UNEMPLOYMENT IN SOUTH AFRICA 1970 – 2002: THE DEVELOPMENT OF A CONFIGURATION CONCERN FOR FUTURE EMPLOYMENT

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Abstract

Unemployment in South Africa has reached crisis proportions and does not seem to be decreasing in concurrence with the more propitious economic reality. Indeed, the unemployment process seems to be isolated from economic reality and has developed a life of its own. This paper investigates what initiates and underlies the development of this phenomenon. The Phillips model on endogenously determined long-run equilibrium unemployment is applied, using hysteresis models and autoregressive modelling, to determine the nature of the high and sustained levels of South African unemployment. We find evidence of unemployment in South Africa being a historical inheritance preserved by uncertainty and sunken costs in the labour market.

Keywords:

Hysteresis, unemployment, persistence, remanence, heterogeneous agents, extreme shocks

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1. INTRODUCTION

Unemployment in South Africa has reached crisis proportions and does not seem to be decreasing in concurrence with the more propitious economic reality. Indeed, the unemployment process seems to be isolated from economic reality and has developed a life of its own. Changing economic factors such as international inclination, interest rates and economic growth have been unable to influence unemployment, which has increased since the mid-1980s to the current high level, relating to the unemployment level already reached at the beginning of 2000.

The view of this paper is that long-run stable or equilibrium unemployment in South Africa is much more complex than postulated by conventional theory on the natural rate of unemployment. The paper argues that economic factors on their own cannot explain the high stable levels of unemployment. It consequently proposes that unemployment should rather be considered as endogenously determined and the composite product of interrelated non-price or non-economic factors and economic constraints in the labour market. In this regard, the paper analyses institutions, imperfect information and uncertainty as possible non-economic contributors to changing motives and decisions on the supply of and demand for labour in South Africa – or, as referred to in the paper; labour market dynamics. Ample theory and literature on the effects of micro-structure, risk and irreducible ignorance or uncertainty on motives and decisions, which underlies the formal argument in this paper, exists.

The aim of this paper is therefore to explore the role of non-economic factors in unemployment in South Africa. The tradition that non-economic factors, like history, social interaction and also more recently behavioural aspects, may affect long-run unemployment starts with Marx and Keynes (Roll, 1989) and is well established in economics.

Current research on unemployment in South Africa can be divided into research that focuses on the role played by real factors (interest rates, exchange rates, wages and productivity) and non-economic factors respectively. The research into the effects of non-economic factors on unemployment can be subdivided into research on institutional aspects (labour unions and legislative aspects) and other non-economic factors such as race, gender and the impact of HIV/AIDS (Kingdon and Knight, 2001a and 2001b). The contribution of this paper to the existing literature on unemployment in South Africa is to add the behavioural aspect, defined as the loss and gain considerations under uncertainty, as a possible contributor to the lasting high levels of long-run unemployment. The findings of this study bring new insights into the specifics responsible for motives and decisions or dynamics in the labour market that underlie unemployment in South Africa.

The hypothesis of unemployment's dependence on behavioural aspects in South Africa is analysed by investigating Quantec data on unemployment (1970-2002) under the assumption of autoregressive dependence in the data series by successively applying the ACF of squared residuals, the McLeod-Li test, the Wald test and the ARCH test on the residual structure of the unemployment data series. The methodology was used to detect the lasting dependence of long-run unemployment on actual unemployment in South Africa.

Section two of the paper will highlight the two main theoretical views on unemployment. The first view (the natural rate of unemployment hypothesis) accommodates only economic considerations, while the alternative or so called long-run Phillips-curve view accommodates both economic and non-economic factors. The role played specifically by uncertainty as a non-economic factor in the latter will be analysed. In the last section, the hypothesis that

uncertainty in the labour market contributes to unemployment dynamics and long-run unemployment in South Africa will be tested.

2. AN ECONOMIC MODEL OF LONG-RUN MULTIPLE UNEMPLOYMENT EQUILIBRIUM

2.1 Current actual employment as a determinant of long-run equilibrium unemployment

Under the natural rate of unemployment hypothesis, actual unemployment does not affect long-run unemployment equilibrium. The mean reverting or long-run equilibrium behaviour of actual employment over time is indicative of the existence of unobservable long-run unemployment equilibrium (Cross, 1995). Only exogenously determined economic factors or fundamentals underlie long-run unemployment. Each set of fundamentals that underlie activity in the labour market are associated with a unique equilibrium. Long-run unemployment – natural rate of unemployment (or long-run NAIRU) – is therefore uniquely determined by a specific system or structure of economic factors (Friedman, 1968).

The long-run Phillips curve adds non-economic factors as contributors to long-run unemployment. In his seminal article, Phillips (1958) laid the foundation for conceptualising multiple steady states of unemployment. According to Desai (1975), Phillips was attempting to extract an endogenous long-run equilibrium relationship from actual unemployment and wage data in an esoteric manner because no procedure such as the error correction model (ECM) existed at the time. Phillips's methodology therefore allowed for a long-run equilibrium to emerge endogenously from actual observations. Multiple long-run unemployment levels are thus possible in a given set of exogenous economic factors (Desai, 1975). The relationship is in contrast to classical wisdom and later also to the so-called Phillips curve interpretations. This possibility contradicts the natural rate of unemployment hypothesis.

Two different views on the factors responsible for the dynamics that underlie endogenously determined long-run equilibrium unemployment exist. According to the first view, institutional frictions (market micro-structure), sunken cost and imperfect information are reasons for the lasting or persistent influence of unanticipated changes in labour-related factors or shocks on unemployment, as referred to in the paper. Uncertainty, in terms of the second view, is responsible for the remnant effect of selective shocks on unemployment. Both views have anchored their arguments in the hysteresis concept.

2.2 The effect of current actual employment and shocks on long-run equilibrium unemployment

The conceptual foundation of hysteresis was laid in 1881 by Ewing, an engineer, to describe the behaviour of electromagnetic fields in ferric metals when exposed to magnetising cycles (Cross, 1993). The term refers to any input-output system – in this paper, an auto-regressive structure in an unemployment time series (output) that exposes dependence on a input or shock or memory of the shock, even long after the initial shock or cause has been removed (Cross, 1993).

Two views on hysteresis exist currently: persistence and remanence. At the heart of the persistence view on hysteresis is the regressor property of actual unemployment in the medium

term. According to this view, the dynamics in the labour market are influenced by non-economic factors only temporarily. In the long-run, the dynamics depend on economic considerations only. For analytical purposes, the origin of the persistent influence of shocks or current actual unemployment on long-run unemployment can be divided into two sources: on the supply side, the activity of insiders (employed union members using union power) and the passivity of outsiders (unemployed), and on the demand and supply side the passivity of employers and labour due to uncertainty and sunken or irreversible cost (e.g. search and lay-off costs) in the labour market.

The persistent influence of actual unemployment on long-run unemployment is due to the slow or time-dependent adjustment of the labour market after a shock. The slow adjustment after for instance an adverse shock in the first case is caused by insiders who recognised the opportunity to use union power, contrary to economic reality, to keep wages intact at the cost of outsiders and higher employment (Blanchard and Wolfers, 2000; Layard, Nickell and Jackman, 1991). The outsiders or unemployed, left without any union power by the increased actual unemployment after a shock, cannot exert demand pressure on wages, while the higher wages lead to an increase in temporary equilibrium unemployment. The action of insiders therefore stabilises unemployment at a new higher equilibrium rate, which reconciles wage and price setting (Blanchard and Summers, 1986; Nickell, 1987; Layard and Nickell, 1987). The insiders will change their views and adjust their wage strategy (position) over time as they will realise that the new higher unemployment rate and number of outsiders are a potential threat to their future job prospects. In view of this reality, the temporary higher unemployment will then converge to the unique long-run NAIRU (Layard, et al., 1991: 10) in a self-correcting manner. Due to insider behaviour, actual unemployment does affect equilibrium unemployment temporarily or persistently. The adjustment process after a shock is a time-dependent but convergent process, to reach a long-run equilibrium that is independent of its prior adjustment path or time (Blanchard and Wolfers, 2000).

Uncertainty and sunken cost in the second case — and subsequently employer and labour passivity — result in actual employment affecting long-run unemployment. In conventional micro-economic and financial economic theory under assumed certainty, the view is that individuals tend to adjust the factors under their control to a changing environment continuously and rapidly in a representative way to new information, resulting in a continuous adjustment to long-run equilibrium (Blinder, 1981; Fama, Fischer, Jensen and Roll, 1969). Continuous and rapid representative adjustment, however, is not typical of a stochastic environment with imperfect information, risk and irreversible or sunken cost (Blinder, 1981 and Dixit, 1992). Risk and sunken cost (e.g. search and lay-off costs) make wrong decisions costly and cause a difference in entrance (hiring) and exit points (firing), which creates an interval of indecision or waiting and not immediate hiring or firing of labour. Employer and labour adjustment after a shock is lagged and tends to peak at infrequent intervals when fundamental information is realised and views converge. The reason for this behaviour in a stochastic environment is initial uncertainty about the probable outcomes of a shock. In such a situation, waiting obviates downside risk and reduces ignorance or uncertainty, while most of the upside potential remains and has a positive effect. According to the option theory, the higher the risk the more positive the value of waiting and the wider the interval of indecision the more extreme are the changes needed to create certainty and induce activity or reverse the effects of a shock (Dixit, 1992). Uncertainty therefore optimises discontinuous adjustment. Agents will only adjust if ignorance is reduced and uncertainty is transformed into calculable risk by the waiting, or if consensus is induced by relative extreme shocks. Adjustment in unemployment under

uncertainty and risk therefore differs in the time-dependent or lagged and discontinued adjustment and the lasting influence of shocks to the timeless long-run NAIRU. Risk and sunken cost are the reasons for the imperfect realisation of the long-run NAIRU.

The two possibilities of persistence and the remnant view (to be discussed later), both time-dependent, can be formalised intuitively by means of a simple autoregressive first-order linear equation:

$$y_t = \beta y_{t-1} + e_t \qquad (1)$$

where y_t is current actual unemployment, β, the parameter of the regressor, is a real variable but $\beta \neq 0$, y_{t-1} is the previous period's actual unemployment, and e_t (error term or unexpected change in unemployment) is normally distributed $e_t \rightarrow N(0, \sigma_e^2)$.

The error or residual structure of (1) is:

$$e_t = \lambda e_{t-n} + v_t \qquad (2)$$

where $\lambda = 0$ to reflect a random unsystematic e_t or change in unemployment. Actual unemployment is thus bounded by and linearly dependent on past actual unemployment only if

$$e_t = S_{t-1} \qquad (3)$$

where S_{t-1} is a random unsystematic shock in the previous period that changed previous unemployment to current actual unemployment.

If it is assumed that $|\beta| < 1$ but $\beta \neq 0$ in (1) and $\lambda = 0$ in (2), all shocks, S_{t-n}, will affect unemployment due to institutional friction but the effects disappear and a uniquely determined stationary path exists over time. If it is therefore assumed in (1) that $|\beta| < 1$ then unemployment is not affected by shocks in the long-run and equation (1) describes the dynamics of a "weak" form of the persistent view in economics when the effects of shocks disappear over time, and unemployment converges to a long-run time independent NAIRU.

When $\beta = 1$ in (1) and $\lambda = 0$ in (2), the past history of all shocks, S_{t-n}, determines y_t. The effects of history are not removed over time as in the previous case and the current actual unemployment depends on $y_0 + \sum S_{t-n}$ where y_0 is the initial unemployment and $\sum S_{t-n}$ the sum of all previous shocks as equivalent for unexpected changes in unemployment. Under this assumption, the equation in (1) is a Random Walk Model (RWM) and describes the dynamics of the second form of persistence. In the model, persistence results from the lagged reaction to all shocks as in the previous form but due to sunken cost and risk. The reduction in ignorance opens the possibility of a change in dynamics and for unemployment to adapt, as ignorance is reduced to the original NAIRU or natural rate. Adverse shocks have a relatively longer but not lasting effect on long-run equilibrium unemployment in this model. An opposite equivalent shock, expansionary labour policies or reduced ignorance can therefore neutralise the effects of an adverse shock. Nothing in the unstable even asymmetric structure (drift) of a RWM guarantees non-mean reversion or prevents mean reversion — only systematic shocks in the existence of uncertainty or irreducible ignorance, as discussed above. At the natural rate in this form of persistence, unemployment is not automatically ensured but is conditional on realised fundamental information and reduced uncertainty over time and represents a relatively "stronger" form of persistence or hysteresis (Bernanke, 1980; Blinder, 1981; Dixit, 1992 and

Layard, et al., 1991). The directional adaption to the long-run NAIRU in this form is a bumpy process.

In both analysed possibilities, the reversion or adaption to the long-run NAIRU is coordinated or exogenously directed and homogeneous. Actual unemployment is persistent under institutional friction and risk but, as with continuous rapid adjustments under certainty, actual unemployment will revert or adapt to but not influence the naturally determined unemployment path (Bernanke, 1980; Caballero and Engel, 1992).

According to the remnant view on hysteresis, the dynamics of the labour market, however, are influenced by non-economic considerations after a shock and prevent a reversion or adaption to a long-run NAIRU. The future path of long-run equilibrium therefore depends on the current actual unemployment as preserved by historically determined dynamics and future selective shocks. If $\lambda \neq 0$, then y_t or the change in unemployment after a shock does not randomly depend on S_t the shock itself as in case of persistence, but systematically on the historic magnitude or extremity of the shock. The dependence of actual unemployment on S_t is selective and thus remnant in the absence of other extreme shocks. The shock has to change the existing historically based consensus or convention (the constant k in the analysis later on) of labour and/or employers. The dynamics underlying unemployment, β and y_t or the level of actual unemployment in a given economic state depends on unemployment's vulnerability to specific shocks. This implies the possible existence of multiple long-run unemployment equilibriums in a given state of the world rather than a unique long-run equilibrium or NAIRU.

The rationale for the dependence of unemployment on systematic shocks and the remnant effects of these shocks on unemployment, as discussed above, result from uncertainty in the labour market, in combination with sunken cost, that create individual specific bands of indecision or spreads for employers. The greater the uncertainty and sunken cost, the greater the role played by behavioural considerations (animal spirits), the greater the dispersion of views in terms of possible labour-induced future outcomes, and the smaller the possibility of coordinated or market (normally distributed) reaction to shocks by employers. The heterogeneous reaction by individual employers to shocks in the presence of uncertainty and sunken cost in the labour market affects the extremity of future shocks, needed to override the non-dominated effect of a historically based consensus: "... the history of the shocks experienced (which drives adjustment at the micro-level) affects the cross-sectional distribution of properties to adjust, and this conditions the macro-economic aggregate as well as current shocks" (Cross, 1994). Only extreme shocks can affect individual spreads, consent and adjustment under uncertainty. Extreme shocks create a new consensus that changes current actual unemployment and long-run unemployment. Contrary to representative action and consequent persistence in a risky environment, an uncertain environment and heterogeneously positioned employers are the reason for the systematic influence of selective shocks on long-run unemployment (Dixit, 1992; Cross, 1994; Cross, Darby and Ireland, 1997 and Cross, Darby, Ireland and Piscitelli 1998).

The systematic adjustment of unemployment only to selective shocks results in the non-linear reaction of unemployment to a changing economic environment (Cross, 1994; Amable, Henry, Lordon and Topol, 1995). Contrary to the linear assumption in the presence of persistence, the remanence proposition requires that the parameter in (1), β, be non-linear to reflect the non-linearity and time-dependence of β, the changed dynamics in unemployment after adjustment and the dependence of unemployment only on selective (extreme) shocks. Current actual unemployment in the model thus depends on initial unemployment in summation with only the

historical sequences of extreme shocks that changed unemployment: $y_0 + \sum S_{t-n} > k$, where k is a constant (consensus as the behavioural equivalent) and the result of the last sequence of extreme shocks or S_{t-1}^* that changed the entrance and exit positions of firms at t^*. Future actual unemployment will only decrease if the current shock (S_t) is expansionarily higher or more extreme than S_{t-1}^*. Future actual unemployment will only increase if the current adverse shock (S_t) is lower than $|S_{t-1}^*|$.

A systematic relation in the residual structure of unemployment, $\lambda \neq 0$, reflects that shocks do affect unemployment in a remnant way. The existence of the systematic residual structure is conditional for a change in the dynamic structure of unemployment and its stability (consensus and not equilibrium) over time even in a changing environment. The current actual unemployment can only be different from past actual unemployment in the presence of an interim extreme shock and changed consensus or a decrease in uncertainty through purposeful policies. The existence of such a systematic residual structure in unemployment in South Africa is the hypothesis that the paper is testing.

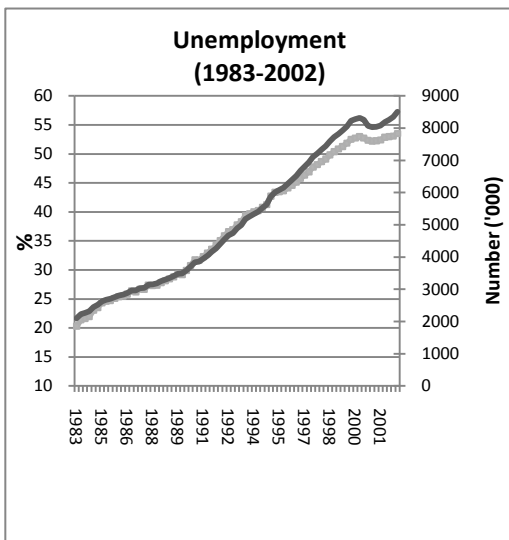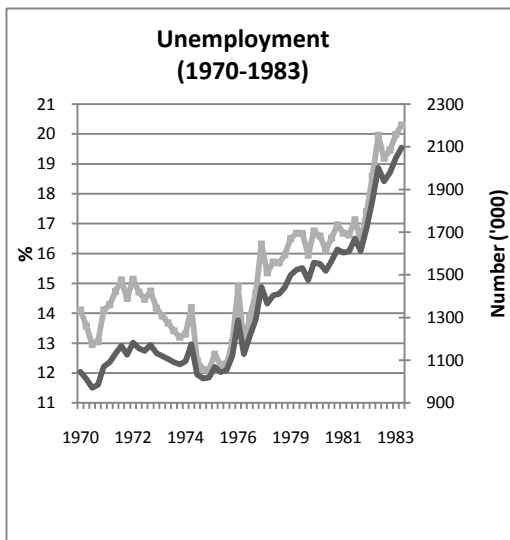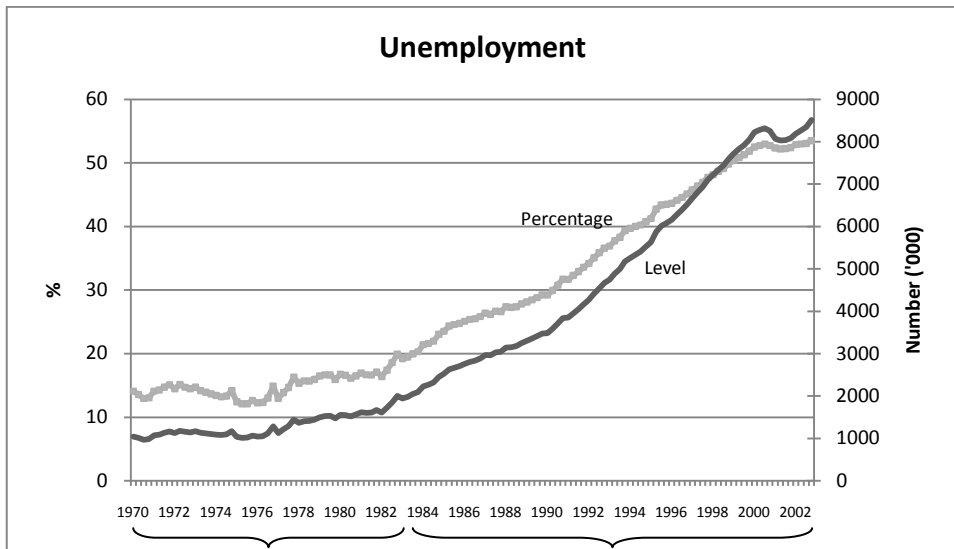## 3. AN ANALYSIS OF UNEMPLOYMENT IN SOUTH AFRICA (1970 – 2002)

3.1 The data set

The unemployment time series data set for South Africa used in the analysis was obtained from Quantec. Quantec Research constructed an employment database with sectoral and provincial employment time series data, using the following sources:

- Labour Force Surveys (LFS): Stats SA;

- October Household Survey/General Household Survey (OHS/GHS): Stats SA; Population Censuses, 1970-2001: Stats SA;

- Industry Censuses (various): Stats SA;

- EasyData Standardised Provincial Demographic Database: Quantec Research; Survey of Employment and Earnings (SEE): Stats SA;

- Development Bank of Southern Africa (DBSA) Standardised Employment Series: DBSA (discontinued during the late1990s);

- Manpower Survey: Stats SA and the Department of Labour (discontinued in 1996);

- SA Labour Statistics: Stats SA (last published in 1996); and

- Easy Data Standardised Industry Database: Quantec Research.

With respect to the discontinuities in the SEE, Quantec linked the new and old SEE (before the service industries were comprehensively covered) by phasing in the new SEE from 1985 onwards. Previously, the DBSA Standardised Employment Series was used as the basis to provide estimates of the service industries.

The unemployment data can be plotted on a graph as in **FIGURE 1**.

FIGURE 1: Extended unemployment in South Africa, 1970 – 2002

Source: Quantec, 2007

The data used is extended unemployment data on a quarterly basis (formal unemployment plus informal employment) of the sample period 1970(1) to 2002(4). When a simple eyeball-analysis is done, a remarkable feature of the unemployment data plotted in **FIGURE 1** is the way in which unemployment was plagued by shocks between 1970 and 1983. From 1970 to 1977, unemployment cyclic movement (or reversion to a near constant mean) was evident. Actual unemployment did not have an influence on its mean during this period. It therefore seems that only economic factors underlay unemployment. The period from 1977 until the end of 1983 was characterised by unemployment moving to a higher and changing mean level. An adverse shock in 1977 put unemployment at a still higher level. Moreover, it seems that actual unemployment

began to influence the mean of unemployment at that time. The changed dynamics indicate that it was not only economic realities that contributed to unemployment: non-economic factors started influencing labour market dynamics. In comparison to the pre-1983 period, the path unemployment followed from approximately 1983 indicates changed dynamics in unemployment in South Africa. A characteristic of this period is that unemployment increased year after year. There were no indications in the data-generating process after 1984 up to 2002 that unemployment would revert or adapt to the average unemployment level of the 1970s. It seems that unemployment started developing a life of its own and was not distracted from the path it then followed in any way.

3.2   Formal analysis, results and inference

The analysis of the lasting effects of adverse shocks on unemployment under uncertainty in section 2.2 can offer a possible starting point to explain the dynamics of South African unemployment described in 3.1. The relevance of non-economic factors for South African unemployment is analysed in the following section.

For current actual unemployment in the model to determine long-run unemployment, or for shocks to have a remnant influence on unemployment, long-run unemployment depends on initial unemployment in summation with the historical sequences of extreme shocks only. The existence of such a systematic residual structure in unemployment in South Africa is the hypothesis that the paper is testing. The residual structure (2) of the simple first-order linear equation in (1) is used to test β in (1) for non-linearity in the actual South African unemployment data. The residual structure:

$$e_t = \lambda e_{t-n} + v_t \qquad (2)$$

reflects the dependence of unemployment on non-economic shocks, as discussed in section 2.2. $H_o: \lambda = 0$ and $H_1: \lambda \neq 0$ reflects the nil hypothesis (linear dependence in β) and alternative hypothesis (non-linear dependence in β) respectively.

The ACF of squared residuals, McLeod-Li test, Wald test and ARCH test were applied to test for non-linear dependence in β. The methodology was used to detect evidence for the hypothesised dependence and the significance of uncertainty as a contributor to long-run unemployment in South Africa. For more information on the nature and details of these tests, see Enders (2004) and Botha, Greyling and Marais, (2006).

The tests results are presented in **TABLE 1** and **TABLE 2** below:

TABLE 1: Testing for non-linearity

Test	Test statistic	p-value	H_0: linear
ACF of squared residuals	Correlogram	n/a	Reject
McLeod-Li test	Q-statistic	0 (lag 1)	Reject
Wald test	F-statistic	0	Reject

Source: Results from Eviews estimates

TABLE 2: ARCH test result

	Test statistic	p-value	H_0: No arch
ARCH test	F-statistic	0	Reject
	TR^2	0	Reject

Source: Results from Eviews estimates

All tests rejected the nil hypothesis of linearity, $H_0: \lambda = 0$, at a 1% level of significance. Evidence points overwhelmingly in the direction of time-dependent β and non-linear dynamics in the labour market of South Africa. The stated hypothesis that non-economic factors are responsible for the remnant high levels of unemployment in South Africa cannot be rejected on the basis of evidence detected in the data series. The evidence suggests that the dynamics and high levels of unemployment in South Africa are due to uncertainty in the presence of sunken cost.

The concern that emanates from the researched evidence is that uncertainty in the demand side of the labour market, created by for example a history of bad labour relations and the appropriation of capital, resulted in the irreversible substitution of unionised labour for investment in fixed capital-intensive production technologies (technology shift), long-run underemployment and inefficiency in production, decades after the events took place (Caballero and Hammour, 1997; and Blanchard and Phillipon, 2004). South Africa in this regard has a long history of bad labour relations. These peaked in the 1980s in open political conflict in which labour played an active and decisive role through strikes, which had a high cost for employers who were seen as allies of the government of the day. The conflict and the HIV/AIDS reality that surfaced in the late 1980s may be the reason for specific perceptions about labour militancy and sunken cost and the rationale for the uncertainty on the demand side in the labour market. The uncertainty was amplified by the change in the political dispensation in 1994 and the ushering in of a government that openly favours labour (Slabbert, 1999).

The consensus still remains that South African labour is militant (World Economic Forum, 2007). As a result, labour has become an uncertain production factor with high sunken cost. Under these circumstances, the endogenous nature of technology made it possible for employers to switch from uncertain high sunken cost labour to more certain or less risky capital in the form of capital-intensive technology (Bhorat and Hodge, 1999).

4. SUMMARY

Unemployment in South Africa has reached crisis proportions. The current high and stable level of unemployment is of concern. The possibility that behavioural factors could contribute and are currently isolating unemployment from economic reality in South Africa was investigated.

According to the Phillips theory, actual unemployment determines long-run unemployment. The specifics needed to influence the dynamics in the labour market and for long-run unemployment to be dependent on actual employment are described in different models. The insider-outsider model explains the role played by institutions in the dependence of unemployment on shocks. The option theory explains the role played by imperfect information and sunken cost in the dependence of unemployment on shocks. Cross (1995) demonstrates the dynamics needed for a remnant dependence of unemployment on shocks and the implied role of uncertainty.

We have found evidence of the existence of non-linear dynamics in the labour market in South Africa. Unemployment therefore seems to be fuelled by uncertainty and sunken costs. In essence, long-run unemployment in South Africa seems to be a historical inheritance preserved by uncertainty and sunken cost in the labour market. There seems to be consensus, based on the theoretic analysis and empirical evidence in this regard, not to invest in unionised labour, but rather to invest in more certain capital-intensive production technologies.

In the absence of a change in labour market dynamics, current unemployment in South Africa gives an indication of what can be expected in terms of unemployment in the future. Sound economic policies, such as a high growth rate, may therefore be a necessary but insufficient condition for decreasing unemployment in South Africa.

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