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Hidden Unemployment in Australia 2007

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1. Introduction

This paper updates the estimates of hidden unemployment by age and gender in Australia provided by Mitchell (2001). The context of this paper is rather different to that faced when I last examined hidden unemployment in detail. In 2001, the official unemployment rate was persisting around 6.8 per cent even after a decade of growth following the 1991 recession. Some 6 years later, the official unemployment rate has fallen to around 4.3 per cent, economic growth is being sustained and overall labour force participation rates have increased from around 63.5 to around 65.5 per cent.

The CofFEE Labour Market Indicators (CLMI, 2007) estimated broad labour underutilisation (encompassing official unemployment, hidden unemployment and underemployment) was hovering around 12.5 per cent in 2001 compared to the August 2007 estimate of 8.2 per cent. While still far from what could reasonably be termed full employment, the labour market is clearly stronger than it was in 2001.

The question this paper addresses is what has happened to hidden unemployment since Mitchell (2001) last provided detailed age-gender estimates for Australia. The paper employs the same method of estimation which is derived from the notion of cyclical upgrading popularised by Arthur Okun and others in the 1960s and early 1970s. A vast body of literature describes the manner in which the labour market adjusts to the business cycle (see Reder, 1955; Wallich, 1956; Wachter, 1970; Okun, 1973; Thurow, 1975; Vroman, 1978). The literature also ties in with some versions of segmented labour market theory. Together they provide the basis of a theory of cyclical upgrading, whereby disadvantaged groups in the economy achieve upward mobility as a result of higher economic activity.

Two major questions are investigated in this paper:

- How do labour force participation rates of different age and gender groups behave over the economic cycle?
- For a given arbitrary full employment level (in this paper we use a 2 per unemployment rate), what is the potential employment levels for groups and the economy in total, and how are the employment gaps (defined as the difference between potential and actual employment) distributed across demographic groups?[2]

From the viewpoint of upgrading, a cyclical rise in labour force participation (indicating that the discouraged worker effect is dominant) provides marginal workers with the chance to share in the benefits of the higher output and employment. Workers who enter the labour force only when they assess the probability of them gaining work has increased are often termed - *hidden unemployed*. The literature has traditionally indicated that teenagers and to lesser extent women exhibit the largest swings in labour force participation and are therefore more prone to being found among the hidden unemployed in a downturn.

In this paper we will explore how these groups have fared in the long growth phase that the Australian economy has experienced since 1991.

The paper finds that hidden unemployment remains a significant problem in Australia despite the long period of economic expansion since the early 1990s. It took nearly 15

years of expansion to wipe out the hidden unemployment that had occurred during the two preceding downturns (1982 and 1991). In Australia, the official unemployment rate in May 2007 was 4.3 per cent. Taking into account the estimated hidden unemployment in the same quarter, the adjusted unemployment rate (calculated by expressing the sum of hidden unemployment and recorded unemployment as a percentage of the potential labour force) would be 6.4 per cent. If we add the latest estimates of underemployment to this figure then we would get a labour underutilisation rate in May2007 of around 9.3 per cent.

This gives a significantly different picture of the economy which the politicians are claiming is at full employment. Ignoring the underemployment, if we wanted to get the official rate of unemployment down to 2 per cent then we would have to increase employment by 478 thousand 4.6 per cent to allow for the increase in labour force participation that would result. That tells us that we are a long way from achieving full employment despite the rhetoric from the politicians.

Section 2 outlines the method used to estimate cyclical participation effects and then compute estimates of hidden unemployment. Section 3 generates estimates of hidden unemployment for Australia. Section 4 computes the labour underutilisation rates that are implied by these estimates of hidden unemployment. Concluding remarks follow.

2. Cyclical participation effects and hidden unemployment

In this section, we estimate the various demographic labour force participation responses over the business cycle and use these estimates to calculate hidden unemployment for each demographic group. The first issue concerns the derivation of a 'full-employment' labour force, which will serve as a benchmark upon which comparisons with the actual cyclically sensitive labour force are based.

Trend extrapolation is a popular method of deriving a benchmark labour force. An estimated trend is combined with an arbitrary full employment level of a variable designed to measure the cycle and the regression simulated to yield labour force estimates at full employment (for example, Simler and Tella, 1968; Gordon, 1971). Typically, linear trend functions are fitted and the simulated results are often unrealistic. Alternatively, some studies have chosen an arbitrary point in time as a full employment observation, and then simply projected a trend from that point to the end of the sample on the assumption that the long-term rate of GDP growth and its relationship to the labour market was stable over the sample period (for example, Stricker and Sheehan, 1981).

We use another approach first developed by Perry (1971). We begin with a set of age-gender regressions estimating labour force participation rates on cyclical and trend factors. The models seek adequate representations of the movements in terms of secular filters and cyclical filters rather than presenting structural explanations for the complex behaviour. The econometric model of labour force participation is

$$(1) \qquad (LFPR_i)_t = \alpha + \beta NPOP_t + \phi T + \sum_{j=1}^{3} \delta_i S_i + + \varepsilon_t$$

where $LFPR_i = (L_i / POP_i)$ and is the labour force participation rate of the i^{th} age-gender group defined as the labour force divided by the total civilian population for that

particular group; *NPOP* is non-farm total employment divided by the civilian population between 15-64 years, *T* is a linear time trend, *S* are seasonal dummy variables and ε_t is a stochastic error term. The trend term was included to add precision to the cyclical coefficient on the *NPOP* variable.

The β coefficient measures the degree of cyclical sensitivity of the labour participation rate. The participation gap, being the extra labour force participation that would be forthcoming if the economy was at the "full employment" level of the *NPOP*, was calculated by multiplying the β coefficient by the deviation from this full employment *NPOP* in each period. The calculation of the participation gaps uses this expression

$$PRGAP_i = \beta(NPOP^{FN} - NPOP_i) \tag{2}$$

where $PRGAP_i$ is the participation rate gap for the i^{th} age-gender group, $NPOP^{FN}$ is the employment-population ratio at full employment, assuming some arbitrary benchmark unemployment rate as full employment, and $NPOP_i$ is the current employment-population ratio.

PRGAP thus measures the incremental variation in the relevant participation rate, which would occur if the economy moved from its current level of activity to the defined full employment level of activity.

The process of deriving potential labour forces for each demographic group begins with the regression estimates reported in Tables 1 and 2. The participation gap for each group is derived by multiplying β times the difference between the full-employment employment population ratio and the actual value of the employment-population ratio. The full-employment population ratio was calculated using the formula

$$N^* = \frac{(1-x)(L-\beta N)}{1-\beta(1-x)} \tag{3}$$

Where N^* is the full-employment level of employment at an unemployment rate equal to *x*, *L* is the actual labour force, *N* is the actual level of employment, and β measures the cyclical sensitivity of the labour force, as before (see Appendix for full derivation). The full employment employment-population ratio is then calculated using N^* and the actual civilian population. The estimation of β was based on a regression like Equation (1) except that the aggregate labour force was used as the dependent variable.

Once the employment gap is calculated, participation gaps for each age-gender group are calculated using Equation (2). The hidden unemployment for each age-gender group was then calculated as the participation gap times the appropriate civilian population.

This method is arguably superior to the trend simulation method, especially in times when participation rates exhibit trend increases quite unlike previous periods. In that case, trend simulation would seriously underestimate or overestimate the potential labour force. Using a method that is more sourced in terms of the actual data variations; the gap approach is better able to accommodate the strong trend variations in the labour force participation rates over time.

3. Hidden Unemployment in Australia

3.1 Participation rate regressions

Table 1 shows the male regressions for Australia. The labour force participation rates of teenage males and males above 55 year of age are sensitive in varying degrees to the business cycle. For prime-age males (25-54 years of age) there is significantly smaller participation rate responsiveness detected. All male participation rates show a downward secular movement over the sample period used. The results are in accord with the prevailing wisdom.

Table 1 Male participation rate regressions by age, Australia, 1978(3) to 2007(2)

	15-19	20-24	25-34	35-44	45-54	55-59	60-64	> 65
Constant	-6.57	74.00	88.69	88.57	77.00	11.47	-5.30	-6.88
	(0.61)	(12.7)	(22.5)	(21.85)	(13.2)	(0.82)	(0.33)	(1.20)
Trend	-0.12	-0.08	-0.05	-0.05	-0.04	-0.09	0.08	0.03
	(6.39)	(11.5)	(11.8)	(11.8)	(3.97)	(2.94)	(1.35)	(1.18)
NPOP	1.27	0.33	0.14	0.14	0.25	1.20	0.83	0.26
	(6.53)	(3.11)	(1.95)	(1.86)	(2.36)	(4.71)	(2.87)	(2.42)
R^2	0.94	0.96	0.97	0.98	0.94	0.94	0.95	0.92
%s.e.*	1.17	0.53	0.28	0.29	0.38	1.04	1.69	3.10
DW	1.99	2.03	2.00	1.96	1.93	2.00	1.92	2.02

Note: All regressions used seasonal dummy variables. All regressions were estimated using an exact Maximum Likelihood Estimator with AR(2) disturbances (see Pesaran, 1972). The figures in parentheses are *t*-statistics. * the % s.e. is the standard error as a percentage of the mean of the dependent variable.

Table 2 shows the female regressions, which are in contrast to the male results. The participation rates for every female age group demonstrate cyclical sensitivity, with females aged between 35 and 54 showing the most responsiveness. The younger females (15-44) exhibit negative participation trends (notwithstanding the fact that the estimates for the 20-24, 25-34 and 35-44 year olds are statistically insignificant) while the older females exhibit a rising secular trend (again noting the marginal statistical significance).

The participation rates of young females are less sensitive to the cycle relative to their teenage male counterparts. On the contrary, older males (55-59 and 60-64 year groups) exhibit much stronger sensitivity than their female counterparts. Overall, the results support the net discouraged worker hypothesis.

Table 2 Female participation rate regressions by age, Australia, 1978(3) to 2007(2)

	15-19	20-24	25-34	35-44	45-54	55-59	60-64	> 65
Constant	-3.10	37.23	57.07	37.20	-3.76	-3.51	-105.46	-9.62
	(0.25)	(3.36)	(0.52)	(1.08)	(0.36)	(0.25)	(0.23)	(3.10)
Trend	-0.04	-0.04	-0.11	-0.05	0.22	0.30	0.82	0.01
	(2.36)	(0.70)	(0.22)	(0.21)	(4.99)	(8.78)	(0.47)	(1.94)
NPOP	1.12	0.75	0.62	0.74	0.91	0.41	0.14	0.21
	(5.04)	(4.18)	(4.17)	(4.32)	(4.84)	(1.57)	(0.62)	(3.64)
R^2	0.86	0.96	1.00	0.99	1.00	0.99	0.99	0.93
%s.e.*	1.16	0.69	0.47	0.52	0.50	1.09	1.42	1.66
DW	2.00	2.08	1.96	1.95	1.87	1.99	1.93	1.86

Note: All regressions used seasonal dummy variables. All regressions were estimated using an exact Maximum Likelihood Estimator with AR(2) disturbances (see Pesaran, 1972). The figures in parentheses are *t*-statistics. * the % s.e. is the standard error as a percentage of the mean of the dependent variable.

3.2 Hidden unemployment estimates

Table 3 compares the actual and hidden unemployment for each age-gender group in 1991 (a recession year) and 2007 (a boom year). A comparison with Mitchell (2001) reveals that our estimates of hidden unemployment are now higher because the cyclical sensitivities of participation rates are generally estimated to be higher in the larger data sample. The comparison provides some indication of the changes that occur over a business cycle and the proportional impacts on demographic groups. In September 1991, the aggregate unemployment rate was 10.0 per cent (seasonally adjusted) and has slowly declined over the growth phase and in September 2007 was 4.2 per cent. The improved circumstances show up in lower total hidden unemployment (820.7 thousand in 1991 compared to 315.6 thousand in 2007). The gender shares of hidden unemployment have remained stable over the expansion despite females now accounting for a higher percentage of recorded unemployment (40.0 per cent in 1991 to 49.9 per cent in 2007).

It is also clear from Table 3 that women's underutilisation is manifested proportionately more in terms of hidden unemployment while men have a higher tendency to remain in the labour force as unemployed. While official unemployment has declined from 812.6 thousand to 482.2 thousand between 1991 and 2007, teenagers and older workers have seen their relative position deteriorate. Teenage males and females, as a group, have experienced a worsening in terms of their share of unemployment but this partially reflects their increased participation (and lower hidden unemployment). It is interesting to note that the position of 45-54 year old males has deteriorated over the period of growth from 1993. Their relative unemployment and hidden unemployment has risen since 1993. The other significant change is the sharp deterioration in unemployment share for prime-

age females (25-54 years age group). The results confirm that the benefits of expansion in terms of increased labour force participation and lower unemployment are not distributed evenly across all demographic groups.

Table 3 Actual and hidden unemployment by age-gender, Australia, 1991 and 2007 (thousands and percentage shares)

	Males				Females				Total			
	UN	% of Total	HU	% of Total	UN	% of Total	HU	% of Total	UN	% of Total	HU	% of Total
1991												
15-19	90.6	11.2	77.1	13.3	80.2	9.9	64.8	11.2	170.8	21.0	141.9	24.5
20-24	96.1	11.8	20.1	3.5	67.6	8.3	45.2	7.8	163.7	20.1	65.2	11.3
25-34	125.9	15.5	16.9	2.9	78.9	9.7	76.5	13.2	204.9	25.2	93.4	16.1
35-44	83.7	10.3	16.9	2.9	56.9	7.0	84.2	14.5	140.5	17.3	101.1	17.5
45-54	47.7	5.9	21.1	3.6	33.8	4.2	73.7	12.7	81.5	10.0	94.7	16.4
55-59	22.6	2.8	38.6	6.7	6.0	0.7	12.9	2.2	28.6	3.5	51.6	8.9
60-64	21.3	2.6	26.7	4.6	1.2	0.2	4.6	0.8	22.6	2.8	31.2	5.4
Total	**488.0**	**60.0**	**217.4**	**37.5**	**324.7**	**40.0**	**361.8**	**62.5**	**812.6**	**100.0**	**579.1**	**100.0**
2007 (a)												
15-19	57.8	12.0	25.4	11.4	56.8	11.8	21.3	9.6	114.6	23.8	46.8	21.0
20-24	41.5	8.6	6.8	3.0	35.1	7.3	14.8	6.6	76.6	15.9	21.6	9.7
25-34	49.7	10.3	5.5	2.5	49.8	10.3	24.2	10.9	99.5	20.6	29.7	13.3
35-44	37.0	7.7	5.5	2.5	46.0	9.5	30.9	13.9	82.9	17.2	36.4	16.3
45-54	32.7	6.8	9.7	4.4	37.3	7.7	36.2	16.3	70.0	14.5	45.9	20.6
55-59	13.7	2.8	21.0	9.4	11.1	2.3	7.2	3.2	24.8	5.1	28.2	12.7
60-64	9.2	1.9	12.1	5.4	4.5	0.9	2.0	0.9	13.7	2.8	14.1	6.3
Total	**241.6**	**50.1**	**85.9**	**38.6**	**240.6**	**49.9**	**136.8**	**61.4**	**482.2**	**100.0**	**222.7**	**100.0**

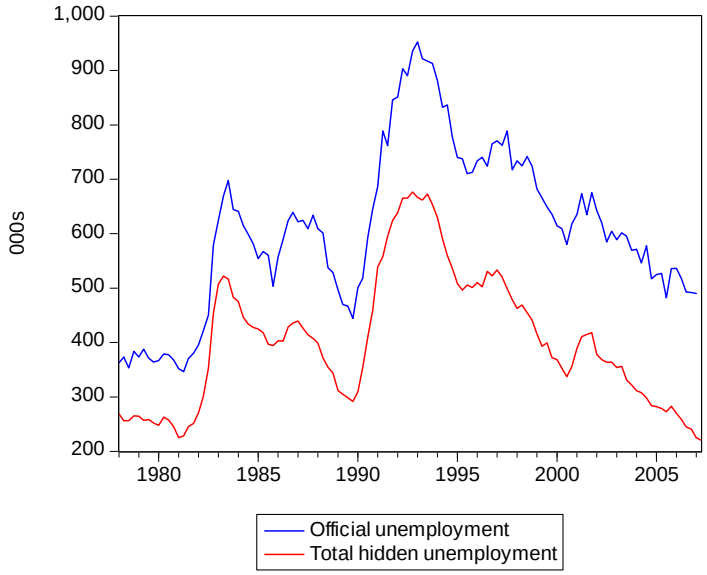
Source: ABS Labour Force, Australia, Author's own estimates. (a) Average to 2007.

Figure 1 charts the course of total hidden unemployment in Australia since 1978 and also reports hidden unemployment for males and females separately. The cyclical nature of hidden unemployment is clearly shown with two local peaks coinciding with the two major downturns in economic activity over this period. The other disturbing point that emerges from the chart is that the long recovery period since the 1991 crash has taken until late 2005 to get hidden unemployment down to the levels that were apparent in 1978 (268 thousand). The sharp asymmetries in the time series data for hidden unemployment mirror those found in the behaviour of official unemployment and remind us of the huge costs that are incurred as a result of allowing the economy to plunge into recession.

Figure 2 decomposes the total estimated hidden unemployment into male and female aggregates. Consistent with the results in Table 3, females are more prone to hidden unemployment than males, probably because they still face more constraints on their time

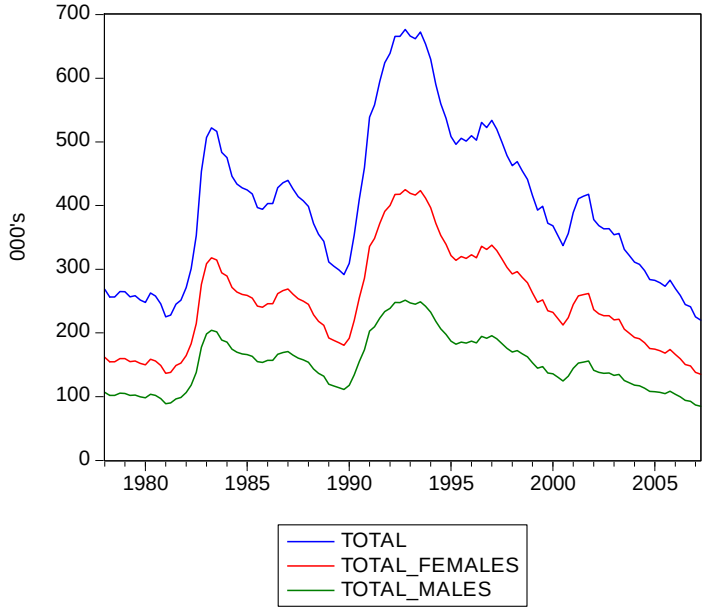
(combining work and home responsibilities), which means that women's work, in part, remains instrumental. The gap between females and males also widens when unemployment peaks but has contracted again over the expansion.

Figure 1 Measured unemployment and hidden unemployment, Australia, 1978-2007, thousands



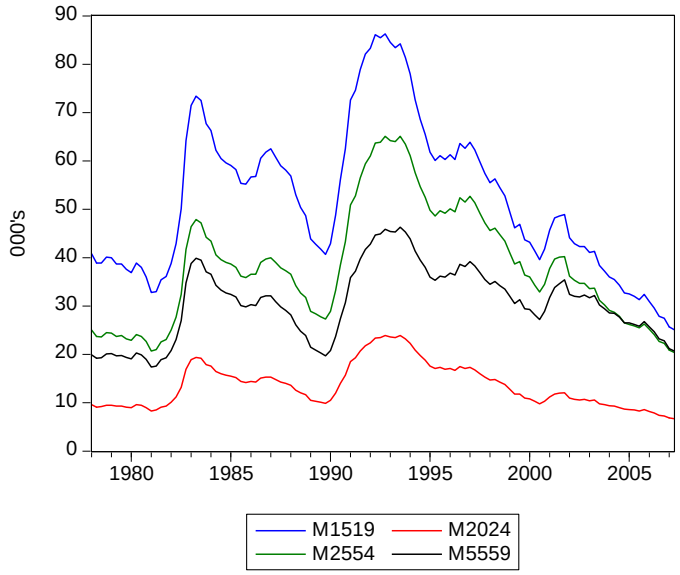
Source: Author's estimates

Figure 2 Hidden unemployment by gender, Australia, 1978-2007, thousands

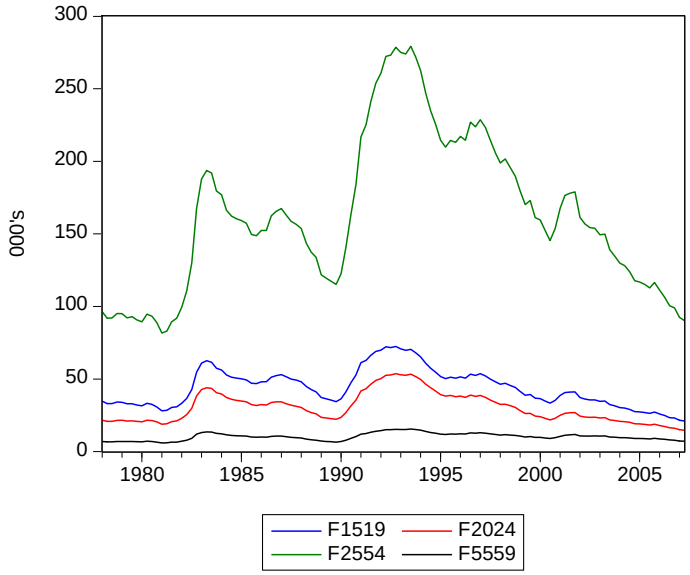


Source: Author's estimates.

Figure 3 Male and female hidden unemployment, 1978 to 2007, thousands



(a) Males



(b) Females

Source: Author's estimates.

It is instructive to consider the incidence of hidden unemployment across the age and gender groups. Once we decompose the gender aggregates by age, an interesting picture emerges. Figure 3 plots the estimates of hidden unemployment for males in 4 age categories: teenagers (15-19 years); 20-24 year olds; prime-age workers (25-54 year); and older workers (55-64 years). The aggregations were guided by similar behaviour within the disaggregated groups that comprise the categories shown. Hidden unemployment is

worst for teenagers. However, what is disturbing in these new estimates is that the previously immune prime-age group now experience increased levels of hidden unemployment than previously estimated (compare with Mitchell, 2001). This is due to the rising cyclical sensitivity of prime-age male participation rates.

4. Implications for total labour underutilisation

How would we evaluate the claims by politicians in the current federal election campaign that Australia is close to full employment? Table 4 reports the recent estimates of labour underutilisation using the broad indicators published by the Centre of Full Employment and Equity (CLMI, 2007) taking into account the new estimates of hidden unemployment produced in this paper. The CLMI adds official unemployment to percentage estimates of hidden unemployment and underemployment to produce a broad measure of labour underutilisation.

The results confirm that the well known rule of thumb of "doubling the official unemployment rate" to get a broad measure of the extent of labour underutilisation is a useful approximation.

Table 4 Labour underutilisation: official unemployment, hidden unemployment and underemployment, Australia, various years per cent.

Year	U3	CU4	CU7	CU8
1980	6.1	9.8	7.5	11.1
1985	8.3	13.5	10.0	15.2
1990	7.0	11.7	9.6	14.2
1995	8.2	13.5	11.8	17.1
2000	6.3	9.8	9.5	13.1
2005	5.1	7.6	8.1	10.7
2006	4.8	7.1	7.7	10.0
2007	4.4	6.4	7.3	9.3

Source: ABS Labour Force, Australia and CLMI (2007). Estimate for 2007 is the average for the first two quarters. U3 is the official unemployment rate published by the ABS. CU4 is the total unemployment plus hidden unemployment as a percentage of labour force plus hidden unemployment. CU7 is U3 plus the CLMI estimate of underemployment. CU8 is U3 plus hidden unemployment plus underemployment.

4. Conclusion

The estimates of hidden unemployment in Australia indicate that many more jobs have to be created to reduce the true slack in the labour market than is indicated by the unemployment rate. Unemployment is only the tip of the iceberg.

The reality for Australia is that the economy continues to waste 9.3 per cent of its available labour resources even as we enter an inflationary phase with skills shortages evident in some sectors. Taken together, the persistent labour underutilisation and the emergence of skill bottlenecks signal a major failure in economic management by the federal government. If the Government had have used the windfall gains from the

corporate tax revenue in recent years to invest in a national skills development framework then both problems (labour underutilisation and skills shortage) could have been alleviated.

Appendix

The estimates of the employment gap requires an assumption to made about the full employment unemployment rate, which then defines the potential employment-population ratio, $NPOP^{FN}$ and implicitly the potential labour force, L^*. Expressions can be derived for these unknown aggregates.

We define the potential labour force as

(A.1) $$L^* = L + H$$

where L is the actual labour force and H is the estimated hidden unemployment.

(A.2) $$H = \beta\left(NPOP^{FN} - NPOP\right)$$

Hidden unemployment is defined as the cyclical sensitivity of the labour force participation rate, β times the employment gap.

Substituting and re-arranging Equation (A.1) gives

(A.3) $$L^* = L + \beta N^* - \beta N$$

where N^* is the level of employment at full employment and N is the actual level of employment in any period.

Define the target full employment unemployment rate, x as

(A.4) $$x = \left(1 - \frac{N^*}{L^*}\right)$$

Re-arranging Equation (A.4) and substituting for the potential labour force generates an expression for the potential employment level

(A.5) $$N^* = \frac{(1-x)(L - \beta N)}{1 - \beta(1-x)}$$

Substituting back into Equation (A.3) provides a straightforward expression for the potential labour force.

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Endnotes

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[2] Mitchell (1998) outlines a model of the economy, which allows the unemployment rate to be reduced to some low frictional figure and so 2 per cent is a realistic full employment unemployment rate.