

Hysteresis in the Australian Unemployment Rate *

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Abstract

This study analyses the Australian unemployment rate during the period 1966-1991. It uses unit root and cointegration techniques to determine whether the unemployment rate follows the behaviour pattern described by the natural rate or hysteresis hypothesis. A simultaneous equation model was formulated to illustrate the channels that generate hysteresis. The model was validated using log-difference specification of labour market variables to ensure stationarity. The model results demonstrate how human capital deterioration and insider power generate hysteresis in the unemployment rate. Furthermore, an attempt is made to review the controversy surrounding corporatist ethos introduced by the Accord. The study concludes with comments on the need for activist policies to countervail hysteresis in the unemployment rate.

Key words: Hysteresis. Natural Rate. Unemployment. Unit Roots. Cointegration. Human capital deterioration. Insider-outsider effects. Labour Market. Simultaneous Equation Models. Macroeconomic Policy. Australia.

1. Introduction

The current unemployment rate of 11.1% in Australia has reached the highest level recorded during the post-war period. A back of the envelope calculation based on Okun's law indicates that the high rate of unemployment should result in a loss of 18% potential GNP.¹⁾ The most worrisome aspect of the high unemployment rate is

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1) Given Okun's Law : $(Y - Y^*)/Y^* = -4(U - U^*)$, assuming the following values for Australia: $U = 10.6\%$ (Current Unemployment Rate), $U^* = 6\%$, the potential GNP gap $(Y - Y^*)/Y^* = 18\%$ approximately.

that it is likely to persist into the future increasing the misery index and worsening socio-political tensions. The recent behaviour of the Australian unemployment rate suggests that the current high level is determined by its past high level. When the unemployment rate becomes a function of its history causing a higher equilibrium level of unemployment it is defined to be hysteretic. Hysteresis is a notion that explains the path dependence of dynamic systems or variables. Hysteresis may result from the influence of past values of the endogenous variable on its current value (Franz, 1990; Wypolosz, 1987; Kaldor, 1985). Broadly speaking hysteresis means that where you are now is determined by now you got there (Buiter, 1987). The Australian unemployment rate has been rising from a quinquennial average of less than 2 % in 1966 to 7.7% in the past quinquennium (See Table 1, Appendix). The prognosis is that the unemployment rate will continue to soar upwards reaching higher equilibrium plateaus in the foreseeable future.

The behaviour of the Australian unemployment rate runs against the grain of the dominant neo-classical and Keynesian theories which assert that when the unemployment rate is disturbed from its natural rate or non-accelerating inflationary unemployment (NAIRU) level it eventually reverts to it in the long run (Phelps, 1967; Friedman, 1968). The Keynesians and classicists both subscribe to the natural rate hypothesis disagreeing only on the issue of the speed of adjustment (Cross et al., 1988). Hysteresis in the unemployment rate tends to create a structural sclerosis and blunts the effectiveness of conventional fine tuning policies. Hysteresis can only be prevented by an activist stabilisation policy stance contrary to the non-interventionist stance implicit under the natural rate hypothesis. Hysteresis in the unemployment rate is often propagated by adverse exogenous shocks which leave permanent scars on the labour market (Blanchard & Summers, 1986). The hysteresis in the unemployment rate is often accompanied by the rise in the long-term unemployment rate or the proportion of the labour force unemployed for a duration of more than year or 52 weeks.²⁾ In Australia the long-term unemployment

2) The long-term unemployment rate has been measured by the Australian Bureau of Statistics on the basis of the Labour Force Survey Questionnaire returns and also by the Department of Social Security data on Unemployment benefit recipients. The data used in this study for the long-run and short-run unemployment was obtained from Dr. Peter Keynon, Murdoch University, Economics Program.

rate has increased from a quinquennial average of less than 3.5% in 1966 to nearly 24% in the past quinquennium (Table A1, Appendix). The sharp rise in the duration composition or the long-term unemployment rate is undesirable on three grounds: First, it is iniquitous at the incidence of the long-term unemployment rate falls heavily on the most vulnerable segments of the labour force such as school-leavers, older workers, migrants and aborigines (Janunkar & Kapuscinski, 1991). Second, it undermines macroeconomic efficiency because the long duration of unemployment erodes the productivity of workers and constricts the mobility of the labour force. Third, protracted duration of unemployment diminishes the probability of the unemployed from escaping the unemployment trap (Miller & Volker, 1987; Trevedi & Hui, 1987).

To tackle the problem of hysteresis in the Australian unemployment rate it is necessary to identify the channels that generate it. There are two proximate channels that contribute to the hysteretic behaviour of the unemployment rate. The first channel operates through the deterioration or the rusting of human capital due to protracted periods of unemployment. Long spells of unemployment causes skill atrophy, stigmatisation of the unemployed as low quality workers, weakening of job search intensity and weakening of the work ethic (Blanchard & Summers, 1987). The second channel or the insider-outsider channel that generates hysteresis is activated by the insiders or the card carrying union members. They are also the short-term unemployed and engage in rent-seeking behaviour to keep their real wages above market clearing level. Their actions precipitate involuntary unemployment amongst the outsiders. The outsiders are the long-term unemployed and they are disenfranchised and ply no part in the wage-bargaining process between unions and employers (Lindbeck & Snower, 1988).

In Australia the prices and incomes policies or the Accords introduced since 1983 have been identified as a move to enfranchise outsiders and increase their participation in the wage setting process (Keynon, 1990). The Accords have been regarded as the harbinger of consensual wage bargaining principles based on a corporatist ethos (Newell & Symons, 1987)³⁾. Some labour market analysts credit

3) "Corporatism is a set of institutions where the interest organisations of labour are brought together in a framework with the state in which a high level of unemployment is sought by limitation of wage demands." (Newell & Symons, 1987: 578)

the Accords with restraint on wage inflation, the reduction in industrial disputation and the creation of jobs (Chapman and Gruen, 1990; Lewis and Spiers, 1990). Others contend that the Accord is only a veil and the benign scenarios attributed to the Accord would have eventuated anyway (Pissarides, 1991).

The aim of this paper is fourfold: First and primarily to review the behaviour of the Australian unemployment rate during the sample period (1966–1991) against the back-drop of the conflicting theoretical perspectives of the natural rate and hysteresis hypotheses. Second, to cover new ground by examining empirically the channels that generate hysteresis by validating a simultaneous equation model with log-difference variable specifications. Third, to review briefly the controversy surrounding the Accord. Fourth, to outline policy initiatives to tackle the structural sclerosis associated with hysteresis.

The paper is organised as follows: Section 2 of the paper applies standard unit root tests to ascertain whether the time-series properties of the Australian unemployment rate support the natural rate or the hysteresis hypothesis. Section 3 uses cointegration techniques to examine whether the unemployment rate and the long-run unemployment rate exhibit a long-run equilibrium relationship as postulated by the natural rate hypothesis or a disequilibrium relationship as postulated by the hysteresis hypothesis. Section 4 of the paper describes the structural form of the simultaneous equation macro model incorporating a dummy variable to capture the Accord environment. The model has been validated using log-difference variables and is designed to illustrate the channels through which hysteresis in the Australian unemployment rate is generated. Section 5 discusses the results of the empirical validation of the hysteresis model from the perspective of received theory and the corporatist ethos infused by the Accord. Section 6 portrays the phenomenon of hysteresis using diagrams. Section 7 concludes with a summary and comments on some macro policies for countervailing the phenomenon of hysteresis in the unemployment rate.

2. Unit root testing of the hysteresis in the unemployment rate

The unemployment rate can be viewed as a composite of a natural rate or equilibrium component that is determined by labour market structural factors and a transitory component that is determined by exogenous shocks. According to the

Table 1 DF test : DSP vs. TSP & ADF test : Unit Roots

Var Log	DF-test	ADF-test	Minimum AIC (lags)	Ljung-Box Q (df)	Integ. Order
u_t	1.82	- 0.67	- 4.07 (1)	3.51 (5)	I (1)
v_t	2.18	- 1.20	11.3 (2)	4.17 (4)	I (1)
w_t	7.54	- 1.12	- 113.2 (2)	5.30 (4)	I (1)
d_t	2.71	- 0.15	- 138.9 (3)	2.86 (3)	I (1)
l_t	1.68	- 1.34	30.3 (1)	1.78 (5)	I (1)
s_t	0.65	- 0.84	- 32.9 (1)	3.43 (5)	I (1)
Type I Error	$F_{2, 25},$ $\alpha = .05$ $= 7.25$	$T_\mu = - 2.66$		$X^2 = 7.8 (3)$ $X^2 = 9.5 (4)$ $X^2 = 11 (5)$ $\alpha = .05$	

Note:

DF (Dickey-Fuller) Test:

$$Y_t = \alpha_0 + \alpha_1 T + \gamma Y_{t-1} + \varepsilon_t$$

$$H_0: = \text{Hysteresis or DSP } (\alpha_0 = 0 \quad \alpha_1 = 1) .$$

$$H_1: = \text{Natural Rate or TSP}$$

$$\text{Critical value} : = F\text{-statistic}$$

ADF (Augmented Dickey-Fuller) Test:

$$\Delta Y_t = \alpha_0 + \alpha_1 T + \gamma Y_{t-1} + \sum_{i=k}^p \beta_i \Delta Y_{t-i} + \varepsilon_t$$

$$H_0: = \text{Hysteresis or Unit root or DSP}$$

$$\text{Critical value} : = \gamma < \text{ADF tabulated value.}$$

natural rate hypothesis the equilibrium unemployment rate will revert to its natural rate (NAIRU) in the long-run if it is temporarily blown off course by exogenous shocks. The non-reversal of a time-series to its natural or equilibrium path has been defined as a difference stationary process (DSP) and the reversal, as a trend stationary process (TSP) (Nelson & Plosser, 1982). The above dichotomisation of a time-series into TSP or DSP is coterminous with the distinction between the natural rate and hysteresis hypotheses (Franz, 1990). In this study the unemployment rate and other labour market variables have been subjected to the Dickey and Fuller (DF) (1976) test to determine whether the variables are DSP or TSP. The more robust Augmented Dickey Fuller (ADF) (1981) test, after ensuring that the residuals are white noise, determine that a labour market time-series is hysteretic if it has unit roots and natural rate otherwise. The results of both the DF and ADF tests are shown in Table 1. Except for the real wage rate, all variables are DSP according to the DF test. According to the ADF test all the variables have unit roots and exhibit hysteresis. These results were confirmed by the visual inspection of the correlogram of the unemployment rate. The sample autocorrelation function (ACF) decayed slowly starting from a high autocorrelation. The partial autocorrelation function (PACF) had a spike at lag one confirming that the unemployment rate was AR(1) or a typical hysteresis process with a long memory. The above

definition of hysteresis based on unit root testing has been criticised as an oversimplification of a complex process. This critique characterises hysteresis as a more encompassing process involving changes in technology, tastes, notions of general equilibrium and deep endogeneity (Setterfield, 1991 ; Arthur, 1988 ; Witt, 1990).

3. Cointegration testing for hysteresis in the unemployment rate

Hysteresis is generated by the effects of duration composition of the unemployment rate or more specifically by the adverse effects of the long-term unemployment rate. The underlying causal mechanism can be explained as follows: the high unemployment rate bolsters up the long-term unemployment rate which in turn raises the unemployment rate to a higher equilibrium level. According to some analysts the absence of cointegration or a long-term relationship between labour market variables such as the unemployment rate and the long-term equilibrium unemployment rate or the wage rate and the unemployment rate could be symptomatic of hysteresis (Cross et al., 1990 ; Coe, 1988 ; Gregory, 1986). Cointegration techniques can be used to determine whether labour market variables are characterised by long-run disequilibrium or hysteresis.

The theory of cointegration (Engle & Granger, 1987) postulates that if univariate time-series are integrated order one, $I(1)$, (that is, they have to be differenced once to induce stationarity), then their linear combinations could be

Table 2 Cointegration Tests on Labour Market Variables

Dep & Indep Var	Cointeg. Coeff.	ADF	min AIC (lags)	Ljung-Box Q (df)
u_t & l_t	0.58 (11.73)	- 2.03	2.44 (2)	1.67 (5)
u_t & w_t	4.83 (10.04)	- 1.16	1.94 (1)	3.59 (5)
u_t & s_t	- 2.43 (4.41)	- 0.08	5.24 (1)	1.46 (5)
u_t & y_t	2.73 (11.76)	- 0.67	- 1.49 (1)	3.20 (5)
w_t & l_t	0.09 (5.33)	- 2.43	- 77.5 (1)	1.04 (5)
s_t & l_t	- 0.14 (6.33)	- 0.76	- 46.4 (1)	4.14 (5)
u_t & d_t	- 3.86 (13.37)	- 0.69	- 11.9 (1)	3.36 (5)
Type I Error ($\alpha = .05$)		ADF $_{\alpha=.05} = - 3.6$		X $^2_{\alpha=.05}$ (5) = 11.1

Note: ADF Cointegration Test :

$$\Delta u_t^2 = \delta u_{t-1} + \sum_{i=1}^k \delta_i \Delta u_{t-i} + \varepsilon_t$$

H_0 : No-cointegration.

Critical Value : T_α from the ADF Table.

cointegrated. Two time-series are cointegrated if the residuals of the cointegration regression are stationary or integrated order zero, $I(0)$. The ADF unit root test can be used to examine the order of integration of a time-series. The appropriate critical values to test the stationarity of the cointegration residuals for small samples were obtained from published tables (Blangiewick & Charemza, 1990). The test results are reported in Table 2. They are consistent with the finding that the unemployment rate and the long-term unemployment rate are not cointegrated. Such non-cointegration supports the hypothesis of hysteresis in the unemployment rate for Australia (Flatau et al., 1990) and for the USA (Cross et al., 1990). The non-cointegration of the unemployment rate with the wage rate and the real GDP are also consistent with similar findings for Australia (Watts & Mitchell, 1990; Lewis & MacDonald, 1991). Overall the cointegration tests done in this study favour the conclusion that the Australian unemployment rate is hysteretic.

Cointegration analysis per se fails to shed light on the labour market mechanisms through which these duration effects and insider effects generate hysteresis in the Australian unemployment rate. Therefore, a simultaneous equation macroeconomic model of the labour market has been used in the next section to shed light on these issues.

The DF and ADF tests in the previous section indicate that log difference specifications should be used to induce stationarity and avoid spuriousness in empirical analysis. Many Australian labour market studies are econometrically flawed as they ignore the issue of nonstationarity and work in levels and others mix both level and difference specifications (Lewis & MacDonald, 1990). Nevertheless, there are two considerations that prevent the outright rejection of the labour market empirics in level form. First, when the data are subject to trend segmentation or structural breaks then it has been demonstrated that the unit root tests are unduly biased in favour of accepting the unit root null (Perron, 1990; Rappoport & Reichlin, 1989). Second, it has been shown that when the sample size is small the distinction between DSP and TSP could become obfuscated because the two processes become observationally equivalent (Blough, 1988). This study avoids the pitfalls that can result from the use of nonstationary level form data. Therefore, although level form analysis was performed, only the log difference empirics are reported in the next section.

4. The structural form of the hysteresis model

The hysteresis model basically has four equations explaining the simultaneous interactions of the vacancy rate, the real wage rate, labour demand and the long-term unemployment rate. Similar models have been validated in level form as a module of the LBS (London Business School) macro model of the UK (Budd et al., 1988) and for the Netherlands (Graafland, 1991). Besides, the use of the log-difference specification another innovative feature of the hysteresis model formulated for Australia is the incorporation of a dummy variable. This aims to capture the alleged benign employment and wage effects of the corporatist ethos associated with the Accord as claimed by several labour market researchers (Chapman, 1990; Kenyon, 1990; Lewis & Spiers, 1990). The definition of model variables and a description of the data sources are given in Table 1 in the Appendix.

The structural form of the hysteresis model and the expected signs of the partial derivatives or elasticity coefficients are given next and the theoretical underpinning of each equation is discussed thereafter:

A HYSTERESIS MODEL : AUSTRALIA (1966 – 1991)

$$\text{Vacancy Rate : } v_t = f[v_{t-1}, l_t, s_t, r_t, A_t, \varepsilon_{t1}] \dots\dots\dots (1)$$

$$\text{Wage Rate : } w_t = f[w_{t-1}, l_t, s_t, r_t, p_t, h_t, A_t, \varepsilon_{t2}] \dots\dots\dots (2)$$

$$\text{Labour Demand : } d_t = f[d_{t-1}, w_t, y_t, t_t, e_t, e_{t-1}, A_t, \varepsilon_{t3}] \dots\dots\dots (3)$$

$$\text{Long-term Unemployment : } l_t = f[l_{t-1}, f_t, z_t, g_t, r_t, A_t, \varepsilon_{t4}] \dots\dots\dots (4)$$

Expected signs of partial derivatives or elasticity coefficients.

$$\text{Equation (1) : } \delta v_t / \delta l_t < 0 ; \delta v_t / \delta s_t < 0 ; \delta r_t / \delta v_t > 0 ; \delta v_t / \delta A_t < 0 .$$

$$\text{Equation (2) : } \delta w_t / \delta l_t < 0 ; \delta w_t / \delta s_t < 0 ; \delta w_t / \delta r_t > 0 ; \delta w_t / \delta p_t > 0 ; \delta w_t / \delta h_t > 0 ; \\ \delta w_t / \delta A_t < 0 .$$

$$\text{Equation (3) : } \delta d_t / \delta w_t < 0 ; \delta d_t / \delta y_t ; \delta d_t / \delta t_t < 0 ; \delta d_t / \delta e_t > 0 ; \delta d_t / \delta e_{t-1} < 0 ; \\ \delta d_t / \delta A_t > 0 .$$

$$\text{Equation (4) : } \delta l_t / \delta f_t > 0 ; \delta l_t / \delta z_t > 0 ; \delta l_t / \delta g_t < 0 ; \delta l_t / \delta r_t > 0 ; \delta l_t / \delta A_t < 0 .$$

Classification of Variables (See Appendix for definitions):*Endogenous :*

Vacancy Rate : v_t
Real Wage Rate : w_t
Labour Demand : d_t
Long-term Unemployment Rate : l_t

Exogenous :

Short-term unemployment rate : s_t
Replacement rate : r_t
Accord dummy : A_t
Relative price index : p_t
Productivity index : h_t
Real GDP : y_t
Technological trend : t_t
Employment : e_t
Probability of not finding a job : f_t
Reciprocal of search intensity : z_t
Excess of short-term unemployment : g_t
Stochastic error terms : $\varepsilon_{1t}, \varepsilon_{2t}, \varepsilon_{3t}, \varepsilon_{4t}$.

Vacancy rate equation (1):

This is analogous to the U-V equation derived under steady state conditions by matching vacancies with job seekers. It is based on the Beveridge curve hypothesis (Layard et al., 1991: 34–42; Graafland, 1990: 168–69). Both the long-run and the short-run unemployment elasticity coefficients are expected to be negative under natural rate market clearing conditions. However, if long duration of unemployment erodes human capital, as postulated by the hysteresis hypothesis, the elasticity coefficient of the long-run unemployment may not be significant. The elasticity coefficient of the short-run unemployment rate is expected to be negative unless heterogeneity effects cause severe mismatches between vacancies and the short-term unemployed. The replacement rate is anticipated to be positively related to the vacancy rate if reservation wages are high. Several factors such as high unemployment insurance benefits, increased search intensity and scope for job choosiness could contribute to a high reservation wage and a positive replacement rate coefficient (Feldstein & Poterba, 1984; Minford, 1985; Katz & Meyer, 1988).

Equation 2 The wage equation

The real wage rate is a function of both the short-run and long-run unemployment rates as hypothesised in wage bargaining theories (Graafland, 1991 : 159 ; Nickell & Andrews, 1983 ; Pissarides, 1991 : 41 – 44). In Australia both the real wage rate specification (Lewis & Kirby, 1987) and the nominal wage Phillips curve specification (Gregory, 1986 ; Simes & Richardson, 1987) have been extensively used in labour market modelling. This study uses the real wage specification. The elasticity coefficients of both the long-run and the short-run unemployment rates are anticipated to be negative showing that the unemployed exert downward pressure on the real wage rate. However, the insiders could extract real wages above market clearing rates as long as the rent margin is more than the turnover costs or the hiring and firing costs of the outsiders or the long-term unemployed (Lindbeck & Snower, 1988). Therefore, non-negative elasticity coefficients in the unemployment rate variables in the wage equation could be regarded symptomatic of hysteresis. The non-significance of the elasticity coefficient of the long-term unemployment rate signals hysteresis by indicating that the long-term unemployed have been effectively disenfranchised by the insiders from participating in the wage bargaining process (Layard, 1986). The elasticity coefficient of the replacement rate should be positive if the unemployment benefits were high enough to raise reservation wages and the union threat point (Graafland, 1991 : 158). The increase in producer prices and the productivity indicator are expected to be positively related to the real wage rate. Because the rise in producer prices and labour productivity should increase employers' profits and therefore their willingness to grant wage increases, provided cost push inflation is not excessive. If the Accord did have significant wage moderation effects as claimed by several labour market analysts then the Accord dummy should show a significant negative coefficient.

Equation 3 The demand for labour equation

The real wage elasticity coefficient is expected to be negative indicating that increase in real wages would lead to a fall in the demand for labour. However, if the insiders could exert their monopoly power they could prevent real wages from affecting labour demand. Therefore, a non-significant wage elasticity coefficient would support the notion of hysteresis. Hysteresis implies that a downward wage rigidity would prevail in the labour market, in the face of rising unemployment,

because of the operation of insider power. The coefficient of the time trend should be negative if autonomous technological change was labour saving. Similarly the elasticity coefficient associated with real GDP should be negative if growth was accompanied by widespread adoption of capital intensive or labour saving technology. The lagged employment coefficient is expected to show a negative coefficient if the burden of adjustment costs was high (Graafland, 1991: 163–164). If the corporatist ethos introduced by the Accord was employment creating as claimed by several analysts, then the Accord dummy should have a positive coefficient.

Equation 4 Incidence of long term unemployment

The steady state long term unemployment rate is determined by both impact of the inflow rate into long term unemployment and outflow rate from short-term unemployment. One of the important factors that determine the probability of not finding a job ($f=u/v$) is the inflow rate into long-term unemployment (Budd et al., 1988). The inflow rate and probability of not finding a job is expected to be positively related to the long-term unemployment rate (Jackman et al., 1989). The search intensity is proxied as the reciprocal of the long-term unemployment to vacancies ($z=l/v$) (Nickell, 1985). Therefore, a high positive coefficient for z implies that adverse duration effects have undermined search intensity in a significant manner. The outflow from short-term to long-term unemployment has been proxied by the ratio of short-term unemployment to vacancies ($g=s/v$). As the outflow rate rises the long-term unemployment would be expected to fall giving a negative value to the coefficient of g . The replacement rate should be positively related to the long-term unemployment rate if the unemployment benefits raised the reservation wage of the long-run unemployed. The theory underpinning the derivation of the determinants of the long-term unemployment equation has been discussed in detail elsewhere (Budd et al., 1988; Graafland, 1991).

5. Empirical results of the validation of the hysteresis model

The log-difference linearized version of the structural form of the simultaneous equation model was validated to investigate both the hysteresis in the unemployment rate and the effect of the corporatist ethos or the Accord on the

Australian labour market. All the model equations were overidentified and were prone to simultaneity bias because of the presence of the lagged endogenous variables as explanators. Therefore, the Two-Stage Least Squares (2SLS) procedure rather than Ordinary Least Squares (OLS) was used to estimate the parameters of the model equations. A parsimonious specification of lagged variables was designed to capture the labour market stock-flow dynamics. The model diagnostics such as the coefficient of determination (R^2) revealed satisfactory fits and the significant t and F -statistics showed that multicollinearity was not drastic except in the case of the wage equation. The Durbin-Watson statistics for the equations did not reveal significant first order autocorrelation and the smallness of the sample size precluded the calculation of a meaningful Durbin's h -statistics. The root-mean-square error and other simulation fit statistics indicated that the model was dynamically stable.

The empirical results of the model validation are discussed in the sequel:

A MODEL OF HYSTERESIS : AUSTRALIA (1966 – 1991)

(Linearized version with Log-difference variable specification.)

$$\Delta v_t = -4.06 - 0.49 \Delta v_{t-1} - 0.26 \Delta l_t + 1.14 \Delta s_t + 0.99 \Delta r_t + 0.10 A_t$$

$$\bar{R}^2 = 0.41 \quad DW = 2.02 \quad \dots\dots\dots (1)$$

$$(t) = (-3.77)^{**} (3.74)^{**} (-1.37) (1.96)^* (1.54) (0.99) \quad F_{5,19} = 4.40^*$$

$$\Delta w_t = 3.87 + 1.99 \Delta w_{t-1} - 0.16 \Delta l_t - 0.71 \Delta s_t - 0.17 \Delta r_t - 6.86 \Delta p_t + 4.62 \Delta h_t - 0.30 A_t$$

$$\bar{R}^2 = 0.19 \quad DW = 1.01 \quad \dots\dots\dots (2)$$

$$(t) = (1.14) (2.55)^* (-0.47) (-0.73) (-0.16) (-1.23) (1.08) (-0.39) \quad F_{7,17} = 1.81$$

$$\Delta d_t = 5.12 - 0.53 \Delta d_{t-1} + 0.0001 \Delta w_t - 0.12 \Delta y_t - 0.01 t_t + 0.79 \Delta e_t$$

$$- 0.12 \Delta e_{t-1} - .01 A_t \quad \bar{R}^2 = .77 \quad DW = 2.20 \quad \dots\dots\dots (3)$$

$$(t) = (4.02)^{**} (-3.41)^{**} (0.02) (-2.83)^{**} (-1.73)^* (5.13)^{**} (-0.43) (-1.36)$$

$$F_{7,17} = 12.27^{**}$$

$$\Delta l_t = 3.23 - 0.83 \Delta l_{t-1} + 0.71 f_t + 0.74 \Delta z_t - 0.61 g_t + 0.46 \Delta r_t + 0.08 A_t$$

$$\bar{R}^2 = 0.95 \quad DW = 0.93$$

$$(t) = (1.99)^* (-11.02)^{**} (10.04)^{**} (9.31)^{**} (-4.11)^{**} (1.43) (0.77) \quad F_{6,18} = 53.50^{**} \dots\dots\dots (4)$$

*Level of significance : #: 10% ; * : 5 % ; ** : 1 %.*

Vacancy rate (Equation 1)

The elasticity coefficients of the long-run unemployment rate was as expected negative. But it was not significant indicating that the long-term unemployed did

not exert any influence on the vacancy rate. This shows that long spells of unemployment have resulted in human capital deterioration rendering the long-term unemployed unsuitable to fill the available vacancies. Therefore, hysteresis in the unemployment rate has been generated by adverse duration effects during the sample period as suggested by theory (Layard, 1986). The elasticity coefficient of the short-term unemployment rate is not significant and it fails to reduce vacancies as expected. This perverse behaviour of the short-term unemployed could be explained by heterogeneity effects that cause a severe temporary mismatch of available skills and vacancies. The elasticity coefficient of the replacement rate was not significant suggesting that unemployment benefits did not make reservation wages high enough to have any influence on job acceptance and choosiness. The non-significance of the Accord dummy coefficient casts doubts on the claims that the Accord reduced vacancies and generated employment during the sample period.

Wage rate (Equation 2)

The elasticity coefficient of the long-term unemployment rate is non-significant indicating that the long-term unemployed played no part in the wage bargaining process. Also the elasticity coefficient of the short-term unemployment rate was non-significant suggesting that the short-term unemployed or the insiders kept their real wage rates from decreasing to market clearing levels. This concurrent non-significance of the elasticity coefficients of both the unemployment rates are supportive of the interpretation that insider power prevented real wage rates falling in the face of unemployment creating more involuntary unemployment amongst the outsiders. Therefore, the empirical results suggest that insider power generated hysteresis in the unemployment rate during the sample period. The elasticity coefficient of the replacement rate was not significant and it showed that the unemployment benefits did not improve that fall back position of the unemployed. Also this supports the interpretation that the unions have not been that caring of the long-term unemployed. The coefficient of the Accord dummy is negative but it does not pass the conventional levels of significance and fails to give conclusive support to viewpoint that the corporatist ethos of the Accord restrained wages and wage inflation. On the contrary it provides a modicum of support to the counter-factual position that the Accord was merely a veil.

Demand for labour (Equation 3)

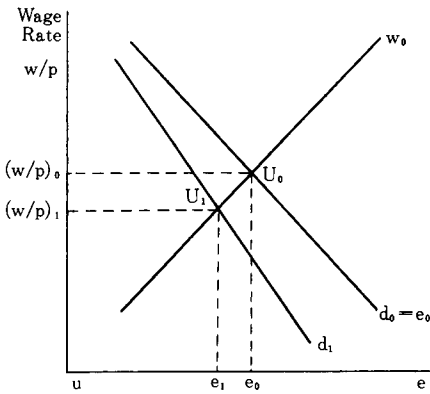
The elasticity coefficient of the real wage rate failed to expected negative effect on labour demand in the face of large unemployment levels. The proxy for autonomous technical progress revealed a negative coefficient indicating that labour saving technology had been widely adopted during the sample period. The elasticity coefficient associated with real GDP was also negative suggesting that growth induced investment undertaken during the sample period was of the capital intensive variety. A 1 % increase in real GDP was related to 0.12% decline in the demand for labour and perhaps this was due to capital substitution. The adjustment costs did not appear to be significant when the employment rate is lagged over one year, this may indicate that adjustment costs are long drawn out (over periods of more than one year). The coefficient of the Accord dummy was not significant and this again calls into question the claims that the Accord increased the demand for labour by creating jobs during the review period.

Long term employment growth (Equation 4)

The empirical results indicated a significant positive coefficient for f , implying that hysteresis increased the probability of not finding a job by increasing the inflow rate and consequently the long term unemployment rate. The search intensity had a positive coefficient indicating that human capital deterioration due to long unemployment duration was taking its toll as postulated by hysteresis theory. The coefficient of (g) or the excess of short-term over long-term unemployment was negative and significant indicating that outflow from short-term to long-term unemployment was related inversely with the long-term rate as expected. The positive coefficient of the Accord dummy again fails to support the assertion that the Accord was employment generating. Overall, the empirical results on the long-term unemployment rate conjure up the gloomy prospect of a persistence of high unemployment and a rising unemployment equilibrium or hysteresis.

6. The stylisation of the channels generating hysteresis

The above empirical evidence supports the conclusion that the Australian unemployment rate is subject to hysteresis. The two channels that generate hysteresis have been identified as the human capital deterioration channel and the



e : employment, u: unemployment.

Fig. 1 Human Capital Deterioration Effects

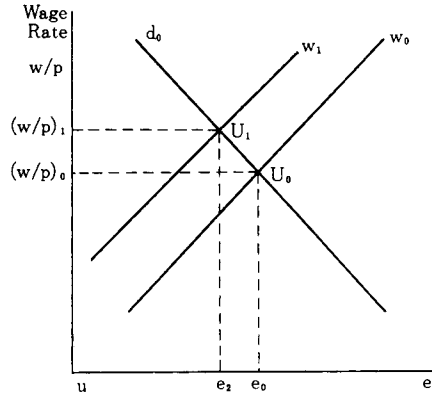


Fig. 2 Insider Rent-seeking Effects

insider channel. They are stylised and presented in Figures 1 and 2. The first channel or the human capital deterioration channel operates mainly through the vacancy rate equation. Here, the long spells of unemployment effectively render the long-term unemployed unsuitable to fill the available vacancies. This human capital deterioration effect is portrayed by an almost overlapping labour demand curve d_0 and employment curve e_0 . The overlap indicates that the long-term unemployed exert no effect on the vacancy rate as postulated by hysteresis theory. If initially the economy is at the unemployment equilibrium U_0 and an exogenous shock (recession) causes labour demand to fall from d_0 to d_1 , then high unemployment will persist and the economy will move to a higher unemployment equilibrium U_1 as postulated by the hysteresis theory (Figure 1). The second channel or the insider power channel operates through the wage equation. Insider power effectively precludes the outsiders or the long-term unemployed from exerting any downward influence on the real wage rate. Starting from an initial unemployment position of U_0 , if an exogenous shock (recession occurs) then the insiders prevent real wage rates from falling. Thus high real wages for the employed or the insiders are shown by a shift of the wage curve from w_0 to w_1 . The level of unemployment rises and also the equilibrium rate of unemployment moves to a higher level U_1 from U_0 (Figure 2).

7. Concluding comments

The counterfactual results of the validation of the hysteresis model without the Accord dummy lends further support to the view that the Accord was a mere veil.

Overall the empirical tests demonstrate that the Australian unemployment rate does not follow the natural rate behaviour pattern but rather a hysteretic pattern. Hysteresis in the unemployment rate calls for policy stances that are completely at variance with the passive policy postures advocated under a natural rate scenario. Under a hysteresis scenario the customary fine-tuning may be impotent unless quickly initiated. Also more cogent demand management policies that have real or supply-side effects may have to be implemented. A taxonomy of such policies have been identified (Lindbeck & Snower, 1989). In the Australian context, these demand management policies with supply-side implications provide some guidelines for the initiatives required to counteract hysteresis: (i) Employment creating policies based on infrastructure investment and microeconomic reforms. Such policies are designed to improve the marginal productivity of labour as foreshadowed in the **One Nation Strategy** (Keating, 1992). (ii) Policies aimed at enhancing Australia's international competitiveness. For example, the phasing out of the protectionist barriers as recommended in the Garnaut Report (1989) and the Goods and Services Tax (GST) and associated tax reforms (Hewson, 1992) fall into this category. (iii) Insider power reducing policies or labour market deregulation, elimination of restrictive work practices, enterprise bargaining and productivity enhancing schemes could also qualify for inclusion in this category. (iv) Policies could also be targeted to enfranchise the outsiders through training, job skill programs, award restructuring, profit sharing schemes and the like. Recent policy pronouncements reflect that there is an appreciation of the need for activist policy measures to counteract the growing structural sclerosis caused by hysteresis. However, the successful implementation of these policies will call for political acumen and commitment because they will be resisted vigorously by vested interests that have been nurtured on mercantilism and unionism for decades.

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APPENDIX

Table A1 Data Base : Hysteresis Model

Year	U	V	W	D	L	S	R	P	H	Y	E	T	A
1966	1.9	0.33540	55.4000	2.006	4.7	78.3	99.9	100.00	100.00	100.000	98.38	0	0
1967	1.9	0.29511	56.6407	1.957	4.9	79.0	94.5	100.34	101.40	106.631	98.26	1	0
1968	1.8	0.29465	59.2593	1.915	3.3	84.8	88.2	102.26	111.42	110.573	98.42	2	0
1969	1.7	0.35533	62.2293	1.871	2.5	88.3	81.3	103.98	114.06	120.341	98.49	3	0
1970	1.7	0.40578	65.9523	1.800	1.7	88.9	87.8	105.14	116.16	127.061	98.57	4	0
1971	1.9	0.32534	68.0846	1.753	1.3	88.7	79.6	107.04	120.21	134.229	98.35	5	0
1972	2.9	0.24616	70.5298	1.694	2.3	82.6	112.8	106.58	123.02	141.039	97.49	6	0
1973	2.1	0.57026	73.6779	1.667	3.4	81.6	134.2	107.34	129.87	147.043	98.20	7	0
1974	2.7	0.63493	80.9879	1.628	1.3	86.9	126.8	112.38	133.91	153.047	97.64	8	0
1975	5.0	0.27242	82.6800	1.559	4.4	70.7	147.8	116.15	137.43	155.914	95.44	9	0
1976	5.1	0.19944	81.8816	1.538	8.6	61.1	149.7	113.29	144.11	159.588	95.26	10	0
1977	6.0	0.18021	82.3400	1.484	12.7	55.3	155.7	111.92	146.39	164.158	94.33	11	0
1978	6.5	0.19196	81.7222	1.464	15.7	50.2	158.4	110.97	152.72	165.681	93.76	12	0
1979	6.1	0.19116	81.3092	1.458	18.2	49.0	147.6	110.71	154.48	174.014	94.16	13	0
1980	6.1	0.19132	84.2382	1.409	19.9	47.6	142.3	112.63	156.23	178.226	94.08	14	0
1981	5.9	0.21189	86.8451	1.393	20.9	50.2	134.3	113.08	162.74	184.229	94.39	15	0
1982	7.0	0.16086	87.8569	1.363	18.8	50.8	134.5	112.49	162.03	187.097	93.24	16	0
1983	10.2	0.15541	86.0968	1.300	27.6	34.7	142.3	112.48	169.24	184.588	90.08	17	1
1984	8.8	0.27335	88.3076	1.293	31.2	37.6	147.1	114.17	175.74	194.803	91.45	18	1
1985	8.1	0.34742	86.5037	1.270	31.0	37.2	147.6	112.82	178.73	205.376	92.10	19	1
1986	8.2	0.38020	84.8000	1.224	27.5	41.2	150.8	110.79	176.09	213.351	92.05	20	1
1987	8.0	0.37971	84.4112	1.198	28.6	40.4	155.0	110.77	177.68	218.638	92.17	21	1
1988	7.0	0.42932	84.3133	1.180	28.4	41.6	154.7	112.65	183.12	229.032	93.17	22	1
1989	5.9	0.49852	83.2176	1.150	22.8	49.1	156.2	110.57	186.29	238.351	94.27	23	1
1990	7.0	0.37104	83.7943	1.075	20.1	52.0	147.4	108.67	189.80	247.312	91.63	24	1
1991	10.5	0.29062	85.5473	1.046	20.0	53.0	154.9	108.91	193.32	256.272	89.46	25	1

Definition of Variables :

- U : Unemployment rate : Number unemployed as % of the labour force.
- V : Vacancy rate : Vacancies as % of employment in industries (x 1000).
- W : Real wage rate : Nominal weekly wage rate deflated by CPI.
- D : Demand for Labour : Employment plus Vacancies (millions).
- L : Long-term unemployment rate : Unemployed for > 52 weeks or one year as a percentage of the labour force.

- S : Short-term unemployment rate: Unemployed < 13 weeks as a percentage of the labour force.
- R : Replacement rate index : Ratio of post-tax unemployment benefits to wage income.
- P : Relative producer price index : Ratio of implicit GDP deflator to the Consumer Price Index.
- H : Labour productivity index.
- Y : Value added index (Index of real GDP).
- E : Employment by industries as percentage of the labour force.
- T : Time trend to proxy autonomous change in labour saving technology.
- D : Dummy variable proxying the pre-Accord period by zero and post-Accord period by one.

Data Sources :

- U : Australian Bureau of Statistics.
Labour Force, Australia. (Cat. 6203.0)
The Labour Force, Australia, Historical Summary. (Cat. 6204.0)
- V : Commonwealth Employment Statistics. Department of Employment, Education and Training, Canberra.
- W : Australian Bureau of Statistics, Canberra. (Cat. 6302.0).
- D : Australian Bureau of Statistics.
The Labour Force Australia. (Cat. 6204.0)
- L & S : Department of Economics. Murdoch University and Australian Bureau of Statistics. (Cat. 6204.0)
- R : Department of Health and Social Security. Canberra.
Annual Report, Department of Social security.
Report of the Commissioner of Taxation. Annual.
- P : Australian Bureau of Statistics. Canberra.
Australian National Accounts. National Income and Expenditure. (Cat. 5204.0 and Cat. 5206).
Consumer Price Index (CPI). (Cat. 6401.0)
- H : Australian Bureau of Statistics. Canberra.
Estimates of Multifactor Productivity in Australia.
Statistics Occasional Paper. (Cat. 5233.0)
- Y : OECD, Paris. Real GDP at constant prices.
National Accounts of OECD Countries. Vol. (Annual).
- E : Australian Bureau of Statistics. Canberra.
Labour Force, Australia. (Cat. 6204.0)
- L F : Australian Bureau of Statistics. Canberra.
Labour Force Australia in millions. (Cat. 6204.0)
Foster, R. A. and Stewart, S. E. (1991).
Australian Economic Statistics, 1949 – 50 to 1988 – 90.
Occasional Paper No. 8, Reserve Bank of Australia.