

**The NAIRU as a Guide for Macroeconomic
Policy in South Africa: In Search of the Dismal Reality?**

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1. Introduction

One of the most pressing problems in South Africa today is the extremely high unemployment level (Mahadea, 2003:23). Along with output, growth and the rate of inflation, it is considered to be indicative of economic health. Nickell (1990:391) put it as follows: “High unemployment reduces current output and aggregate income. It increases the inequality of the income distribution, since the unemployed lose more than the employed. It erodes a nation’s human capital. Finally, it involves psychic costs for people need to be needed”.

Since Phillips s’ original paper in 1958, unemployment and inflation have been indissolubly connected. The unemployment-inflation trade-off has since been a central facet of macroeconomics (Nickell,1990:426).The natural rate of unemployment and the non-accelerating inflation rate of unemployment (which goes by the acronym NAIRU) are exponents of this relation and similar in style and tradition. The NAIRU is, according to Stiglitz (1997:3), useful as an analytic concept and guideline for thinking about macroeconomic policy. The purpose of this paper is to determine to what extent the NAIRU can be used as a guide for macroeconomic policy in South Africa.

In essence what we are trying to do is to detect what underlies unemployment dynamics on a macro level in South Africa. The atheoretical method, Box-Jenkins methodology, used in the analysis requires an in-depth look into the origin, genealogy and genetics of the NAIRU not only to create a sound theoretical foundation for the method followed but also to come to terms with the implications the generating process (dynamics) holds for the execution of macroeconomic policy in South Africa. The first part of the paper gives a bird’s eye view on the development of the debate on unemployment. The debate is then placed into a natural rate of unemployment context from where a

theoretical framework is developed. The theoretical framework forms the cornerstone of the analysis and testing in the rest of the paper.

The paper concludes that the NAIRU cannot be used as a guide for macroeconomic policy in South Africa. The NAIRU does not seem to be in the form of a single curve but rather a series of trajectories that are dependent on real time. The changing nature of the NAIRU in South Africa makes the NAIRU too much of an elusive entity to have any practical value.

2. The origin and course of the debate on involuntary unemployment.

The debate on involuntary unemployment and the determinants of unemployment have a long history. The debate springs from the ideas of Malthus and Richardo and were later taken up by Marx, Gisell and Douglas (Keynes, 1936:4 and 362–365) developed and structured by Hume (Dixon, 1995: 58) Wicksell and Hobson (Keynes, 1936:364) and formalised by Keynes (1936) and Patinkin (1965) respectively in the effective demand principle and the homogeneity principle. The debate was refuelled by Phillips's notion of the long-run (Desai, 1995) relation of nominal wage growth to unemployment, a notion which was turned into a short-run relationship by Lipsey, popularised by Samuelson and Solow as a guide to monetary policy and then overturned and replaced by Phelps, Friedman, Lucas and Rapping with the natural rate of unemployment.

It was especially, according to Blanchard (1995: xiii), the contribution of Phelps (1967) and Friedman (1968) in the development of their natural rate hypothesis that took the analysis of labour markets from the "ad hocery" of the Phillips curve to more solid methodological ground. Central to their arguments was the idea that the natural rate of unemployment is quite stable, that it is a strong attractor of the actual rate of unemployment and that nominal magnitudes are not on the list of factors that influenced the natural rate (the real-nominal dichotomy or homogeneity postulate as formally stated by Patinkin, 1965).

What we have learned so far from the experience, though, is that the natural forces cannot get one out of a recession. What are needed are expansionary fiscal and monetary policies (Blanchard, 1995: xiii). It is evident that nominal magnitudes do influence real magnitudes (employment) but not by the sort of linearity implied by the usual models. An example is debt deflation's (larger levels of real indebtedness after a huge drop in inflation) influence on unemployment in Europe (Phelps, 1995: 28-29). The natural rate can in the light of this at best be described as a path of equilibria or a series of trajectories rather than a steady state concept. Phelps (1995: 16) claims that the neutrality of money (and inflation) hypothesis was less a theory of employment than a set of axioms required or needed for a natural rate model – and that the natural rate was a reaction and a theoretical counterpart to the plain-sailing Keynes-Phillips orthodoxy. The contribution of the natural rate concept therefore does not lie in its practical or real value but in the rich insights it brought into the determination of unemployment (Phelps, 1995).

Another distinctive feature of unemployment in Europe is that low inflation goes hand in hand with relatively high unemployment (Blanchard and Katz, 1997: 66-69). A characteristic of inflation in Europe, and one that complicates the situation for the natural rate hypothesis, is that the inflation rate is quite stable at these high unemployment rates. It thus seems that the natural rate has rejoined the actual rate. The natural rate is therefore as much an attractee as it is an attractor. The question is no longer what the influence of the natural rate on the actual rate is but rather what the influence of the actual rate on the natural rate is (Blanchard, 1995: xiii). This question is also very relevant for South Africa. The aim of this study is therefore to begin looking at what possible insight this hypothesis can provide in terms of the dynamic and adjustment processes at root of our unemployment problem.

3. The nature of the debate on involuntary unemployment

The debate on unemployment centres on the possibility that all shocks, including demand shocks, may have long-lasting real effects in the economy. On the one side there is the Lipsey alternative to the Phillips curve and the

views of Samuelson and Solow on its short-run usefulness for policy purposes (Samuelson and Solow, 1960). The Lipsey (Phillips) curve as a guide to government demand policies later found its counterpart in the natural rate of unemployment concept that surfaced empirically as the non-accelerating inflation rate of unemployment or NAIRU, the backbone of the new classical anti-interventionism stance on government policy (Espinosa-Vega and Russel, 1997: 4). The natural rate concept is a restatement of competition as the process underlying the dynamics and growth properties of the market. It constitutes a complete break with Keynes in that it modifies the employment policy from one of cyclical and secular concern to one of just anti-cyclical policy (Corry, 1995: 369–370). The labour market is hinging on its supply side with market imperfections (like wage-fixing policies and trade union activities) affecting the natural rate of unemployment. Reducing these imperfections will automatically lower the natural rate and hence the average actual rate of unemployment (Corry, 1995: 370). The natural rate of unemployment is by definition a real steady state concept.

On the other side, but less noted in the literature, is the idea that the Phillips curve (Desai curve) is a long-run relationship compiled from an array of short-run observations (Desai, 1975: 2). This approach is not merely a restatement of Keynes's ideas on unemployment (unemployment creates unemployment) but also an attempt to model the economy without imposing the homogeneity postulate a priori on these relationships. Nominal terms (money wages, prices, money stock and interest rates) appear as nominal values and only unemployment, real output and labour productivity appear in real terms. A distinctive feature of the model is the endogenisation of unemployment, inflation and interest rates (in Schumpeterian terms) in a monetary model of the economy (Rogers, 1989: 8).¹⁾ Taken to its extreme it means that shocks to unemployment, either from the demand or supply side, will have permanent effects on unemployment. This behaviour of unemployment implies path-dependence, meaning that the steady state unemployment equilibrium is determined by how it is arrived at. Policy actions, which cause actual

changes, will have long-lasting effects. In terms of the natural rate concept, it means that the natural rate is as good an attractor as it is an attractee.

4 The theoretical framework

4.1 The Phillips procedure: A textual exegesis

The purpose of Phillips's (1958) well-known article was to test his hypothesis that the rate of change of money wage rate in the United Kingdom could be explained by the level of unemployment and the rate of change of unemployment (except for periods in which there was a very rapid rise in import prices) (Phillips, 1958: 284). Phillips (1958) was also convinced that the relationship between unemployment and the rate of change of wage rates was highly non-linear (see the specification of his equation in Phillips, 1958: 290). He considered the periods 1861-1913, 1913-1948 and 1948-1957 separately and plotted observations of U_t and W_t respectively, average unemployment during year t and the rate of change of wage during year t .

In his examination of the series 1861-1913 he identified 6½ fairly regular trade cycles with an average period of about eight years. Instead of using all 52 observations Phillips classified the U observation in six ranges and averaged the U_t and the W_t observations, which fall within that range. The averaging was done by taking six classes (0 and 2, 2 and 3, 3 and 4, 4 and 5, 5 and 7, and 7 and 11 percent) respectively. He stated the purpose of doing so as follows: “Since each interval includes years in which unemployment was increasing and years in which it was decreasing the effect of changing unemployment on the rate of change of wage rates tends to be cancelled out by his averaging, so that each cross gives an approximation to the rate of change of wages which would be associated with the indicated level if unemployment were held constant at that level” (Phillips, 1958: 290). The curve that was fitted to the crossed equation was of a chosen form

$y + a = bx^c$ as a proxy for the non-linear equation

or $\log(y + a) = \log b + c \log x$

where y is the rate of change of wage rates and x the percentage unemployment. The constant b and c were estimated by least squares using the y and x values corresponding to the crosses in four intervals between 0 and 5 percent unemployment. The constant was chosen by trial and error to make the curve as close as possible to the remaining two crosses in the intervals between 5 and 11 percent (Phillips, 1958: 290).

This unorthodox estimation procedure by using transformed observations opens up a debate on the short-term versus long-term nature of the Phillips curve. This debate culminates in the different views on the applicability of the natural rate hypothesis as a guide to macroeconomic policies.

- 1) "In terms of Schumpeterian definition, Monetary Analysis is based on the premise that both real and monetary forces determine long-period equilibrium positions"

4.2 The Lipsey curve, the Friedman-Phelps natural rate and the NAIRU

In the analysis of unemployment dynamics we are making a distinction between two interpretations of the Phillips curve as previously described. The distinction is based on the method Phillips used, the long-run equilibrium nature of the curve, the line of causality in the model and linearity in the unemployment-wage relationship (Desai, 1975 and Gilbert, 1976). Analysing unemployment dynamics this way (respectively as the Lipsey curve and the Desai curve) illustrates the different views not only on unemployment reaction to shocks but also the implications these dynamics hold for fiscal and monetary policies.

The Lipsey curve is a structured time series model expressing the rate of change of nominal wage rate as a function of unemployment levels and other variables of which the change in nominal wages is one (closely correlated to the rate of change of the price levels) indicating the equilibrium rate of growth in money wages. The relationship is only a short-term relationship. The Lipsey equation is linear in the parameters (coefficients) and non-linear in variables. Unemployment in the model is exogenous and will in the long run

always be at full employment equilibrium (Desai, 1975; Gilbert, 1976). A long debate between the Keynesians and classicals followed concerning the Lipsey curve implications for the exogenousness of unemployment, the variables underlying unemployment and the long-run properties of unemployment (Samuelson and Solow, 1960; Patinkin, 1965; Phelps, 1967; Friedman, 1968; Lucas and Rapping, 1969 etc.) This debate culminated in the contention of both views in the natural rate of unemployment (Friedman, 1975; Friedman, 1977). The long-run vertical Phillips curve or natural rate hypothesis restates the classical homogeneity in terms of inflationary expectations. Deviations from the natural rate were in terms of informational problems, changes in technology and unanticipated inflation. Layard and Nickell (1985, 1986) introduced the concept NAIRU and it became the empirical image of the abstract natural rate concept. This imitation, though, is quite the opposite of Friedman's (1968: 9-10) view that the monetary authority cannot know the natural rate but it gives recognisable stature and a new dimension to the natural rate. It gives to the critics and proclaimers something real to test and new venom to a long-running debate. This creation was very British and therefore one could expect that unions would play a significant role in the construction of the time-varying NAIRU. In the long run, the outcome is a unique time invariant NAIRU, unemployment reverts to the natural rate of unemployment (Layard, Nickell and Jackman, 1991:10, 16 and 369). This model also leads to a negative correlation between unemployment, inflation and real wages. The dynamics and levels are different from traditional (Patinkin / Lucas) labour market theory of natural rate (Layard and Nickell, 1990). They create the possibility of large swings in the short- to medium-run NAIRU, because of real and nominal shocks that influence actual unemployment, but return eventually to a long-run real ("Walrasian") NAIRU (Layard, Nickell and Jackman, 1991: 10) or what Friedman called the "natural unemployment rate" (Johnson and Layard, 1986: 921). In the long run, actual changes do not have any influence on the NAIRU.

The natural rate of unemployment or long-run NAIRU is thus a single curve invariant of time and is according to Friedman (1968: 9) "the level that would be ground out by the Walrasian system of general equilibrium equations,

provided there is imbedded in them the actual structural characteristics of the labour and commodity markets...”).

4.3 The Desai curve and Keynes’s natural rate of unemployment

Although Keynes, in the principle of effective demand, formalised the idea that expansionary fiscal and monetary policies are needed to get one out of a depression/recession, Phillips (1958) and Desai (1975) gave prominence to the idea that monetary and real variables are related – even in the long-run. The procedure Phillips used, in short, as was previously described, was instead of fitting a curve to the annual observations 1861 – 1913 on the rate of change of money wage rates and unemployment (change of the demand or labour) - he fitted the curve to average values of changes in money wages and levels of unemployment (Phillips 1958: 290). Desai (1975) argued that Phillips used this esoteric method to extract unobservable long-run data from actual short-run (cyclical) observations because there was at that time no procedure like the error correction model (Sargan 1964), which would have allowed a long-run equilibrium relationship to emerge from short-run observations. According to Cross (1995: 183), “The Phillips curve is not the disequilibria relationship which appears through the lens of the natural rate hypothesis”. It does not try to explain the relationship between the rate of change in inflation (rate of change in wage rates) and the level of unemployment, and by that indicate the equilibrium rate of growth of money wages (Desai, 1975: 6). The Phillips curve provides an alternative to the natural rate account of equilibrium unemployment (Cross, 1995: 183). The Phillips curve is therefore a locus of long-run equilibrium points for unemployment and changes in nominal wages (not rate of changes in wage rates). The long-run Phillips curve indicates, contrary to the Lypsey interpretation, the equilibrium rate of unemployment (Desai, 1975: 6). The position and shape (unlike the natural rate) of the Phillips curve is not invariant from one period to another, but changes from one period to another depending on differences in monetary regimes, integrated processes for the price level and productivity growth (Desai, 1975; Alogoskoufis and Smith,

1991). The Phillips curve is thus a series of trajectories rather than a single curve (Cross, 1995: 198).

Desai (1995) developed the Phillips curve further into a coherent, small macro-model, a set of structural equations, in which he endogenised wage, price, unemployment and interest in a full dynamic specification. He did this because he saw the Phillips curve as a phase equation of a larger simultaneous model (Gilbert, 1976). This model was tested using British data for the period 1955-1979. Contrary to the natural rate hypothesis, money supply shocks in this model have a long-term relationship with unemployment. Desai (1995) further illustrated that it is possible to develop a Keynesian natural rate of unemployment as reference to Phelps and Friedman's natural rate. The Desai natural rate violates the homogeneous principle in that, not only is non-inflationary growth in aggregate demand (employment) possible, but monetary values can play a part. Monetary shocks therefore do not only have a short-run effect on employment but also a long-run one, and this could happen without any influence on the rate of change in the price level. Price-elasticity can take on any value and it does not have to be a unity as the monetarists conceive of it (Desai, 1995: 360). The difference between Desai (1995) and Friedman (1968) therefore does not lie in an immutable and unchangeable natural rate. Friedman (1968: 9) also admits that the natural rate is man-made and policy-made but monetary (demand) policies cannot play a long-run role: "Thus the natural rate hypothesis applies the classical proposition of monetary neutrality to unemployment, and in doing so yields the policy ineffectiveness proposition that aggregate demand policy measures cannot change the sustainability or equilibrium rate of unemployment" (in Cross, 1995: 181). The difference lies in the role monetary variables play.

Rogers (1989) developed an analogical but different model around the effective demand principle to illustrate the persistent influence that demand and supply shocks have on actual and equilibrium unemployment. In his model money supply is endogenised, while interest rate is seen as conventional and time dependent, therefore as an exogenous / independent variable (Rogers, 1989: 169-170; 173-176; 232). The level of employment in

the Rogers model is determined at a redefined monetary equilibrium (Rogers, 1989: 178). With a given interest rate the marginal efficiency of capital adjusts to the rate of interest and thereby determines the rate of investment. The mechanism at work here is the conventional rate as a discount rate for future streams of income out of investment that has to be equalised with the supply price or present cost of production (Rogers, 1989: 206). This point of investment is the effective demand and is a long-period equilibrium in the classical sense of a uniform rate of return on all assets. According to Rogers (1989: 178) “ in the manufacturing industry, entrepreneurs are earning normal profits on their investment in productive capital and they have no incentive to expand production even if unemployment exists. This, in a nutshell, is the monetary theory of effective demand which integrates real and monetary forces in the determination of long-period equilibrium”. There is therefore a limit to profitable expansion of output and no incentive to expand production even if unemployment exists. Full employment in this sense is a special case. There is no unique employment level independent of the normal rate of interest. Monetary equilibrium determines the point of effective demand over a range of output with full employment as only one possible solution. Monetary and supply shocks do have, through their influence on the conventional interest rate, transitional and persistent effects on output and employment (Rogers, 1989: 181).

For both of these models transitory supply and demand shocks have permanent effects on actual and equilibrium unemployment. The shape of the Desai curve or the behaviour of unemployment in relation to inflation is not invariant from one time period to another. There exists a series of trajectories of unemployment equilibria (determined by Keynes’s demand and supply) and the actual equilibrium employment rate is also the long-run equilibrium employment rate. A single shape natural rate of unemployment does not exist. Inflation and unemployment’s behaviour (the shape of the natural rate) is a function of the historical time period in which it is generated.

4.4. Persistence, remanence and hysteresis: An attractee attribute

4.4.1 The theory underlying persistence and remanence

At the heart of the natural rate lies its attractor property. A stable unique natural rate of unemployment, determined by structural characteristics and immune to changes in nominal variables (such as aggregate demand), exists, towards which actual unemployment converges. But this theory did not fit the facts in Europe (Blanchard and Katz, 1997: 66).

To reconcile the natural rate hypothesis with the facts Phelps (1972) suggested an amendment (auxiliary), hysteresis, to the model. The hypothesis underlying the behaviour of unemployment in the natural rate context, stripped of its actual economic content, refers to an input-output system with one particular type of response of the system when one modifies the value of the input. "The system is said to exhibit some remanence when there is a permanent effect on output after the value of the input has been modified and brought back to its initial position" (Amable, Henry, Lordon and Topol, 1995: 155). James Alfred Ewing created this term in 1881 to describe effects that remain after initial causes are removed – this being the behaviour of electromagnetic fields in ferric metals. Hysteresis is a property of non-linear systems with heterogeneous micro-elements (Krasnosel'sskii and Poksovskii 1989). Such systems do not revert to the status quo ante after a temporary shock is removed.

The adjustment to the unemployment theory was done by Blanchard and Summers (1986), Nickell (1987) and Layard and Nickell (1987). It is therefore possible, according to Nickell (1987) and Layard and Nickell (1987), that actual employment can lead to an increase in medium-run unemployment through disenfranchised labour that cannot exert demand pressure on wages after a shock (change in input) that changes the structural characteristics of the labour market. This raises the unemployment to a new rate which reconciles wage- and price-selling, to achieve a new (temporary) equilibrium rate. The medium-term equilibrium unemployment becomes a weighted average of the natural rate and the previous period's actual unemployment. This medium-term equilibrium rate implies a zero change in unemployment

and a steady inflation rate, typical of what happened in Europe (larger unemployment with steady inflation).

The systemic adjustment or transmission process after a shock (a change in input) differs between the different hypotheses on the natural rate. In a pure natural rate context a temporary shock like contractionary monetary policy will lead to a temporary increase in unemployment with a simultaneous decrease in inflation. The actual inflation rate will become (in the absence of additional shocks) the expected inflation rate after some time. Decreasing prices will lead to an increase in the real money supply and unemployment will retreat back to its original equilibrium level at a stable lower inflation rate. The actual rate does not contribute to the long-run development of unemployment. The effect of the shock can be reversed by a shock in the opposite direction of the same intensity. The relationship is not only linear but also symmetrical in terms of the effect of the shock.

In Layard-Nickell's (1987) model the adjustment is somewhat different. An equivalent shock will lead to an increase in unemployment. Workers that were previously part of the labour market are now excluded, due to union and firm behaviour (imperfect competition) changing the structural characteristics of the market. The disenfranchised labour cannot exert downward pressure on wages, and unemployment increases. The unemployment became semi-permanent or persistent. The behaviour of the agents does not change. A shock in the opposite direction of equal intensity would still, as in the steady natural rate example, allow unemployment to retreat back to its original position. The reason for this is that, although unemployment and its structural characteristics change after the shock, the new unemployment equilibrium is determined not only by the effect of the shock but also by all previous shocks or previous actual rate. By reversing the shock, unemployment changes back to its original structure at the original unemployment rate. The unemployment equilibrium is thus the sum of all past shocks. Unemployment in this model has an infinite memory. In the absence of other shocks, actual unemployment will converge in a self-correcting manner to the unique long-run NAIRU (Layard, Nickell and Jackman, 1991:10).

The adjustment process in the Cross model (1995) is very different from the previous two models. The difference lies in the assumptions in terms of the heterogeneous characteristics of the agents involved in the labour markets and the non-linear and asymmetrical way in which unemployment reacts to shocks. This implies that the heterogeneous agents in the system are influenced differently by the same shock that will manifest in unemployment's non-linear and asymmetrical behaviour. The labour market structure will not only adapt and a new unemployment equilibrium be created, but the behaviour of the system will also change. It is therefore also possible that new shocks will have no influence on the unemployment equilibrium. The agents on the market have, in contrast to the Layard and Nickell model, only selective memory. Only non-dominant extreme shocks are remembered. The complication is that an opposite shock of the same intensity will not have any impact on the new unemployment equilibrium unless it surpasses the previous extreme shock. This implies remanence or hysteresis. For example: "The impact [of the war in Europe] upon American markets was immediate. Memories of the First World War – memories of insatiable demand, of sharp increase in buying, of inflation – were rekindled and there was an immediate and sharp increase in buying. The businessman who customarily bought one carload put in an order for three. Prices rose precipitately, basic commodities and basic raw materials both jumping about 25 percent in the single month of September Employment in manufacturing increased almost 10 percent by the end of the year. Pay rolls rose 16 percent" (Cowen,1989) and: "...the Great Depression in the United States, where the output declines of 1929-1932 do not seem to have self-correcting, yet the New Deal and Second World War were able to shift the economy away from sustained low production" (Durlauf, 1997:5). There was no linearity in the subjects' reactions. The selective memory of the economic system was changed, and this influenced unemployment behaviour after 25 years. The new unemployment equilibrium erratically displaced the old one and would only again be influenced by non-dominant extreme shocks in future (Cross, 1995: 190-196; Amable et al, 1995: 155-173). History, which is stored by a

hysteretic system, consists only of the past extremum of shocks (Amable et al, 1995, p157). When the system only remembers past non-dominant extreme shocks then one could say that unemployment's behaviour is consistent with hysteresis. Then shocks will have a remanent influence on employment.

4.4.2 The natural rate, persistence and remanence in time series vocabulary

When analysing the time series structure of unemployment (the drawing of information and inferences from of actual data) it is helpful to start with the ideal data series that would be associated with the different hypothesis. For the natural rate hypothesis an ideal series would be one where the mean value is a constant with a cyclical random actual rate movement around the mean. The mean will take the value of the natural rate of unemployment with cyclical random changes (actual unemployment) round the mean. No relation exists between actual levels over time. In simple statistical terms it means that in the model

$$Y_t = \beta_1 + \beta_2 Y_{t-1} + U_t \quad (1)$$

$$\text{Mean } EY_t = \mu \quad (\text{is constant}) \quad (1.1)$$

$$\text{Variance var } Y_t = \left(y - \mu \right)^2 = \theta^2 \quad (\text{is constant}) \quad (1.2)$$

$$\text{Covariance } Y_t = E \left[\left(Y_t - \mu \right) \left(Y_{t+k} - \mu \right) \right] \quad (1.3)$$

$$\beta_2 = 0$$

β_1 -Represents the natural rate.

U_t -Represents the cyclical movement of actual unemployment.

The properties 1.2 – 1.3 are properties of a stochastic process known as a weakly stationary or covariance stationary – a process that is time-invariant. Characteristic of this stochastic process is that the series will tend to return to its mean (mean reversion) and fluctuations around this mean will have constant amplitude. In unemployment and natural rate terms it means that actual unemployment is attracted by the natural rate.

A less restrictive way of looking at the natural rate hypothesis (in line with Friedman's [1968: 9] idea on changing market characteristics) is to look at it as a trend stationary process (TSP; a non-stationary process.) The process can be explained by the following model

$$Y_t = \beta_1 + \beta_2 Y_{t-1} + \beta_3 t + U_t \quad (2)$$

Where $\beta_1 \neq 0$

$$\beta_2 = 0$$

$$\beta_3 \neq 0$$

Although the mean of Y_t (natural rate of unemployment) is not constant- The variance is. In this view the natural unemployment rate will change over time as the market characteristics underlying the natural rate (that is man-made and policy-made) are changing (Friedman, 1968:9). The amplitude (cycles of actual unemployment), though, will not have any influence on the trend/natural rate. Deviations (actual unemployment) from the trend line (natural rate) are purely random (depending on the economic and political climate then prevailing) and will die out quickly. What is important is that the deviations do not contribute to the long-run development of the series. The long-run development is determined by the trend component (Gujarati, 2002: 804).

There is a definite relation between short-run and long-run unemployment in terms of the Desai curve (1975, 1988 and 1995) and NAIRU. Changes in policies and regimes not only influence equilibrium unemployment because of

the change in the labour market structure (Layard and Nickell, 1987) but such changes also alter the structure of the relationship with monetary variables like inflation (Desai, 1975).

A short-run unemployment influence on long-run unemployment can, in time series structure vocabulary, be presented by a difference stationary process (unit root process). In the pure random walk model (RWM) the value of Y_t in 2

is determined by $Y_t = Y_{t-1} + U_t$

where $\beta_1 = 0$

$$\beta_2 = 1$$

$$\beta_3 = 0$$

which shows that Y_t (unemployment rate) is equal to the lagged (previous) value plus an unsuspected change (shock) in unemployment. The unemployment rate at any specific point is therefore determined by its original value plus the sum of all short-term changes in unemployment over time. In terms of the RWM there is no tendency for unemployment to return to the natural rate of unemployment in the short to medium run (persistence) and the rate or magnitude of unemployment at any point is determined by the sum of its past cyclical (short-run) behaviour (history) (Peel and Speight, 1995: 233). Shocks to unemployment do not die out quickly as in the TSP but keep on influencing the outcome of long-run unemployment in a linear/non-linear way. A feature of the RWM is thus the persistent influence of random shocks. This model does not exclude the return to the so-called natural rate of unemployment or the dying out of a shock's influence (Amable et al, 1995: 167-168). What it does show is that the actual rate of unemployment does have medium-run influence on the equilibrium unemployment rate and that shocks, real or monetary, have not only short-run but also medium-run real influence in case of linear dependence.

According to Amable et al (1995: 174) this kind of model cannot capture the idea of formal structural change. In a stringent sense this type of model explains persistence in change but not remanent or residual effects. In layman's terms, a shock to unemployment not only changes unemployment, but also changes the way in which unemployment will react to future shocks. Remanence is a much stronger reaction: all changes in terms of persistence stand but there is more – the system's behaviour also changes. An opposite shock of the same magnitude will not bring the system back to its initial position. The structure and behaviour of the system has changed and it will react differently in comparison with its original position to minor shocks. It will now, in its new position, behave differently to the same shock of the same magnitude. It displays remanence. In terms of remanence we do not have homogeneous agents, agents who could either forget all past shocks (zero root dynamics) or remember, like an elephant, all past shocks (unit root dynamics). Only extreme shocks are remembered and minor one's dies out while firms, workers, unions, employer organisations etc. will react in heterogeneous ways to the same shock (hysteric operators) (Archibald, 1995, Caburello and Engle, 1992 and Hamermesh, 1992). One needs something more than unit root to indicate on the presence of remanence in a time series. The true structure modelling a remanent influence of a shock on a variable (unemployment) is a model that can detect non-linearity in process that generates unemployment. For unemployment to display remanence there has to be non-linear dependence in unemployment. The time series model has to mimic the extremity of the shock necessary to have any influence on unemployment's behaviour and the permanence of the shock in the absence of other non-dominant extreme shocks. A standard time series model with a constant variance over time only describes linearity in the conditional mean and does not make room for non-linear changes in unemployment's mean. The way to describe non-linearity in the conditional mean is through a non-standard time series model that makes room for changes in variances (Engle, 1982, p989). In this way one can detect non-linear dependence. The ARCH model or ARCH effects in the residuals of linear models give an indication of non-linearity in the data-generating process. The presence of ARCH effects in, for instance, an AR-RWM, gives an indication of non-linearity in the

generating process of the conditional mean. ARCH effects in the residuals of a linear model, like an AR-RWM, are an indication of non-linear dependence in the conditional mean of unemployment. Small and large errors (shocks) in this type of model also tend to cluster together thus indicating the interdependence of extreme shocks. According to McNees (1979) there is also serial correlation in episodes of large variance. In hysteresis or remanence terms it intuitively means that extreme shocks are permanent and change the conditional mean or unemployment's behaviour. The problem with this model, however, is that it only makes use of squared residuals. If the residuals are actually linked by, for instance, a cubic relationship, non-linearity is unlikely to be revealed by a test on squared residuals (Copeland, 1994: 420).

5. Natural rate perspectives and their implications for macroeconomic policy

5.1 The classical stance on the natural rate

The combination of Friedman's model and rational expectations makes it clear that any fiscal or monetary policy that is aimed at changing the natural level of employment would be a futile exercise. With fully anticipated inflation, unemployment will always be at its natural rate. This anti-interventionist policy or policy neutrality doctrine stems from the idea that competition in labour markets as well as goods markets underlies the growth properties of markets. All supply as well as demand shocks will die out over time. The fluctuations in economic activity stems from imperfect information about aggregates. This leads to households varying labour supply in response to current and future wages and prices (Lucas, 1981). Macroeconomic policy has to be directed in a way that gives support to individual rational choice and competitive markets. Unemployment is primarily of microeconomic concern. Frictions and imperfections in labour and goods markets have to be removed to increase the natural rate and, likewise, the actual rate. Macroeconomic policies in the form of demand policies will not have any influence on the natural rate and therefore on the actual rate.

5.2 A neo-classical view on the enduring properties of macroeconomic policy

Macroeconomic policies (fiscal and monetary) will at best only have medium-run influence (Layard, Nickell and Jackman, 1991). Actions have to be aimed at microeconomic policies to reduce market imperfections like trade union activity and wage regulations and therefore to increase employment over the long run (Friedman, 1975). This is the only possible way to increase natural employment and, through that, actual employment. Short-term anti-cyclical fiscal and monetary policies may be necessary as cyclical or transitory changes may work through to the non-cyclical components of the natural rate. It is clear that, at least in the short-to-medium term, the homogeneity principle is not holding and anti-cyclical policies will be necessary to curb negative medium-run influences. The long-run NAIRU, though, remains a steady and unique guide for macroeconomic policy. Although the NAIRU is fundamental and steady, it is not fixed. A combination of micro and macro policies seems feasible.

5.3 The permanent real influence of supply and demand policies on the economy

In view of the remanent hypothesis the natural rate cannot be detected through the properties it is supposed to have. “Natural forces which return unemployment to normal are weak at best” (Blanchard, 1996: xiii). The natural rate seems to be a product of the actual rate, especially for Europe with its stable low inflation at relatively high unemployment rates. It seems, furthermore, that high unemployment is associated with low inflation, indicating that the path followed to lower inflation has determined the natural rate. Unemployment is therefore path-dependent and not naturally determined. Extreme shocks determine the path of unemployment and thereby also change the dynamics of the generating process of unemployment. This implies that an opposite policy of the same magnitude aimed at neutralising a shock’s influence may lead to inertia or a totally

different equilibrium than that expected. Although all extreme shocks (demand or supply) influence unemployment behaviour, the influence is not in a symmetrical way. This complicates macro-policies in the sense that anti-cyclical policy could for instance have quite opposite reactions to those anticipated, or not even induce a reaction at all. Reaction will depend on the selective memory of the system. The roots or the initial conditions of the unemployment problem have to be determined. The Desai curve accommodates this way of thinking. Aggregate demand policies can shift the equilibrium rate of unemployment with the associated influence on inflation, but only in the given framework of the time-dependent Desai curve. It is possible to manage oneself out of a recession. The particular policies taken will depend on what extreme shock lies at the root of unemployment behaviour or what initial conditions underlie unemployment. The causal mechanism (extreme shock) has to be identified first to formalise any meaningful demand-supply policies. The path to unemployment has to be determined. Instead of trying to pin down a elusive NAIRU and let it be for time being, a mind constraint on employment creation, it will pay to determine the long-run Phillips curve (Desai curve) and to “buy” an unemployment level with the related stable inflation (Cross, 1995: 198).

6. Unemployment in South Africa – mean reversion, trend stationary, persistent or remanent – a Box-Jenkins diagnosis

To detect what lies at the root of unemployment’s data-generating process in the period 1970-2002, use was made of the Box-Jenkins methodology. Inferences from the literature study on the natural rate and on the ideas on persistence and remanence were put to test for South Africa. The unemployment time series data used in the analysis was obtained from Quantec. The data used is quarterly extended unemployment data (formal unemployment plus informal employment) of the sample period 1970(1) – 2002(4). The Box-Jenkins methodology was followed to determine the key features of the unemployment time series.

A remarkable feature of the unemployment data plotted in Figure A is the way in which unemployment was plagued by extreme shocks between 1970 and 1983.

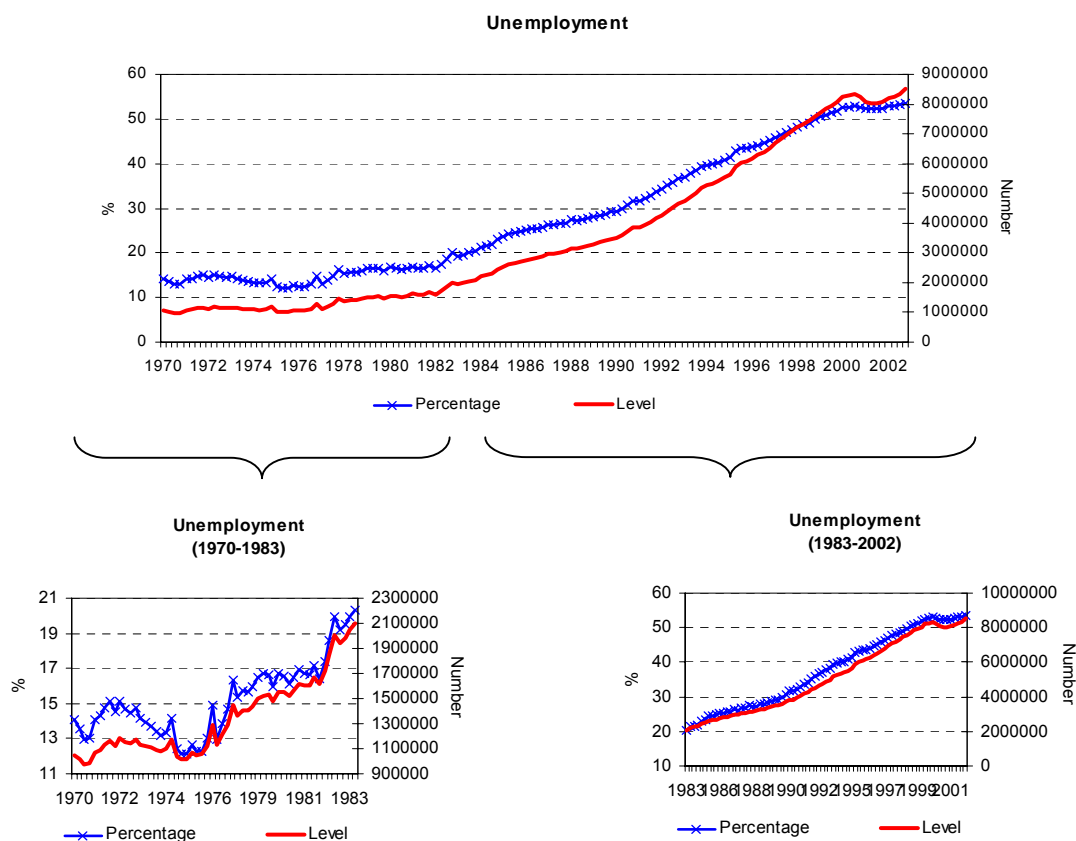


Figure A: Extended unemployment rate in South Africa

The unemployment data-generating process after 1984 was more steady. Unemployment increased sharply after 1984, from about 20 percent in 1984 up to about 53 percent in 2002. What is also remarkable is that there were no indications in the data-generating process after 1984 that unemployment would revert to the average unemployment level of the 1970s. Unemployment's behaviour changed dramatically if one compares it to unemployment's behaviour for the period 1970 to the end of 1983.

Unemployment seemed to be bounded between 10 percent and 20 percent for this period. From 1970-1977 unemployment was cycling around, or reverting to a near to constant mean. It seems that actual unemployment did not have any influence on its mean during this period. The period 1977-1983(4) is characterised by unemployment moving to a higher and changing mean level. The negative shock in 1977 not only put unemployment on a higher level, it also seems that actual unemployment now started to influence the mean of unemployment. In the period after the negative shock in 1983 unemployment becomes totally dependent on its past values. What is also characteristic of this period is that unemployment was increasing year after year. Unemployment, it seems, developed a life of its own and was not distracted in any way from the path it followed.

The South African unemployment time series, it was found, was of a univariate nature and difference stationary of an integrated order of 1. The generating process of the series can at best be described as an AR (1) -RWP with ARCH effects in the residuals at a two percent level of significance. The ARCH effects in the residuals of linear models are an indicator of non-linearity in the conditional mean of the underlying regression model (Engle, 1982 and Weiss, 1986). The conclusion is therefore is that unemployment time series in South Africa are generated in a non-linear way. According to, and as demonstrated by Krasnosel'skii and Pokrovskii (1989), hysteresis will be exhibited by any system containing a non-linear relationship. The implication is that the system's current behaviour will depend selectively on past shocks. The South African unemployment time series data exhibited hysteresis. The influence of non-dominant extreme shocks on unemployment is remanent, implying path-dependence in the unemployment data-generating process. For South Africa this implies a continuously changing, time-dependent NAIRU.

7. Conclusion

The purpose of this paper was to determine the appropriateness of the NAIRU, a proxy for the natural rate, as a guide for macroeconomic policy

in South Africa. From the literature and empirical study on the genesis, genealogy and genetics of the NAIRU, it can be seen that the changing nature of the NAIRU in the presence of unit root and non-linearity in unemployment's data-generating process makes it a moving entity. The NAIRU can at best be described, in the presence of unit root or non-linearity in the data-generating process, as as good an attractee as an attractor. The NAIRU is under these circumstances, it seems, not a single curve but a series of trajectories determined by underlying heterogeneous agents (in terms of motives and principles) in the market, with non-linear and asymmetrical reactions to shocks and dependent on historical time or time periods. Unemployment is influenced by shocks and extreme shocks like changes in capital stock, oil prices, commodity prices, politics, exchange rates, monetary policies, fiscal policies and all kinds of other changes, real or nominal.

In South Africa the situation around NAIRU is even more complicated. It would seem that unemployment has developed a life of its own since 1983(4). Where extended unemployment was moving between 10 and 20 percent from 1970 it broke the 20 percent level in 1983(4) and has not returned to these levels since then. Extended unemployment rose from 20 percent in 1983(4) to about 53 percent in 2002, only 18 years later. It is possible, in the light of the non-linear dependence of unemployment, that the extreme shocks prior to 1984 are still determining unemployment's dynamics. This, though, needs more research before any conclusive findings can be made. But what we know by now in South Africa is that the longer recession lasts, the more severe it is and the greater the effort needed for recovery. There is no natural force that pulls one out of recession. One has to determine what lies at the root of the seemingly a-economic (irrational) behaviour of unemployment in South Africa to formulate effective micro and macro policies. Under these circumstances the NAIRU cannot be a guide to macroeconomic policy in South Africa.

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