

Chapter-2

Survey of Literature

Economists had looked into the relationship between unemployment and inflation ever since a variant of this relationship was investigated as early as 1926 by Irving Fisher(1926). However, it was AW Phillips's paper (1958) that caught the attention of many economists. Interestingly, two independent papers on this subject, by L.A. Dicks-Mireaux and J.C.R. Dow (1959) and by Lawrence R. Klein and Robert J. Ball (1959), appeared at approximately the same time. For three reasons, however, Phillips's competitors and their insights were ignored at that time because of three reasons. First, Phillips's article appeared a few-months earlier than the others. Second, Phillips's article was extended in a brilliant piece by Richard Lipsey(1960). Third, and probably most important, only Phillips drew the eye catching, curve that bears his name the Phillips curve.

Phillips seeks to examine the applicability of traditional economic propositions to the labour market in the United Kingdom. In particular, when there is excess commodity demand, prices are expected to rise. Does this happen in the labour market? To find out, Phillips regresses the rate of wage inflation against the unemployment rate, which is his measure of excess demand, using the relation

$$Dw/w + a = bU^c$$

where $D=d/dt$, w is the nominal wage rate, and U is the unemployment rate. This is , however , a difficult form to estimate. Because of the additive constant a and because of several observations with negative values for Dw/w , Phillips faces statistical problems, which he attempts to overcome though perhaps clever, way. Unemployment rates are divided into six intervals: 0-2, 2-3, 3-4, 4-6, 5-7, 7-11. All 52 raw observations are placed into six groups, according to interval in which their unemployment rates fall. Within each group, the values of Dw/w are averaged. This average is paired with the midpoint of the unemployment interval defining the group, and this average inflation-unemployment pair constitutes a composite data point. Thus six composite points are found. Four of these have positive average values of Dw/w , and these are used to estimate b and

c in $(Dw/w + a = bU^c)$ using least squares. The constant a is chosen by trial and error to make the fitted curve pass as close as possible to the remaining two composite points.

This unusual procedure led to criticism of this procedure and prompted Lipsey to write his extension. First, only four points are used to estimate the two parameters b and c , leaving only two degrees of freedom. Because the four composite points are averages of considerably points are highly stable. Thus the cost of few degrees of freedom has brought with it a very low variance of sample points to be used for estimation. Thus Phillips's procedure might still produce significant coefficients. Unfortunately, Phillips does not report significance tests. Second, the parameter a is found by iteration given the values of b and c . Thus the three parameters are determined sequentially rather than simultaneously. Third, the number of raw points averaged into each composite point is different for each composite point is different for each composite point. Thus the composite points should be weighted to reflect the amount of information they contain. Otherwise, outlying raw points will be given undue significance in the regression. Such weighting is not done, however, and the composite points are treated as equals.

In any event, Phillips finds a negative, nonlinear relation between wage inflation and unemployment. Phillips also notes that the raw data points are distributed around his fitted curve in a systematic way: before World War II, the data describe counterclockwise loops and thus tend to lie above the fitted curve when unemployment is falling (and inflation rising); after World War II, the loops become clockwise. Phillips does not explore this looping behavior either theoretically or empirically.

Lipsey repeats Phillips's work but uses standard statistical techniques to eliminate the econometric problems associated with Phillips's methods. To do so, he hypothesizes an alternative to equation:

$$Dw/w = a + b U^{-1} + c U^{-2}$$

Lipsey shows that his equation can be made arbitrarily close to the one estimated by Phillips by choosing appropriate values for the parameters a , b and c . Thus if Phillips's equation were correct, it would be corroborated by the fit for $(Dw/w = a + b U^{-1} + c U^{-2})$. However, Lipsey obtains magnitudes much different from those needed to make $(Dw/w = a + b U^{-1} + c U^{-2})$ and $(Dw/w + a = bU^c)$ same, although he does get a negative, nonlinear relation. Thus he confirms Phillips's basic

findings, but obtains different magnitudes. Lipsey also adds the rate of price inflation to capture changes in the cost of living and find that it, too, improves the fit. Finally, Lipsey tests versions of $(Dw/w = a + b U^{-1} + c U^{-2})$ in several time periods. He finds a negative, nonlinear relation in all periods ; but the functional form varies slightly across periods, the coefficients vary substantially and in some periods errors seem temporally unstable, suggesting the possibility of omitted variables.

It seemed established that there was a negative relation between wage inflation and unemployment. The policy implications of this finding were both important and clear. If such a negative relation exists, then there is a trade-off between inflation and unemployment. If a social welfare function could be chosen, then it would be possible to choose and attain an optimal point on the Phillips curve, representing the optimal combination available to the policy maker. Clearly, it is important to explain and estimate the Phillips curve very accurately. Thus, a large number of economists devoted their efforts to theoretical and empirical investigations of the Phillips curve.

After publication of the pioneering works, research on the Phillips curve expanded rapidly. Most efforts were devoted to the time-series behavior of unemployment and inflation in the United States and Britain, but other countries were examined, too. In addition, some authors did disaggregated studies, examining regions, metropolitan areas, or industries. In all, the major problem that has been addressed is what variables to use in explaining aggregate wage inflation.

Following the lead of Phillips and Lipsey , almost all authors use the unemployment rate in the wage equation as a proxy for excess demand. However, there is considerable disagreement over the functional form and measure of unemployment to be used. There is theoretical agreement about a nonlinear relation between inflation and unemployment. However, the form of his nonlinearity varies from author to author. Some use the inverse of the unemployment rate, some combine this inverse with the inverse of the unemployment raised to some power, some use logs.

Several empirical studies supported the nonlinear relationship, but other studies appeared in which a linear relation was found to do well. The resulting dilemma inspired further investigation. Some authors compare linear and nonlinear models; the results are inconclusive. For example, Robert France gets a slightly better fit with the linear model(1962), whereas Perry gets a slightly better fit with the nonlinear model(1964). William Bowen and Albert Berry argues that

most linear models apply to the United States, which rarely had very low unemployment rates and would therefore be on the more linear part of Phillips curve, so that a linear model might fit well (1963). Unfortunately, this does not explain why some authors—such as Klein and Ball (1959), R.L. Thomas and P.J.M. Stoney (1972)—obtain good fits for linear models applied to British data, for Britain certainly did experience low unemployment rates. To add to the confusion, several authors found insignificant coefficients for unemployment in both the linear and nonlinear models in many or all of their regression runs. (See, for example, Lipsey and Steuer (1961), France (1962), Bowen and Berry (1963), Kaliski (1964), Robert Eagly (1965), Ronald G. Bodkin (1966), Kuh (1967), Jim Taylor (1970), Leslie Godfrey (1971), Koshal and Gallaway (1971) and Thomas and Stoney (1972)). These findings suggest that neither relation is appropriate. The evidence thus seems contradictory and inconclusive, but further examination suggests that the weight of the evidence lies with a significant nonlinear relation.

Regarding significance, most studies that find the unemployment rate insignificant in explaining wage inflation do so primarily for post-war years; pre-war years are much more likely to show a significant relation. See Rattan Bhatia (1961), France (1962) and Bowen and Berry (1963) for examples of the change in behavior from pre-war to post-war years.

In addition, the studies rejecting the relationship generally use annual data. Studies using quarterly data generally find a significant relation even for the post-war years. See, for example, Klein and Ball (1959), Perry (1964), Schultze and Tryon (1965), Norman J. Simler and Alfred Tella (1968), Pierson (1968), Archibald (1969), Robyn Kemmis, and J.W. Perkins (1974) and Thomas (1974). This difference suggests that a year is probably too long a period to use in studying Phillips curve behavior. A considerable amount of cyclical activity can be hidden in a year's time; for example, several of the post-war recessions in the United States lasted less than twelve months. Thus quarterly studies presumably are more trustworthy in this case, and such studies on average support an inverse relation between wage inflation and unemployment. Another important problem with the studies rejecting the Phillips relation is multicollinearity, which may spuriously rob the unemployment rate of its statistical significance. This problem will be discussed in detail below. Thus, it may not be surprising to find an insignificant coefficient for unemployment in these studies.

Regarding nonlinearity, most of the quarterly studies that find the unemployment rate significant also find a nonlinear relation preferable to a linear one.

The measurement of unemployment is another area of disagreement in the literature. There is the obvious problem of which statistics to use. For example, Phillips (1958) uses unemployment rates of union members' Perry (1964) uses total unemployment of civilian labour force; Kuh(1967) uses quarterly averages of monthly ratios of the private labour force to the employment rate; and so on. Such problems are unavoidable but also minor if the various measures are highly correlated, as they seem to be.

Another problem is comparability of data across countries. Britain, for example, does not count new entrants as unemployed, whereas the United States does. Thus even if the British and United States economies were identical, the former would have a lower Phillips curve than the latter and would appear to enjoy a more favourable trade-off, all merely because of data differences. Furthermore the ratio of new entrants to other types of unemployed varies cyclically, so that differences in counting new entrants presumably would cause differences in the intertemporal relation between inflation and unemployment, again making comparison across countries difficult. A full discussion of data difference is beyond the scope of this paper; suffice it to say that each country assembles its unemployment data in a unique manner, rendering international comparisons of Phillips curves difficult at best. Robert Flanagan is exceptional in recognizing these problems and making appropriate corrections (1973).

Friedman(1968) argued that Phillips had made a fundamental mistake in failing to distinguish between nominal wages and real wages; and he further distinguished between anticipated and unanticipated variables. As to the first distinction:

“A lower level of unemployment is an indication that there is an excess demand for labour that will produce upward pressure on real wages. A higher level of unemployment is an indication that there is an excess supply of labour that will produce downward pressure on real wage rates.(My emphasis)”

On this basis the Phillips curve which relates inflation in nominal wage rates to unemployment seems completely counter to economic intuition. Nevertheless, in the interim or

adjustment period there may occur a negative short run correlation between wage inflation and unemployment.

The essence of Friedman's model, which leads to short run Phillips curves which are not vertical, is the misperception of workers as to whether real wages have increased following an increase in nominal wages. This takes place in an economy with perfectly competitive firms producing where the real wage is equal to the marginal product of labour. Suppose starting from a position in which the labour market clears there is an increase in aggregate nominal demand resulting in an increase in prices, following this employers are willing to pay higher nominal wages to attract additional workers (this part of the story is as in Phillips' competitive bidding). Now in order to produce extra output the employers' real wage, which is equated to the marginal product of labour, has to fall. Provided any consequent increase in money wage is less than the increase in prices, the real wage has fallen and there will be an increase in output.

Workers adjust their perception of prices more slowly than employers, because what matters to them is prices in general, on which information is costly to obtain or which is only available with a lag, rather than prices in particular. Friedman (1977, p.466) notes: 'Price indexes are imperfect; they are only available with a lag and generally are applied to contract terms only with a further lag'. Workers therefore perceive an increase in nominal wages as an increase in real wages and offer more labour. The apparent contradiction of employers demanding more labour at a lower real wage and workers supplying it at a higher real wage than initially is resolved by their different perceptions of the real wage. As result of the increase in demand, prices and money wages have increased and unemployment has decreased. There is a Phillips curve relationship between wage inflation and unemployment conditional on the workers perception of price inflation.

But, as Friedman points out (1977, p.457), this is temporary situation: in due course workers' perceptions catch up with reality and, therefore, as the relative price of labour has not changed employment return to its original market clearing position and unemployment returns to its 'natural' rate given the labour force. This scenario could be rehearsed again for a different perceived rate of inflation, which would draw out another short run relationship between wage inflation and price inflation. However, in Friedman's model only one long run, the natural rate of unemployment, is sustainable since that is determined by real forces, and is compatible with any perceived rate of inflation. Hence there is a series of short run Phillips curve each conditional on

a perceived or expected rate of price inflation, but the long run Phillips curve is vertical. To achieve a long run trade-off between wage inflation and unemployment there must be a continuing acceleration in perceived price inflation, but even that assumes workers will not come to understand the nature of their continuing mistakes in the perception of inflation.

If one accepts the view that the long run Phillips curve is vertical, at what Friedman has called the 'natural rate of unemployment', and that if a trade off exists it is a purely temporary phenomenon, what led Phillips to suggest a relationship between changes in nominal wage rates and unemployment? Friedman (1975, p.16 et seq.) has suggested that Phillips was working within a framework in which prices were regarded as stable, in which case changes in nominal wages are equal to changes in real wages.

The study of the Inflation and Unemployment was attempted by JAMES TOBIN (1972) by the literary review on different aspect of the inflation and unemployment. The article is divided in six sections with different view on the relation between inflation and unemployment. In the first section the various views on the full employment is analyzed by them. The natural unemployment, involuntary unemployment and the 1950's 'New inflation' due to cost push is also reviewed in this article. Second section of this article is on the interpretations of unemployment by Keynesian and classical. The full employment is also included the involuntary unemployment. Because the view on the full employment and deflation is also means of maximum aggregate supply in an economy. If the aggregate supply in the economy is less than the aggregate demand the inflation and unemployment would be occurred due to gap. The literary debate in classical and the Keynesian views are also noted down in this article for the inflation and unemployment. The third section analyses the additional employment does not produce enough to compensate workers for the value of other uses of their time. The better jobs for the better wages are willing of every one, so there are dual labour markets by the fact of price inflation. There is voluntary unemployment due to better job search. In fourth section the inflation without aggregate excess demand is made due to the wage rates. When the wage rates will be rose without any intervening in the competitive struggle over relative wages than the inflation will be proceed continuously as outcomes due to rise in wage rates. Fifth section reflects the role of monopoly power on inflation and unemployment. In the last the policy makers is also play an active role to control the inflation and unemployment with different policies like fiscal and monetary policies. The literary review of

this article was not enough to explain the relation of inflation and unemployment. There is more need to analysis the relation between inflation and unemployment.

Eckstein and Brinner (1972) advanced a new theory of the long-run Phillips Curve by combining the main features of M. Friedman's long-run Phillips Curve and the original traditional short-run Phillips Curve. They agree with M. Friedman's proposition that there is no trade-off between unemployment rate and inflation rate below 'critical rate of unemployment '(this is same as given by the M. Friedman's natural rate of unemployment). Because they contend that beyond the critical rate of unemployment and below a certain rate of inflation, there does exist a trade-off between unemployment and inflation.

Robert J. Gordon (1976) was examined the theoretical literature of the past decade on the causes of inflation and unemployment. This paper takes a selective rather than comprehensive approach and is concerned with the causes of inflation but not with its costs; with the theoretical development but not with the results of empirical tests. The scope of this paper includes the causes of unemployment as well as inflation, because the most interesting recent papers have treated both phenomena as part of a single analytical problem, e.g. those which model the optimal adjustment by firms of employment and wage rates in response to unexpected changes in product demand. The basic theme is to extend the impact of sluggish price adjustment on the validity and relevance of recent models. The determination of inflation which can be demand-pull or cost-push inflation, it is the role of money. The insulation of real output from anticipated monetary changes, derived in the recent rational expectations literature, loses its validity when prices adjust slowly to changes in demand. The search literature explains only part of unemployment when layoffs rather than wage cuts are the major tool of employment adjustment in recessions. The role of expectations is well defined in his article. A basic thrust of the labour market literature had been a questioning of the 1940's and 1950's emphasis on full employment as an overriding goal, by its shifting of a substantial share of the observed unemployment from involuntary to voluntary in its motivation, explicitly in the case of frictional unemployment analysed in the search literature, and implicitly in the case of the temporary layoffs studied in the 'new-new' contract literature. Some problem of the monetarist view and the recent discussion of auction, customer and idiosyncratic remain to define in his article according the review of his article.

The article is analyzed by Milton Friedman(1977), which is consisted with the different stages of the Phillips Curve with different opinion. The controversy about the relation between inflation and unemployment has been intertwined with the controversy about the relative role of monetary, fiscal and other factors in influencing aggregate demand, however produced, works itself out through changes in employment and price levels, the other with the factors accounting for the change in aggregate nominal demand. In this article the first stage is accepted the trade-off between inflation and unemployment in short period. The second stage is introduced the inflation expectations, as a variable shifting the short run Phillips curve and of the natural rate of unemployment, as determining the vertical shape of Phillips curve. In the third stage the empirical phenomenon has been made for the seven countries for their rate of price change, percent per year and unemployment, percentage of labour force. The data were taken for the average of five years from 1956 to 1975. In the analysis of data some countries are shown the trade-off between inflation and unemployment some are not in this perception. In the analysis a new case of positively sloped Phillips curve is highlighted. The unweighted average of seven countries are shown that the positive relationship between these two variables. In conclusion by the view of Keynesian revolution of the 1930s was the acceptance of a rigid absolute wage level and nearly rigid absolute price level as a starting point for analyzing short-term economic change. The changes in aggregate nominal demand would be reflected almost entirely in output and hardly at all in prices. The natural rate hypothesis contains the original Phillips curve hypothesis as a special case and rationalizes a far broader range of experience, in particular the phenomenon of stagflation. It has by now been widely though not universally accepted.

The work on Phillips Curve in Indian context is done by Ravinder H. Dholakia (1987) in his paper to study the trade-off between inflation and unemployment in India. The paper is written on the hypothesis of extended Phillips curve. Which is also analysis the trade-off between inflation and unemployment is essentially a short run and long-run phenomenon. For the Less Developed Countries, the hypothesis of extended Phillips Curve has very serious implications due to the external supply shock. The empirical investigation in India is limitations due to the availability of data. The data were collected meticulously and on regular annual basis from 1950-51 to 1984-85 and used annually. The inflation rate is measured with the help of the GNP deflator and the output gap is measured by the GNP at 1970-71 prices. The data is analyzed with the OLS , regression , autocorrelation and D.W. statistics methods. The equation is estimated by the Okun's Law and

assumption of adaptive expectations. The empirically finding can be interpreted to imply that the Indian Economy or Less Developed Countries does not seem to face any appreciable trade-off between unemployment and inflation even in the short run. In Less Developed Countries always need to rapid their growth of output not only tackle some of their pressing problem like poverty and unemployment but also to combat inflation.

The paper of N.Gregory Mankiw(2000) discuss the short-run trade-off between inflation and unemployment by the literature review with the effect of the monetary policy in the inexorable and mysterious trade-off. In the review of the literature is shown by the article that the changes in monetary policy push these two variables in opposite directions. The empirical work is also reviewed in this paper mostly on the United State quarterly of different economists views for inflation and unemployment. The analysis of the hysteresis, monetary non-neutrality, New Keynesian Phillips Curve with equations has been reviewed. The failure of the New Keynesian Phillips Curve due to disinflationary booms, inflation persistence and monetary policy shocks has been also discussed in his paper. The forward and backward looking models have shown the very important role for this trade-off. The trade-off remains a necessary building block of business cycle theory; economists have yet to provide a completely satisfactory explanation for it. The conclusion for the almost all economists today agree that monetary policy influences unemployment, at least temporarily, and determines inflation, at least in long run. Price stickiness can easily explain why society faces a short-run trade-off between inflation and unemployment. The monetary policy can be reduced the unemployment and increase the inflation in short-run. The mystery is again remains between trade-off of two variables.

Jordi Gali and J David Lopez-Salido (2000) is introduced the study on Spain. This paper has been analyzed the New Phillips Curve (NPC) to fit the data for Spain in the most disinflationary period from 1980 to 1998. Recent developments in monetary business cycle theory have led to the development of a so called NPC. The key difference with respect to the traditional Phillips curve is that price changes are the result of optimizing decisions by monopolistically competitive firms subject to constraints on the frequency of price adjustment. The objectives of the present paper are twofold. First, that is provided evidence on the fit of the NPC and to understand the disinflation process for Spain. Second, to compare the characteristics of Spanish inflation dynamics with those observed for the euro area. The data source is Bank of Spain, Research

Department. The variables of study are inflation (GDP deflator), wage inflation, import prices and marginal costs for four lags. This study is also included the Cob-Douglas and CES production function for the estimation of marginal costs. The study is based on the estimation of wages and prices equations, f-test, regression and j-statistics for Gaussian Mixture Models. The nature of such a relationship, the emphasis of the literature shifted from analyzing the link between inflation and unemployment or output in terms of a relationship like to a relationship between real wages and unemployment. The study was made on the various components for the analysis. The backward-looking and the forward-looking components are used to analysis the data for the inflation. The data for the Spain is well fit in NPC and backward-looking component is well used to measure the inflation. The degree of price stickiness implied by the estimates is plausible. The behavior of marginal costs is mostly depend on labour market frictions, wage markup and the independent information about the price of imports affects the measure of the firm's marginal costs and inflation.

GUY DEBELLE and JAMES VICKERY (2000) has been analyzed the Phillips Curve for Australia in their article with some evidence and implications for Australia. The recent work on the Phillips Curve has been generally conducted in a linear form. The other side for the analysis has made to restore the 'curve' in the short-run Phillips curve and has investigated the empirical evidence for, and implications of, a non-linearity of the Phillips curve. This article was made on the existing literature on the non-linear Phillips curves. The aim of the paper is simply to investigate the possibility that the Phillips curve is non liner, and use our derives estimates of a non-linear Phillips curve as an expository device to demonstrate the implications of an asymmetrical Phillips curve. In this paper the linearity and non-linearity of the Phillips curve has been analyses differently with various study on Australian literature. The variables for the analysis were used; Consumer Price Index (CPI) for inflation, Unemployment rate and NAIRU was also estimated. Four-quarter ended growth in the CPI was used. Inflation expectations are measured in a number of different forms from bond-market yields and the Melbourne Institute measure of consumer inflation expectations. The unemployment rate was the quarterly average of the monthly seasonally adjusted unemployment rate. The data for the unemployment rate was taken from the ABS Labour Force Survey from 1966 onward and from the NIF-10 database prior to that. Kalman Filter, Autocorrelation, Standard errors and Newey West approach were used in this paper for the

analysis of linearity and non-linearity of Phillips curve. After the empirically analysis of these estimation the conclusion of the study is the non- linearity specification for the short-run Phillips Curve may be a more accurate representation of reality that the traditionally used liner specification. The study should only be regarded as indicative of the presence of non-linearity. So the Phillips Curve is in reality a curve, there are important implications for the stronger stabilization policies. The short-run Phillips curve is not enough to represent the long run stabilization for the economy. But, it reinforces the need for policy makers to proceed cautiously, if the economy is close to its potential.

IAN M. MCDONALD(2002) from the University of Melbourne, Australia used the AW Phillips's idea in article on equilibrium unemployment for measurement in Australia Using the Phillips Curve". IAN M. MCDONALD used the different studies for their reviews to reach their objective. The main objective of that article was to review the measurement of equilibrium unemployment in Australia using the Phillips Curve. The idea was used to equilibrium the level of unemployment from disequilibrium level. If the unemployment level will be increased or decreased then the inflation can be controlled on this condition by the increase or decrease the inflation. In this article the Wage Bargaining, Involuntary Unemployment and Equilibrium Unemployment sections were used theoretical. Which are shown the demand and supply of the labour in labour market. Mostly the Natural Rate of Unemployment is positively related with the population, which include the involuntary unemployment. The disequilibrium relation between inflation and unemployment on which the Phillips curve is based can be derived from the analysis of involuntary unemployment. There the rate of unemployment above or below the equilibrium rate indicate an excess demand or supply of labour and will cause inflation to increase or decrease. The case of 'deskilling' is also highlighted in this article, which shown that persons unemployed for long periods lose their skills, or some of their skills, relative to recently employed people. As a finding, the deviation of wages or prices from expected wages or prices became the defining characteristic of disequilibrium in the labour market. The labour market model described thus far has not been very successful in explaining the patterns of inflation and unemployment. To improve the empirical performance of the equilibrium model, extensions have been developed to allow for multiple equilibrium, that is hysteresis and the range of equilibria. Deskilling is an incomplete explanation for hysteresis. The results of these studies support the existence of hysteresis in that the equilibrium rate of unemployment tends to follow the actual path of unemployment. For the

minimum unemployment, unemployment benefits have a strong influence. The conclusion is that the range model, by not confounding demand and supply effects, embodies a more appropriate specification of the influence of unemployment benefits, i.e. their level will not have a discernable effect on the inflation process when the economy is in the range. In the review of this article the hysteresis and range models suggest that aggregate demand policy can have permanent effects on the rate of unemployment. There may be an inflation cost from reducing unemployment, but this cost is not the persistently increasing rate of inflation emphasized by natural rate theory

D.HODGE(2002) has worked on the relation between Inflation and Unemployment in his article to study the trade-off between inflation and unemployment. The main aim of that paper was to establish whether there is a trade-off between inflation and unemployment in South Africa and how stable any such relationship has been. D. HODGE has analyzed some empirical evidence of the relationship between inflation, unemployment, and growth in South Africa over the past thirty years (1970-2000) annually. In his paper, the variables for the analysis were nominal GDP growth, which reflect the unemployment or an output gap and CPI (Inflation Rates). The data for the unemployment, CPI (Inflation Rates) and GDP Growth has taken from the MOHR. P. 2000, Economic Indicators, Pretoria: Unisa Press; STATISTIC SOUTH AFRICA.2000. South African Labour Statistics, section 7.6. The methods for the analysis in his article are Adjusted R-Square , Durbin-Watson test, T test, F test Correlation and the Ordinary Least Square used. A general-to-specific approach was used with the South African data, starting with three lags on the inflation rate, the unemployment rate and the change in the import price index. The analyses of the variables were supportive of the trade-off hypothesis. The modification of the unemployment rate terms with jobless rates was also support to the trade-off hypothesis. Short-run changes in the inflation, unemployment, and employment in South Africa have been essentially independent of each other. Thus, a short run trade-off between inflation and growth appears possible in South Africa, but not in between inflation and unemployment. The rising the unemployment rates were the result of large increase in the NAIRU or natural rate of unemployment.

A study on the connection of the inflation and unemployment is studied through Brain W. Cashell (2004). The data source for the study is the Department of Labour, Bureau of Labour Statistics. The study has been plotted the annual U.S. unemployment rates and consumer price inflation together from 1961s to1 to 1969 and 1970 to 2003. This short period for the analysis is

not enough but the result has the same as Phillips Curve's result and the long run is shown the clockwise pattern due to the combination of expectations adjustments and policy changes. This study is also included the Natural Rate Hypothesis, which is the reason for the vertical shape of Phillips Curve for long run due to adaptive expectations. The study is also highlighted the actual unemployment and the NAIRU since 1949 to 2003, which is also plotted and shown the percent unemployment by trend methods. Some empirical challenge to the natural rate may be differ due to big variation in the unemployment rate and inflation rate. The rapid inflation fails to materialize as soon as the unemployment rate falls below the estimated natural rate may be little reason to remain unconcerned. Inflation may be slow to pick up in response to labour market tightness. Once the inflation rate rises significantly, it can also take time to respond to any labour market slack, making disinflation a costly process that might better be avoided altogether.

The paper on the wage curve and the Phillips Curve is empirically and literary reviewed by MONTUENGA-GOMEZ AND RAMOS-PARRENO (2005). The aim of this paper is twofold; first, to present a systematic approach to what recent findings on the wage curve imply when studying the relationship between wages and unemployment; second, to offer a survey on the literature that has followed the appearance of the wage curve and, in particular, the efforts to relate this concept and the Phillips Curve. The theoretical and empirical framework of wage curve and Phillips curve is analysed from the various eastern countries from their own data sources from different period of time. The authors work with data for 50 states. The productivity or the price level, which are supposed to be time varying but constant across states are used as variables. The estimation is mainly worked around the United State. The data sources for the estimation is used the US Current Population Survey corresponding to the month of March of each year during the period 1964-1991. The methods are correlation, auto correlation, regression, auto regression, OLS and different methods according the data used. Using the data, a Phillips curve is supported in the United State, whereas slightly modified error correction appears to well model the situation in eastern countries. The conclusion is that the traditional role of Phillips curve as the supply side of the economy has recently been challenged by the inception of the so called 'wage curve'. This representation offer empirical support for the modern no-competitive theories of the labour market, which suggest a negative relationship between the level of wages and the unemployment rate. As a consequence of this wage-curve modeling of the supply side of the economy, supply shocks have persistent effects in output, unemployment and inflation. Only for the United State the shocks are

temporary is effected on unemployment and on inflation. As the aim the unemployment effect on wages takes place in just one period and supply shocks have permanent effect on unemployment and on inflation. As the aspect of the existence of price and wage rigidities, along with the processes of matching, bargaining and rent sharing, suggest that partial adjustment to shocks is more plausible.

This study done by Edward S. Knotek,II (2007) to define the use of Okun's Law with different versions. The Okun's Law is given by economist Arthur Okun who first documented it in the early 1960 to find out the negative correlation between Gross Domestic Product growth and unemployment. In the article of Edward S. Knotek use it the Okun's Law with alternative versions to find out the reliable, stable relationship and useful forecasting tool. The data sources for the analysis is taken from the Federal Reserve Bank of St. Louis and the Federal Reserve Bank of Philadelphia for unemployment and real output from 1948 to 2007. The data was analyses quarterly and annually with the regression and correlation methods and shown the diagrammatically. The data also shows that the negative correlation between the change in the unemployment rate and real output growth has not always been reliable negative over short time spans. The recession is also affect on the unemployment with jobless recoveries. In the conclusion of the article the Okun's law is not a tight relationship. There have been many exceptions to Okun'slaw, or instances where growth slowdowns have not coincided with rising unemployment. This is true when looking over both long and short time periods. The law has not been a stable relationship over time. The relationship between output and unemployment is different in recession and expansions and recent expansions have been longer than average. The data suggest that a weakening of the contemporaneous relationship between output and unemployment has coincided with a stronger relationship between past output growth and current unemployment. These conclusion have practical applications. The forecasting can be improved even more by allowing for a dynamic relationship between unemployment and output growth. This is a reminder that Okun's law –contrary to connotations of the word “Law”- is only a rule of thumb, not a strucutreal feature of the economy

Peter Flaschel, Gran Kauermann and WilliSemmler(2007) write the paper on testing the wage and price Phillips Curve for United State. The research paper is illustrated the labour and product market interact in determining as outcome a generalized reduced-form price Phillips

Curve. In this paper the labour market is shown by the wage Phillips curve(WPC) and the product market is shown by the price Phillips curve(PPC). The variables are used unemployment rate, capacity utilization: manufacturing percent of capacity, non-farm business sector: compensation per hour, GNP price deflator, non-farm business sector: output per hour of all persons and non-farm business sector: real compensation per hour. Both the Phillips curve are estimated separately using the ordinary least squares, moving average, non-parametric estimation and three stage least squares methods for WPC and PPC. The data are taken from the Federal Reserve Bank of St. Louis(using the website data). The data are quarterly, seasonally adjusted and are all available from 1948 to 2001. The forward-looking variables in both the WPC and PPC-enough inertia in the wage-price spiral as observes empirically. The finding is that the wages are always more flexible than prices with respect to their respective demand pressure and that price inflation responds somewhat more to a medium-run cost pressure than does wage inflation. The implications for macroeconomic stability are illustrated. There is also a link between WPC and PPC, that employment is related to output as Okun's law states. Overall the non-linear estimates tend to confirm our liner estimates, non-linearity in some relationships of the Phillips curve are important as well.

Robart J. Gordan(2008) is made his study to divide the American theoretical and empirical literature, with the exception of Phillips original article. The first part for analysis up to 1975 is well known and the second part is the post 1975. Initially the backward-looking component is used to measure the inflation and after 1975 the forward-looking expectation is used. The scope of his paper is limited to the American theoretical and empirical literature with the exception of Phillips's (1958) article itself. The interpretation of the Phillips Curve has been changed with the review of his article. The data for the unemployment and inflation rates is quarterly used since 1960-2007. The data source for the analysis is US Bureau of Labour Statistics and US Bureau of Economic Analysis used with the regression analysis and F-statistics. The implication for the analysis is shown the triangle model reflecting its three cornered dependence on demand, supply and inertia. In his article there are three main interrelated themes. First, two quite legitimate responses occurred after 1975 to the chaotic state of the Phillips Curve. Second, each response is important and helps us to understand how inflation behaves, albeit in different environments. Third, two approaches need to pay more attention to each other, and this paper represents a start toward that reconciliation.

The discovery by Phillips and his disciples Samuelson and Solow of an inverse relationship between inflation and unemployment briefly suggested an exploitable policy trade-off that was destroyed by the Friedman-Phelps natural rate hypothesis of the late 1960s. Exploitable trade-offs were out, and long-run neutrality is in. The econometric models developed in the 1960s to support the policy trade-off were rejected both empirically and logically. An important difference between the mainstream approach and other post 1975 developments is that the role of the past inflation is not limited to the formation of expectations, but also includes pure persistence due to fixed-duration wage and price contracts, and lags between changes in intermediate goods and final product prices. Inflation is dislodged from its past inertial values by demand shocks proxied by the unemployment or output gap, and explicit supply shock variables including changes in the relative prices of food, energy and imports, and the role of changes in trend growth of productivity.

P. Benigno and L.A. Ricci (2008) offer a theoretical foundation for the long run Phillips curve in a modern framework. It introduces downward nominal wage rigidities in a dynamic stochastic general equilibrium model with forward looking agents and flexible goods prices. The main difference with respect to current monetary models is that nominal rigidities are assumed to be asymmetric rather than symmetric (and on wages rather than prices). Downward nominal rigidities have been advocated for a long time as a justification for the Phillips curve, but with weak theoretical and empirical support. Over the past decade and a half, a substantial body of theoretical and empirical research across numerous countries has offered a conceptual justification for these rigidities and has confirmed not only their existence, but also their relevance in a low inflation environment.

This paper offers a closed form solution uncovering a highly non-linear relationship for the long run trade-off between average inflation and unemployment: the trade off is virtually nonexistent at high inflation rates, while it becomes relevant in a low inflation environment. The relation shifts with several factors, and in particular with the degree of macroeconomic volatility. In a country with significant macroeconomic stability, the Phillips curve is virtually vertical also at low inflation. However, a country with moderate to high volatility may face a substantial cost in terms of unemployment if attempting to reach price stability.

It is interesting to note that the forward looking behavior of optimizing agents in the presence of downward wage rigidities generates an endogenous tendency for upward wage rigidities.

Indeed, when choosing the wage increase in the presence of inflationary shock, agents anticipate the negative effect of downward rigidities on their future employment opportunities, and thus moderate their wage adjustment. Hence, in our model the overall degree of wage rigidity is endogenously stronger at low inflation rates and disappears at high inflation rates, while in time dependent models of price rigidities, prices remain sticky even in a high inflation environment. The endogenous wage rigidity introduces a trade off also between the volatility of unemployment and the one of inflation.

The degree to which downward rigidities soften when inflation declines can reduce the extent of the trade-off (as argued by Mankiw and Ball, 1994). However, numerous recent empirical studies have confirmed the persistence of such rigidities at low inflation for various countries. More evidence would be nonetheless useful to assess the degree of such persistence and the corresponding implication for the trade off.

Several policy implications arise. First, not every country should target the same inflation rate: differences in, among other things, the degree of macroeconomic volatility should matter for the choice of the inflation rate. Countries subject to larger macroeconomic volatility (such as numerous emerging markets and developing countries) may find it desirable to target a higher inflation rate than countries exhibiting low volatility. And as the degree of volatility changes over time, the inflation target may need to be adjusted. Second, policymakers can influence the inflation unemployment trade-off: stabilization policies aimed at reducing macroeconomic volatility would improve the trade off, thus reducing the unemployment costs of lowering long run inflation.

M.Karanassou, H.Sala and D.J. Snower (2009) have opined that the orthodox view there is no long run relationship between inflation and unemployment has implied that the evolution of inflation and unemployment can be adequately modeled by separate economic branches. These branches comply with a vertical Phillips curve and the existence of a natural rate unemployment.

In particular, the inflation dynamics macro branch takes for granted the existence of the natural rate of unemployment and estimates the unemployment rate compatible with inflation stability- the NAIRU. The labour macro branch takes for granted the existence of the NAIRU, and tries to identify the real economic forces that drive the natural rate of unemployment.

So, the conventional inflation and dynamics and unemployment rate models can be viewed as two sides of the same coin- the coin of the classical dichotomy. We demonstrated that the phenomenon of frictional growth, i.e. the interplay between lags and growth, implies that the compartmentalization between the real and nominal sides of the economy cannot be sustained. Frictional growth is incorporated into the chain reaction theory framework, which we compared and contrasted with the natural rate unemployment and hysteresis theories.

They also overviewed the literature of the Phillips curve and critically assessed the restrictions that need to be imposed so that its models predict a zero inflation unemployment trade off. We showed that the orthodox view that the long run New Phillips Curve is either vertical or nearly vertical and that forward looking Phillips curve's are difficult to reconcile with substantial inflation persistence relies on the implausible assumption of intertemporal weighting symmetry (symmetric backward and forward looking elements in the price setting behavior due to a zero discount rate). When intertemporal weighting asymmetry is introduced in the new Phillips curve, the resulting model allows the interplay of frictions (nominal staggering) and growth (permanent shocks) to generate sufficient inflation persistence and produce an inflation unemployment trade off in both the short and long run.

Their analysis calls for the adoption of a holistic framework that can jointly model inflation dynamics, estimate the inflation unemployment trade off and determine the factors responsible for the movements of the long run equilibrium unemployment rate. We argued that a chain reaction theory model that includes wage/price- setting equations and labour market ones can jointly evaluate Phillips curve effects and identify the temporary and permanent shocks that give rise to the observed unemployment and inflation trajectories.

After Irvin Fisher study, AW Phillips a British economist at London School of Economics, brought out a study of relationship between unemployment and change in money wage rates in the British economy during the period 1861-1957. Phillips found inverse relationship between the rate of changes in money wage rate and the rate of unemployment.

Economist have criticised and in certain cases modified the Phillips Curve. The trade-off in inflation and unemployment is temporary according the M. Friedman. He said that this is shown the short run condition of the Phillips Curve. The temporary trade-off comes not from inflation,

but from unanticipated inflation, which generally means from a rising rate of inflation. In the long run, there is no trade-off between inflation and unemployment. These views have been expounded by M. Friedman and E.S. Phelps in what has come to be known as the “Adaptive Expectations” hypothesis. According to M. Friedman, there is no need to assume a permanent downward sloping Phillips Curve to explain the trade-off between inflation and unemployment. In fact, this relation is a short run phenomenon. But there are certain variables which cause the Phillips Curve to shift over time and the most important of them is expected rate of inflation. So, if there is any discrepancy between expected and actual rate of inflation, the downward sloping Phillips Curve will be found. If we remove the discrepancy in expected and actual rate of inflation in long run, then the shape of the Phillips Curve would be vertical. There is only one rate of unemployment whatever the rate of inflation. This rate of unemployment he called the “natural rate of unemployment” which an economy will have to tolerate in the long-run. This rate was subsequently termed as the “non-accelerating-inflation rate of unemployment”(NAIRU). Here M. Friedman argued that NAIRU cannot be eliminated permanently by means of expansionary monetary and fiscal policies of the government. The expansionary policy may only accelerate the rate of inflation and cause an upward shift in the Phillips Curve has shown higher levels of unemployment and inflation rate. In the ultimately Phillips Curve become in the shape of vertical line.

Eckstein and Brinner advanced a new theory of the long-run Phillips Curve by combining the main features of M. Friedman’s long-run Phillips Curve and the original traditional short-run Phillips Curve. They agree with M. Friedman’s proposition that there is no trade-off between unemployment rate and inflation rate below ‘critical rate of unemployment’ (this is same as given by the M. Friedman’s natural rate of unemployment). Because they contend that beyond the critical rate of unemployment and below a certain rate of inflation, there does exist a trade-off between unemployment and inflation.

James Tobin, in his address before the American Economic Association in 1971, proposed a compromise between the negatively sloping and vertical Phillips Curve. J. Tobin believes that there is a Phillips Curve within limits. But as the economic expands and employment grows, the curve become even more fragile and vanishes until it becomes vertical at some critical low rate of

unemployment. Thus J. Tobin's Phillips Curve is kinked-shaped, a part like a traditional curve and the rest part like M. Friedman's Curve.

Solow does not believe that the Phillips Curve is vertical at all rates of inflation. According to him the Curve is vertical at positive rates of inflation and is horizontal at negative rates of inflation.

The views of the Otto Ekestein and Roger , R. Tobin and R . Solow is same on the shape of the Phillips Curve. The natural unemployment rate is given by the M. Friedman 'natural rate of unemployment' as used with the name of 'critical unemployment rate'. Those three economists worked jointly the shape of Phillips curve in short-run and in long-run. They have been sum up the different shapes of Phillips Curve.

H. Dholakia (1987) has estimated and examined the Phillips curve indirectly without using the unemployment data owing to the non-availability of the same in Indian context. This has been made possible by making use of different versions of Okun's law and reformulating the Phillips curve accordingly. He has estimated the extended Phillips curve by using the Indian data over the period 1950-51 to 1984-85. He found that the empirical evidence does not suggest any substantial trade-off between inflation and unemployment even in the short run in the LDCs like India. The labor markets in the LDCs have such characteristics, which bring them very close to the Keynesian aggregate supply curve in the short run on the basis of the estimate of the coefficient of expected inflation, which is significant and not different from one, the Phillips curve is found to be vertical and long run. The study also concludes that the wage or inflation is not affected significantly by disequilibrium in the labour market. The study however, has not undertaken the tests of stationarity and causality among the variables.

A part of the debate, in addition to the shape of Phillips curve, involves a disagreement about whether unemployment causes inflation or inflation causes unemployment. Phillips emphasized the causal relation as running from unemployment to wage inflation. In contrast Fisher (1976, p.498) suggested that the correlation arises due to causation the other way round and it is temporary.