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NATURE OF SHORT RUN PHILLIPS CURVE: A COMPARATIVE STUDY OF U.S.A. AND INDIA (1961-2020)

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Abstract: The study shows the nature of the short-run Phillips curve in India and in the USA during the period from 1961-2020 using the reciprocal model. Both the two countries show a negative slope of the Phillips curves, so the inverse relationship between the rate of inflation and the rate of unemployment prevails in both the two countries. However, the slope of India's Phillips curve is little bit steeper than that of the USA; which confirms- if the rate of unemployment lowers, or the employment rate rises, the rate of inflation will be a little bit higher in India than that of the USA. The study further estimates the natural rate of unemployment in both the two countries. The estimated natural rate of unemployment clusters around 5-6% in both the two countries, which is a significant one as the economists suggest.

Keywords: Short-run Phillips curve, rate of inflation, rate of unemployment, natural rate of unemployment

1. INTRODUCTION AND BACKGROUND

The Indian economy has one of the highest inflation rates among the emerging market economies in the world and is now in danger of overheating. Further, since independence India is facing one major problem of unemployment. The latest reports indicate that the unemployment rate

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of the country is over 8% this year which is quite high. According to the reports, almost fifty million people are still unemployed in the country and more employment opportunities are required for balancing the unstable situation. The Indian Government is trying to solve this problem. In every five year plan the Indian Government has introduced a new plan for creating new employment opportunities. The root of the problem is 'jobless growth' in the Indian economy. So the question is arising that-is there any trade-off between these two. In 1958, the Zealander economist A. W. Phillips carried out the empirical study of the British economy, using data for the period from 1861 to 1957. This study estimates the relationship between the rate of unemployment and the rate of change in the money wage as an indicator of inflation, given that wages represent a large proportion of the cost and thus the price, the results of the study reveal the presence of a trade-off between the unemployment rate and the rate of change in wages as a representative of the rate of inflation. So there is a curiosity in the existence of Phillips Curve in India.

Moreover, Phelps (1968) interpreted that in booms, the demand for labor increase and the unemployment rate decrease then workers have the opportunity to request higher wages while in the periods of depression, the demand for labor decrease and unemployment rate increase then the ability of workers to demand higher wages is limited and decreasing wage rate increase significantly. This finding supports Keynesian thought; therefore, a number of economists in the United States (U.S.) were encouraged to measure the relationship between inflation and unemployment rate using data on the U.S. economy. The studies revealed the inverse relationship between the two variables, which led to consolidate the results of Phelps' study and dubbed this relationship as the Phillips curve. Further, one of the earlier studies by Solow (1970) examined the relationship between the two variables inflation and unemployment rate in the context of the United States. The results led to a conclusion that there existed an inverse relationship between unemployment and inflation rates in the USA. Furthermore, Gordon (1971) also confirmed the existence of a negative trade-off between unemployment and inflation using U.S. macroeconomic data. However, Lucas (1976) strongly opposed the proposition of the existence of the Phillips curve. He argued that there could have existed a trade-off between unemployment rate and inflation if the workers did not expect that the policy makers would try to create an artificial situation where high-inflation is paired with low unemployment. Otherwise, the workers would foresee high inflation in the future and would demand wage increases from their employers. In this case, there could be coexistence of high unemployment rate and high inflation, which is known as the "Lucas critique" in the literature.

So the questions are: is there any inverse relation between inflation and unemployment rate in India and in the U.S.A.? Even if the inverse relationship between these two exists in both two countries, is the relationship linear or nonlinear? Further, is there any difference between the slopes of the Phillips curve in these two countries? Lastly, is there any difference in the natural rate of unemployment in these two countries?

2. A BRIEF LITERATURE REVIEW

This section focuses on an extensive review literature available on the offered topic. In 1958, the theory of the Phillips curve came into existence with the proposition of the trade-off between inflation and the unemployment rate. After that, the failure of the Phillips curve trade-off in the 1970s made Friedman (1968) validate this nexus of inflation and unemployment for a short period only. Following this, the Phillips curve and its validation became the area of research for researchers worldwide. Just two years later after A. W. Phillips, Samuelson & Solow (1960) asserted a negative association between nominal wages and unemployment rate through the use of US macroeconomic data. Later, Solow (1970) & Gordon (1970) validated the Phillips curve using Solow-Gordon affirmation. On the contrary, Friedman (1968) and Lucas (1976) rejected the existence of the Phillips curve theory implying no trade-off between inflation and unemployment, also giving rise to "Lucas Critique". F Levi, M. D., & Makin, J. H. (1980) tested the evidence of inflation uncertainty and implication of the Philips curve. Incorporating data of macroeconomic level for the US, King and Watson (1994) checked the presence of the Phillips curve. Their results have shown that the current theory of the trade-off relationship of inflation and unemployment rate over time under review has been very supportive. However, Islam et al. (2003) tested the Phillips proposition for US data from 1950 to 1999 and discovered a poor long-term cointegration of unemployment-inflation relations.

The Phillips curve framework relating inflation to economic activity continues to be the workhorse model for understanding inflation dynamics, even as it has faced a number of challenges in the past and is confronted with new complexities in the aftermath of the Great Recession (Stock and Watson, 2009). Inflation in the major advanced economies has deviated persistently from forecasts from the conventional Phillips curve specifications since 2008: actual inflation during 2009-2010 was higher than expected, while in the more recent period, especially in the US, inflation has turned out to be lower than expected. The years 2009 and 2010 were marked by the phenomenon of "missing deflation" in the US and other major advanced economies: given the large negative unemployment and

output gaps, the Phillips curve framework would have predicted a sharp decline in inflation, whereas the actual core inflation was close to its 2008 level (Ball and Mazumder, 2015).

In the Indian context, a number of studies have found support for the Phillips curve framework at the national level, with inflation responding both to demand and supply shocks. These include Kapur and Patra (2000), RBI (2002, 2004), Dua and Gaur (2009), Paul (2009), Patra and Ray (2010), Singh et al. (2011), Mazumder (2011), Patra and Kapur (2012), and Kapur (2013). Srinivasan et al. (2006), on the other hand, could not find support for the Phillips curve. Overall, this section tells, there is strong support for the Phillips curve relationship in these two countries.

3. OBJECTIVES OF THE STUDY

The objectives of this study are:

1. To study the nature of trade-off between unemployment rate and inflation in India and U.S.A. during 1961-2020.
2. To analyse the nature of empirical relationship between unemployment rate and inflation in order to predict the trade-off between these two variables and to estimate its existence in the context of Indian economy and United States as well during this period.
3. To estimate the slope of Phillips curve of the Indian economy during the period under study and to compare its slope with that of U.S.A.
4. To estimate the natural rate of unemployment in the context of the Indian Economy as well as U.S.A
5. To make a comparison between the natural rate of unemployment in the U.S.A. and India.
6. To explain whether unemployment is the only factor or a serious factor that influences the inflation rate of the two countries.

3.1. Scope of Research

The present study concentrates upon U.S. and India's Forty (40) years data of Inflation and Unemployment rate.

3.2. Type and Sources of Data

The study uses Secondary Data. Secondary data was collected from the internet, reference books, journals, articles, publications and various printed material.

Mainly data were sourced from *https://www.macrotrends.net/countries/IND/india/inflation-rate-cpi*, *https://www.macrotrends.net/countries/IND/india/*

unemployment-rate, https://www.macrotrends.net/countries/USA/united-states/inflation-rate-cpi, World Bank and the U.S. Bureau of Labor Statistics and also from the Economic Report of the President of U.S.A.

3.3. Duration of Study

The study covers time duration for forty years i.e. from 1961 to 2020.

3.4. Econometric Modeling

The econometric model on which the estimation of Phillips curve is predicted is thought as a reciprocal model. The model is expressed as:

$$Y_i = \beta_1 + \beta_2(1/X_i) + u_i \quad (1)$$

Although the model is non-linear in the variable *X* because it enters inversely or reciprocally, the model is linear in β_1 and β_2 and is therefore a linear regression model.

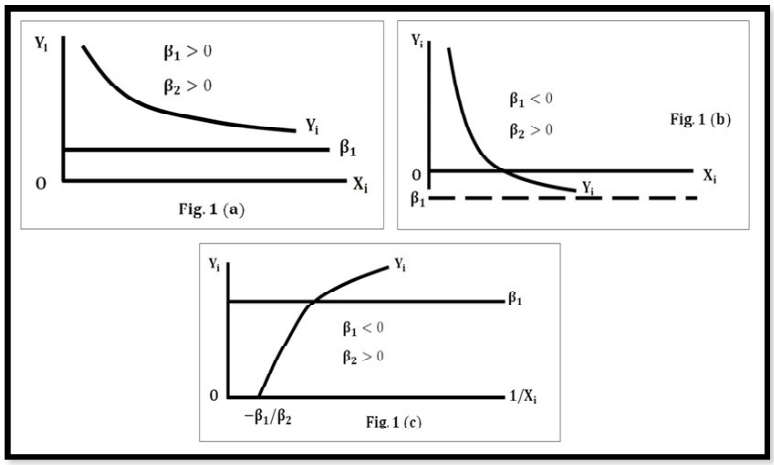
This model has these features: as *X* increases indefinitely, the term $\beta_2(1/X)$ approaches zero (note: β_2 is a constant) and Y approaches the limiting or asymptotic value β_1.

Therefore, the models like (1) have inbuilt them an asymptote or limit value that the dependent variable will take when the value of the *X* variable increases indefinitely. Some likely shapes of the curve equivalent to Equation (1) are shown below:

Here the slope of Equation (1) is: $dY/dX = -\beta_2 (1/X^2)$, implying that if β_2 is positive, the slope is negative throughout, and if β_2 is negative, the slope is positive throughout. See Figures 1(a) and 1(c), respectively. But in Figure 1(b), β_2 is positive vis-à-vis $dY/dX = -\beta_2 (1/X^2) < 0$ and $d^2Y/dX_2 = 2\beta_2 (1/X^3) > 0$, implying that the curve is downward sloping and convex from below.

One of the important applications of Figure 1(b) is the celebrated Phillips curve. Using the information on percentage change in money wage rates (*Y*) and the rate of unemployment (*X*) for the United Kingdom for the period 1861–1957, Phillips obtained a curve whose general shape resembles Figure1(b).

As Figure 1(b) shows, there is an asymmetry in the response of wage changes to the level of the unemployment rate: wages rise faster for a unit change in unemployment if the unemployment rate is below $\boldsymbol{U}^N$, which is termed the natural rate of unemployment by economists [defined as the rate of unemployment required to keep inflation (money wage) constant], and then they fall slowly for an equivalent change when the unemployment rate is above the natural rate, $\boldsymbol{U}^N$, indicating the asymptotic floor, or "$\hat{a}_1$, for wage change. This particular feature of the Phillips curve may be due to various institutional factors, like the trade union's bargaining power, minimum wages, unemployment compensation, etc.



Since the publication of Phillips's article, there has been very extensive research on the Phillips curve at the theoretical as well as empirical levels. We don't come into the details of the controversy surrounding the Phillips curve. The Phillips curve itself has had several confinements. A relatively recent formulation is provided by Olivier Blanchard as below.

If we let μ_t denote the rate of inflation at time *t*, which is defined as the percentagechange in the price level as measured by a representative price index, such as the Consumer Price Index (CPI), and UN_t denotes the unemployment rate at time *t*, then a modern version of the Phillips curve are often expressed as:

$$\mu_t - \mu^e_t = \beta_2(UNt - U^N) + u_t \quad (2)$$

Where μ_t =actual rate of inflation at time t, μ^e_t = expected rate of inflation at time t the expectation being formed in the year (t-1), UN_t = actual rate of unemployment prevailing at time t, U^N=natural rate of unemployment and u_t=stochastic error term.

Since μ^e_t is not directly observable, as a starting point one can make the simplifying assumption that $\mu_t = \mu^e_{t-1}$; that is, the rate of inflation expected this year is the inflation rate that prevailed in the last year.

Substituting this assumption into Equation 2 and writing the regression model in the standard form, we obtain the subsequent estimating equation:

$$\mu_t - \mu_{t-1} = \beta_1 + \beta_2 UNt + ut \quad (3)$$

Where $\beta_1 = -\beta_2 U^N$. Equation 3 states that the change in the inflation rate between two time periods is linearly associated with the current rate of unemployment.

Theoretically β_2 is predicted to be negative and β_1 is anticipated to be positive [See figure 1(b), where β_2 is negative and U^N is positive].

The Phillips relationship given in Equation 2 is known in the literature because the modified Phillips curve, or the expectations-augmented Phillips curve (to indicate that μ_{t-1} stands for expected inflation), or the accelerationist Phillips curve (to suggest that a low unemployment rate leads to an increase in the inflation rate and hence an acceleration of the price level).

4. ANALYSIS OF RESULTS

In order to illustrate the nature of Phillips curves of India and U.S.A. and in order to compare their nature, we present data on inflation as measured by year-to-year percentage change in the Consumer Price Index (CPI) and the unemployment rate for the period 1961–2020 of the Indian economy in Table 5.1 and of the same in Table 5.2 for the U.S. economy during the same period of time. The unemployment rate represents the civilian unemployment rate. From these data we obtained the change in inflation rate ($\mu_t - \mu_{t-1}$) and plotted it against the civilian unemployment rate. The resulting graph appears in Figure 2 and 3, respectively.

As is predicted, the relation between the change in inflation rate and the unemployment rate is negative - a low unemployment rate leads to an increase in the inflation rate and therefore an acceleration of the price level, hence the name accelerationist Phillips curve.

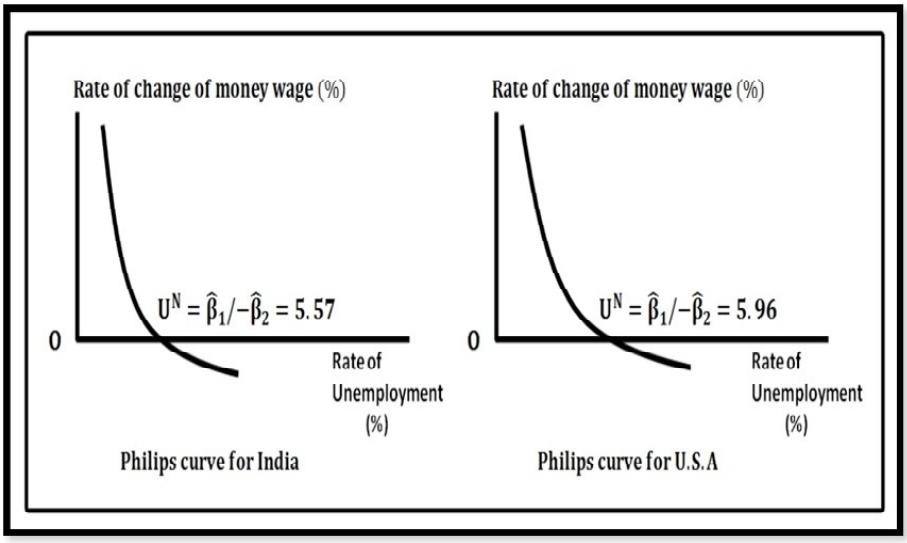


Figure 2 (a): Philips Curve for India and Figure 2 (b): Philips Curve for U.S.A.

However, it is not obvious whether a linear (straight line) regression model or a reciprocal model fits the information well; there could also be a curvilinear relationship between the two variables. We present below

regressions supported both the 2 models. But, keep in mind that for the reciprocal model the intercept term is anticipated to be negative and the slope positive, as mentioned in the methodology earlier.

Table 5.1: Inflation Rate And Unemployment Rate, India, 1960-2020

Year	*Inflation Rate*	*Change in Inflation Rate*	*Unemployment Rate*	*$1/U^n$*
1960	1.78		5.85	0.17094
1961	1.71	-0.07	5.89	0.169779
1962	3.63	1.92	5.65	0.176991
1963	2.95	-0.68	5.68	0.176056
1964	13.36	10.41	5.28	0.189394
1965	9.47	-3.89	5.45	0.183486
1966	10.81	1.34	5.36	0.186567
1967	13.06	2.25	5.26	0.190114
1968	3.24	-9.82	5.65	0.176991
1969	-0.58	-3.82	5.87	0.170358
1970	5.09	5.67	5.66	0.176678
1971	3.08	-2.01	5.98	0.167224
1972	6.45	3.37	5.43	0.184162
1973	16.94	10.49	5.22	0.191571
1974	28.61	11.67	5.11	0.195695
1975	5.75	-22.86	5.48	0.182482
1976	-7.63	-13.38	5.89	0.169779
1977	8.31	15.94	5.22	0.191571
1978	2.52	-5.79	5.83	0.171527
1979	6.28	3.76	5.14	0.194553
1980	11.35	5.07	5.15	0.194175
1981	13.11	1.76	5.06	0.197628
1982	7.89	-5.22	5.55	0.18018
1983	11.87	3.98	5.18	0.19305
1984	8.32	-3.55	5.56	0.179856
1985	5.56	-2.76	5.88	0.170068
1986	8.73	3.17	5.45	0.183486
1987	8.81	0.08	5.56	0.179856
1988	9.83	1.02	5.67	0.176367
1989	7.09	-2.74	5.35	0.186916
1990	8.98	1.89	5.81	0.172117
1991	13.87	4.89	5.45	0.183486
1992	11.79	-2.08	5.51	0.181488
1993	6.33	-5.46	5.56	0.179856
1994	10.25	3.92	5.63	0.17762
1995	10.22	-0.03	5.64	0.177305
1996	8.98	-1.24	5.65	0.176991

Year	*Inflation Rate*	*Change in Inflation Rate*	*Unemployment Rate*	*1/U^n*
1997	7.16	-1.82	5.64	0.177305
1998	13.23	6.07	5.63	0.17762
1999	4.67	-8.56	5.69	0.175747
2000	4.01	-0.66	5.66	0.176678
2001	3.78	-0.23	5.66	0.176678
2002	4.32	0.54	5.72	0.174825
2003	3.81	-0.51	5.73	0.17452
2004	3.77	-0.04	5.67	0.176367
2005	4.25	0.48	5.61	0.178253
2006	5.81	1.56	5.45	0.183486
2007	6.37	0.56	5.32	0.18797
2008	8.35	1.98	5.28	0.189394
2009	10.88	2.53	5.57	0.179533
2010	11.99	1.11	5.64	0.177305
2011	8.86	-3.13	5.64	0.177305
2012	9.32	0.46	5.65	0.176991
2013	10.91	1.59	5.67	0.176367
2014	6.35	-4.56	5.61	0.178253
2015	5.87	-0.48	5.57	0.179533
2016	4.94	-0.93	5.51	0.181488
2017	2.49	-2.45	5.42	0.184502
2018	4.87	2.38	5.33	0.187617
2019	7.66	2.79	5.36	0.186567
2020	6.93	-0.73	7.11	0.140647

Source: www.macrotrends.net, World Bank

Table 5.2: Inflation Rate And Unemployment Rate, United States, 1960-2020

Year	*Inflation Rate*	*Change in Inflation Arate*	*Unemployment Rate*	*1/Un*
1960	1.4		6.6	0.151515
1961	0.7	-0.7	6	0.166667
1962	1.3	0.6	5.5	0.181818
1963	1.6	0.3	5.5	0.181818
1964	1	-0.6	5	0.2
1965	1.9	0.9	4	0.25
1966	3.5	1.6	3.8	0.263158
1967	3	-0.5	3.8	0.263158
1968	4.7	1.7	3.4	0.294118
1969	6.2	1.5	3.5	0.285714
1970	5.6	-0.6	6.1	0.163934
1971	3.3	-2.3	6	0.166667
1972	3.4	0.1	5.2	0.192308
1973	8.7	5.3	4.9	0.204082

Year	*Inflation Rate*	*Change in Inflation Arate*	*Unemployment Rate*	*1/Un*
1974	12.3	3.6	7.2	0.138889
1975	6.9	-5.4	8.2	0.121951
1976	4.9	-2	7.8	0.128205
1977	6.37	1.47	6.4	0.15625
1978	9	2.63	6	0.166667
1979	13.3	4.3	6	0.166667
1980	12.5	-0.8	7.2	0.138889
1981	8.9	-3.6	8.5	0.117647
1982	3.8	-5.1	10.8	0.092593
1983	3.8	0	8.3	0.120482
1984	3.9	0.1	7.3	0.136986
1985	3.8	-0.1	7	0.142857
1986	1.1	-2.7	6.6	0.151515
1987	4.4	3.3	5.7	0.175439
1988	4.4	0	5.3	0.188679
1989	4.6	0.2	5.4	0.185185
1990	6.1	1.5	6.3	0.15873
1991	3.1	-3	7.3	0.136986
1992	2.9	-0.2	7.4	0.135135
1993	2.7	-0.2	6.5	0.153846
1994	2.7	0	5.5	0.181818
1995	2.5	-0.2	5.6	0.178571
1996	3.3	0.8	5.4	0.185185
1997	1.7	-1.6	4.7	0.212766
1998	1.6	-0.1	4.4	0.227273
1999	2.7	1.1	4	0.25
2000	3.4	0.7	3.9	0.25641
2001	1.6	-1.8	5.7	0.175439
2002	2.4	0.8	6	0.166667
2003	1.9	-0.5	5.7	0.175439
2004	3.3	1.4	5.4	0.185185
2005	3.4	0.1	4.9	0.204082
2006	2.5	-0.9	4.4	0.227273
2007	4.1	1.6	5	0.2
2008	0.1	-4	7.3	0.136986
2009	2.7	2.6	9.9	0.10101
2010	1.5	-1.2	9.3	0.107527
2011	3	1.5	8.5	0.117647
2012	1.7	-1.3	7.9	0.126582
2013	1.5	-0.2	6.7	0.149254
2014	0.8	-0.7	5.6	0.178571
2015	0.7	-0.1	5	0.2
2016	2.1	1.4	4.7	0.212766
2017	2.1	0	4.1	0.243902
2018	1.9	-0.2	3.9	0.25641
2019	2.3	0.4	3.5	0.285714
2020	1.2	-1.1	8.1	0.123457

Source: www.macrotrends.net, World Bank, U.S. Labour bureau & the Economic Report of the U.S. President

Linear model in India:

$$(\mu_t - \mu_{t-1}) = 38.59 - 6.93UN_t \quad (4)$$

$$t = (2.86) \quad (-2.85) \quad r^2 = 0.13$$

Reciprocal model in India:

$$(\mu_t - \mu_{t-1}) = -46.88 + 260.42(1/UN_t) \quad (5)$$

$$t = (-3.24) \quad (3.25) \quad r^2 = 0.16$$

Linear model in U.S.A:

$$(\mu_t - \mu_{t-1}) = 2.74 - 0.46UN_t \quad . (6)$$

$$t = (3.03) \; (-3.15 \; r^2 = 0.15$$

Reciprocal model in U.S.A:

$$(\mu_t - \mu_{t-1}) = -2.42 + 13.46(1/UN_t) \quad (7)$$

$$t = (-2.57) \quad (2.68) \quad r^2 = 0.11$$

All the estimated coefficients in both the models of 2 countries are individually statistically significant at less than 5% probability level (see Table 6 & 7 in the Appendix) although coefficients of determination are significantly low implying that unemployment isn't the only factor or a significant factor that influences rate of Inflation in the 2 countries.

Model (4) and (6) found that if the unemployment rate goes down by one decimal point, on a mean, the change in the inflation rate goes up by about 6.93 percentage points in India and 0.46 percentage points in U.S.A. This implies that reduction in unemployment rate has a greater inflationary effect in India than in U.S.A. This might result to the very fact that marginal propensity to consume (MPC) becomes higher in India comparing to it in U.S.A. There is no contradiction regarding this assumption because in a developing country like India this is often the fundamental characteristics. Whereas model (5) and (7) show that whether or not the unemployment rate goes up indefinitely, the most the change in the inflation rate will go down are about 46.88 percentage points in India and a couple of 0.42 percentage points in U.S.A..

Incidentally, from Equations (4) and (6), we are able to compute the underlying natural rate of unemployment in India and in U.S.A.

$$U^N \text{ India} = \hat{\beta}_1 / -\hat{\beta}_2 = 38.59/6.93 = 5.57 \quad (8)$$

$$U^N \text{ U.S.A.} = \hat{\beta}_1 / -\hat{\beta}_2 = 2.74/0.46 = 5.96 \quad (9)$$

That is, the natural rate of unemployment is about 5.57% in India and 5.96% in U.S.A. implying that there is no significant difference of the natural rate of unemployment in the two countries. It is also to be noted in this

connection that economists put the natural rate of unemployment in between 5% and 6%. So we got quite significant results in case of both the 2 countries.

5. SUMMARY AND CONCLUSIONS

The study uses secondary data of unemployment rate and inflation in India and in U.S.A. for the time period 1961-2020 so as to point out the relation between these two. The results revealed that unemployment rate and inflation are inversely related, thus confirming the existence of Phillips curve in India and in U.S.A., with inflation having a significant impact on unemployment in both the 2 countries. The main conclusions of the study may be summarized as follows:

1. The slope of the Phillips curves becomes negative in India and in U.S.A. during the period from 1961-2020; although the Phillips curve of India becomes relatively steeper comparing to that of the U.S.A. This suggests that if the unemployment rate goes down by one percentage point, then on an average, the change in the inflation rate goes up more in India than in U.S.A. This implies that Phillips curve in India becomes more accelerationists.
2. Because the reciprocal model fits the data in both the 2 countries well there exist a curvilinear relationship between the 2 variables in both the 2 countries. The reciprocal models further show that whether or not unemployment rate increases indefinitely, the rate of inflation will go down larger in India than in U.S.A.
3. The natural rate of unemployment in the two countries is lying in between 5% and 6% as the rate suggested by economists. So we got quite significant results in case of both the 2 countries.

We may, therefore, say that the Phillips curves fit well in case of both the 2 countries (India and U.S.A.) during the period 1961-2020 although the Phillips curve in India remains little bit steeper. This can be quite natural as we mentioned earlier. As employment rises by a smaller fraction it is going to generate larger purchasing power, thereby create larger demand within the market then creates larger inflation in the country than in U.S.A. This might result to the very fact that on an average marginal propensity to consume (MPC) remains larger in India than that in U.S.A. Thus the inverse relationship between the rate of unemployment and the rate of inflation is truly applicable in case of both the 2 countries (India and USA) although their slopes remain different.

5.1. Policy Implication

1. Need to capital account surplus which will create capital accumulation and employment.

2. To active skill training programme that will help reduce natural rate of unemployment.
3. Increasing productive efficiency and import substitution of commodities in order to reduce prices of commodities.
4. Improve self-employment, entrepreneurship development progamme and autonomous investment of the country.

5.2. Limitations of the Study

Limitations of this study are:

a) Present paper is based on available info of Inflation and Unemployment rate of India and U.S.A.

b) This paper also concentrates upon only U.S.A. and Indian scenario of Inflation and Unemployment rate.

Appendix

Table 6: Summary Output: India

Linear Regression Model				
Regression Statistics				
Multiple R	0.353812			
R Square	0.125183			
Adjusted R Square	0.109835			
Standard Error	5.421114			
Observations	59			
ANOVA				
	df	*SS*	*MS*	*F*
Regression	1	239.706	239.706	8.156463
Residual	57	1675.143	29.38848	*Significance F*
Total	58	1914.849		0.005977
	Coefficients	*Standard Error*	*T Stat*	*P-value*
Intercept	38.58749	13.49874	2.8586	0.005933
5.89	-6.92597	2.425101	-2.85595	0.005977
Reciprocal Model				
Regression Statistics				
Multiple R	0.395665			
R Square	0.156551			
Adjusted R Square	0.141753			
Standard Error	5.323035			
Observations	59			
ANOVA				

	df	*SS*	*MS*	*F*
Regression	1	299.7711	299.7711	10.57965
Residual	57	1615.078	28.3347	*Significance F*
Total	58	1914.849		0.001924
	Coefficients	*Standard Error*	*T Stat*	*P-value*
Intercept	-46.8782	14.45619	-3.24278	0.001981
0.169779	260.4209	80.06455	3.252637	0.001924

Source: Authors' own calculation

Table 7: Summary Output: USA

Linear Regression Model				
Regression Statistics				
Multiple R	0.38173			
R Square	0.145717			
Adjusted R Square	0.130988			
Standard Error	1.853113			
Observations	60			
ANOVA				
	df	*SS*	*MS*	*F*
Regression	1	33.97361	33.97361	9.893231
Residual	58	199.1735	3.434026	*Significance F*
Total	59	233.1471		0.002617
	Coefficients	*Standard Error*	*T Stat*	*P-value*
Intercept	2.735662	0.903072	3.029283	0.003657
XVariable1	-0.45777	0.145539	-3.14535	0.002617
Reciprocal Model				
Regression Statistics				
Multiple R	0.33425			
R Square	0.111723			
Adjusted R Square	0.096139			
Standard Error	1.904108			
Observations	59			
ANOVA				
	df	*SS*	*MS*	*F*
Regression	1	25.99279	25.99279	7.169183
Residual	57	206.6608	3.625628	*Significance F*
Total	58	232.6536		0.009671
	Coefficients	*Standard Error*	*T Stat*	*P-value*
Intercept	-2.41613	0.938855	-2.57349	0.012694
0.166667	13.46203	5.027775	2.677533	0.009671

Source: Authors' own calculation

References

Ball, L. and Mazumder, S. (2011). Inflation Dynamics and the Great Recession. *Brookings Papers on Economic Activity*, 42 (1), 337–405.

Dua, P. and Gaur, U. (2009). Determination of Inûation in an Open Economy Phillips Curve Framework: The Case for Developed and Developing Economies. Working Paper 178, *Centre for Development Economics,* Delhi School of Economics.

Friedman, M. (1968). The Role of Monetary Policy. American Economic Review, 58 (1), 1–17.

https://www.macrotrends.net/countries/IND/india/inflation-rate-cpi, World Bank

https://www.macrotrends.net/countries/IND/india/unemployment-rate, World Bank

https://www.macrotrends.net/countries/USA/united-states/inflation-rate-cpi, World Bank

Gordon, Robert J. (1970). Prices in 1970: The Horizontal Phillips Curve. Brookings Papers on Economic Activity, Economic Studies Program, The Brookings Institution, 1(3), 449-458.

Levi, M. D., & Makin, J. H. (1980). Inflation Uncertainty and the Phillips curve: Some Empirical Evidence. *The American Economic Review,* 70(5), 1022-1027.

Islam, F., Hassan, K., Mustafa, M. and Rahman, M. (2003). The Empirics of US Phillips Curve: A Revisit, *American Business Review,* 20(1), 107-112.

King, R.G. and Watson, M.W. (1994). The Post-war US Phillips Curve: ARevisionist Econometric History, Carnegie Rochester Conference Series on Public Policy, 41, 157-219.

Kapur, M. (2013). Revisiting the Phillips curve for India and Inflation Forecasting. *Journal of Asian Economics,* Vol. 25 (C), 17-27.

Kapur, M. and Patra, M. (2000). The Price of Low Inflation. Occasional Papers, *Reserve Bank of India,* 21(2–3), 191–233.

Levi, M. D., & Makin, J. H. (1980). Inflation Uncertainty and the Phillips curve: Some Empirical Evidence. *The American Economic Review,* 70(5), 1022-1027.

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

Mazumder, S. (*2011*). *The Stability of the Phillips Curve in India: Does the Lucas Critique Apply*? *Journal of Asian Economics*, *22 (6)*, *528-539.*

Patra, M. and Kapur, M. (2012). A Monetary Policy Model for India. *Macroeconomics and Finance in Emerging Market Economies,* 5(1), 16-39.

Patra, M. and Ray, P. (2010). Inflation Expectations and Monetary Policy in India: An Empirical Exploration. Working Paper WP/10/84, International Monetary Fund.

Paul, B. P. (2009). In Search of the Phillips Curve for India. *Journal of Asian Economics,* 20 (4), 479-488.

Phelps E.S. (1968). Money-Wage Dynamics and Labor-Market Equilibrium. *Journal of Political Economy,* 76(4), 678–711.

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

Reserve Bank of India (2002), Report on Currency and Finance 2000-01.

—— (2004), Report on Currency and Finance 2003-04.

Samuelson, P. A. & Solow, R. (1960). Analytical Aspect of Anti-inflation Policy. *American Economic Review* 50 (2), 177- 194.

Singh, B. Karan, Kanakaraj, A. and Sridevi, T.O. (2011). Revisiting the Empirical Existence of the Phillips curve for India. *Journal of Asian Economics,* 22 (3), 247-258.

Solow, R. (1970). Discussion of R.J. Gordon's Recent Acceleration of Inflation and its Lessons for the Future. Brookings Papers on Economic Activities, 1 (Washington, DC: Brookings Institution), 42(6).

Srinivasan, N., Mahambare, V. and Ramachandra, M. (2006). Modelling Inflation in India: Critique of the Structuralist Approach. *Journal of Quantitative Economics, New Series,* 4 (2), 45–58.

Stock J and Watson MW (2009). Phillips Curve Inflation Forecasts", In: Fuhrer J, Kodrzycki Y, Little J, Olivei G, *Understanding Inflation and the Implications for Monetary Policy*, Cambridge: MIT Press, 99-202.