Abstract
The issue of a country’s evolution is solved and resolved by analyzing the macroeconomic results indicators. Gross domestic product and, in particular, Gross Domestic Product per capita is the most synthetic and accurate indicator of the level recorded by a country in its evolution over time. In statistical practice, there are a number of methods and models of macroeconomic analysis in chronological, structural or international comparability. The economic evolution of a country for international comparability is the question of establishing the results of each period in comparable terms, ie bringing macroeconomic indicators expressed in current prices at constant or comparable prices. Of course, inflation is the factor that requires the deflation of macroeconomic aggregates to bring them to comparability. In statistical practice, theoreticians have been unable to give up the Philips curve that interprets demand and supply inflation. In this article, we wanted to analyze and interpret how the Philips curve applies in the current context. We consider the representation of this curve in a system of cointegrated variables. Consistency and changes in the unemployment rate are also estimated on the basis of the Philips curve, which is a precise representation of the correlation between the rise in the central outcome indicator and inflation.

Keywords: Philips curve, product market, uncertainty, unemployment, Lucas curve

JEL Classification: C44, E23

Introduction
The inflation model and the Phillips curve originated in the same age of macroeconomics. While Aukrust’s model departed from academia, literature on the Phillips curve developed in the 1960s and made a huge impact over
the next four decades. Here are some of the significant steps in Phillips curve developments. The Phillips Curve and Aukrust’s model were considered as alternatives, representing the „demand” and „offer” inflation model. The difference between considering the labor market as an important source of inflation and the special attention paid by the Phillips product market curve is more a matter of principle than the principle, and the two mechanisms can work together. Next, it shows how the two approaches formally can be combined, giving the Phillips curve the short-term relationship of nominal wage growth, while the main thesis is valid in the long run. Essential issues are addressed to apply the Phillips curve in the current context, its representation in a system of cointegrated variables; Consistency and changes in the unemployment rate; Uncertainty of Phillips curve estimated NAIRU; And the inversed Phillips curve status, respectively Lucas’s offer curve.

**Literature review**

The econometrics book authored by Anghelache and Anghel (2016) is a reference work in the study of econometrics, the authors include both theoretical and practical approaches, case studies. Mitruț and Șerban (2007) have presented the basics of econometrics in business administration. Anghelache and Manole have presented the usefulness of the Philips curve in macroeconomic analyses, insisting on the correlation between unemployment and inflation, they consider that the Philips curve is a powerful instrument in the context of such studies. Wakita (2006) has studied some phenomena on the Japanese labor market, the constant labor share and the law of Okun, he states that the only driving factor behind the increase of labor’s share based on income was depreciation, while the potential growth rate has recorded massive decreases, corroborated with structural breaks in Okun’s law. Coibion and Gorodnichenko (2015) have considered the oil price growth as major factor in increasing household expectations regarding inflation. Gertler and Leahy (2008) have studied the case of a Philips curve based on the state-dependent pricing, they consider that the developed model is appropriate in matching the characteristics of price adjustments and is significantly flexible in the aggregate price level, when compared to the model that is time-dependent. Deleplace (2008) researches on the development of economic thinking, he approaches the Keynesian “revolution” and the critic of Robert Clever. Tambakis (2002) develops on the expected social welfare under certain characteristics of Philips Curve and asymmetric policy-related preferences. Dickens (2008) emphasizes the role of the Philips curve’s estimates as information provider for NAIRU estimates, namely the characteristics of inflation and unemployment. Stanley (2002) discusses on the fact that, after six years when the unemployment rate was situated below the NAIRU estimates led to declining inflation, contrary to the natural rate hypothesis, which predicted growing
inflation, Isard, Laxton and Eliasson (2001) develop on some aspects regarding inflation targeting with NAIRU. Haldane and Quah (2000) have studied the trend described by the Philips Curve in the UK economy, the differences in comparison to the US situation, they insist on the fact that the weakness of the potential trade-off between inflation and unemployment should be carefully considered by policy makers. Karanassou and Snower (2007) discuss on the trustworthiness that can be associated to the „persistency puzzle“, considering that this concept is not to be given confidence. Backhouse (2000) is a major contribution for the studies concerning the so-called heterodox economics, he outlines three criteria that are to be fulfilled by any heterodox school. Balaban and Vîntu (2010) have studied the characteristics of the Romanian economy and they promote the idea of a specific non-linear Philips curve, in opposition to the linear shape of the curve for the euro area, their study converges with Musso et al. (2007). Bjerkholt (2005) compares the post-war economic recovery in Europe with the transition to free economies (the case of former communist countries in Eastern Europe), he argues that planning is subjected to certain limitations, while being still important in the economic policy. Brissimis and Magginas (2008) discuss on the usefulness of the New Keynesian Phillips Curve in explaining the evolution of inflation in the United States, compared with expectations represented official forecasts, their results show that the standard forward-looking New Keynesian Phillips curve is a proper instrument under certain assumptions. Gordon (2011) describes the two majors applications of the Philips curve, which became obvious after 1975, the explanation on the US inflation and the policy responses to supply shocks. Woodford (2005) develops on the application of the new Keynesian Phillips curve in analyzing firm-specific capital. Zhang, Osborn and Dong (2008) analyse the applications of NKPC in the context of sticky prices, Dupor, Kitamura and Tsuruga (2010) develop on a similar topic. Ewing and Seyfried (2003) have examined the Philips curve under non-linear status of the second moment of inflation, a valuable result from their study is the positive relation between inflation rate and conditional volatility. Kim and Kim (2008) discuss on the importance of the backward-looking component in a New Keynesian Phillips Curve. Levy (2004) presents a demonstration on the behavior of two difference stationary series cointegrated with a cointegrating vector. Cogley, and Sbordone (2008) develop on the inflation persistence in the New Keynesian Phillips Curve.

**Results and discussions**

- **Cointegration, causality and natural rate reflected in the Phillips curve**

As we have shown before, there are many ways in which a Phillips curve for an open economy can be inferred from economic theory. Our
appreciation of the Phillips curve is based on Calmfors, which reconciled the Phillips curve with the Scandinavian inflation model. We plan to take a step forward, however, and incorporate the Phillips curve into a framework that takes into account wage and price data series. Reconstructing the model in terms of cointegration and causality reveals that the Phillips curve version of the master model imposes a mechanism to correct the balance on the system. Thus, while consistent with Aukrust’s main theory, the Phillips curve is also a special model because it includes only one of the wage setting mechanisms discussed by Aukrust.

Without departing from generality, we will focus on salaries in the Phillips curve and we recall that, in accordance with Aukrust’s theory, it is assumed that:

1. \( w_{t+1} = q_{a_{t+1}} - q_{a_{t}} \) \( \sim (0) \) \( s_{t} (u_{t}) \) \( \sim (0) \), possibly after removal of deterministic changes; and

2. The causal structure is „a way” represented by \( H_{4}^{mc} \) and \( H_{5}^{mc} \).

Consistency with assumed cointegration and causality requires a pattern of equilibrium correction for nominal wage rates in the exposed sector. Assuming a first order dynamic for simplification, a Phillips curve system is defined by the following two equations:

\[
\begin{align*}
\Delta w_{t} & = \beta_{w0} - \beta_{w1} u_{t} + \beta_{w2} \Delta a_{t} + \beta_{w3} \Delta q_{t} + \varepsilon_{w,t} \\
& \quad 0 \leq \beta_{w1}, \ 0 < \beta_{w2} < 1, \ 0 < \beta_{w3} < 1 \\
\Delta u_{t} & = \beta_{u0} - \beta_{u1} u_{t-1} + \beta_{u2} (w - q - a)_{t-1} + \beta_{u3} z_{u,t} + \varepsilon_{u,t} \\
& \quad 0 < \beta_{u1} < 1, \ \beta_{u2} > 0, \beta_{u3} \geq 0
\end{align*}
\]

where (notation is simplified by renunciation / reduction to „e“).

Alternatively, given \( H_{2}^{mc} \), \( \Delta w_{t} \) represents the increase in the average salary of two sectors.

\( \varepsilon_{w,t} \) and \( \varepsilon_{u,t} \) are innovations regarding information available during the period \( t-1 \). The equation of aggregate consumption function is the short-term Phillips curve, while (1) is the basic idea that profitability (in sector e) is a factor explaining the change in the unemployment rate.

\( z_{u,t} \) represents other \( [(0)](0) \) variables (and deterministic terms) which, if the other factors do not change, will lead to a decrease in the unemployment rate. The factor \( z_{u,t} \) will typically include a measure of the rate of growth of the economy, and other factors linked to the supply of labor. The insertion of equation (1) into the general equation leads to an explicit salary model.

For determining the main rate of equilibrium unemployment, equation (1) is rewritten as:
\[ \Delta w_t = -\beta_{w1}(u_t - \bar{u}) + \beta_{w2}a_t + \beta_{w3}q_t + \varepsilon_{w,t} \]  \tag{2}

where \( \bar{u} = \frac{\beta_{wc}}{\beta_{w1}} \) is the unemployment rate that does not affect wage growth.

Using unconditional environments, denoted by \( E \), on both sides of (2) we obtain:

\[ E[\Delta w_t] - g_f - g_a = -\beta_{w1}E[u_t - \bar{u}] + (\beta_{w2} - 1)g_a + (\beta_{w3} - 1)g_f \]  \tag{3}

Using the assumption of a fixed wage weight, the left is zero. Thus, using \( g_a \) and \( g_f \) as notes of constant growth rates of productivity and external prices, we obtain:

\[ E[u_t] \equiv u^{phi} = \left( \bar{u} + \frac{\beta_{w2}-1}{\beta_{w1}} g_a + \frac{\beta_{w3}-1}{\beta_{w1}} g_f \right) \]  \tag{4}

as a solution for the equilibrium unemployment rate, denoted \( u^{phi} \). The long-term average of the salary weight is accordingly:

\[ E[w_t - q_t - a_t] = w^{phi} = \frac{\beta_{w2}}{\beta_{w1}} u^{phi} + \frac{\beta_{w3}}{\beta_{w1}} E[\varepsilon_{ut}] \]  \tag{5}

In addition, \( u^{phi} \) and \( w^{phi} \) represent the stable and unique state of the corresponding pair of deterministic difference equations.

The known shape of the Phillips curve is illustrated in Figure 1. It is assumed that the economy initially shows a low level of unemployment, ie \( u_0 \) in the figure. The short-term Phillips Curve (1) determines the wage increase rate \( \Delta w_0 \). The share of wages according to equation (1) is above the long-term equilibrium value, implying that unemployment is rising and wage growth decreases along the Phillips curve. The steep shape of the Phillips curve is defined for the case \( \Delta w_t = \Delta q_t + \Delta a_t \).

The slope of the curve is given by \( -\beta_{w1}/(1-\beta_{w3}) \), being referred to in the literature as the Phillips Curve. The steady equilibrium is reached when the salary increase is equal to steady steady growth, ie \( g_f + g_a \), and the unemployment level is given by the \( u^{phi} \).
The problem of the long-term Phillips curve is seen as depending on the $\beta_{w3}$ coefficient, the elasticity of wage growth determined without taking account of the price of the products. In the figure, the long-term curve has a decreasing tendency, i.e. $\beta_{w3} < 1$, which conventionally refers to a dynamic inhomogeneity in wage setting. Conversely, dynamic homogeneity implies $\beta_{w3} = 1$ and a vertical Phillips curve. Given the dynamic homogeneity, the uphil equilibrium rate is independent of global inflation $g_f$.

The long-term slope of the Phillips curve was one of the most debated problems in macroeconomics in the 1970s and 1980s. An argument in favor of the long-term vertical curve Phillips is that it has clearly been noticed that workers are able to obtain full compensation for inflation. It follows that $\beta_{w3} = 1$ is a normal restriction on the Phillips curve, at least if $\Delta q_t$ is interpreted as a variable of probabilities. The downward slope of the Phillips curve in the long run has been challenged on the grounds that it provides a picture too optimistic about economic policy: that the government can permanently reduce unemployment to below the natural rate by „fixing” a high level of inflation.

In an open economy, this discussion appears to be somewhat exaggerated because the long-term compromise between inflation and unemployment does not come from the premise of a long-term downward curve. In contrast, according to Figure 1, the stable level of unemployment is determined by the imported inflation rate $g_f$ and by the increase of the exogenous productivity $g_a$. These two indicators are not considered as means (or intermediary targets) of economic policy.
In the real economy, cost-of-living considerations play a significant role in wage setting. Thus, applied econometric research usually includes current and delayed inflation, reflecting the emphasis on cost-of-living considerations in wage negotiations. The following is considered to represent this possibility:

\[ \Delta w_t = \beta_{w0} - \beta_{w1} u_t + \beta_{w2} \Delta a_t + \beta_{w3} \Delta q_t + \beta_{w4} \Delta p_t + \xi_{w,t} \]  

(6)

\[ \Delta u_t = \beta_{u0} - \beta_{u1} u_{t-1} + \beta_{u2} (w - q - a)_{t-1} + \beta_{u3} z_t + \xi_{u,t} \]  

(7)

\[ \Delta p_t = \beta_{p1} (\Delta w_t - \Delta a_t) + \beta_{p2} \Delta q_t + \xi_{p,t} \]  

(8)

The first equation increases with the change in the consumption prices \( \Delta p_t \), with the coefficient \( 0 \leq \beta_{w4} \leq 1 \).

In order to make a formal distinction between this equation and the aggregate consumption function, a distinctive sign is used above the other coefficients (and above the deviation term). The second equation is identical to the unemployment equation (1). The last equation of stochastic prices combines the definition of consumer prices with the identical assumption of the stability of the wage weight in the covered sector and the increase in wages in the exposed sector.

Using (8) to remove \( \Delta p_t \) in (6), we return to the integrated consumption function with coefficients and \( \xi_{w,t} \) redefined accordingly. It is useful to express uphill in terms of coefficients of an extended system (6) - (8):

\[ u_{\text{uphill}} = \bar{u} + \frac{\beta_{w2} \beta_{p2} - 1}{\beta_{w3}} g_a + \frac{\beta_{w3} \beta_{w4} \beta_{p2} - 1}{\beta_{w3}} g_f \]  

(9)

because there are two homogeneity restrictions required for the long-term Phillips curve, namely: \( \beta_{w3} = 1 \) and \( \beta_{p1} + \beta_{p2} = 1 \).

The Phillips salary system in an open economy is a complete specification of the dynamics of the inflation model. Clearly, the dynamic properties of the model apply to other versions of the Phillips curve. In particular, all Phillips curve systems assume that the natural rate of unemployment (NAIRU) is a stable solution. As a single equation, the equation of the Phillips curve is unstable for a given rate of unemployment. The dynamic stability of wage and unemployment rates depends on the integrated equalization mechanism in the unemployment rate equation. In this sense, a definition of wage formation based on the Phillips curve cannot be adapted to an economic policy that targets the unemployment rate, since only the natural rate of unemployment corresponds to a stable wage weight. Any other level (target) leads to a continuous increase or decrease of the salary weight.

Dynamic stability of the natural rate is a subject of interest and can not be addressed in an incomplete Phillips curve system, that is, by estimating a Phillips curve model with a single equation. But there are practical approaches.
in which the estimation of the natural rate of unemployment is based on such incomplete systems. Staiger et al. Presented an important study following the tradition of estimating only the Phillips curve, considering the default balancing mechanism (1). For other countries, especially European ones, where the instability of the unemployment rate is stronger, the problem of the correspondence between estimated rates and stability is a topical issue.

- **Using the Phillips curve in the study of unemployment**

  In the expressions (4) and (9), \( u^{\text{phil}} \) depends on the parameters of the salary Phillips curve and the external growth rates. The coefficients of the unemployment equation do not enter into the expression of the natural rate. In another variation of the Phillips curve, expressing the natural rate depends on the price and wage setting parameters, i.e., the model is specified as a Phillips price curve rather than as a Phillips salary curve. But the expression of the rate in a Phillips price curve remains independent of the parameters in equation (1).

  The fact that an important system property (unemployment) can be estimated by a single equation leads in a way to explaining the popularity of the Phillips curve. However, results based on an incomplete system analysis offer limited information. In particular, single-based analysis provides insufficient information about the dynamic properties of the system. First, unless the Phillips curve is estimated along with the aggregate consumption function (equation), dynamic stability cannot be verified, and the correspondence between the uphil and the stability of the system cannot be supported. Thus, estimates with one equation are not attainable, because the principle of correspondence can be forced. Second, even if it is considered a priori that the uphil corresponds to the stable state of the system, the rate of adjustment to a stable state of interest and requires estimation of equation (1) as that of the Phillips curve (1).

  It is understandable that high unemployment required models that fulfill the following functions:
  - take into account lags when adjusting around a steady natural rate;
  - allow change of balance.

  A combination of the two functions is also possible.

  Simply being a dynamic system, the Phillips curve model features slow dynamics. In principle, the adjustment coefficient \( \beta_{ul} \) in the unemployment equation (1) may be arbitrarily small, as long as it is not zero, \( u^{\text{phil}} \) corresponds formally to the stable state of the system. However, the question arises as to how slow the speed of adjustments can be before the idea of equilibrium becomes undermined „from within”. According to Phelps and Friedman’s arguments, the natural rate should be almost stable and should be a strong
point of attraction for the effective rate of unemployment. However, practical experience has shown that at best the natural rate is a weak point of attraction. These are practical aspects of the issue: Governors, looking at prospects after a negative economic shock, will find that the unemployment rate will eventually return to its natural level, but only after 40 or more years.

The study of the Phillips Curve offers only limited capability to explain economically the changes that are manifested by the unemployment rate. It sometimes seems incredible that the change in the real growth rate $g_a$ can only explain profound and persistent increases in the unemployment rate as happened in Europe. A nominal growth rate may of course suffer major increases, but in order for those changes to have an impact on the equilibrium rate, the long-term Phillips curve with downward slope is needed.

The Phillips curve is better suited to a stable regime characterized by a low adjustment lag around a stable average rate of unemployment, rather than to the change in unemployment in Europe. New models have emerged that promised to explain the changes in the unemployment equilibrium rate, and there is concrete information on how the structural characteristics of labor and commodity markets affect the balance of unemployment. The new models have not reached the stage of being unanimously accepted, as was the role of the Phillips Curve.

The concepts considered show that permanent changes in unemployment are large-scale changes, with intermittent manifestations, in line with the conception of the unemployment rate as $\Delta w^*$. An alternative view is the so-called natural rate variable over time. The basic idea is that the natural rate of unemployment reacts to small-scale influences that occur frequently. According to this opinion, the natural rate of unemployment is given by the relationships:

\begin{align}
\Delta w_t &= -\beta_{w1}(u_t - \bar{u}_t) + \beta_{w2}g_t + \beta_{w3}q_t + \varepsilon_{w,t} \\
\bar{u}_t &= \bar{u}_{t-1} + \varepsilon_{u,t}
\end{align}

The difference is that natural rate is no longer a time independent parameter, but a stochastic parameter that follows the random path (11), and a deviation $\varepsilon_{u,t}$ that represents small scale influences. In estimating this pair of equations, the standard error $\varepsilon_{u,t}$ is limited from the start, otherwise $\bar{u}_t$ would change up and down and absorb all deviations in $\Delta w_t$ left unexplained by explanatory variables. The methodology involves a basic unit, both in the observed unemployment rate and in the natural rate of unemployment. The practical relevance of this framework appears to be limited to the US, where there are few major changes in the unemployment rate.

Regarding the natural rate of unemployment, variable over time is the concept of hysteresis. Economists have invoked the term „hysteresis” for the case
if the equilibrium rate could be the same as the delayed rate of unemployment. A distinction is made between real delay as a multilne nonlinear phenomenon and the linear property of a root unit. It has been shown that hysteresis is not an effective delay (in the true sense of the word as a nonlinear phenomenon) and that the phenomenon of hysteresis effectively leads to an approach of unemployment that does not correspond to the hypothesis of the natural rate.

- **Estimating the uncertainty of the NAIRU Phillips curve (natural rate of unemployment)**

  We will try to describe three approaches to estimating a „trust area” of the NAIRU Phillips curve. The reason for the absence of confidence intervals in most NAIRU calculations is related to the fact that NAIRU is a non-linear function of regression coefficients.

  There are three methods that can be used to build NAIRU trusted intervals: the Wald method, the Fieller method, and the probability coefficient method. Fieller’s approach and probability coefficient formulas are preferable due to the finite sample properties.

  The first and most intuitive approach is based on the associated standard error and the t ratio for the estimated coefficients and corresponds to a Wald statistic.

  In the case of a full shift in productivity increases in wages and the lack of „money illusion”, \( u^{\text{phil}} \) from the Phillips NAIRU curve is \( \beta_{w0}/\beta_{w1} \) and its estimated value \( \hat{u}_{\text{u}} \) is \( \hat{\beta}_{w0}/\hat{\beta}_{w1} \).

  As already noted, from (1) we deduce:

  \[
  \Delta w_t - \Delta q_t - \Delta q_t = -\beta_{w1}(u_t - u^{\text{phil}}) + \varepsilon_{w_t} \tag{12}
  \]

  where \( u^{\text{phil}} \) can be estimated directly by the least square nonlinear method.

  The result is numerically equivalent to the \( \hat{\beta}_{w0}/\hat{\beta}_{w1} \) coefficient, derived from linear estimates \( (\hat{\beta}_{w0},\hat{\beta}_{w1}) \) of relation (1). In each case, a standard error for \( \hat{u}^{\text{phil}} \) can be calculated, of which confidence intervals can be obtained directly.

  A confidence interval includes the unrestricted estimate of the \( u^{\text{phil}} \), which is \( \hat{\beta}_{w0}/\hat{\beta}_{w1} \) and a certain range around that value. Heuristically, the confidence interval contains each coefficient value that does not follow the hypothesis:

  \[
  H_W: \frac{\hat{\beta}_{w0}}{\hat{\beta}_{w1}} = u^{\text{phil}} \tag{13}
  \]

  We consider that \( F_W(u^{\text{phil}}_0) \) s the Wald-based F statistic for \( H_W \) verification, and \( Pr(\cdot) \) the probability of its argument. A confidence interval of \( (1-\alpha)\% \) is defined by \( Pr(F_W(u^{\text{phil}}_0)) \leq 1 - \alpha \) for \( u^{\text{phil}}_0 \in [u^{\text{phil}}_{\text{low}},u^{\text{phil}}_{\text{high}}] \).
If $\beta_{w1}$, the elasticity of the unemployment rate in the Phillips curve, is accurately estimated, the Wald approach is satisfactory. Small sample sizes clearly jeopardize the precision of the estimate, but the size of the sample depends on the amount of observation-based information. However, if $\beta_{w1}$ is imprecisely estimated (not statistically significant), this approach can be misleading to a large extent. The Wald approach ignores how $\hat{\beta}_{w0}/\hat{\beta}_{w1}$ behaves for values of $\beta_{w2}$ relatively close to zero, where "relatively" reflects the uncertainty in estimating $\beta_{w1}$. For European Phillips curves, the $\beta_{w1}$ estimates are typically statistically insignificant that this concern is related to the calculation of natural rates through the Phillips curve for Europe. Essentially, the problem arises because $\mu_u$ is a non-linear function of the estimators ($\hat{\beta}_{w0}, \hat{\beta}_{w1}$) that are normally distributed.

The second approach avoids this problem by transforming the nonlinear hypothesis (3) into a linear one, that is:

$$H_F: \beta_{w0} - \beta_{w1} u_0^{phi} = C$$  (14)

The hypothesis (4) and the corresponding F statistic are denoted $H_F$ and $F_F(u_0^{phi})$. Since hypothesis (4) is linear in parameters $\beta_{w0}$ and $\beta_{w1}$, his assumptions of this hypothesis are appropriate, even if $\beta_{w1}$ is close to zero. Determination of confidence intervals is done exactly as in the Wald approach, except that the F-statistic is constructed for $\beta_{w0} - \beta_{w1} u_0^{phi}$.

The third approach uses the statistical verosimility coefficient to calculate the confidence interval for the $H_W$ hypothesis. That is, relationship (2) is estimated both unrestrictedly and under the $H_W$ restriction, corresponding probabilities (residual amounts of squares for singular equations) are obtained, and the confidence interval is constructed from $u_0^{phi}$ values for which the verosimilitude is less than the critical value given.

If the original model is linear in its parameters, Fieller’s solution is numerically equivalent to the solution based on verosimilitude, providing a previous generic justification. If the estimated Phillips curve does not exhibit dynamic homogeneity, $\hat{\beta}_{w0}/\hat{\beta}_{w1}$ is only a component of the NAIRU estimate that would be appropriate to the underlying theory. This leads to more complex calculations for the NAIRU, and the codispersion of terms such as $\hat{\beta}_{w0}/\hat{\beta}_{w1}$ and $(\beta_{w2} + \beta_{w4} - 1)/\hat{\beta}_{w1}$ should be considered. However, unless the homogeneity distance has a large numerical value, $[u_{phi}^{low}, u_{phi}^{high}]$ may be a good representation of the degree of uncertainty associated with the estimated natural rate of the Phillips curve. Similar statistical problems occur in other areas of macroeconomic application, for example in the form of a "monetary conditions index".
Conclusion

From the theoretical presentation of the Philips curve, which emphasized its use in macroeconomic analyzes, some theoretical and practical conclusions were drawn. From a theoretical point of view, the Philips curve can be integrated, used in an inflation analysis model. The second conclusion is that a complex macroeconomic analysis can be achieved by using econometric methods and models adapted and used in the study of macroeconomic elements. In other news, the macroeconomic analysis should focus on a structural, chronological but based on deflated aggregates. The evolution of unemployment is a major problem at the level of any national economy as it causes a number of complex developments. Thus, the macroeconomic performance indicators in real terms depend on the level recorded by the inflation rate. The size of wages or wage policies must bear in mind the level of inflation rate. As a result, a nation’s living or welfare state based on real incomes must also be based on how it expresses the influence of inflation. We have made some analyzes and assessments about a closed economy or an open economy. The Philips curve is used in the analysis and its correlation with the other macroeconomic variables. The problem of balance and others of this kind depends on the use of a complex model, considering that the estimation of a trustworthy range of the Philips curve is typically NAIRU. This is a non-linear function of the regression coefficients that allow a rigorous interpretation of the effect of inflation on economic outcomes. Practically, in the application of macroeconomic models the aspects contained in this study can materialize by giving quantified values on the basis of which forecasts and other useful elements in the macroeconomic management can be expressed.

Selective references