Does the Phillips Curve Hold in the Long Run?

Evidence from Sri Lanka, 2001–2024

Presented to

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Abstract

This paper empirically examines the long-run stability of the Phillips Curve in Sri Lanka between 2001-2024. The crucial hypothesis of an inverse relationship between inflation and unemployment is examined on the basis of a set of econometric approaches. These include regression analysis, stationarity tests, and Granger causality tests within the context of a Vector Autoregression (VAR). The results provide strong evidence against the presence of a trade-off in the Phillips Curve. The regression equations produce a statistically negligible and economically small relationship between the variables. Above all, the Granger causality tests demonstrate that lagged unemployment rates have no predictive power for inflation, thereby discrediting one of the theory's underlying assumptions.

The study concludes that the conventional Phillips Curve is not a proper construct in explaining the inflation dynamics of the Sri Lankan economy for this period. The implications are that inflation was regulated by non-demand-related factors, such as supply shocks and imported inflation. Hence, macroeconomic policy based on such a perceived trade-off will have a low probability of effectiveness, and, therefore, alternative analytical constructs need to be pursued.

Keywords: Phillips Curve , Inflation rate , Unemployment rate , Sri Lanka , Macroeconomic policy , Regression analysis , Granger causality tests , Vector Autoregression (VAR) , Trade-off , Long-run stability

1. Introduction

The Phillips Curve, first proposed by A.W. Phillips in 1958, describes a negative correlation between the rate of inflation and the rate of unemployment. According to this theory, if there is higher unemployment, there will be lower inflation, and vice versa. As governments often viewed it as a trade-off between job creation and price stability, this relationship affected economic policy around the world for decades. However, recent changes in the global economy and the stagflation in the 1970s have raised doubts about the reliability of the Phillips Curve to operate, particularly over the long term.

Sri Lanka presents a special argument for reconsidering this debate. The country has experienced various economic challenges over the past two decades, such as spikes in inflation, increases in unemployment, increasing debt, and international shocks. The economy has also evolved as a result of domestic policy reforms and structural changes in the labour market. From all these considerations, it is crucial to determine whether the Phillips Curve relationship, which is frequently assumed in economic theory, accurately describes Sri Lanka's long-term data.

This study covers significant periods of Sri Lanka's economy from the post-war recovery period to the most recent financial crisis, with special reference to the period 2001–2024. We examine whether the Phillips Curve is supported by the movement of unemployment and inflation using time-series methods, regression analyses, and descriptive statistical analysis.

The central focus of this study is the examination of the long-run sustainability of the Phillips Curve in Sri Lanka. The study does more than just test the hypothesis that unemployment and inflation are negatively correlated. We also express concerns regarding the accuracy and consistency of inflation and unemployment rates of Sri Lanka, which can debilitate the case of the Phillips Curve in the long term.

2. Literature Review

2.1. Global Perspectives on the Phillips Curve :

Phillips (1958) reported a stable negative relation for the U.K. over 1861–1957, leading to a wave of empirical studies. Friedman (1968) and Phelps (1967) extended the framework to include expectations, giving rise to the notion of a vertical long-run Phillips Curve at the natural rate of unemployment and a short-run trade-off only when inflation surprises take place, Later research shows that the trade-off is not constant; there are episodes when it is stronger, episodes when it is weaker (for example, during supply shocks or regime changes (e.g. oil shocks, shifts in the monetary policy regime). Contemporary assessments still debate slope, stability, and the role of expectations and credibility, but most agree on a weaker long-run trade-off.

2.2. Developing Country Perspectives on the Phillips Curve:

Across developing economies, evidence is mixed and often sensitive to model choice, inflation type (demand-pull vs. cost-push), and structural features (informality, supply constraints, exchange-rate pass-through). South Asian panel work finds negative and significant inflation–unemployment links in some countries and periods, and weak/positive links in others, highlighting instability over time and across regimes. Methodologically, expectations-augmented and New Keynesian variants tend to fit better than simple static models.

2.3. Sri Lankan Evidence on the Phillips Curve:

In the Sri Lankan context, researchers have found mixed but interesting patterns when testing the Phillips Curve. Many studies suggest that in the short run, there is often an inverse relationship between inflation and unemployment, though this link is far from stable over time. For instance, Thayaparan (2018) examined data covering several decades and reported a statistically significant negative relationship, indicating that higher inflation tended to be associated with lower unemployment during certain periods. This finding aligns with the classic Phillips Curve framework.

However, more recent work by the Central Bank of Sri Lanka (CBSL) highlights that the relationship is not consistent in the long run. While cointegration analysis shows that inflation does enter inversely in some models—hinting at a Phillips-type trade-off—the evidence also points to several additional macroeconomic drivers. Factors such as GDP growth, exchange rate movements, oil price fluctuations, and structural rigidities in the labor market play a crucial role in shaping inflation–unemployment dynamics.

Sri Lanka's economic history provides practical examples of this instability. During times of strong growth, moderate inflation was sometimes tolerated as it coincided with lower

unemployment. Yet, in episodes of high inflation caused by supply shocks, currency depreciation, or policy-driven price adjustments, the expected trade-off weakened, and unemployment did not necessarily fall. For example, post-war expansion in the 2010s showed phases consistent with the Phillips mechanism, whereas the more recent economic crisis—marked by shortages, exchange rate depreciation, and sharp inflation—illustrated how cost-push pressures can break the traditional relationship.

Overall, the Sri Lankan evidence suggests that while the Phillips Curve framework has some relevance, it cannot fully explain inflation and unemployment trends in isolation. The trade-off is better understood as conditional and context-specific, depending heavily on structural factors, global linkages, and domestic policy choices. This makes Sri Lanka an important case where the Phillips Curve provides partial insights but must be combined with broader macroeconomic analysis.

2.4. Comparative Analysis and Critique:

The Sri Lankan evidence on the Phillips Curve broadly mirrors what has been observed in many other countries, yet with its own local particularities. In the short run, a trade-off between inflation and unemployment is visible, especially during periods when demand-driven forces dominate the economy and people's expectations about inflation adjust only slowly. For instance, during phases of post-war economic expansion or periods of credit growth, moderate inflation often coincided with reductions in unemployment, giving some support to the classic Phillips Curve view.

However, as both global and Sri Lankan experiences show, this relationship weakens in the longer term. Once expectations catch up, and once structural realities such as imported inflation, global commodity price cycles, and exchange-rate pass-through effects are accounted for, the neat trade-off breaks down. This is particularly true in open and vulnerable economies like Sri Lanka, where international price shocks, fuel imports, and currency depreciation can easily override domestic demand dynamics. In such cases, unemployment does not necessarily fall when inflation rises, undermining the predictive power of the simple Phillips Curve.

The role of policy regimes also deserves special emphasis. Sri Lanka's recent shift toward a **Flexible Inflation Targeting (FIT)** framework reflects a conscious attempt to manage inflation expectations more directly, in line with international practice. This approach assumes that by clearly communicating and anchoring expectations, policymakers can reduce the inflation–unemployment trade-off and essentially "flatten" the Phillips Curve in the short run. The **Central Bank of Sri Lanka (CBSL)** has, in recent years, set a medium-term inflation objective of around **5%**, signalling a move toward credibility, transparency, and stability.

In an Asian context, this policy shift resonates with developments in other emerging economies. For example, countries such as India, Indonesia, and Thailand have also adopted inflation targeting or quasi-targeting regimes, placing credibility and expectation management at the center of

monetary policy. These experiences show that while the Phillips Curve still has teaching value, it cannot be seen as a mechanical or permanent relationship. Instead, it serves as a conditional framework—relevant when demand shocks dominate, but less useful during times of supply shocks, global turbulence, or institutional change.

In summary, Sri Lanka's evidence reinforces a broader Asian lesson: the Phillips Curve provides insights into short-term trade-offs, but in the long run, effective **policy credibility, structural reforms, and global linkages** shape outcomes far more than the simple inflation–unemployment relationship.

3. Methodology

3.1 Objective of the study

The main objective of the study is to analyze the long-run validity of the Phillips Curve in Sri Lanka in the period 2001–2024. Specifically, the study seeks to:

- Discuss the connection between inflation and unemployment in Sri Lanka via the Phillips Curve.
- Determine the existence of the Phillips Curve in the long run by using econometrics and time series methods.
- Estimate the strength and direction of the relationship between unemployment and inflation over the period of investigation.
- Analyze the predictive power of unemployment for inflation using Granger causality and VAR models
- Evaluate the credibility of macroeconomic data from the Central Bank of Sri Lanka, Department of Census and Statistics (DCS), and the World Bank in capturing this relationship.

3.2 Methods of data analysis

Linearity
Linearity is tested to determine if two variables are approximately linearly related by a straight line. As for the Phillips Curve, it informs whether unemployment and inflation move consistently.

Regression Analysis
Regression analysis measures the relationship between a dependent variable and one or more independent variables. For example, a simple linear regression is expressed as:

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

where Y is inflation, X is unemployment, β0 is the intercept, β1 is the slope, and ε is the error term. To reflect the Phillips Curve's inverse relationship, a reciprocal model can also be used;

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

Where,
Y = Inflation rate measured by the wage price index
β_0 = Intercept term
β_1 = Coefficient of X1
X1 = Unemployment rate
ε = Error term

This model shows that the effect of unemployment on inflation can change at different levels of unemployment.

Stationarity

Stationarity means that a time series has a constant mean and variance over time.Basic pattern over time. Making sure data is stationary helps get accurate results in analysis.

Autocorrelation

Autocorrelation quantifies whether a variable's current values are influenced by its historical values. It helps identify patterns in time-series data and guides model selection.

Granger Causality Test

The Granger Causality test determines whether past values of one variable can predict another variable. In this study, it helps assess whether past unemployment data can forecast inflation trends.

Vector Autoregression (VAR)

VAR models capture how multiple time-series variables affect each other over time. It illustrates the long-term effects of changes in one variable, like unemployment, on another, like inflation.

4. Analysis & Results

4.1 Data Collection and Preparation

Sri Lankan annual inflation and unemployment data from 2001–2024 were employed for analysis. The inflation rates were obtained from the World Bank, unemployment rates from the Central Bank of Sri Lanka, and the remaining data from the Department of Census and Statistics, where missing values were present. The dataset contains female, male, and mean unemployment rates along with inflation.

The first data cleaning was accomplished by verifying that missing values were checked, column names had been corrected, and the year was converted to an integer format. Summary statistics and exploratory visualizations were generated so trends could be understood and abnormalities sought out. The line plot of average unemployment and inflation revealed time-varying variable-specific trends and identified when the economy had been volatile.

4.2 Exploratory Analysis

Phillips Curve Analysis

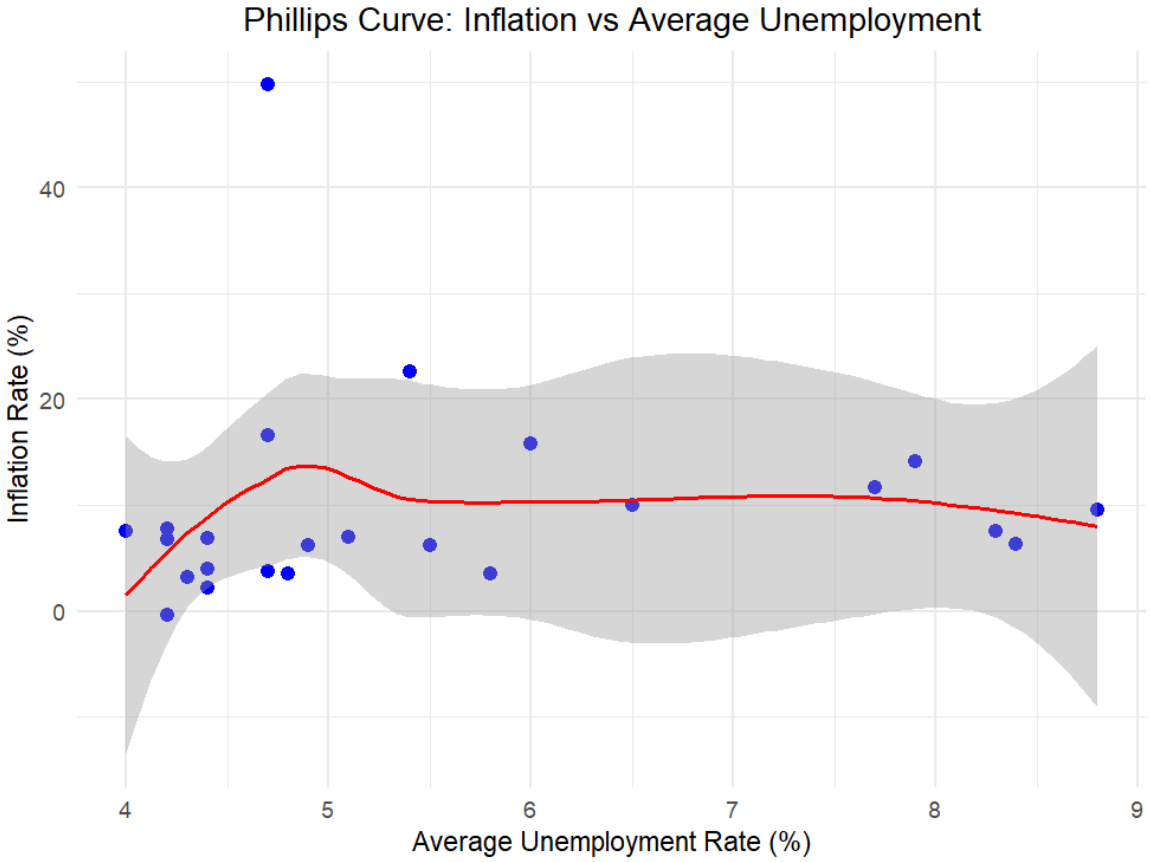

Figure 1. Phillips Curve: Inflation vs Average Unemployment in Sri Lanka (2001–2024). The plot shows annual observations (blue dots) and a fitted local regression line (red) with a 95% confidence interval (gray).

As shown in Figure 1, the Phillips Curve scatter plot illustrates the relationship between Sri Lanka's average unemployment rate (x-axis) and inflation rate (y-axis) between the years 2001 and 2024. Every blue dot represents a yearly observation, and the red curve is a locally weighted regression (loess) line with a 95% confidence interval (shaded gray).

The plot demonstrates that the fit curve first exhibits a gentle rising slope at lower unemployment levels, indicating a weak positive trend, but is flat at higher levels of unemployment. It does so because rare inflation events—most notably the 2022 economic crisis—dominate the trend in the higher end of unemployment. They influence the local regression so that the line is flat rather than exhibits a steep rising or falling trend.

Overall, the scatter of points and shape of the fitted curve suggest that there is no systematic inverse unemployment-inflation relationship in the Sri Lankan experience during this period.

4.3 Regression Analysis

The simple linear regressions were conducted as a method of quantifying relationships.

Table 1. Simple Linear Regression of Inflation on Average Unemployment (2001–2024)

(Intercept)	7.394
	(7.959)
Avg_Unemployment	0.408
	(1.383)
Num.Obs.	24
R^2	0.004
R^2 Adj.	-0.041
AIC	183.5
BIC	187.0
Log. Lik.	-88.738
F	0.087
RMSE	9.76

The table demonstrated that the coefficient of unemployment ($\beta = 0.4076$, $p = 0.771$) was not significant, and the low R^2 (0.0039) value in the average unemployment was zero explained by the power of our model. The P-value was greater than 0.05 in the simple regression model, which revealed that the unemployment rate was not a good predictor of inflation. The findings were in accordance with the preliminary visual inspection.

4.4 Time Series Analysis

As time series is a time series data, for a deeper analysis of potential correlations, time series techniques were utilized.

Stationarity: Augmented Dickey-Fuller (ADF) tests were run on inflation and unemployment to see if the time series data is stationary.

Table 2. Augmented Dickey-Fuller (ADF) Test Results for Average Unemployment (2001–2024)

Test.Statistic	X1..Crit.Value	X5..Crit.Value	X10..Crit.Value
-3.47651	-4.38	-3.6	-3.24

Table 3. Augmented Dickey-Fuller (ADF) Test Results for Inflation (2001–2024)

Test.Statistic	X1..Crit.Value	X5..Crit.Value	X10..Crit.Value
-1.870355	-4.38	-3.6	-3.24

For inflation, the test statistic of the ADF was -1.87, which is greater than the critical values at the 1%, 5%, and 10% levels (-4.38, -3.60, and -3.24, respectively). Thus, we can not reject the null hypothesis of a unit root in other words.
For unemployment, the test statistic of the ADF was -3.48, which is greater than the critical values at 1%, 5%, and 10% levels. This indicates that the unemployment series is also non-stationary. Since both series are non-stationary, both series were transformed by taking first differences to achieve stationarity

Autocorrelation: Autocorrelation (ACF) and partial autocorrelation (PACF) plots for different series had very little autocorrelation, which reflected that short-term dependencies were weak.

4.5 Granger Causality Tests

Table 4. Granger Causality Test Results (2001–2024)

Model	DF_Difference	F_Statistic	p_value
Restricted: Inflation ~ Lags(Inflation, 1:4)	NA	NA	NA
Unrestricted: Inflation ~ Lags(Inflation, 1:4) + Lags(AvgUnemp, 1:4)	-4	0.965	0.4678

A Granger causality test was employed to check whether average unemployment can predict inflation. The unrestricted model contained 4 lags of inflation and average unemployment, while the restricted model contained just the lags of inflation. The F-statistic was 0.965 ($p = 0.468$), which indicates that adding average unemployment did not improve the prediction of inflation very much. Thus, we are led to reject the hypothesis of Granger causality from average unemployment to inflation in this data.

4.6 Vector Autoregression (VAR) Analysis

Table 5. VAR(4) Estimation Results (2001–2024)

Predictor	Estimate	Std_Error	t_value	p_value	Equation
Inflation.l1	-0.75810187	0.33215946	-2.2823431	0.04560367	Inflation
AvgUnemp.l1	-5.94586997	6.54619426	-0.9082942	0.38508960	Inflation
Inflation.l2	-0.67340740	0.43305517	-1.5550153	0.15099523	Inflation
AvgUnemp.l2	7.07611166	7.43302274	0.9519831	0.36354817	Inflation
Inflation.l3	-0.19053266	0.62748274	-0.3036460	0.76762124	Inflation
AvgUnemp.l3	9.30265383	7.39256168	1.2583803	0.23684044	Inflation
Inflation.l4	-0.90765569	0.64674593	-1.4034192	0.19077326	Inflation
AvgUnemp.l4	-1.68199304	7.38967156	-0.2276140	0.82453253	Inflation
const	2.70361572	3.75319270	0.7203509	0.48780524	Inflation
Inflation.l1	0.01994937	0.01552268	1.2851757	0.22769787	AvgUnemp
AvgUnemp.l1	0.30431876	0.30592071	0.9947635	0.34331202	AvgUnemp
Inflation.l2	0.01188992	0.02023780	0.5875106	0.56988826	AvgUnemp
AvgUnemp.l2	0.18959693	0.34736451	0.5458155	0.59715738	AvgUnemp
Inflation.l3	-0.01662403	0.02932390	-0.5669106	0.58327507	AvgUnemp
AvgUnemp.l3	-0.25364258	0.34547366	-0.7341879	0.47969506	AvgUnemp
Inflation.l4	-0.02470514	0.03022412	-0.8173981	0.43274425	AvgUnemp
AvgUnemp.l4	-0.23970884	0.34533860	-0.6941270	0.50340828	AvgUnemp
const	-0.21850465	0.17539647	-1.2457756	0.24124370	AvgUnemp

The VAR(4) model was estimated with inflation and mean unemployment as endogenous variables and four lags each. The results show that current inflation is largely driven by its own first lag, which is statistically significant ($p = 0.046$), while the remaining lagged terms of inflation and all unemployment lagged terms are not statistically significant. This shows that historical inflation possesses some short-run explanatory power, but historical unemployment has no measurable effect on inflation. Similarly, the average unemployment equation shows that lag unemployment and lag inflation have no effect on the current level of unemployment. Overall, these findings imply that, for this data set, inflation behavior is largely autonomous and that unemployment changes have little short-run effect on inflation, which is consistent with the Granger causality results.

5. Discussion

The Sri Lankan inflation and unemployment data for 2001–2024 suggests that the traditional relationship of the Phillips curve does not exist within this dataset. Visualizations and scatterplots indicated a weak and variable relationship between inflation and unemployment, whereas simple linear regression demonstrated the lack of statistical significance. The regression output (β = 0.4076, $p = 0.771$) and extremely low R^2 establish that mean unemployment has no explanatory power for inflation.

Time series methods corroborated these findings. Inflation and unemployment were both found to be non-stationary with the implication that long-run trends and economic shocks may overwhelm short-run relationships. Autocorrelation was reduced by differencing to make the series stationary, confirming weak short-run relationships between the variables.

Granger causality tests also indicated that mean unemployment does not predict inflation significantly, consistent with regression results. Consistently, the VAR(4) test also indicated that inflation is mainly determined endogenously, with only the first lag of inflation having a significant effect on the current inflation. Lagged unemployment did not matter at all in affecting current unemployment or current inflation. Overall, all these results imply that in the Sri Lankan environment, inflationary movements are more determined by domestic forces and inflation history than recent unemployment evolution. This could pick up structural changes in the economy, external shocks, or policy responses that have breached the classical inverse relationship between inflation and unemployment.

6. Conclusion

This study examined the relationship between inflation and unemployment in Sri Lanka during 2001-2024 via regression, Granger causality, and VAR tests. The findings reveal no significant negative correlation between the mean unemployment rate and inflation. Inflation appears to be largely self-regulating, and the variations in unemployment possess negligible predictive power for inflation in the short term.

These results suggest that Sri Lankan policymakers can take variables other than unemployment into consideration in addressing inflation, such as supply shocks, monetary policy, or even foreign economic conditions. Sectoral inflation, structural breaks, or the expectations channel are some of the areas which can be explored further to reveal more insight into the inflation-unemployment relationship in Sri Lanka.

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