y, on the assumption that the labour ivity rose at the rate of 2.5 percent per 2

Pechman has pointed out that the ion between changes in wages and yment, as suggested by Phillips in the conomy is rather exaggerated. The of Samuelson and Solow concerning ce-employment relationship in the his opinion have not been supported cal facts.[3]

s similar to Phillips' were conducted and Routh. R.G. Lipsey reworked ta. Covering the period 1862-1957, that over four-fifths of the variance vage rates could be associated with unemployment and its rate of change. er, pointed out that the relationship age rates and unemployment rates veaker during the period after 1913. d that the wage change were related to the changes in the cost-of-living the inter-war and post-war periods. an objection to the validity of Phillips s methods of aggregation. His however, were roughly the same. oped a hypothesis that the change in the United Kingdom were related he levels of profits.[4] Lipsey and , could not find sufficient evidence this hypothesis. On the basis of ta for 10 British industries, they profits were not significant in post-war changes in wage rates vel of unemployment was. Ball gh their study, also showed that profits and productivity ... helpful in explaining the changes in wage rates.

Dicks Mireaux and Dow analysed the postwar inflation in Britain and found that wages were most sensitive to the changes in (V–U) a gap between unfilled vacancies (V) and the number of unemployed job-seekers (U). A one per cent increase in (V–U) was associated with a 3 to 4 per cent rise in wages.

The studies of wage-employment relation in the U.S. economy have yielded more pessimistic results. Phillips as well as Samuelson and Solow could find such results which were unfavourable to the possibility of checking tolerable limits of unemployment. Unlike the British economy a significant relationship between changes in profits and wage rates was found by Levinson in the United States. This result was also supported by R.J. Bhatia, who on the basis of data covering 1900-1958 period, found that there was much less evidence of Phillips type relationship and that wage changes were related more to the level and rate of change of profits than with the changes in unemployment. Eckstein and Wilson, however, found a better statistical fit. T.F. Dernburg pointed out that the standard negatively sloped Phillips Curve was discernible during 1972-73, 1976-79 and 1981-82 periods in the U.S. economy.[5]

2. PHILLIPS CURVE AND EFFECTIVENESS OF POLICIES

The Phillips curve can be used for determining the *effectiveness of monetary and fiscal policies to check inflation* as shown in Fig. 2.

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n and M. Solow : *Analytical Aspects of Anti-inflation Policy*, American Economic Review ; Vol. 50, 177 -- 94.

Comment on Samuelson-Solow Paper, AER (May 1960), P. 219.

nomic Growth and the Problem of Inflation, Part II, *Economica*, Nov. 1959, Pp. 287 – 98.

Macro Economics (1986), P. 298.

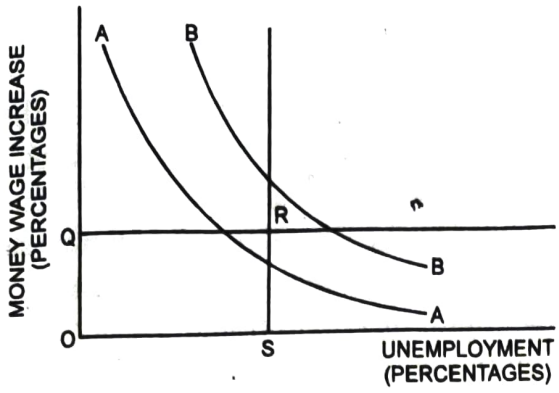

Fig. 2

OQ represents the maximum percentage of money wage increase which a capitalist economy can absorb, on the average, with rising productivity without inflationary consequences. The Council of Economic Advisers in the United States has estimated that the appropriate figure of such a wage guidepost for the U.S. economy would be like 3.2% per annum. The vertical drawn at S represents the maximum acceptable level of unemployment, which most of the economists in the United States have placed between 3 and 4 per cent. If the Phillips curve passes between R and the point of origin as does AA in Fig. 2, the supply inflation of the wage-push type can be checked through monetary and fiscal policies without inflicting unacceptably high unemployment on the economy. If the Phillips curve passes to the right of R, as does the curve BB, the wage push pressures can be held in check with the growth of productivity. In such a situation, restrictive monetary and fiscal policies fail to provide an acceptable solution.

H.G. Johnson raised serious doubts about the applicability of Phillips curve to the formulation of economic policies. In his words, "On the one hand, the curve represents only a statistical description of the mechanics of adjustment in the labour market, resting on a simple model of economic dynamics with little general and well tested monetary and value theory behind it. On the other hand, it describes the behaviour of labour market in a combination of periods of economic fluctuations and varying rates of inflation, conditions which presumably influenced the behaviour of the labour market itself so that it may reasonably be doubted whether the curve would continue to hold its shape if an attempt were made by economic policy to pin the economy down to a point on it."

3. THE NATURAL RATE HYPOTHESIS OR LONG-RUN PHILLIPS CURVE

The natural rate hypothesis related to unemployment and inflation was developed by Milton Friedman. An independent attempt in this regard was made also by Edmand Phelps.

Friedman defined the natural rate of unemployment as that rate of unemployment "which has the property that it is consistent with equilibrium in the structure of real wage rate."[6] Corresponding to an equilibrium level of output in any economy, there is an accompanying rate of unemployment determined by real forces such as factor supplies, technology and the institutions of the economy. This rate can be considered as the natural rate. This rate was subsequently also called as the "non–accelerating inflation rate of unemployment".

According to Friedman, an increase in the supply of money leads to an increase in aggregate demand. This expansionary policy measure can move the output above the equilibrium rate and the rate of unemployment below the natural rate. The increased demand will cause prices to increase. In the short run, price adjustments cannot be complete. Therefore, the classical conclusion that increased demand raises prices but leaves output unaffected, is not valid. So the short run effects of growth in money supply involve higher rate of inflation and

6. M. Friedman : *The Role of Monetary Policy,* AER (March 1968), P.8.

lower rate of unemployment. Friedman, in this way, was in agreement with the notion of trade-off between inflation and unemployment postulated through Phillips Curve. But he pointed out that the terms of trade would be rather good in the short run as much of the increase in nominal income would be in the form of an increase in real output with prices rising to a lesser extent.[7]

The labour supply increases in the short period because the ex-ante or expected real wage is higher due to the higher nominal wage and given behaviour of prices. The fall in actual real wage paid by the employer causes the demand for labour to increase. As a consequence, the rate of unemployment gets pushed below the natural or equilibrium rate.

In the long run, the workers will ultimately notice the increase in price level at a higher rate. So they will start demanding higher money wages. As the real wage will revert to initial higher level, the demand for labour will get reduced and the rate of unemployment will also return to the natural rate. Thus, in the long run, the economic system, consequent upon the increase in money stock, may maintain itself at the natural rate of unemployment, though rate of inflation will continue to increase.

The short run and long run implication of growth in money stock related to unemployment and price level can be explained through Fig. 3.

Fig. 3 shows that A is the short run Philips curve based on the assumption that price level is stable when a 3 per cent increase in money stock results in 3 per cent growth in real income. Given a zero expected rate of inflation, the rate of unemployment is 6 per cent. It is supposed to be the equilibrium or natural rate of unemployment. B is the modified Phillips curve corresponding to expected rate of inflation of 2 per cent when money stock grows at the ra of 5 per cent and real income grows at the ra of 3 per cent. C is another short run Phillip curve that corresponds to a 4 per cent expecte rate of inflation. In this case, the rate of inflatio is computed by 7 per cent growth in money stoc minus 3 per cent growth in real income. If th expected rate of inflation is 6 per cent (9 pe cent growth in money stock minus 3 per cen growth in real income), the relevant short ru Phillips curve is D. **P is the long run Phillip curve** which is drawn on the assumption tha there is complete anticipation of the rate o inflation by the suppliers of labour.

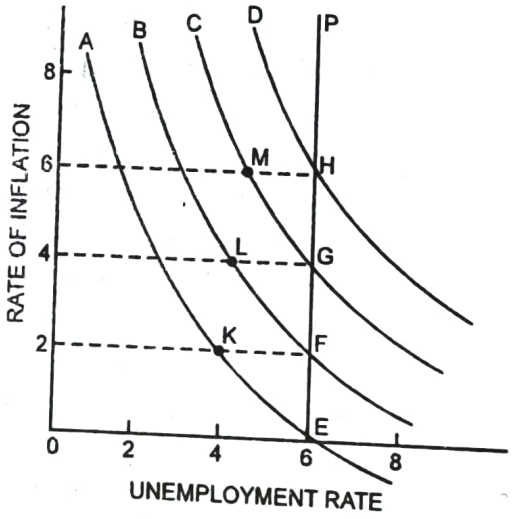

Fig. 3

Initially the system is at E which corresponds with stable price level and natural rate of unemployment of 6 per cent. If the price level rises at the rate of 2 per cent, the system moves to K where the rate of unemployment falls below the natural rate. If the suppliers of labour anticipate that prices are rising at this rate, they will demand a corresponding rise in money wages. This will cause a shift in Phillips curve to B. Given the actual and expected rate of inflation of 2 per cent, the system shifts to F where there is return to initial natural rate of

7. R.T. Froyen : *Macro Economics* (1988), P. 274.

unemployment of 6 per cent. The policy makers may not be satisfied with the return to 6 per cent rate of unemployment and may decide to raise money stock by 7 per cent. Given a 3 per cent increase in real income, prices will increase at the rate of 4 per cent. So the system will shift to point L where the rate of unemployment is less than the natural rate. The suppliers of labour will again anticipate after some time that the prices will rise in future too at the rate of 4 per cent and the system will get back to 6 per cent natural rate at point G and the relevant short run Phillips curve corresponding to 4 per cent rate of inflation is C. The attempt to peg rate of unemployment at a level lower than natural rate, will make the policy-maker to increase the money stock at 9 per cent. It will result in a rise in prices at the rate of 6 per cent and the system will shift to point M. If prices are expected to increase at the rate of 6 per cent, the short run Phillips curve shifts to D. In the long run if the suppliers of labour expect that prices will continue to rise at 6 per cent, the system will again reach the equilibrium or natural rate of unemployment. The points E, F, G and H indicate that system maintains equilibrium at natural rate of unemployment of 6 per cent, although these points of equilibrium correspond with consecutively higher rates of inflation. These points get determined on the assumption *that actual rate of inflation remains equal to expected rate of inflation or when inflation is fully anticipated.* All these points lie on a vertical path P which can be considered as the *long run Phillips curve.*

The above analysis given by Milton Friedman and Phelps is also known as the *Accelerationist Hypothesis* or *Adaptive Expectation Hypothesis.* Given the continuous expectation that the actual and expected rates of inflation will remain equal, there is perfect adaptation of expectations in the long run. The economic system experiences an accelerated rate of increase in prices, while the equilibrium or natural rate of unemployment remains unchanged. The natural rate hypothesis or adaptive expectations model rules out the trade off between inflation and unemployment in the long run.

In a study made by Lucas, using data for 18 countries, it was found that the long run trade off between inflation and unemployment was absent and the real output responded more to price level changes in countries with lower and stable rates of inflation than it did in countries with more rapid inflation.[8]

The theory of natural rate of unemployment provides a theoretical foundation for the monetarist belief that changes in money stock influence primarily price level and other nominal variables in the long run and the real variables like output and employment have sufficient time to get adjusted to their natural levels.

From Friedman's natural rate theory, some significant **policy implications** can be derived. *Firstly,* the interventionist demand-raising policies to tackle unemployment can bring only short run gains. In the long run, such policies have resulted in increased rates of inflation in the United States and other industrial countries. *Secondly,* the policy makers cannot peg the rate of unemployment at some arbitrarily determined target rate. The attempts to achieve or maintain that target rate are likely to precipitate inflation.

8. R.E. Lucas : *Some International Evidence on Output-Inflation Trade-offs,* AER, 63 [June 1973]