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INFLATION AND UNEMPLOYMENT RELATIONSHIP IN TURKEY: AN EXAMINATION ON THE VALIDITY OF PHILLIPS CURVE (1988-2017)

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ABSTRACT

It makes important contributions to economics literature Phillips Curve explaining the interaction between rate of change in monetary wages and unemployment rate firstly appeared in 1958. It explains relationship between inflation rate and unemployment rate Phillips Curve which has been handled differently since and after 1960. This study aims to examine inflation-unemployment relationship and the validity of Phillips Curve in Turkey. In this context, the data set used for econometric application is annual and covers the period 1988-2017. Econometric methods are used as ordinary least squares estimation and Johansen cointegration test in the study. Ordinary least squares estimation method and Johansen cointegration test results indicate that there is a relationship between inflation and unemployment and Phillips Curve is valid in Turkey during the period 1988-2017. Johansen cointegration test results show that there is a long-run relationship such as unemployment rate, inflation rate, unit value index of export goods, unit value index of imported goods and broadly defined monetary growth variables. Thus, it is thought to be useful the Central Bank of the Republic of Turkey of the policies implementation taking into account the existence of this relationship between inflation and unemployment in the context of ensuring and sustaining price stability in the next process.

Keywords: Inflation, unemployment, Turkey, Phillips Curve.

INTRODUCTION

Inflation and unemployment are among the macroeconomic problems all over the world, especially developing countries. Inflation rate and unemployment rate are negatively affected and significant fluctuations occur in these two indicators especially after economic and financial crises. It is stated that there is a trade-off relationship between these two indicators and one of the variables increases while the other decreases. This phenomenon entered macroeconomic literature as Phillips Curve in 1958, and was later differentiated and reconsidered by Keynesian, New Keynesian, Monetarist and New Classical economists. While it initially explains the exchange between monetary wages and unemployment rate, it started to express exchange between inflation and unemployment since 1960 Phillips Curve expressing relationship between unemployment and inflation.

Unemployment and inflation continues to be the two most important macroeconomic problem in Turkey. The inflation rate increased rapidly in the eighties and nineties and continued at two-digit numerical values and at times reached three-digit numerical values. In this respect, it is targeted to reduce inflation to reasonable levels in monetary and stability programs and to ensure its long-run sustainability, policy instruments are used towards this goal. In this process, there was an economic crisis caused by negative consequences in public balances in Turkey in 1994 and there was an important financial crisis arising from the financial sector in 2000. Combating inflation has been successful in short-run desired success cannot be achieved in ensuring a permanent price stability in long-run as a result of stabilization program implementations implemented in nineties and two thousand years.

On the other hand, significant regional investment incentives are provided in order to reduce to the lowest level of development disparities among regions facing and reduce unemployment in Turkey. Although these policies to increase employment are successful in short term, they are not successful in long term due to the effect of the economic policies implemented and rapid population growth.

Consumer price index (CPI) inflation rate and unemployment rate series are shown in Figure 1 in Turkey during the period 1988-2017. According to Figure 1, inflation rate shows a fluctuating trend during the period 1988-2004 and shows a horizontal trend during the period 2005-2017. There was a significant breakpoint in inflation rate in 1994, which is 89.11 percent. A major economic crisis occurred as the reason for this breakpoint in the inflation rate in Turkey in 1994. After this economic crisis, significant fluctuations in inflation and other macroeconomic indicators in Turkey occur.

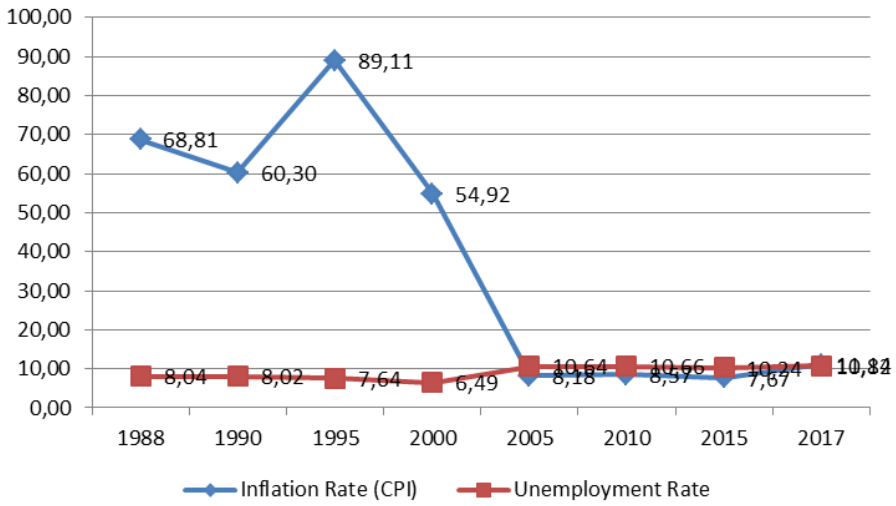

Figure 1. Comsumer Price Index (CPI) Inflation Rate and Unemployment Rate (1988-2017)

According to Figure 1, the unemployment rate shows a horizontal trend during the period 1988-2017. However, it has been acting together with the inflation rate since 2005.

It is tried to contribute to the literature the presence of inflation-unemployment relationship and in terms of the results to determine the validity of Phillips Curve in Turkey in this study. It is acted within the framework of a basic hypothesis such that the presence of inflation-unemployment relationship and that the current direction of Phillips Curve in Turkey in this study. In this context, what are the theoretical dimensions of relationship between inflation and unemployment? What are the approaches of different economic trends on this relationship? In this respect, is there a relationship between inflation and unemployment in Turkey? If there is such a relationship, what is the dimension and direction of this relationship? Answers to the questions are sought.

In the first part of the study, it will be discussed inflation-unemployment relationship and theoretical dimensions of Phillips Curve, and it will be examined theoretical approaches that belong to different macroeconomic flows. In the second part, It will be discussed the studies on the relationship between inflation and unemployment and the validity of the Phillips Curve. In the third part, it will be done econometric application on inflation-unemployment relationship and the validity of Phillips Curve using annual data in Turkey for the period 1988-2017. Finally, it will be discussed obtained the findings throughout the study.

THEORETICAL BACKROUND

It begins with the detection of the negative relationship between unemployment rate and wage inflation rate by using data of the United Kingdom (UK) in 1958 by A. W. Phillips the first appearance of Phillips Curve. Later, Phillips Curve has emerged expressed today in a modern sense modifying the theoretical dimensions of Phillips curve. The Modern Phillips Curve differs from the original Phillips Curve in three respects. The first difference, the modern Phillips Curve, is based on price inflation rather than wage inflation. As a reason for this, price

inflation and wage inflation are related since prices increased rapidly in the period when wages increased. The second difference is Phillips Curve approach, which includes the expected inflation proposed by Friedman (1968) and Phelps (1967). The third difference is that the modern Phillips Curve includes supply shocks. It is due to the rapid increases of world oil prices in the 1970s differences in these approaches on Phillips Curve (Mankiw, 2009: 390). Input prices are also increasing ss a result of a rapid increase in oil prices, therefore, unemployment rate is also increasing while prices of goods and services are increasing rapidly.

The basics of Phillips Curve are based Phillips (1958)'s study for the UK. Phillips (1958) examined the relationship between unemployment rate and monetary wages change rate for the UK during the period 1861-1957. Phillips (1958) found a negative relationship between unemployment rate and monetary wages change rate.

After Phillips (1958), Samuelson and Solow (1960) determined the existence of a negative relationship between unemployment rate and inflation rate by differentiating Phillips Curve in their analysis for the USA during the period 1935-1959.

According to Samuelson and Solow (1960), Phillips Curve provides an attractive option for policymakers to follow expansionary monetary and fiscal policies, which will increase inflation, but not to high levels. Samuelson and Solow (1960) argue that Phillips Curve is also a policy instrument. They estimated relationship between inflation and unemployment in US economy for the period 1934-1958 instead of focusing on the relationship between the rate of change in nominal wages and the unemployment rate Phillips (1958) did (Hall & Hart, 2010: 2-3). Original Phillips Curve is shown in Figure 2. According to Figure 2, the labor market is in balance at the U_f unemployment rate and wages are stable.

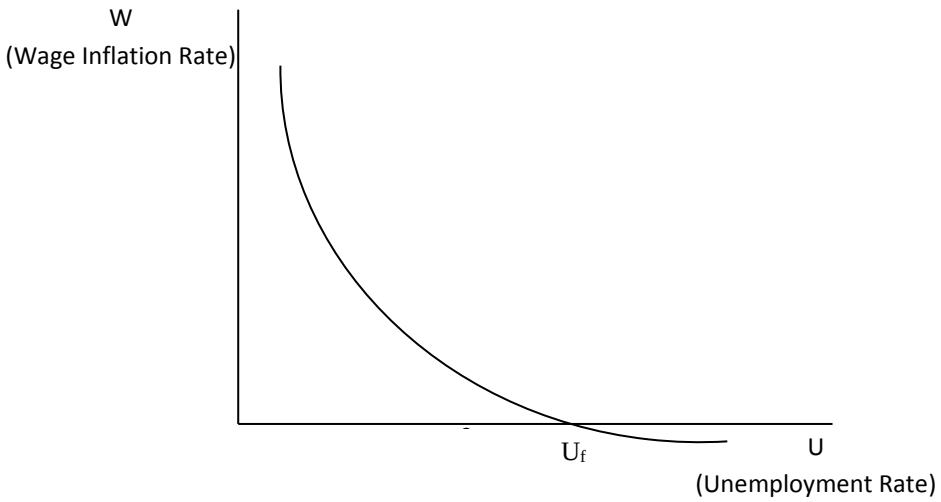

Figure 2. Original Phillips Curve

Source: (Humphrey, 1985: 4)

According to Figure 2, U_f unemployment rate shows frictional and structural unemployment rate in which total labor demand is zero and wages are constant. If unemployment rate decreases, demand and wages for labor force increase. When unemployment rate increases, wages decrease due to excess supply in labor market. Convex Phillips Curve shows that labor reduces marginal productivity in reducing unemployment with increasing demand for labor. Wage inflation rate increases as you go upwards and wage inflation rate decreases as you go downwards on the curve in Figure 2.

Phillips Curve reflects a nonlinear relationship and its slope differs. Accordingly, it becomes vertical when unemployment is low and it gradually becomes horizontal when unemployment is high (Gagnon & Collins, 2019).

Humphrey (1985) attributes the rapid acceptance of Phillips Curve in economic theory for three reasons. It is the first reason that Phillips Curve reflects a steady state for a bivariate relationship. Accordingly, the results are consistent with each other examined from 1861-1913 to 1948-1957 periods. The second reason is that Phillips Curve embodies very different inflation theories. Accordingly, inflation, wages and prices were announced as a result of excessive demand. Excess demand may arise from changes in supply regardless of changes in demand or the reasons for these changes. The third reason is Phillips Curve addressing policy makers, and it sets out a convincing rationale in the context of the fact that full employment cannot be achieved with price stability targets previously stated to be mutually compatible and argues that both objectives cannot be achieved at the same time. Accordingly, original Phillips Curve is expressed in form in equation (1).

$$\pi_t = \sum_{i=1}^{l} \alpha_i \pi_{t-i} + \eta \tilde{y}_t \qquad (1)$$

According to equation (1), $\sum_{1} \alpha_i = 1$ and $\eta>0$. π_t, is inflation rate and $\tilde{y}t$ is a typical output gap. Accordingly, positive output deficit increases inflation rate since there is no long-run transaction (McAdam & Willman, 2003: 6).

Different approaches have been proposed on theoretical dimensions of Phillips Curve. Among these approaches, Keynesians argued that central bank should target unemployment rate in order to increase employment and make full use of resources. The amount of free resources is increasing in economy due to weaknesses in price system. In such a case, central bank should restrict an acceptable real target. Phillips Curve thus enables policymakers to estimate cost of implementing full employment target.

It is New Keynesian Phillips Curve one of theoretical approaches on Phillips Curve. The New Keynesian Phillips Curve states that future expected inflation has a positive function and that the output gap deviates from the potential level of real output. To follow policy based on rules and to prevent potential supply from being exceeded as in New Classical theory it is policy implication of New Keynesian theory (Motyovszki, 2013: 9).

Therefore, it is misleading that nominal wages are decisive for the labor market balance. From this perspective, real wages reveal a healthier situation in understanding the labor market.

On the other hand, Monetarists brought three different innovations to Phillips Curve analysis. Firstly, demand excess variable is redefined. Monetarists express the difference between current and normal capacity of real production or current and natural unemployment rates that are equal to this in original Phillips Curve analysis. Secondly, price expectations are included in Phillips Curve analysis. Accordingly, Monetarists see the expected inflation rate as reason for Phillips Curve to shift. Thirdly, Monetarists have developed the expectation calculation mechanism, expressed as the adaptive expectations hypothesis to understand how economic units' price expectations are formed. According to the adaptive expectations hypothesis, economic units use their future expectations to shape what they learned from their past experiences (Tunay, 2010: 9-13). In this respect, Monetarists contributed to Phillips Curve analysis in three different ways. Monetarists argue that central bank should focus on money creation control to ensure price stability. This monetary goal is transferred to price mechanism responsibility for determining real variables such as unemployment rate (Hetzel, 2013: 91).

According to the New Classical Economists, as long as inflation is a surprise, there is a balance between inflation and unemployment, otherwise Phillips Curve is vertically shaped, demand-side policies have no real effects (Motyovszki, 2013: 7). New Classical Economists explain their approach on Phillips Curve Based on Rational Expectations hypothesis and wage-price elasticity assumptions. According to the new classics, the actual inflation depends on being different from the expected inflation existence of unemployment-inflation relationship. The difference between actual and expected inflation is random if expectations are rational. In such a situation, unemployment, except for shock and random errors, always occurs at the level of natural unemployment. In this case, inflation can be reduced without a loss in production and employment (Çevik, 2005). According to the rational expectations hypothesis, Phillips Curve is vertical in both short-run and long-run. New Classics argue that economy is at the natural unemployment level. They base unemployment on voluntary reasons, in other words, they express that they are unemployed voluntarily.

On the other hand, adverse conditions and economic recession cause unemployment and inflation to accelerate emerging in world economies in seventies. These two negative situations brought important criticisms against Phillips Curve since Phillips Curve could not demonstrate the unemployment and inflation relationship in a consistent framework. As part of these criticisms, Phelps (1967) and Friedman (1968) state that there are some errors in Phillips Curve. They see real wages as opposed to nominal wages as the main determinant of the labor market balance the main point that Phelps (1967) and Friedman (1968) criticized Phillips Curve. In this context, they argued that expectations are very important and state that the expected real wage is a correct variable to be considered (Motyovszki, 2013: 5).

LITERATURE REVIEW

In this section the studies have been examined on relationship between inflation and unemployment and the validity of Phillips Curve developed and developing countries. It is stated that obtained the results in developed and developing countries differ in supporting the existence of the inflation-unemployment relationship and the theoretical background of Phillips Curve looking at Phillips Curve literature in a general framework. From these studies, Onder (2004), Kustepeli (2005), Furuoka (2007), Tang and Lean (2007), Schreiber and Wolters (2007) identified a stable and nonlinear relationship between unemployment and inflation. In addition, Okun (1975), Lucas (1976), Turner (1997), Atkeson and Ohanian (2001), Niskanen (2002), Reichel (2004) have demonstrated the existence of an unstable relationship between unemployment and inflation. It may vary depending on economic conditions the existence and direction of the interaction between unemployment and inflation.

On the other hand, Turner and Seghezza (1999) examined the validity of Phillips Curve using the ordinary least squares (OLS) method in Organization for Economic Cooperation and Development (OECD) countries. The variables were determined such that inflation rate, output deficit, import / gross domestic product (GDP), inflation rate of imported goods for econometric modeling of the study. According to the findings, it is determined that Phillips Curve is valid in most OECD countries.

Céspedes et al. (2005) examined the validity of New Keynesian Phillips Curve using the generalized moments (GMM) method in Chilean economy during the period 1990-2004. The variables were determined such that the consumer price index (CPI) inflation rate, output gap, inflation target, labor rate, output-capital ratio and import prices for the econometric model. Findings show that New Keynesian Phillips Curve was valid in Chile for the period 1990-2004.

Sanchez (2006) examined the validity of New Keynesian Phillips Curve by applying the GMM method in Japanese economy for the period 1973-2005. The variables were determined such that wages, hourly wages, real output deficit, gross domestic product (GDP) deflator and Consumer price index (CPI) and the results support New Keynesian Phillips Curve.

Plessis and Burger (2006) examined the validity of New Keynesian Phillips Curve in South African economy for the period 1975-2003. GMM method was applied as econometric method. The variables were determined such that CPI inflation rate, output gap, import prices, daily wages per employee, real marginal cost, real output-Hodrick-Prescot trend, yields of bonds with a maturity of more than ten years for the econometric model. The results showed that in South African economy, New Keynesian Phillips Curve was valid for that period.

Aurelijus and Kulikov (2007) have identified and compared the structural parameters underlying New Keynesian Phillips Curve model in Estonia, Latvia and Lithuania for the period 1995-2005. Findings show that New Keynesian Phillips Curve is significant and valid for open economy model.

Puzon (2009) examined the validity of traditional Phillips Curve in Southeast Asian Union (ASEAN) countries, including Philippines, Thailand, Indonesia and Malaysia during the period 1980-2005. OLS estimation method has been used and the variables were determined such that inflation rate, unemployment rate, interest rate, exchange rate, oil and 1997 Asian Crisis dummy for the econometric model of the study. The findings show that traditional Phillips Curve was valid in Southeast Asian Union (ASEAN) countries studied.

Mihailov et al. (2011) studied the validity of New Keynesian Phillips Curve in ten OECD countries including Austria, Canada, France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland and the United Kingdom (UK) for the period 1970-2007. The findings show that New Keynesian Phillips Curve is partially valid in these OECD countries.

Shahbaz et al. (2012) examined the validity of Phillips Curve in short-run and long-run in Turkish Republic of Northern Cyprus (TRNC) for the period 1978-2007. The variables were determined such that inflation rate and unemployment rate for econometric modeling, Autoregressive Distributed Lag (ARDL) cointegration test and dynamic ordinary least squares (DOLS) estimation methods were used. ARDL cointegration test and dynamic ordinary least squares (DOLS) estimation results indicate that Phillips Curve is valid in both short-run and long-run in Turkish Republic of Northern Cyprus (TRNC).

Bayrak and Kanca (2013) examined the validity of Phillips Curve in Turkey's economy. inflation rate is determined as dependent variable and unemployment rate as independent variable for the econometric model of the study. OLS estimate results suggest that long-term Phillips curve is valid for Turkey.

Saman and Pauna (2013) estimated New Keynesian Phillips Curve in Romanian economy for the period 2000-2011. Estimation results show that the estimated New Keynesian Phillips Curve for Romania is not different from theoretical framework.

Chowdhury and Sarkar (2014) examined the validity of New Keynesian Phillips Curve in four countries: Brazil, Russia, India and South Africa for the period May 1994 and May 2011. The modified Markov Switching model method has been used and the variables were determined such that CPI inflation rate, output gap, monetary growth and real effective exchange rate for the econometric model. Study results show that New Keynesian Phillips Curve is valid for the specified period in Brazilian and South African economies.

Machado and Portugal (2014) studied the formal direction of Phillips Curve in Brazilian economy for the period April 2000 and May 2011. Ljung-Box Q statistical method was used in the study and the econometric model was determined by inflation rate, output, inflation expectation and marginal cost variables. The findings reveal that Phillips Curve was flattened for the period in Brazilian economy.

Rosa (2014) examined relationship between inflation and unemployment using Johansen cointegration test method in Italy for the period 1961-2012. The findings reveal that there is a relationship between inflation and unemployment in Italian economy at the relevant time.

Esu and Atan (2017) examined the validity of Phillips curve in twenty-nine African countries under the Sahara during the period 1991-2015. CPI inflation rate and unemployment rate variables were preferred for the econometric model of the study. There is a insignificant relationship between inflation rate and unemployment rate in twenty-nine African countries under the Sahara during the period 1991-2015. Accordingly, it is determined that Phillips Curve is invalid in twenty-nine countries under the Sahara.

Karahan and Uslu (2018) examined the relationship between unemployment rate and inflation rate in Turkey. The variables were determined such that inflation rate and unemployment rate for the econometric model of the study in which ARDL Bound Test was applied. ARDL Bound Test results show that unemployment rate is effective on inflation rate in Turkey.

Zayed et al. (2018) examined the relationship between unemployment and inflation in Philippines economy for the period 1950-2017. The variables were determined such that inflation rate, target inflation, unemployment rate, annual wage rate and GDP for econometric modeling of the study using OLS estimation, error correction model (ECM) and CUSUM test methods. Accordingly, the Philippines Government needs to implement policy instruments in a way that positively affects the unemployment rate and inflation rate.

DATA SET AND ECONOMETRIC METHODOLOGY

The data set is on an annual frequency and covers the period 1988-2017 used in the econometric application of the study. This data set is obtained from the database on the World Bank (WB) website.

The regression models specified in equation (2) and equation (3) are taken as basis for econometric application in the study. Bayrak and Kanca (2013) 's and Karahan and Uslu (2018)'s study in which they examined the validity of Phillips Curve in Turkey differ from the modeling regression models of the study shown in equation (2) and equation (3). Accordingly, in this study, besides unemployment and inflation variables, export unit value index, import unit value index and broad definition monetary growth variables are added to regression models different from Bayrak and Kanca (2013), Karahan and Uslu (2018). These regression models are shown in equation (2) and equation (3).

$$UR = \alpha_0 + \alpha_1 INF + \alpha_2 LEXPUV + \alpha_3 LIMPUV + \alpha_4 BDMG \quad (2)$$

$$INF = \beta_0 + \beta_1 UR + \beta_2 LEXPUV + \beta_3 LIMPUV + \beta_4 BDMG \quad (3)$$

The variables and coefficients specified in equation (2) and equation (3) are as follows; UR, unemployment rate, INF; CPI inflation rate, LEXPUV; logarithmic transformed export unit value index, LIMPUV; logarithmic transformed import unit value index, BDMG; broad definition monetary growth rate. α_0 and β_0 are constant coefficients of the regression models. α_1, α_2, α_3, α_4, β_1, β_2, β_3, β_4 coefficients indicate slope coefficients of the regression models.

Firstly, the coefficients of the models were estimated using OLS estimation method based on the two regression models specified in equation (2) and equation (3). OLS estimation method is a reliable method in terms of its properties and it is a widely used method for estimating coefficients of economic relations in most accurate way. OLS method is a coefficient estimation method with features such as linear, unbiased and having minumum variance. Null hypothesis, which states that test statistics values of estimated coefficients of independent variables are significantly, are tested according to a certain level of significance in this estimation method. Null hypothesis is rejected if the test statistical value of estimated coefficient of relevant independent variable is significant.

On the other hand, it is being done unit root analysis of series OLS estimation method after estimation. Dickey-Fuller GLS (ERS) and Phillips-Perron (PP) Unit Root Test methods were used one of the unit root test methods commonly used in time series analysis for unit root analysis of the series. Unit root tests show the distribution of series around their averages. If the series contain unit root as a result of unit root tests made according to their level values; in this case, unit root test is performed again according to the appropriate lag values by taking the first differences. The null hypothesis is tested by comparing the critical value corresponding to a certain significance level with test statistical value in implementation of the unit root test. If test statistic value is higher than absolute critical value, then it is decided to reject null hypothesis.

After unit root tests, cointegration tests are applied in order to determine whether the series used are related in long-run. Johansen (1988, 1991) cointegration test is used as cointegration test in this study. It is decided according to the trace statistics and maximum eigenvalue statistics concluded simultaneously the existence of the cointegrated vector in Johansen (1988, 1991) cointegration test. These statistics concluded simultaneously are compared with the critical values. It is concluded that number of vectors cointegrated by corresponding alternative hypothesis if trace and maximum eigenvalue test statistics values are greater than critical values.

FINDINGS

They are estimated using the OLS estimation method coefficients of variables determined for econometric application. OLS estimation is made on two different models. In the first model, the UR variable is accepted and estimated as a dependent variable. In the second model, the INF is accepted as a dependent variable and has been re-estimated. OLS estimation results are given in Table 1 and Table 2.

Table 1. Ordinary Least Squares (OLS) Method Estimation Results

Dependent Variable: UR				
Method: Ordinary Least Squares (OLS)				
Variable	**Coefficient**	**Standart Error**	**t-Statistic**	**Prob.**
C	2.580	15.744	0.164	0.871
INF	-0.061	0.021	-2.974*	0.006
LEXPUV	27.717	20.260	1.368	0.184
LIMPUV	-7.283	3.857	-1.889	0.071
BDMG	0.007	0.014	0.528	0.603
R-squared	0.583	**Adjusted R- squared**		0.5163
S. E. of regression	1.038	**Akaike Info Criterion**		3.063
Sum squared resid	26.930	**Schwarz Criterion**		3.297
Log Likelihood	-40.949	**Hannan-Quinn Criter**		3.138
F-Statistic	8.724	**Durbin-Watson Stat.**		1.194
Probabilty (F-Statistic)	0.000			

***:** It indicates that the null hypothesis was rejected according to significance level 1%.

According to the estimation results given in Table 1, it is determined that the test statistic value of the estimated coefficient of the independent variable INF variable is significant according to the significance level 1%. In addition, they were found insignificant the test statistical values of the coefficient of LEXPUV, LIMPUV and BDMG variables. It means that the effect of INF variable on dependent variable UR is negative the sign of the coefficient for the INF independent variable, which is estimated to be significant is negative. OLS estimation results for the second model are given in Table 2.

Table 2. Ordinary Least Squares (OLS) Method Estimation Results

Dependent Variable: INF				
Method: Ordinary Least Squares (OLS)				
Variable	**Coefficient**	**Standart Error**	**t-Statistic**	**Prob.**
C	-36.974	131.255	-0.282	0.781
UR	-4.266	1.434	-2.974**	0.006
LEXPUV	363.408	159.512	2.278*	0.032
LIMPUV	-99.391	28.083	-3.539**	0.002
BDMG	0.462	0.075	6.156**	0.000
R-squared	0.941	**Adjusted R- squared**		0.932
S. E. of regression	8.661	**Akaike Info Criterion**		7.307
Sum squared resid	1875.535	**Schwarz Criterion**		7.540
Log Likelihood	-104.600	**Hannan-Quinn Criter**		7.381
F-Statistic	99.610	**Durbin-Watson Stat.**		1.927
Probabilty (F-Statistic)	0.000			

***(**):** It indicates that the null hypothesis (H_0) was rejected according to significance level 5% (1%).

According to the estimation results given in Table 2, it is determined that the test statistic values of the estimated coefficients of all independent variables in the model together with UR independent variable are significant according to significance levels 1% and 5%. Accordingly, UR, LEXPUV, LIMPUV and BDMG independent variables were all found to be effective on INF variable. It means that the UR variable has a negative effect on the INF variable. The sign of the estimated coefficient of the UR variable is negative.

It is performed by applying Dickey-Fuller GLS (ERS) and Phillips-Perron (PP) Unit Root Test methods unit root analysis of the series used in the study. Accordingly, Dickey-Fuller GLS (ERS) unit root test results are shown in Table 3.

Table 3. Dickey-Fuller GLS (ERS) Unit Root Test Results

Variable	Level		First Difference	
	Intercept	Intercept Trend	Intercept	Intercept Trend
UR	-1.900(0)	-3.012(2)	-4.538(0)**	-4.548(0)**
INF	-1.381(4)	-2.767(4)	-2.239(2)*	-3.762(1)*
LEXPUV	-1.328(0)	-2.067(0)	-3.312(0)**	-4.670(0)**
LIMPUV	-1.051(0)	-1.928(0)	-4.026(0)**	-4.660(0)**
BDMG	-0.866(1)	-1.806(1)	9.949(0)**	-10.068(0)**

***(**):** It indicates that the null hypothesis (H_0) was rejected according to significance level 5% (1%).
Not: Numerical values in parentheses indicate lag values.

According to the results in Table 3, the series are not stationary according to their level values in case of unit root test as both intercept and intercept-trend according to significance level 5% of the series. All series became stationary according to significance level 5% when the first differences of the series are taken, again Dickey-Fuller GLS (ERS) unit root test method is applied as intercept and intercept-trend.

It is used PP Unit Root Test method as a second test method for unit root analysis of series. PP Unit Root Test method results are shown in Table 4.

Table 4. Phillips-Perron (PP) Unit Root Test Results

Variable	Level		First Difference	
	Intercept	Intercept Trend	Intercept	Intercept Trend
UR	-1.768(5)	-2.330(5)	-4.567(5)*	-4.464(5)*
INF	-0.895(3)	-1.779(3)	-5.226(3)*	-5.130(3)*
LEXPUV	-1.488(3)	-2.606(3)	-5.861(3)*	-5.687(3)*
LIMPUV	-1.069(2)	-2.285(2)	-5.147(1)*	-5.045(1)*
BDMG	-1.763(4)	-3.414(3)	-9.823(3)*	-9.707(3)*

***:** It indicates that the null hypothesis was rejected according to significance level 1%.
Note: Numerical values in parentheses indicate lag values.

According to the results in Table 4, the series were not found to be stationary as a result of the unit root test performed with intercept and intercept-trend according to the level values. Afterwards, it is seen that the series become stationary as a result of the unit root test, which was performed by taking the first differences.

After unit root tests, Johansen (1988, 1991) cointegration test is applied to determine whether the series are related in long-run. Accordingly, Johansen (1988, 1991) cointegration test results are shown in table 5.

Table 5. Johansen (1988, 1991) Cointegration Test Results

Hypothesis		Trace Statistic	Critical Value 5%	P-Value
H_0	H_1			
r≤0	r>0	76.161**	60.061	0.001
r≤1	r>1	43.503*	40.175	0.022
r≤2	r>2	15.521	24.276	0.415
r≤3	r>3	2.920	12.321	0.858
Hypothesis		**Max. Eigenvalue Statistic**	**Critical Value 5%**	**P-Value**
H_0	H_1			
r≤0	r>0	32.658*	30.440	0.026
r≤1	r>1	27.982*	24.159	0.015
r≤2	r>2	12.601	17.797	0.255
r≤3	r>3	2.411	11.225	0.873

***(**):** It indicates that the null hypothesis (H_0) was rejected according to significance level 5% (1%).

According to Johansen (1988, 1991) cointegration test results given in Table 5, trace and maximum eigenvalue statistical values are found to be significant according to significance levels 5%. The alternative hypothesis r> 1 is accepted, that is, test results show that more than one cointegrated vector exists.

When the econometric results are evaluated in a general framework, OLS estimation results show that the unemployment rate variable and the inflation rate variable interact mutually and negatively. Johansen (1988, 1991) cointegration test results indicate that all variables used in econometric practice, especially unemployment rate and inflation rate act together in the long-run. The econometric results offer evidence that Phillips Curve valid in Turkey for the period 1988-2017.

CONCLUSION AND DISCUSSION

Phillips Curve provides important contributions to macroeconomic theory. Keynesians advocates that the central bank should set the unemployment rate as a target in order to realize employment growth and full use of resources on inflation-unemployment relationship and Phillips Curve debate. New Keynesians states that the expected inflation in future has a positive function and output gap is caused by the deviation of the real output from potential level. New Classics argue that Phillips Curve is vertical in both short-run and long-run. In this context, they linked the existence of unemployment-inflation relationship to the fact that the actual inflation was different from the expected inflation. Monetarists express their views on expected inflation within

framework of adaptive expectations hypothesis. Accordingly, people shape their future expectations with their past experiences.

On the other hand, the world economy has entered an important recession in the seventies, simultaneous increases in unemployment and inflation rates caused criticism on the Phillips Curve. In this context, the validity of Phillips curve during the economic crisis is questioned.

In this study, it was examined inflation-unemployment relationship and the validity of Phillips curve in Turkey's economy for the period 1988-2017. It is used OLS estimation and Johansen (1988, 1991) cointegration test methods as econometric method in the study. The findings provide evidence that Phillips Curve is valid in Turkey's economy for the period. In this context, it has been determined the presence of a mutually negative interaction between unemployment and inflation. Also, they have been found to be effective on inflation along with the prices of export goods and import goods, the broad definition monetary growth rate besides the unemployment rate.

The findings indicate the existence of a trade-off relationship between inflation and unemployment in Turkey. This means that unemployment will decrease when inflation increases, or unemployment will increase when inflation decreases. Therefore, it must be put forward correctly the relationship between inflation and unemployment in order to achieve targeted success in the implementation of policies aimed at increasing employment and policies aimed at achieving price stability.

In the coming period, it is important that economic policy decision makers carry out the policies considering the existence of the relationship between inflation and unemployment rate in Turkey. In this context, Expectations that unemployment will increase will also increase the Central Bank of the Republic of Turkey (CBRT) in the case of price stability-oriented monetary policy instruments and taking a back seat as the implementation of oriented policies to increase employment.

Obtained the findings for Turkey, supported the Phillips Curve theory, though, different results can be obtained if a different period or a different developing country is examined. In this context, it becomes difficult to generalize.

ETHICAL TEXT

In this article, journal writing rules, publishing principles, research and publishing ethics rules, journal ethics rules are followed. Responsibility belongs to the author(s) for any violations related to the article.

REFERENCES

Atkeson, A. & Ohanian, L. E. (2001). "Are Phillips Curves Useful for Forecasting Inflation?". *FRB Minneapolis Quarterly Review*, 2-11.

Aurelijus, D. & Kulikov, D. (2007). *New Keynesian Phillips curve for Estonia, Latvia and Lithuania*. Working Papers of Eesti Pank. No 7/2007.

Bayrak, M & Kanca, O. C. (2013). "Türkiye'de Phillips Eğrisi Üzerine Bir Uygulama". *Eskişehir Osmangazi Üniversitesi İİBF Dergisi*, 8(3): 97- 115.

Céspedes, L. F., Ochoa, M. & Soto, C. (2005). *The New Keynesian Phillips Curve in an Emerging Market Economy: The Case of Chile*. Working Papers Central Bank of Chile 355, Central Bank of Chile.

Chowdhury, K. B. & Sarkar, N. (2014). *Is the Hybrid New Keynesian Phillips Curve Stable? Evidence from Some Emerging Economies*. Discussion Paper ERU/2014 – 02

Çevik, F. S. (2005). "Beklentilerin Rolü ve Phillips Eğrisi". *Mevzuat Dergisi*, 95: 1-11.

Esu, G. & Atan, J. (2017). *The Phillip's Curve in Sub-Saharan Africa: Evidence from Panel Data Analysis*, MPRA Paper No. 82112.

Friedman, M. (1968). "The Role of Monetary Policy". *American Economic Review*, 58: 1-17.

Furuoka, F. (2007). "Does the Phillips Curve Really Exist? New Empirical Evidence from Malaysia". *Economics Bulletin*, 5: 1-14.

Gagnon, J. E. & Collins, C. G. (2019). *Low Inflation Bends the Phillips Curve*. Peterson Institute for International Economics Working Paper.

Hall, T. E. & Hart, W. R. (2010). *The Samuelson - Solow "Phillips Curve" and the Great Inflation*. Miami University, Farmer School of Business Department of Economics Working Paper 2010-08.

Hetzel, R. L. (2013). "The Monetarist-Keynesyen Debate and the Phillips Curve: Lessons from the Great Inflation". *Economic Quarterly*, 2(99): 83-116.

Humphrey, T. M. (1985). "The Evolution and Policy Implications of Phillips Curve Analysis". *Economic Review*, March/April, 3-22.

Johansen, S. (1988). "Statistical Analysis of Cointegration Vectors". *Journal of Economic Dynamics and Control*, 2–3(12): 231–254.

Johansen, S. (1991). "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models". *Econometrica*, 6(59): 1551–1580.

Karahan, P. & Uslu, N. Ç. (2018). "A Dynamic Analysis on the Validity of the Phillips Curve for Turkey". *Finans Politik & Ekonomik Yorumlar*, 636(55): 89-99.

Kustepeli, Y. (2005). "A Comprehensive Short-run Analysis of a (Possible) Turkish Phillips Curve". *Applied Economics*, 37: 581–91.

Lucas, R. E. (1976). "Econometric Policy Evaluation: A Critique". *Carnegie-Rochester Series on Public Policy*, 1: 19-46.

Machado, V. G. & Portugal, M. S. (2014). *Phillips Curve in Brazil: An Unobserved Components Approach*. Working Papers 354. Banco De Central Do Brasil, 1-28.

Mankiw, N. G. (2010). *Macroeconomics*. New York: Worth Publishers.

McAdam, P. & Willman, A. (2003). *New Keynesian Phillips Curves: A Reassesment Using EURO Area Data*. European Central Bank Working Paper No. 265, 1-64.

Mihailov, A., Rumler, F. & Scharler, J. (2011). "The Small Open-Economy New Keynesian Phillips Curve: Empirical Evidence and Implied Inflation Dynamics". *Open Economies Review, Springer,* 22(2): 317-337.

Motyovszki, G. (2013). *The Evolution of Phillips Curve Concepts and Their Implications for Economi Policy*. Central European University, Budapest: 1-13.

Niskanen, W.A. (2002). "On the Death of Phillips Curve". *Cato Journal*, 22: 193-98.

Okun, A. M. (1975). "Inflation: Its Mechanics and Welfare Costs". *Brookings papers on Economic Activity*, 2: 351-390.

Onder, A. O. (2004). "Forecasting Inflation in Emerging Markets by Using the Phillips Curve and Alternative Time Series Models". *Emerging Markets Finance and Trade*, 40: 71–82.

Phelps. E. (1967). "Phillips Curve, Expectation of Inflation, and Optimal Inflation over Time". *Economica*, 34: 254-281.

Phillips, A. W. (1958). "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom 1861-1957". *Economics*, 100(25): 283-299.

Plessis, S. & Burger, R. (2006). "A New Keynesian Phillips Curve for South Africa", SARB Conference 2006, 61-78.

Puzon, K. A. M. (2009). "The Inflation Dynamics of the ASEAN-4: A Case Study of the Phillips Curve Relationship". *Journal of American Science*, 5(1): 55-57.

Reichel, R. (2004). "On the Death of the Phillips Curve: Further Evidence". *Cato Journal*, 24: 341-348.

Rosa, A. S. (2014). "The Phillips Curve in Italy". *Econ. e Desenv., Santa Maria,* 2(26): 74-84.

Saman, C. & Pauna, B. (2013). "New Keynesian Phillips Curve for Romania". *Romanian Journal of Economic Forecasting*, 2/2013: 159-171.

Samuelson, P. A. & Solow, R. M. (1960). "Analytical Aspects of Anti-Inflation Policy". *American Economic Review Papers and Proceedings*, 50(2): 177-194.

Sanchez, D. A. (2006). "A New Keynesian Phillips Curve for Japan, A New Keynesian Phillips Curve for Japan". *Federal Deposit Insurance Corporation*, 06: 1-21.

Schreiber. S & Wolters, J. (2007). "The Long-Run Phillips Curve Revisited: Is the NAIRU Framework Data-consistent?". *Journal of Macroeconomics*, 29: 355–367.

Shahbaz, M., Islam, F. & Shabbir, M. S. (2012). "Phillips Curve in a Small Open Economy: A Time Series Exploration of North Cyprus". *Bangladesh Development Studies*, 4(35): 113-130.

Tang, C. F. & H. H. Lean. (2007). *The Stability of Phillips Curve in Malaysia*. Discussion Paper 39, Monash University.

The World Bank (WB) (2019). World Development Indicators Database, World Bank Group. https://datacatalog.worldbank.org/dataset/world-development-indicators, (Accessed: 04.07.2019)

Tunay, K. B. (2010). *50.Yılında Phillips Eğrisi: Makro Ekonomik İstikrar ve Maliyetleri*. İstanbul: Marmara Üniversitesi Yayınları.

Turner, P. (1997). "The Phillips Curve, Parameter Instability and the Lucas Critique". *Applied Economics*, 29(1): 7-10.

Turner, D. & E. Seghezza (1999). *Testing for a Common OECD Phillips Curve.* OECD Economics Department Working Papers No. 219.

Zayed, N. M., Islam, R. & Hasan, R. (2018). "Testing Phillips Curve to Examine the Inflation Rate Regarding Unemployment Rate, Annual Wage Rate and GDP of Philippines: 1950-2017". *Academy of Accounting and Financial Studies Journal*, 5(22): 1-9.