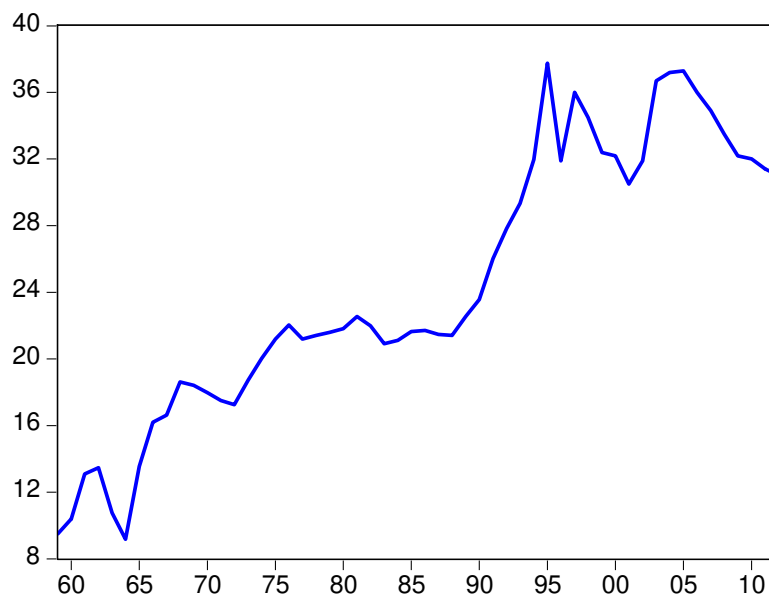
Source: State Statistical Office of the Republic of Macedonia, Statistical Yearbook (different issues).

Note: The methodology for unemployment estimation is not consistent for the presented unemployment rates. The State Statistical Office of the Republic of Macedonia uses LFS methodology only since 1997.

Unemployment in Macedonia has the characteristic of structural unemployment, while frictional unemployment is quite low. Unemployment is determined primarily by the imbalances between supply and demand of labor skills, and also by the unfavorable structure of the unemployment from the waiting time for employment point of view.

Trpeski (2012) argued that unemployment in Macedonia is largely structural. Namely, total unemployment can be explained with 87.16 by changes in long-term unemployment, while 13.24% through changes in short-term unemployment. Unemployment cannot be explained by changes in economic cycles because changes in unemployment only with 6.75% can be explained by changes in GDP.

Imbalances between the supply and demand of labor, and geographical imbalance, show that unemployment in Macedonia is structural. This means that it is long-term unemployment, which receives characteristics of the phenomenon of displaced workers. Most of them are workers who have lost their jobs because their company was closed or in the company were jobs were reduced, so they became unemployed as a result of redundancy. However, it is very difficult for these workers to find another job and if unemployment lasts for a longer period, they give up from searching job further. Over time, these individuals may be more difficult to employ because the unemployment is of a long-term character. Wages that employers are willing to pay to persons who have been unemployed for a long time are lower than the wages that they are willing to pay to people who have been unemployed for a short time, although they have the same qualifications (Blanchard and Diamond 1990).

In the period 1997-2008, average rate of short-term unemployment (unemployment under 1 year) was 5.18%. For comparison, average rate of unemployment up to one month, for the same period was 1.03%. If we consider that the average rate of unemployment in the mentioned period was 34.4%, then it can be concluded that only 15% of unemployment has a short-term character (frictional unemployment), while the other 85% has character of long-term (structural) unemployment.

Feature for long-term unemployment in Macedonia is its permanent increase and sustainability at high level. Namely, unemployment longer than 4 years in 1997 was 15.7%, representing 43.6% of total unemployment, and in 2008 unemployment longer than 4 years rose to 22.8%, which

represented 60.8% of the total unemployment. Long-term unemployment in Macedonia confirms the international experience - that there is a negative correlation between ability to find a job and the duration of unemployment. Also, it confirms the above presented opinion of Blanchard and Diamond that persons who are unemployed for a long time can much harder find a job, even in case when wages are flexible. Employers, however, give preference to people who have spent less time waiting for work (mostly people under 34 years of age), although, for them, they have to pay higher wages. Indeed, this is one way of solving problems of adverse selection and moral hazard on labor market. Thus, people who are waiting for jobs for a longer period of time, although willing to accept lower wages, remain unemployed.

Table 1. Unemployment in Macedonia by duration

	1997	1998	1999	2000	2001	2002
Up to 1 month	0,9	1,5	1,4	1,5	1,0	0,7
2 to 5 months	2,0	1,5	1,4	1,5	1,3	1,9
6 to 11 months	3,3	2,3	2,5	2,3	1,6	2,4
12 to 17 months	2,6	1,5	1,7	1,5	1,8	1,3
18 to 23 months	3,1	2,5	2,4	2,5	1,6	1,9
2 years	5,1	0,4	0,3	0,4	0,3	0,4
3 years	3,4	3,0	3,5	3,0	3,0	3,4
4 and more years	15,7	19,5	19,2	19,5	19,8	20,0

	2003	2004	2005	2006	2007	2008
Up to 1 month	1,1	0,6	0,7	0,8	0,8	1,2
2 to 5 months	1,9	2,2	1,9	2,0	2,1	2,2
6 to 11 months	2,4	2,6	2,3	2,2	2,3	1,8
12 to 17 months	2,1	2,5	2,2	1,9	2,0	1,8
18 to 23 months	1,2	1,7	1,8	1,4	1,6	1,4
2 years	0,2	0,3	0,3	0,3	0,3	0,3
3 years	4,3	3,3	3,5	3,5	3,1	2,5
4 and more years	23,3	23,9	24,4	23,9	22,7	22,8

Source: State Statistical Office of the Republic of Macedonia, Statistical Yearbook (different issues).

We can conclude that the unemployment in Macedonia derives from the mismatch of supply and demand of skilled labor without flexibility of wages that have a greater impact. In fact, supply of labor does not meet the qualifications required on the labor market. Data from the State Statistical Office shows that in 2008 only 7.7% of registered unemployed persons have higher education, while 2% have college education. The remaining 90.3% have a maximum of four years secondary education, of which 41.6% are with primary education. Also, Kavkler et al. (2009), using Cox regression models, estimated the probability of being unemployed in the country

decrease with increase of educational level. However, in the transition period, although some efforts have been made, the educational structure of unemployed persons still remains almost unchanged.

4. LFS unemployment rate correction for grey economy activities

The very high LFS recorded unemployment rates, as already noted, is generally thought to be overstated. However, there are only few relevant studies which deal with this issue. Jackman and Corbanese (2007) suggest that though the LFS in the country is carried out in accordance with ILO best practice standards, it is none the less believed that some respondents may conceal informal sector work, whilst others may simply refuse to take part (the average non-response rate in the 2008-2012 LFS was 13.4%). IMF (2006) argues that probably unemployment rate in the country is less than LFS. Therefore, they made correction of the LFS unemployment rate for shadow economy activities and stated that unemployment rate is probably 24 percent instead of LFS 37 percent in 2005. Recently, ILO (2011) found that in 2010 the employment in the grey economy in the non agricultural activities is equal to 12.6% of non agricultural employment. Also, Jovanovik and Kabashi (2011) used simple assumption that 30% of unemployed persons are unregistered employed persons.

Since there is a consensus about the need for LFS unemployment rate correction, and there is no existence of series of corrected LFS unemployment rates, this section of the paper made correction of the LFS unemployment rates for the period 1998-2012. The correction is based on the Schneider et al. (2011) and ILO (2011) data. The most reliable source for the scale of the grey economy in the country is Schneider et al (2011), while ILO (2011) is only relevant estimation for the employment in the grey economy in the country. However, it estimates only employment in the grey economy in the non agricultural activities, not in all activities (including agricultural) and it refers only to the year 2010. Therefore, we made assumption that employment in the grey economy in the agricultural activities is the same as in non-agricultural activities. Faced with non existence of relevant data, we believe that it is conservative assumption, because probably the informal employment is even higher in agricultural sector in the country. Schneider et al. (2011) estimates of the grey economy as percentage of GDP are used in order to be avoided the

assumption that employment in the grey economy is 12.6% of total employment in all years in the 1998-2012 period, instead this information should make employment in grey economy to be sensitive to the scale of grey economy.

Table 2. Estimates for grey economy in Macedonia, 1999-2007

Year	Grey economy in percent of GDP
1999	34.9
2000	35.7
2001	34.8
2002	35.1
2003	35.5
2004	36.4
2005	36.9
2006	37.7
2007	38.8

Source: Schneider et al (2011).

The LFS unemployment is corrected for grey economy using following formula:

$$U_c = [U_{LFS} - (F \cdot E_{LFS})]$$

where U_c is corrected unemployment; U_{LFS} and E_{LFS} are unemployed and employed persons according LFS; and F is correction factor, which is calculated as:

$$F = (GE \cdot 0.348)$$

where GE is grey economy as percent of GDP; and the scalar 0.348 is percentage of grey economy employment for 1 percent grey economy. It is calculated as $\frac{12.6}{36.2}$, based on ILO's information. If we take for example the year 2007, GE is 38.8 percent of GDP and F is equal to 13.5 (employment in grey economy as proportin of total employment), which leads to 74369 persons in grey economy activity ($F \cdot E_{LFS}$) and U_c become equal to 242536 (E_{LFS} and U_{LFS} are 590234 and 316905, respectively, in 2007). The corrected unemployment rate is 26.7 percent, instead of LFS 34.9 percent. This is reduction of the unemployment rate for 23.5 percent). Note that F is 12.6 for 2010.

Figure 2. LFS unemployment rates and corrected unemployment rates in Macedonia, 1998-2012
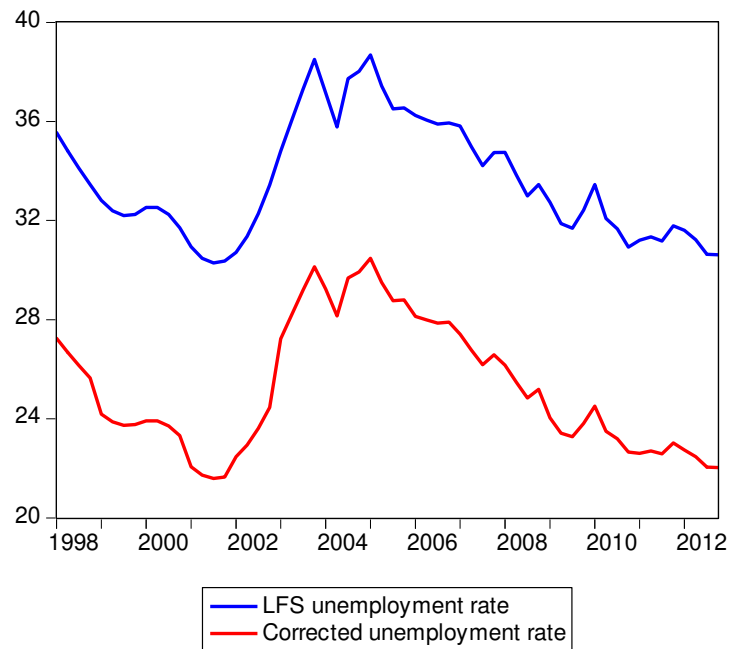
Source: National Bank of Macedonia (2013) and author's calculations.

The Schneider's estimates of the grey economy are presented in the Table 2. Since the estimations are available only for the period 1999-2007 and we make the LFS unemployment correction for 1998-2012, for the years from 2008 to 2012 is used the average percentage of grey economy in the available period (36.2 percent of GDP). We think that it is more realistic assumtion in comparison to trend approach due to the influence of the Global financial and economic crisis on Macedonian economy since 2008. Also, the average of 1999 and 2000 is used for gray economy estimation in 1998 (35.3 percent of GDP).

The Figure 2 compares LFS unemployment rates and corrected unemployment rates in Macedonia for the period 1998-2012. The average reduction of the LFS unemployment rate in the observed period is 25 percent. The average value of the corrected unemployment rate is 25 percent, which is comparable with the unemployment rates before the transition. The corrected unemployment rates are used in estimation of NAIRU in Macedonia.

5. Metodology for NAIRU estimation

To estimate the NAIRU, we follow the Ball and Mankiw (2002) approach, which is supplemented with iterative procedure proposed by Ball (2009). The starting point is modified Phillips curve:

$$\pi_t - \pi_t^e = \alpha(U_t - U^*) + \upsilon_t \qquad (1)$$

where π_t is actual inflation rate at time t, π_t^e is expected inflation rate at time t (the expectation is being formed in year $(t-1)$, U_t is actual unemployment rate prevailing at time t, U^* is natural rate of unemployment (NAIRU) at time t, and υ_t is stochastic error term at time t. The stochastic error term reflects disruptions in the normal inflation process, such as that caused by an oil embargo or a change in the exchange rate.

Since π_t^e is not directly observable, in order to implement equation (1), the assumption is made that expected inflation is equal to last period's inflation: $\pi_t^e = \pi_{t-1}$. The inflation-unemployment tradeoff then becomes:

$$\pi_t - \pi_{t-1} = \alpha(U_t - U^*) + \upsilon_t \qquad (2)$$

The used assumption is simplest version of adaptive expectations approach, according to which expected inflation is weighted average of past inflation. However, the rational expectations revolution was founded precisely on criticizing this approach (Lucas, 1972; Sargent, 1971). Ball and Mankiw (2002) argue that while is indefensible to accept adaptive expectations as a precise and immutable description of the world regardless of the monetary regime, the assumption of adaptive expectations is not far from rational, because the inflation in the economy has been close to a random walk.

Rewriting the equation (2) in the standard linear regression, leads to following estimation equation:

$$\pi_t - \pi_{t-1} = c + \alpha U_t + \upsilon_t \qquad (3)$$

where $c = -\alpha U^*$. Equation (3) states that the change in the inflation rate between two time periods is linearly related to the current unemployment rate (U_t). The constant term (c) and unemployment coefficient (α) are estimated by OLS. A priory, the unemployment coefficient (α) is expected to be negative and the constant term (c) is expected to be positive (Gujarati, 2003). If the assumption is made that U^* is constant and that U_t is uncorrelated with υ_t, then the value of the U^* is given by the ratio of the constant term and unemployment coefficient:

$$U^* = \frac{c}{-\alpha} \qquad\qquad (4)$$

However, this constant nature of NAIRU is questioned by many economists, especially since the apparent fall of NAIRU in the US economy in the late 1990s . Therefore the methodology is upgraded in order to find a time-varying NAIRU. The approach is based on the idea that movements in the U^* are long-term shifts in the unemployment-inflation relation, while the υ_t captures short-term fluctuations. Rearrangement of the equation (3) gives the equation:

$$U^* - \frac{1}{\alpha}\upsilon_t = U_t - \frac{1}{\alpha}(\pi_t - \pi_{t-1}) \qquad\qquad (5)$$

The right side of this equation can be computed from the estimated α and data on unemployment and inflation, yielding an estimate of $U^* - \frac{1}{\alpha}\upsilon_t$, which is NAIRU minus a term proportional to the shorter term supply shock. The U^* can be extracted from $U^* - \frac{1}{\alpha}\upsilon_t$ using a Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997). The HP filter is generalization of a linear time trend that allows the slope of the trend to change over time. Formally, the HP filter minimizes the sum of squared deviations between the trend and actual series, with a penalty for curvature that keeps the trend smooth – smoothing parameter (λ). If the $\lambda = 0$, the filter would yield the original series; if λ is very high, it would yield a linear time trend. The choice of this parameter is largely arbitrary. Hodrick and Prescott suggest a smoothness parameter of 1600 for quarterly data, and that parameter value is most commonly used in practical applications (French, 2001). While 100 is most commonly used value of the parameter for annual data.

Ball (2009) argues that this procedure is internally inconsistent because it estimates a time-varying U^*, but assumes a constant U^* to estimate α. Therefore he proposed iterative procedure for resolving this inconsistency. Once the series for U^* is extracted, that series is used

to re-estimate the equation (2), yielding a new estimate of α. Then the new α is used to estimate a new series for U^*, and so on until results converge to an U^* series.

6. Empirical results and their applicability

The strategy for NAIRU estimation is applied to data from Macedonian economy. Two variables are used: unemployment rate and inflation rate. Unemployment rate is presented by corrected version of LFS unemployment rate (done in the Section4). The inflation rate is based on Macedonian State statistical office consumer price index. The period starts with the first quarter of 1998 and ends with fourth quarter of 2012. Both variables are seasonally adjusted using CensusX12.

Figure 3. Corrected unemployment rate and time varying NAIRUs in Macedonia, 1998-2012
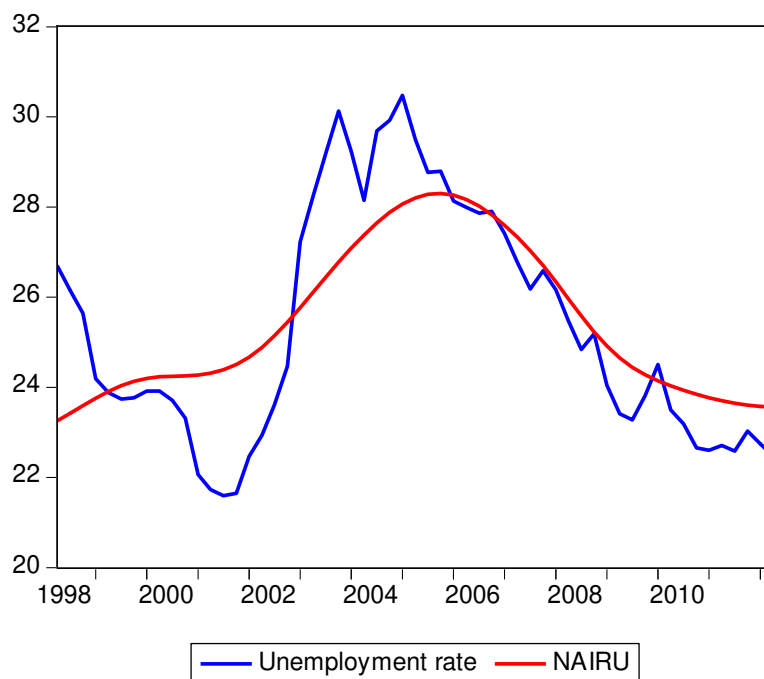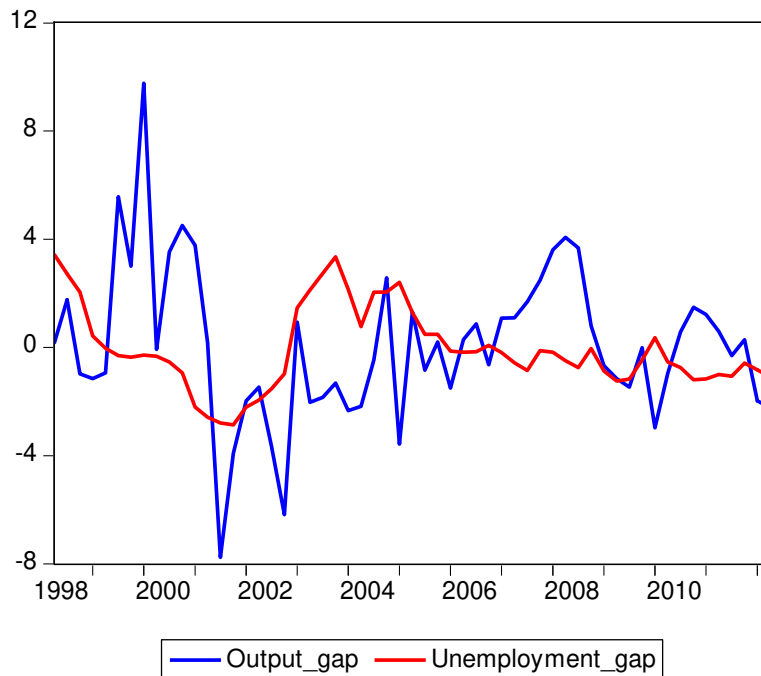

Source: Author's calculation.

Figure 3 presents corrected unemployment rate and estimated time varying NAIRU's in Macedonia. We use 1600 for the value of smoothness parameter in HP filter and the NAIRU

series (U^*) converge after sixth iteration. The estimated NAIRU is 23.5 percent in the second quarter of 1998, peaks at 28.3 percent in the last quarter of 2005 and falls to 23.6 percent in the last quarter of 2012.

Figure 4. Output gap and unemployment gap in Macedonia, 1998-2012

The analytical value of the estimated time-varying NAIRU's in Macedonia is tested with the output gap. Output gap and unemployment gap are given at the Figure 4. Output gap is the difference between GDP and potential output of the country. Potential output is estimated using HP filter, with smoothness parameter value of 1600. The unemployment gap is calculated as the difference between corrected unemployment rate and NAIRU. Theoretically the relationship between the output gap and unemployment gap should be negative. It means that when there is positive unemployment gap (unemployment rate is higher than NAIRU), than the output gap should be negative (the output should be bellows its potential), and vise versa. Empirically, this negative relationship between output gap and unemployment gap is not found in the period 1998-2012. The correlation coefficient is statistically insignificant. However, the correlation coefficient

between these two variables in the period 2003-2012 is equal to -0.31 with 10% statistical significance (p-value is 0.06). It implies that there are negative relationship between the output gap and unemployment gap in the later period. It can be seen also on the figure. The negative output gap in the period 2003-2006 is accompanied by positive unemployment gap, and the positive output gap in the period 2007-2009 is accompanied by negative unemployment gap. The main characteristic of the period 1998-2002 is the war conflict in the country that happened in 2001, when Macedonian economy had negative rate of GDP growth of -4.5%, while unemployment fell by 1.7 percentage points. This is not according to economic theory, but occurred because one part of unemployed people was engaged in the reserve forces of the army and police, which has led to decrease in unemployment.

7. Conclusion

Although in the economic literature there is distinction between the notions Natural rate of unemployment and NAIRU, in this paper, out of practical reasons, we took these notions as synonymous ones, and for both notions we used the term NAIRU.

Often in the economic literature NAIRU concept is deemed for being inapplicable or such with small analytical value for the countries in transition. Therefore, the economic literature in Macedonia produced stand (Miljovski, Stojkov 2012), that expressed reservation regarding the applicability of this concept for the labor market in the country. But, on the other hand, if the concept of potential GDP is applicable for Macedonia (IMF 2009, Fiti and all. 2012), than there could not be also disputed the applicability of the concept of NAIRU.

Hence, following the example of many countries in transition, in the paper we have set our thesis that the concept of NAIRU has its analytical value and is applicable for the labor market in the country. We showed it in our paper.

There is no doubt that in Macedonia there are many factors that affect the applicability of the concept of NAIRU in the country. The problems and limitations for applicability of the concept of NAIRU in the countries in transition, such as: structural shifts in economies that led to structural imbalances on the labor market, the effect of hysteresis, expressed rigidity of the labor

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market and so on., are also valid for the Republic of Macedonia. But despite this, our research shows that there is no doubt that the concept of NAIRU is as applicable for the labor market in Macedonia, as it is applicable the concept of potential GDP.

Survey results showed that NAIRU in Macedonia varies from 23.5% in the second quarter of 1998, it reached a peak of 28.3% in 2005 and decreased to 23.6% in 2012.

With task to show that the calculated time varying NAIRU is based on economic theory, in our analyses we have also introduced the concept of GDP. Thus, we came to conclusion that in Macedonia there can be separated the periods in which relation between the GDP gap and unemployment gap is negative, i.e. when there is a positive gap in unemployment (actual unemployment is higher than NAIRU),then GDP gap is negative (actual GDP is below potential GDP). The results of the research showed that in the period 2003-2012 calculated correlation coefficient of -0.31 with a 10% level of significance (p-value 0,06), suggested that there is an inverse correlation between unemployment gap and GDP gap. Negative GDP gap in the period 2003-2006 is followed by a positive gap in unemployment, while a positive output gap in the period 2007-2009 is followed by a negative gap in unemployment. This clearly shows that NAIRU concept can be applied in Macedonia.

It should be noted that this is valid only in the absence of great shocks in the economy. In fact, in our study, the results show that there is no negative correlation between GDP gap and unemployment gap for the period 1998-2012, which indicates that there is a small analytical value of the NAIRU concept and its applicability. But, as we mentioned above, this is not the case in the period after 2002. However, these results should be taken with caution because in this period in Macedonia there were two events that had a strong influence on the country's economy and unemployment: Kosovo crisis in 1999 and internal conflict in Macedonia in 2001. Especially there should be noted that the internal conflict in Macedonia from 2001 has great influence on applicability of NAIRU concept. Namely, in 2001 Macedonian economy had negative rate of GDP growth of -4.5%, while unemployment fell by 1.7 percentage points, because one part of unemployed people were engaged in the reserve forces of the army and police. This shows that the applicability and analytical value of the concept NAIRU in Macedonia is strongly influenced by the economic shocks caused by non-economic factors.

But very important is to underline that in the case of normal functioning of the economy, without expressed shock, fundamental rules on which NAIRU concept is based, are confirming, the same that confirms is confirmed by the concept of potential GDP. Hence, it is undisputed that the concept of NAIRU is an important analytical instrument for designing and mutually coordinating the basic macroeconomic policies (monetary and fiscal), studying the character of the Macedonian unemployment, business cycles, etc.

References

Ball, L.M. (2009) "Hysteresis in Unemployment: Old and New Evidence," *in NBER Working Paper* 14818.

Ball, L.M., and G.N. Mankiw (2002) "The NAIRU in Theory and Practice." *Journal of Economic Perspectives*, 16, no. 4: 115-136.

Blanchard, O., and P. Diamond (1990) "Ranking, Unemployment Duration and Wages", NBER Working Paper, No. 3387.

Blanchard, O., and L. Summers (1987) "Hysteresis and Unemployment" *European Economic Reviw,* 31, no.1.

Blanchard, O., and F. Katz (1997) "What We Know and Do Not Know About the Natural Rate of Unemployment", *Journal of Economics Perspectives*, 11, no. 1.

Blanchard, O., and J. Wolfers (1999) "The role of Shocks and Institutions in the Rise of European Unemployment: the Agregate evidence", *NBER Working Paper Series*, no. 7282.

Blanchard, O., and L. Summers (1986) "Hysteresis and the European Unemployment Problem", *NBER Macroeconomics Annual*, 1.

Bragin, V., and V. Osakovski (2005) "Estimation of the Natural Unemployment Rate in the Russian Federation, 1994-2004", *Post-Communist Economies,* 17, no. 1.

Fiti, T., V. Filipovski, J. Bogoev, and P. Trpeski (2013). *Potential GDP and natural rate of unemployment in the Republic of Macedonia* (Skopje: Macedonian Academy for Sciences and Arts).

French, M.W. (2001) "Estimating changes in trend growth of total factor productivity: Kalman and H-P filters versus a Markov-switching framework," *Working Paper Board of Governors of the Federal Reserve System.*

Gordon, R. J. (1997) "The Time Varying NAIRU and Its Implications for Economic Policy," Journal of *Economic Perspectives*, 11, no. 1: 11-32.

Gravelis, L. (2007) "The Natural Rate of Unemployment: Has Latvia Reached Full Employment?", *SSE Riga Student Research Papers*.

Gujarati, D. N. (2003) *Basic Econometrics*, *fourth edition* (New York: McGraw-Hill/Irwin).

Gylanik, M., and Hucek, J. (2009) "Estimating the NAIRU in the Slovak economy," *Macroeconomic Issues*, 17: 14-20.

Hodrick, R.J., and E.C. Prescott (1997) "Postwar U.S. Business Cycles: An Empirical Investigation" *Journal of Money, Credit and Banking*. February, 29, no. 1: 1-16.

ILO (International Labour Organization) (2011) *Statistical Update on Employment in the Informal Economy*.

IMF (International Monetary Fund) (2006) *Former Yugoslav Republic of Macedonia: Selected Issues*. IMF Country Report No. 06/345.

Jackman, R., and V. Corbanese (2007) "Evaluation of Active Labour Market Measures and Employment Programme in Macedonia", UNDP.

Jovanovik, B., and R. Kabashi (2011) "Potential GDP and potential output gap of Macedonia according several methods of estimation", *Working Paper, National Bank of Macedonia*.

Kavkler, A., Danacica D.E, Bicanic, I., Bohm, B., Tevdovski, D., and Tosevska, K. (2009) "Cox Regression Models for Unemployment Duration in Romania, Austria, Slovenia and Macedonia", *Romanian Journal of Economic Forecasting,* no. 2.

Lucas, R.E.J. (1972) "Econometric Testing of the Natural Rate Hypothesis," in *The Econometrics of Price Determination.* Otto Eckstein, ed. Washington D.C.: Board of the Governors of the Federal Reserve System: 50-59.

Miljovski, J., and A. Stojkov (2012) "The Natural Rate of Unemployment and the Unemployment in the Republic of Macedonia, *Proceedings of the scientific symposium in honor of the 100th birth anniversary of Academician Kiril Miljovski.*

National Bank of Macedonia (2013) *Quarter Bulletin* (I quarter, 2013).

Phelps, E., and G. Zoega (1998) "Natural Rate Theory and OECD Unemployment", *The economic Yournal*, Rojal Economic Society, 108.

Sargent, T. J. (1971) "A Note on the Accelerationist Controversy ," *Journal of Money, Credit and Banking.* 8, no. 3: 50-59.

Schneider, F., A. Buehn, and C. Montegro (2011) "Shadow Economies all Over the World: New estimates for 162 countries from 1999 to 2007", in Schneider, F. (ed.), Handbook on the shadow economy.

Snowdon, B., and H. Vane, and P. Wynarczyk (1994) *A Modern Guide to Macroeconomics* (Edward Elgar Publishing Company).

(SSO) State statistical office of the Republic of Macedonia, *Statistical Yearbook* (issues: 1967, 1972, and 1990-2009).

Stiglitz, J. (1997) "Reflection on the Natural Rate Hypothesis", *Journal of Economic Perspectives*, 11, no. 1.

Trpeski, P. (2011) *Labor Market in the Republic of Macedonia – New Keynesian Approach* (Bitola: Macedonian Scientific Association).

Trpeski, P. (2012) "Character of Unemployment in Macedonia – Structural, Frictional V.S Cyclical Unemployment", *The Socio – Economic Development of the Republic of Macedonia with Special Focus on the Regional Aspects and the Labor Market,* Macedonian Academy of Sciences and Art and Ss. "Cyril and Methodius University".

Weiner, S. (1993) "New Estimates of the Natural Rate of Unemployment,", *Economic Review*, Fourth Quarter.