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## Impact of inflation on Unemployment in Sri Lanka: Perspective of Phillips Curve

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### Abstract

The aim of this study is to identify the impact of inflation on unemployment in Sri Lanka over the period 1990 - 2016 through the perspective of Phillips curve. For this purpose, the annual time series data for the above period were collected from central bank report in 2016. To achieve the objective, the inflation rate which represents by wage price index was considered as the dependent variable, and the unemployment rate was used as independent variable in the study. The collected data were analyzed using simple linear regression model and reciprocal model which represents the Phillips curve. Results of the coefficient of correlation in linear regression model suggest that inflation and unemployment have 87.5% of negative correlations among them while the model reveals that rate of inflation has a negative impact on unemployment in the country. Results of reciprocal model confirmed the concept of Phillips curve, and it has found that even if the unemployment rate increases indefinitely, the percentage decrease in wage price index floor will not be more than 12.23 percent per year and the results are statistically significant at 1% level. Also, the above model proves that Sri Lanka has attained a 20.8% of the natural growth rate of unemployment which is higher than under linear model while adjusted R<sup>2</sup> is 0.93 in reciprocal model shows that compared to the linear model, the reciprocal model is the best-fitted one to measure the strength of the above two variables. Findings of the study may help the policymakers in formulating the policies to minimize the harmful consequences of inflation and level of unemployment in Sri Lanka.

**Keywords:** Inflation Rate, Phillips Curve, Natural Rate of Unemployment, Reciprocal Model.

### Introduction

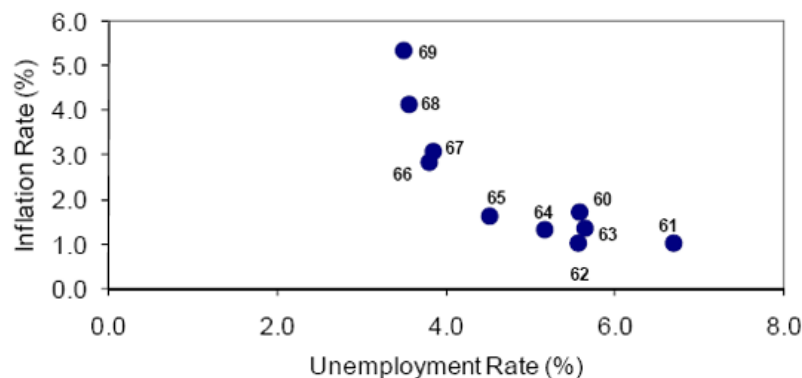
At present modern central banking practices mainly focusing on maintaining the economic and price stability is one of the main objectives of Central Bank of Sri Lanka. In this background, unemployment and inflation are the main macroeconomic concepts which are influencing the all economic aspects of a country. Inflation means that a continued increase in the general price level in an economy and nowadays it is measured by using price indices such as gross domestic product deflator, producer price index, consumer price index and wage price index. In case of Sri Lanka, wage price index and Colombo consumer price index are widely using in the calculation of inflation. Inflation, as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. It is an indicator to measure the changes in the general level of consumer prices and used as one of the key indicators of inflation. Similarly, the wage price index is a price index which measures changes over time in wages and salaries for employee jobs, unaffected by changes in the quality or quantity of work performed. Changes in wages and salaries resulting from changes in the composition of the labor market are excluded from the wage price index movements. In 2017, the inflation rate for Sri Lanka was 6 %. Though

Sri Lanka inflation rate fluctuated substantially in recent years, it tended to decrease through 1998 - 2017 period ending at 6 % in 2017.

Unemployment refers to that, people who were not employed but willing to be employed and who were seeking a job. The unemployment rate decreased to 4.4 percent in 2016 from 4.7 percent recorded in 2015. During 2016, the total labour force has grown by 1.2 percent, while a decline of 5.4 percent was recorded in the unemployed population, reflecting an increase in employment opportunities in the economy during 2016 compared to 2015. In theoretical point of view, in short run, there is an inverse relationship exist between inflation and unemployment. An increase in inflation leads to decrease in unemployment, and a decrease in inflation leads to decrease in unemployment which represents the trade-off between the above variables explained by Phillips curve in the short run.

### *Phillips Curve*

A.W. Phillips was one of the first economists to present compelling evidence of the inverse relationship between unemployment and wage inflation. Phillips studied the relationship between unemployment and the rate of change of wages in the United Kingdom over a period of almost a full century (1861-1957), and discovered that the latter could be explained by (a) the level of unemployment, and (b) the rate of change of unemployment.



Phillips hypothesized that when demand for labor is high, and there are few unemployed workers, employers can be expected to bid wages up quite rapidly. However, when demand for labor is low, and unemployment is high, workers are reluctant to accept lower wages than the prevailing rate, and as a result, wage rates fall very slowly. A second factor that affects wage rate changes is the rate of change of unemployment. If the business is booming, employers will bid more vigorously for workers, which means demand for labor is increasing at a fast pace (i.e., percentage unemployment is decreasing rapidly), than they would if demand for labor is either not increasing (i.e., percentage unemployment is unchanging) or is only increasing at a slow pace. Since wages and salaries are a major input cost for companies, rising wages should lead to higher prices for products and services in an economy, ultimately pushing the overall inflation rate higher. As a result, Phillips graphed the relationship between general price inflation and unemployment, rather than wage inflation. The graph is known today as the Phillips curve. (Elvis Picardo, 2018). In this background, this paper examines the impact of inflation on unemployment in Sri Lanka using the concept of Phillips curve.

### **Objective of the study**

The objectives of this study are to identify the impact of inflation on unemployment in Sri Lanka through the perspective of Phillips curve and to estimate the correlation between the unemployment and inflation rates in Sri Lanka. For this purpose, annual time series data from 1990- 2016 were collected from central bank report in 2016.

## Literature Review

There are a number of researchers have carried out the research based on this topic in many countries using various statistical and econometrics techniques in their studies. Sagar Katria et al. (2011) examined the trade-off between inflation and unemployment using unbalanced annual panel data of 8 SAARC members for the period 1980-2010 from the perspective of Phillips curve. Their study has found that there is a negative relationship between inflation and unemployment rate in the SAARC countries and proved the concept of Phillips curve hold in the member countries.

Another study was done by Mohammed Ziaul Haider, Champa Bati Dutta (2012) on Inflation-Unemployment Trade-off: Evidence from Bangladesh Economy and their results showed that inflation lag, which is positively associated with inflation, strongly explains the current inflation dynamics. The other influencing factors, such as unemployment gap and change in exchange rate, are negatively correlated, and change in the international price of crude oil is positively correlated with inflation.

Muhammad Umair and Raza Ullah (2013) have examined the impact of gross domestic product and inflation on the unemployment rate in Pakistan over the period 2000-2010. Their findings of the study showed that inflation insignificantly influences GDP and unemployment and the correlation is negative. Thus, they concluded that inflation has a role which influential but for GDP and unemployment with insignificant levels in the macroeconomic factors of the Pakistani economy. The relationship between inflation and unemployment in Nigeria was evaluated by Kayode Bamidele Adebawale (2015) for period 1977 – 2013 by the usage of Phillips curve and he has found that there is a negative relationship between inflation and unemployment rates in Nigeria.

Dolly Singh (2016) has analyzed the trade-off between inflation and unemployment in the short run in the Indian economy over the period 2009-2015. His findings proved that inflation has a negative effect on unemployment while it has a positive effect on the real gross domestic product (GDP) in the country. Another research has done by Mohamed Aslam (2017) on the nexus between unemployment and inflation in Sri Lanka using annual time series data from 1959 to 2015. His results confirmed that the Phillips concept of the relationship between the inflation and the unemployment rates and reveals that there was an inverse relationship among the unemployment and the inflation rates in Sri Lanka during the above study periods.

Fejzi Kolaneci, Brunilda Hoxhalli (2016), examined the statistical analysis of the relation between inflation and unemployment in democratic states using Spearman's correlation coefficient with application in Albania. Their findings proved that indicates a weak positive correlation between inflation and unemployment in Albania during the period from January 2005 to December 2014. Phillips curve and inflation in India has examined by Sahu Kabita Kumari (2017) from 1991 to 2015, and the results revealed that the Pearson's coefficient matrix between inflation and unemployment is -0.02 implies that there was a negative relationship between them.

### Methods of data analysis

To analyze the impact of inflation on unemployment in Sri Lanka, secondary data were collected for the period 1990- 2016 from central bank report in 2016. The collected data were analyzed using econometrics analysis such as correlation, simple linear regression, and reciprocal models and the dependent variable is the inflation rate which measured by wage price index and unemployment rate considered as an independent variable in the study.

### Correlation analysis

Correlation analysis is the basic statistical technique to measure the strength of the variables and based on that can identify the correlation among them.

### Simple regression model

A simple linear regression model was applied to identify the impact of inflation on unemployment in Sri Lanka, and it can be expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon$$

Where,

Y = Inflation rate measured by wage price index

$\beta_0$  = Intercept term

$\beta_1$  = Coefficient of  $X_1$

$X_1$  = Unemployment rate

$\varepsilon$  = Error term

### Reciprocal model

Based on the theoretical point of view, there is a trade-off between rate of inflation and unemployment which represents by Phillips curve. Compare with the linear regression model, the reciprocal model is more appropriate, and thus reciprocal model also employed in the study. The model can be shown as:

$$Y = \beta_0 + \beta_1 (1/X_1) + \varepsilon$$

The meaning of each variable is the same as mentioned above.

### Results and Discussions

The strength of the variables namely rate of inflation and unemployment were measured using correlation analysis, and the results display in the following table.

**Table 1: Results of correlation analysis**

Item		Unemployment Rate	Wage price index
Unemployment rate	Pearson Correlation	1	-.875**
	Sig. (2-tailed)		.000
	N	27	27
Wage price index	Pearson Correlation	-.875**	1
	Sig. (2-tailed)	.000	
	N	27	27

\*\* represents the correlation is significant at the 0.01 level (2-tailed)

Source: Estimated by authors

The above results show that there is 87.5% of negative correlation exists among unemployment rate and wage price index and they were statistically significant at 1% level.

It shows that, as unemployment rises, the rate of inflation will decline in the economy of Sri Lanka.

The impact of inflation on unemployment has analyzed by simple linear regression model, and its results were shown in table 2.

**Table 2: Results of simple regression analysis**

Variable	Unstandardized coefficients		Standardized coefficients	t	Significant
	$\beta$	Std. Error	Beta		
Constant	5609.96	384.42		14.5	.000**
Unemployment rate	-378.90	41.912	-.875	-9.04	.000**

\*\* represents the significant levels at 1%.

Source: Calculated by authors

According to the above results, it proved the inverse relationship among the above two variables and inflation has a statistically significant impact on unemployment in Sri Lanka. As wage price index increases by one percentage, the unemployment rate will reduce by 378.90 percent and at zero percentage of inflation, there is 14.8% of unemployment which is called as the natural rate of unemployment attained in Sri Lanka.

Based on the concept of Phillips curve, the reciprocal model is more appropriate than the linear model, and thus, the above variables were estimated using reciprocal model. The estimated results of the model are given below:

**Table 3: Estimated results of the reciprocal model**

Variable	Unstandardized coefficients		Standardized coefficients	t	Significant
	$\beta$	Std. Error	Beta		
Constant	-12.23	198.61		-6.15	.000**
Unemployment	25549.53	1286.94	.970	19.85	.000**

\*\* represents the significant levels at 1%.

Source: Calculated by authors

The above results reveal that there is an inverse relationship between inflation and unemployment and the impact of inflation on unemployment has statistically significant at 1% level. Further, the above model confirmed the concept of Phillips curve where the trade-off is existing between the variables. In the above model, as unemployment( $X_1$ ) increases an inverse of unemployment ( $1/X_1$ ) approaches zero and inflation( $Y$ ) the limiting value of  $\beta_1$ . Based on this, the above results show that the wage price index floor is 12.23% and an unemployment rate increases indefinitely, the percentage decrease in wage price index will not be more than 12.23percent per year. According to this model, Sri Lanka has achieved 20.8% of the natural growth rate of unemployment which is higher than under linear model indicates that due to structural or frictional even at zero rate of wage inflation there is 20.8 % of unemployment exist in Sri Lanka during the sample period.

Impact of inflation on unemployment was estimated by using both simple linear regression and reciprocal models. However, the reciprocal model is more related to Phillips curve than the linear model in explaining inverse relations each other. Comparing adjusted  $R^2$  in both models, reciprocal is better fitted one than the linear model.

**Table 4: Results of adjusted  $R^2$**

Model	R	$R^2$	Adjusted $R^2$	Standard error of the estimate.
Linear	0.87	0.76	0.75	787.40
Reciprocal	0.97	0.94	0.93	397.34

Source: Calculated by authors

In the linear model, adjusted  $R^2$  is 0.75 refers that 75% of the variation in inflation rate explained by unemployment rate while based on the reciprocal model, adjusted  $R^2$  is 0.93 refers that 93% of the variation in inflation rate explained by the unemployment rate. Thus, the reciprocal model which has the highest value of adjusted  $R^2$  proved that it is the best-fitted model compared to linear model to measure the goodness fit in the data.

### Conclusion

This paper has estimated the simple linear regression and reciprocal models by using annual time series data from 1990- 2016 in the economy of Sri Lanka. Estimated results of simple linear regression show a negative relationship between inflation and unemployment rates and changes in unemployment rates significantly affect inflation rates in the economy. Also, the estimated coefficient on the unemployment rates is significantly different from zero shows that there is a trade-off exists in the country. Compared to the linear regression model,

the reciprocal model is best-fitted one refers that, the trade-off between inflation and unemployment and the concept of Phillips curve have more fit than liner model. Based on the reciprocal regression outcomes, it was confirmed that there was short-run Phillips' concept exists in the economy of Sri Lanka too. Findings of this study may assist to policymakers who are engaging in the economic development of the country, they have to consider the Phillips concept when they design the new policies and strategies to uplift the Sri Lankan economy in future.

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