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Research Article

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Is Short-Run Phillips Curve True? : Evidence from Azerbaijan

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ABSTRACT

In this paper, we have analysed relationship between unemployment rate and inflation rate in Azerbaijan. Topic of correlation between these two macroeconomic indicators has always attracted the attention of the famous economists. Phillips curve shows the negative trade-off between these two macroeconomic indicators; inflation rate and unemployment rate. A.W. Phillips examined wage inflation rather than price inflation, but we assume these variables usually move together. However, this curve is not appropriate for Azerbaijan. We have used data related to the period of 2000-2015. Historical data related to this period does not support this model at all. As a result of our analysis, we have found that, there is no any strong negative correlation between unemployment rate and inflation rate. In the paper, we have used statistical graphs, correlation analysis and descriptive statistics

KEYWORDS: ***Phillips curve, unemployment rate, inflation rate, negative correlation.***

Introduction and literature review

In this article, we have analysed relationship between unemployment and inflation in Azerbaijan. In the first part of the article, we have given broad information about the start of the Phillips curve. We have also written about the economists who criticized Phillips curve. In the second part of the paper, we have provided the data collected from the official website of The State Statistical Committee of the Republic of Azerbaijan. In addition, there are no available data about wages inflation in Azerbaijan. We assumed that change in overall prices, wages inflation and consumer price index move together. In our analysis, we have used simple regression analysis and correlation analysis. Statistical graphs were frequently used in our research. In conclusion, we commented on key findings from analysis.

There is a relationship between unemployment and inflation rate. The relationship between these two macroeconomic factors was first examined by A.W. Phillips in 1958. After analysing the economy of the UK between 1861 and 1957, A.W. Phillips found out that in the period of low wage inflation, the unemployment rate was high and in the period of high wage inflation it was low. According to Phillips, when the unemployment rate is low, there occurs a shortage in the labour market and because of this; companies try to attract employees by high salaries. However, when the unemployment rate gets higher, the shortage in the labour market will change into the surplus, thus the same process will happen in an opposite way. Phillips shared his findings in one of his academic articles in the economics journal of "Economica". Little later,

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new theory of relationship between wage inflation and unemployment got popular in New Zeeland, USA and European countries. However, the main detail that one should take into consideration is that saying "inflation", Phillips actually meant wage inflation, not the price inflation. Later in 1960s new theories were assumed about the relationship between unemployment rate and the price inflation rather than the wage inflation and one of them was the theory by Paul Samuelson and Robert Solow. After examining 1960s' economy of the USA, P. Samuelson and R. Solow discussed in their article of "Analytical Aspects of Anti-Inflation Policy" published in the journal "American Economic Review" that the relationship between the price inflation and unemployment rate was negative; when the unemployment rate in the economy was high, the price inflation was low and vice versa. However, the stagflation of 1970s showed that things in the real life were quite different from the "Phillips' curve theories". Among of those guys who critically argued that the Phillips' curve theories have lots of gaps was Milton Friedman and Edmund Phelps. According to them, both employers and employees have to pay their attentions mainly to the real inflation-adjusted wages and government should try to reach and maintain the natural unemployment rate in the economy. M. Friedman and E. Phelps stated that government cannot always implement the "high inflation rate" policy in order to keep the unemployment rate low. We can explain it in following way: Let's assume that unemployment rate in the economy is on its "natural level". Employee is sure that his/her salary has been increased in the same amount as the price inflation, thus the real purchasing power of his/her salary hasn't decreased, in other words, real wages have not been changed, they are constant. Now let's assume that, government tries to lower the unemployment rate below its "natural level" by implementing expansionary monetary policy or any other "tool". As a result of this policy, the amount of the money in the economy will increase, which will lead to the increase in both wages and prices. This time, thinking real wages have increased, employee will get motivated to work and earn more, thus there will occur the surplus in the labour market. Since the companies now get more profit they will also be interested in employing more workers. Therefore, as a result, unemployment rate will go down below its "natural level". However, after a little time, the employee will realize that prices have also increased and he/she will demand to increase his/her salaries and this will make the current unemployment rate to go up back to its "natural level". Analyses by Friedman and Phelps showed that the Phillips' curve theory differs in the long and short-term. The negative relationship between inflation and unemployment rate is real as long as the average inflation rate is stable. However, if the average inflation rate changes due to the policies that government tries to implement in order to lower the unemployment rate, then the unemployment rate will return to its "natural level", thus there will be no relationship between these two macroeconomic factors.

Data

The data have been collected from the official website of The State Statistical Committee of the Republic of Azerbaijan. It is related to the period of 2000-2015. Consumer Price Index has been calculated with chain-based method, base year is the preceding period for all years. The following table shows unemployment rates and CPIs for years between 2000 and 2015.

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Table 1- Unemployment rate and CPI. Source: www.stat.gov.az

Years	Unemployment rate	Consumer price index
2000	11.8	1.8
2001	10.9	1.5
2002	10	2.8
2003	9.2	2.2
2004	8	6.7
2005	7.3	9.6
2006	6.6	8.3
2007	6.3	16.7
2008	5.9	20.8
2009	5.7	1.5
2010	5.6	5.7
2011	5.4	7.9
2012	5.2	1.1
2013	5	2.4
2014	4.9	1.4
2015	5	4

In this period, the highest inflation rate was observed in 2008, but the lowest one was in 2012. The highest unemployment rate was 11.8% in 2000. The lowest unemployment rate was reported in 2014, which was 4.9%. Average unemployment rate was 7.05%. In addition, the average inflation rate was 5.9%. Inflation rates were more volatile than unemployment rates in these years. In table 2, descriptive statistics for both variables have been shown. Here, range is difference between maximum and minimum values in the data set

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Table 2- Descriptive statistics.

Variable	N	Mean	StDev	Minimum	Maximum	Range
Unemployment rate	16	7.05	2.264	4.9	11.8	6.9
Consumer price index	16	5.9	5.78	1.1	20.8	19.7

Analysis of relationship between unemployment rate and inflation rate

In our analysis, we have used two ways to prove that absence of correlation between these macroeconomic indicators in Azerbaijan. First tool is correlation analysis which is relevant for measuring degree of relationship. Second tool is graphical representation of reality. Scatterplots and bar charts have been used in our analysis.

Correlation analysis

We have used simple regression analysis to find relationship between these two indicators. The Pearson's correlation coefficient for these variables was (-0.23238). It means that, there is inverse relationship, the higher unemployment rate, the lower rate of inflation. We have accepted inflation rate as an independent variable, but unemployment rate as a dependent variable.

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Pearson's correlation coefficient was calculated with this equation.

$$r = \frac{n\Sigma xy - \Sigma x \Sigma y}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$$

In the equation, X is independent variables; Y is dependent variables in data set. N shows sample size, which are sixteen in our example. Coefficient of determination is calculated as the square of the correlation coefficient. Coefficient of determination is equal to 5.400192. We would say that 5.4% of the variations in rate unemployment rate can be explained by the variances in inflation. It is not so strong negative relationship.

Simple regression analysis

We have applied simple regression model into our analysis. We assume unemployment rate is response variable, but inflation is control variable. According to our results, regression equation was determined as *Unemployment rate = 7.587 - 0.091 Consumer price index.*

Table 3- Simple Regression

Model Summary			
S	R-sq.	R-sq. (adjusted)	R-sq. (predicted)
2.27893	5.40%	0.00%	0.00%

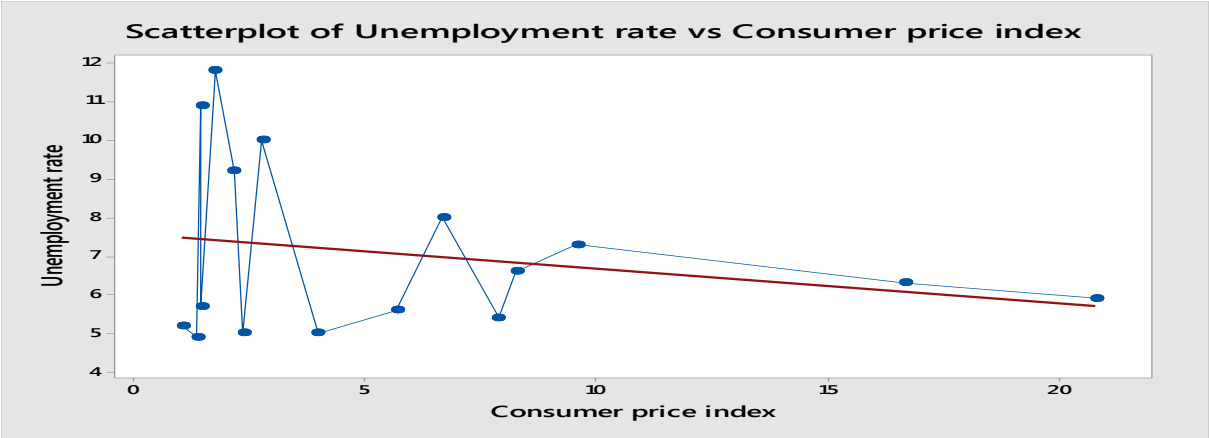
Coefficients					
Term	Coefficient	SE Coefficient	T-value	P-Value	VIF
Constant	7.587	0.828	9.16	0	0
Consumer price index	-0.091	0.102	-0.89	0.386	1

Regression Equation:

Unemployment rate = 7.587 - 0.091 Consumer price index

In the equation, the slope and intercept have been rounded to three decimal places. If inflation rate is 0%, unemployment rate is equal to 7.587%. 1% increase in inflation rate decreases unemployment rate by 0.091%. In graph 1, regression line in scatterplot has been presente

Graph 1- Scatterplot with regression line



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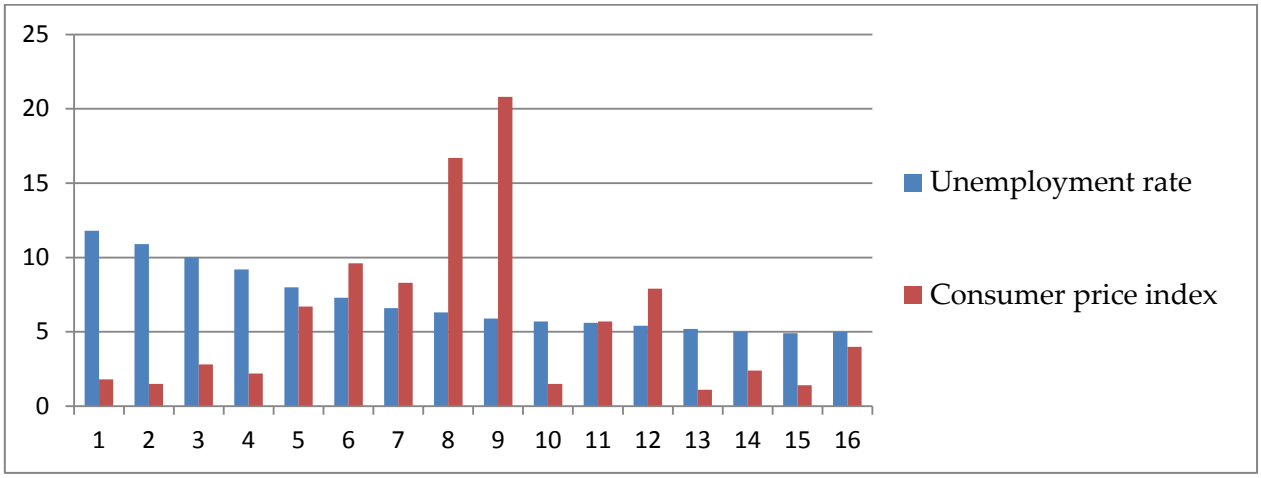
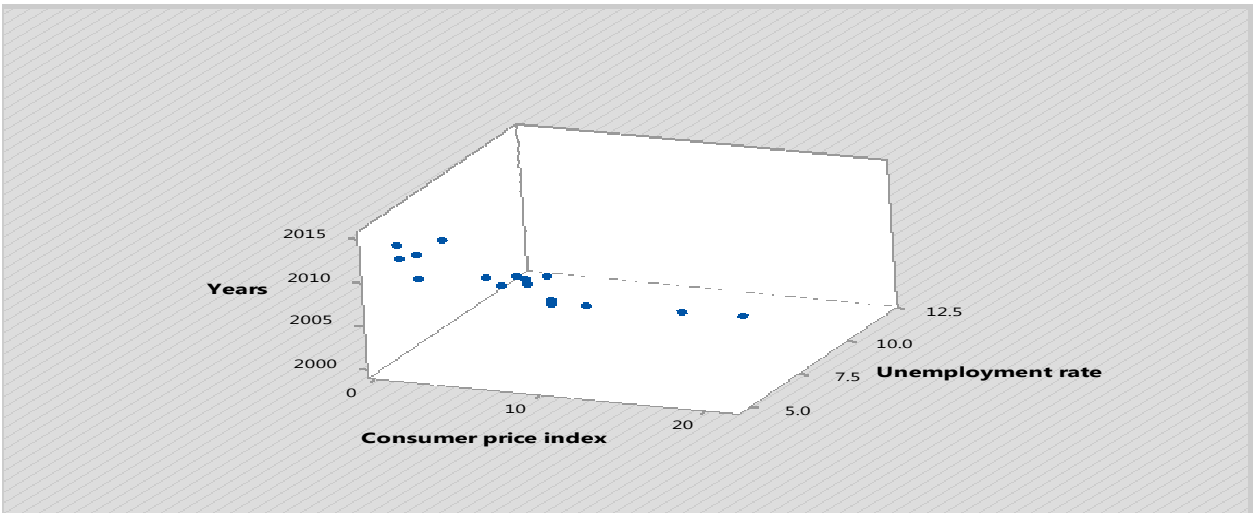
Graphical Representation

In the following graphs, we can see how the variables are related. In graph 2, we can see that, trend in unemployment rate is downward, it is getting decrease year-by-year. However, consumer price indexes are approximately distributed normally and curve is like bell-shaped. In graph 3, scatter graph shows that, there is no strong negative correlation between inflation rate and unemployment rate in Azerbaijan.

Graph 2- Bar chart



Graph 3- 3D Scatterplot



Conclusion

According to the results of research, there is no strong short-run trade-off between unemployment and inflation in Azerbaijan. According to Phillips curve, this correlation arises because high employment rate is associated with high aggregate demand, which also puts pressure on consumer price indexes and salaries in the economy. Sometimes researchers can not differentiate causation and correlation. Inflation can be well correlated with unemployment, but inflation cannot cause variations in unemployment. Charts and Pearson's correlation coefficient give clear information about absence of correlation between inflation and unemployment in Azerbaijan in the period of 2000-2015. According to Hall and Hart

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who used the modern econometric method to estimate the new Phillips curve says there is positive correlation coefficient or negative (approximately zero) between CPI and unemployment rate when unemployment rate is very low in economy. Other findings are shown below;

There is no negative trade-off between inflation and unemployment in Azerbaijan.

1% increase in inflation rate decreases unemployment rate by 0.091%.

Given inflation rate is 0%, unemployment rate is 7.587%.

In this paper, we have only examined the data related to Azerbaijan. It might be wrong or true for other countries. We observed failure of Phillips curve in Azerbaijan. In the world, some well-known economists also found that Phillips curve is not relevant for decision-making in monetary policy by governments. This article may be useful for the agencies implementing monetary policy.

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