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The changing nature of inflation control in Australia

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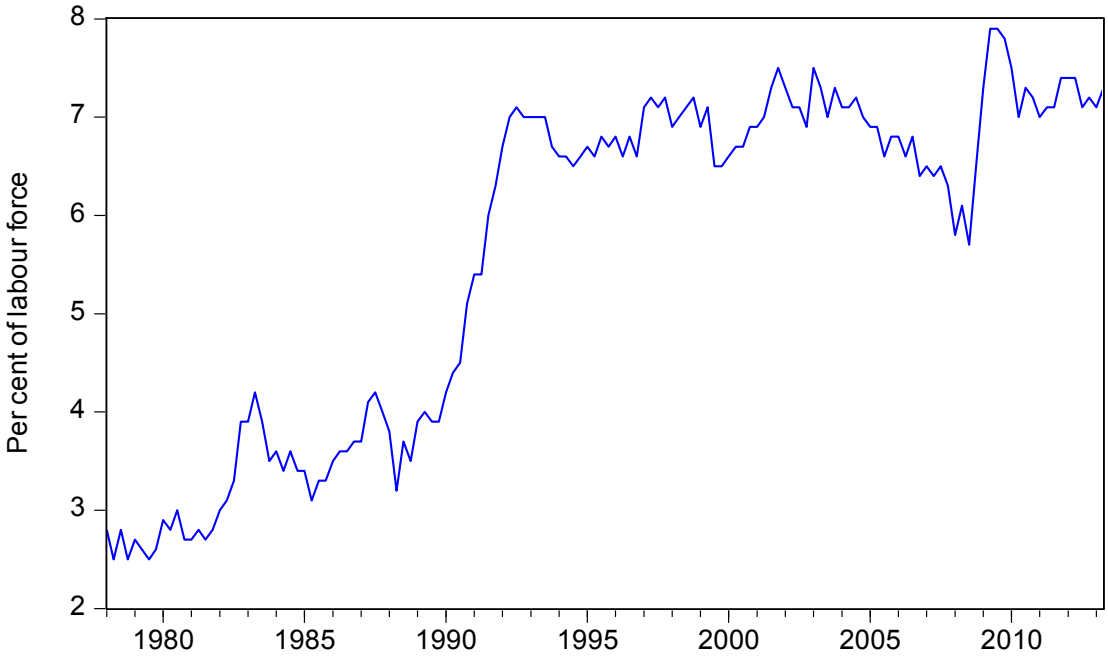
1. Introduction

It is clear that the official unemployment data significantly underestimates the extent of labour market slack in the Australian labour market. Since the 1991 recession, underemployment has risen dramatically in Australia, a trend common in most OECD countries. Figure 1 shows the evolution of underemployment in Australia since 1978.

Figure 1 Underemployment in Australia, 1978Q1 to 2013Q2, per cent



Source: Australian Bureau of Statistics, Labour Force.

The defining event in this evolution was the major recession in 1991 which saw an acceleration of part-time work as full-time jobs were scrapped but moreover an increasing proportion of the part-time offering sub-optimal hours of work. The sharp spike in 2009 was thwarted by the fiscal stimulus that the federal government introduced early in that year. However, a new level appears to have been established as the Australian labour market has endured very low employment growth since 2011. This growth has been biased towards part-time work.

Table 1 Changes in unemployment, underemployment, and Broad underutilisation rate, selected periods, percentage points

Period	UR points	UE points	Broad points
Dec 1989-Dec 1992	5.2	3.1	8.3
Dec 1992-Feb 2008	-7.0	-1.2	-8.2
Feb 2008-Jun 2013	1.6	1.5	3.0

Table 1 shows the percentage point changes in unemployment (UR), underemployment (UE), and the broad underutilisation rate (the sum of unemployment and underemployment), for selected periods. The periods represent the low-point unemployment rate (5.9 per cent in December 1989) to the peak in the 1991 recession (11.1 per cent in December 1991); then to the low-point unemployment rate (4.1 per cent in February 2008); then to the end of the current sample. In December

1989, the underemployment rate was 3.9 per cent and the broad underutilisation rate was 9.8 per cent.

In the growth phase following the 1991 recession to the low-point of the next cycle (February 2008), the Australian labour market essentially "broke even" in terms of broad labour underutilisation. However, the reduction in unemployment following the peak rate in December 1992 exceeded the rise prior to the peak rate, but underemployment behaved more persistently. In the current period (since February 2008), unemployment and underemployment have moved upwards in lock step.

Mitchell and Muysken (2008b) analysed why inflation fell in Australia in the period leading up to the financial crisis despite sustained and strong employment growth and falling unemployment. The underlying proposition outlined was that the rise in underemployment since the early 1990s changed the wage setting process in the labour market and employers use this slack as a means of disciplining wages growth and adjusting to the flux and uncertainty of the business cycle. They concluded that the Phillips curve relationship had altered and within-firm slack had become an additional disciplinary force on inflation.

While the standard Phillips curve approach predicts a statistically significant, negative coefficient on the official unemployment rate (a proxy for excess demand), the hysteresis model suggests that state dependence is positively related to unemployment duration and at some point the long-term unemployed cease to exert any threat to those currently employed. Consequently, they do not discipline the wage demands of those in work and do not influence inflation. The hidden unemployed are even more distant from the wage setting process. So we might expect that short-term unemployment is a better excess demand proxy in the inflation adjustment function.

While the short-term unemployed may be proximate enough to the wage setting process to influence price movements, there is another significant and even more proximate source of surplus labour available to employers to condition wage bargaining – the underemployed. The underemployed represent an untapped pool of potential working hours that can be clearly redistributed among a smaller pool of persons in a relatively costless fashion if employers wish. It is thus reasonable to hypothesise that the underemployed pose a viable threat to those in full-time work who might be better placed to set the wage norms in the economy.

Thus *within-firm* excess supply of labour factors may now exert a significant disciplining force to the wage determination process in addition to, or as an alternative, to the traditional *external* excess supply forces such as the unemployment rate (see Watts and Mitchell, 1990). It is plausible that while the short-term unemployed may still pose a more latent threat than the long-term unemployed, the underemployed are also likely to be considered an effective surplus labour pool. In that case we might expect downward pressure on price inflation to emerge from both sources of excess labour.

Subsequently, Mitchell and Muysken (2010) developed a model to help understand how firms adjust full- and part-time employment to meet the flux and uncertainty of the demand conditions they face. The paper applied the model to the Australian labour market and found that there were disproportionate declines in full-time employment during the recessions in 1982, 1992 and 2009 as a result of the decline in aggregate demand. However, there was also evidence that part of the decline in full-time employment was related to firms replacing full-time jobs with part-time

employment. Further, each recession induced an increasingly stronger underemployment of labour, manifesting itself in an increasing share of part-time workers wanting to work more hours. The 1991 recession, Australia's worst since the Great Depression, was notable in this regard.

In this paper, we extend both papers using data to June 2013, which incorporates the adjustments that have been associated with the financial crisis and subsequent fiscal stimulus and fiscal retrenchment. We show that low unemployment does not indicate that the economy is close to full capacity. This also alters the concept of fiscal space, which we define as the spare real productivity capacity at any point in time, rather than use meaningless financial ratios relating to the size of the deficit or the public debt ratio.

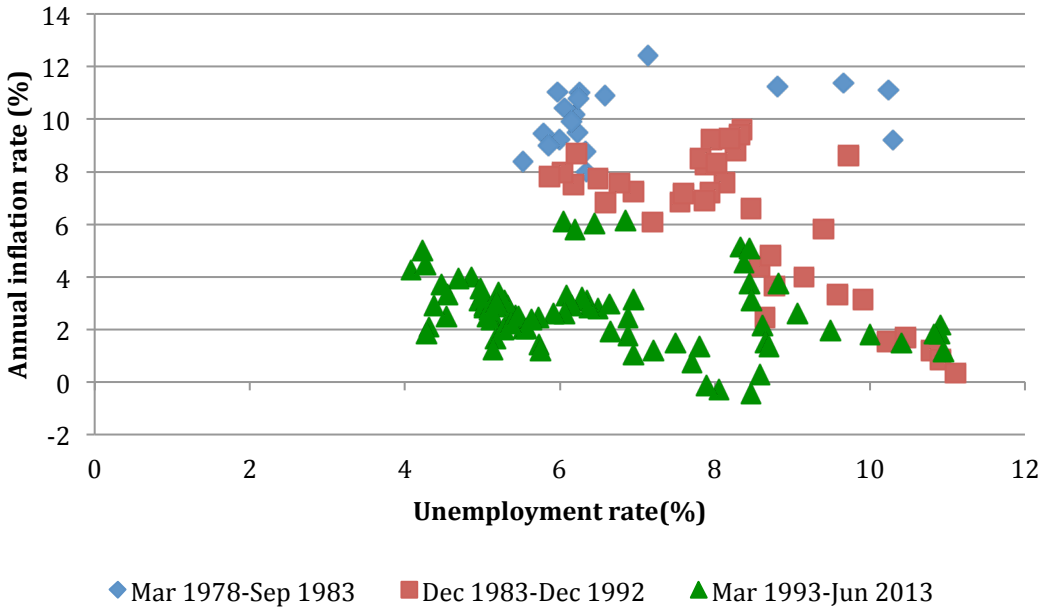
The paper is laid out as follows. Section 2 outlines the stylised facts of labour underutilisation and inflation in Australia since 1978. It traces the rise in underemployment in Australia to the dynamics that accompanied the 1991 recession, which also saw the relationship between unemployment and underemployment shift, such that higher rates of the latter were experienced at each unemployment rate. Section 3 discusses the conceptual way in which unemployment and underemployment can act as disciplining forces to attenuate inflation with the aim of developing hypotheses that can be subjected to further empirical scrutiny. Section 4 outlines the econometric specific used and presents the results. The formal econometric evidence support the proposition that underemployment is a significant negative influence on inflation. It operates independently of unemployment. Concluding remarks follow.

2. Stylised facts – labour underutilisation and inflation

Figure 2 shows the relationship between the unemployment rate and inflation in Australia between 1978Q1 and 2013Q2. The sample is split into three sub-samples: (a) March 1978 to September 1983, defined by the starting point of the most recent consistent Labour Force data (February 1978) and the peak unemployment rate during the 1982 recession (September 1983); (b) December 1983 to September 1993, defined by the recovery phase in the 1980s to the unemployment peak associated with the 1991 recession (December 1992); and (c) March 1993 to June 2013.

The relationship between the annual inflation rate and the unemployment rate clearly shifted inwards and flattened after the 1991 recession. Thus, in the recovery period following the 1991 recession, the unemployment rate and the inflation rate fell together, albeit at different rates. This duality has been explained, in part, by the fall in inflationary expectations. The 1991 recession was particularly severe and led to a sharp drop in the annual inflation rate and with it a decline in survey-based inflationary expectations. However, as we noted above, the other major labour market development during the 1991 recession was the sharp increase and then persistence of high underemployment as firms shed full-time jobs, and, as the recovery got underway, began to replace the full-time jobs with part-time opportunities. Even though employment growth gathered pace in the late 1990s, a majority of those jobs in Australia were part-time. Further, the part-time jobs were increasingly of a casual nature.

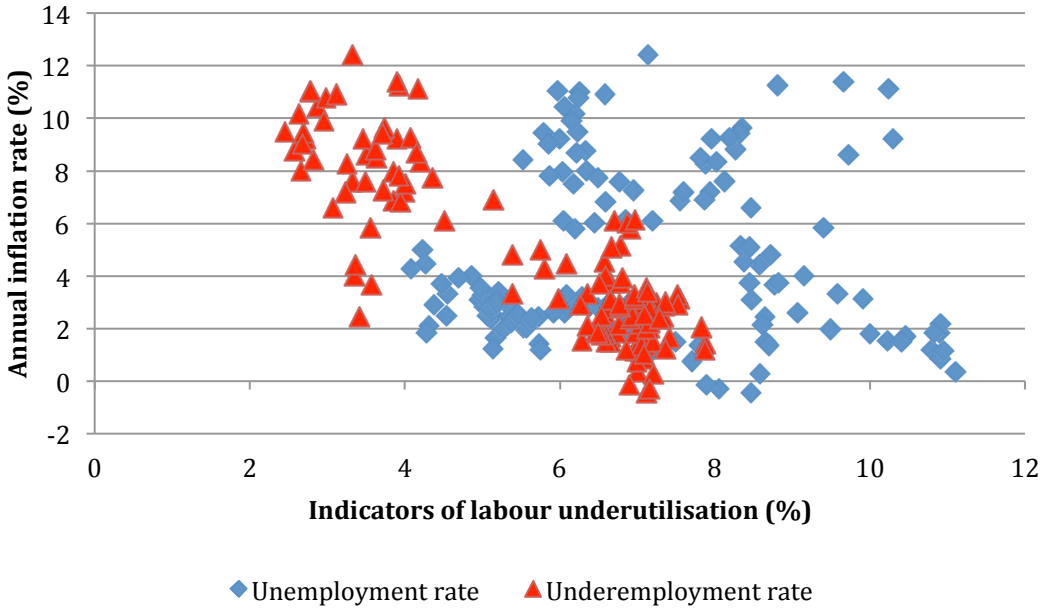
Figure 2 Inflation and unemployment, Australia, 1978Q1-2013Q2, per cent



Source: Australian Bureau of Statistics, Consumer Price Index and Labour Force.

Figure 3 shows the relationship between unemployment, underemployment and inflation from 1978Q1 to 2013Q3 to 2012. The data suggests the negative relationship between inflation and underemployment is stronger than the relationship between inflation and unemployment. We examine this hypothesis more formally in Section 3.

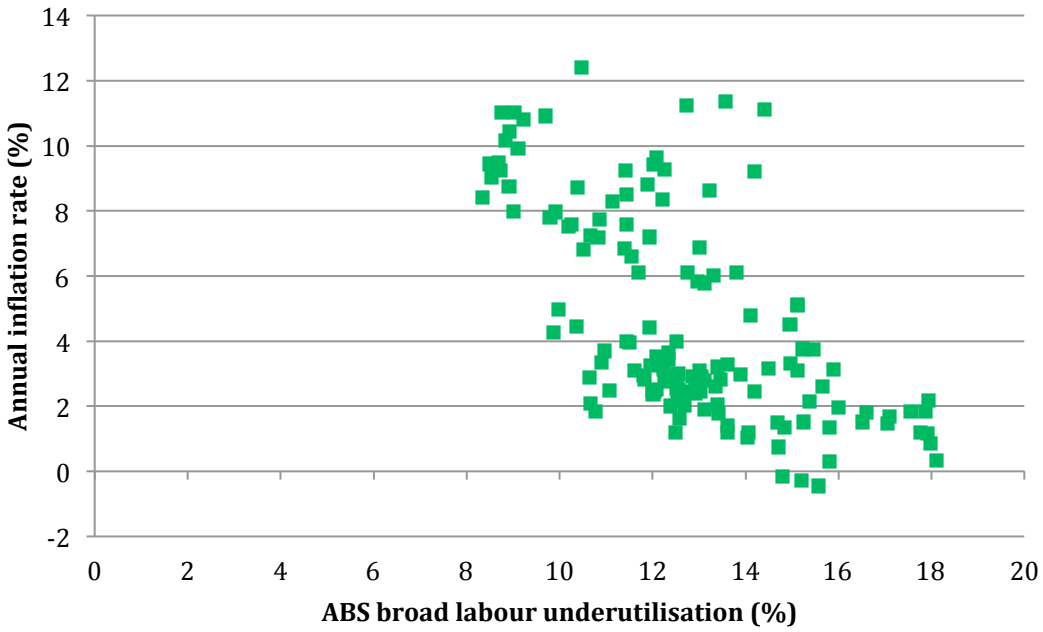
Figure 3 Inflation, unemployment and underemployment, Australia, 1978Q1-2013Q2, per cent



Source: Australian Bureau of Statistics, Consumer Price Index and Labour Force.

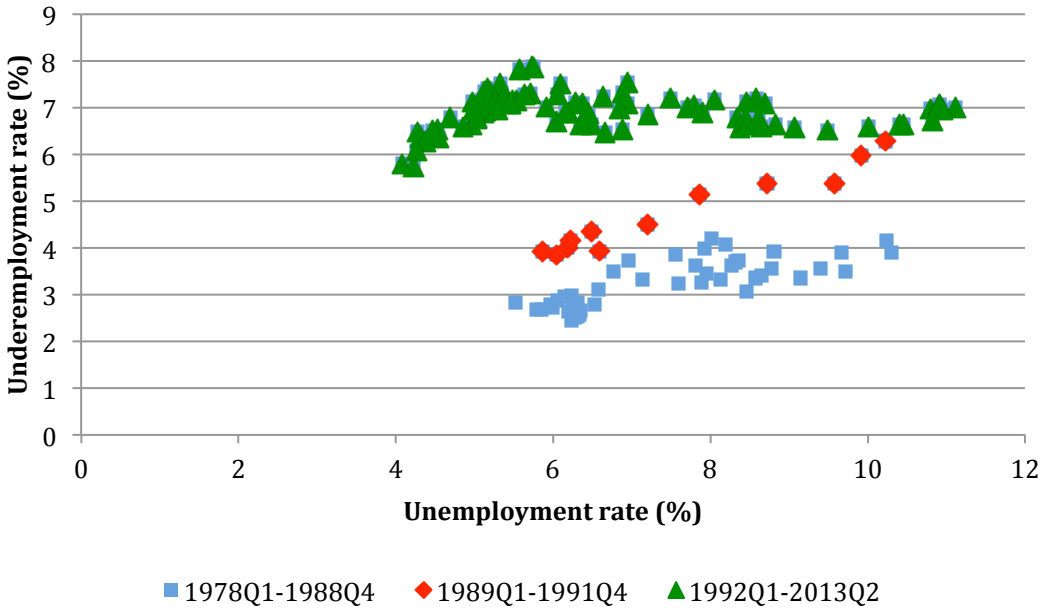
The inclusion of underemployment in the Phillips curve specification suggests that shifts in the way the labour market operates – with more casualised work and underemployment – have been significant in explaining the impact of the labour market on wage inflation and general price level inflation.

Figure 4 Inflation and broad labour underutilistation, Australia, 1978Q1-2013Q2, per cent



Source: Australian Bureau of Statistics, Consumer Price Index and Labour Force.

Figure 5 Unemployment and underemployment rates, Australia, 1978Q1 to 2013Q2, per cent



Source: ABS Labour Force.

Figure 5 reinforces the view that the 1991 recession was decisive in explaining the major increase in underemployment as a significant component of labour underutilisation in Australia. During the 1982 recession, as the official unemployment rate increased, underemployment rose more or less proportionately, which suggests that there was no structural shift in the "hours-quality" of part-time work during this period. The break in the relationship occurred as the 1991 recession unfolded. As the economy improved slowly over the 1990s and into the current century, the relationship between the two major sources of labour underutilisation resumed its more or less proportional nature.

3. Labour underutilisation and the inflation process

There are several interesting testable hypotheses that link the excess labour supply measures (both within-firm and external) to the inflation process and take into account the shifts in the labour market outlined in Section 2.

First, the standard Phillips curve model predicts a significant negative coefficient on the official unemployment rate (a proxy for excess demand) and nominal homogeneity (to derive a unique NAIRU). Given homogeneity of labour is assumed, we might expect the broader measures of underutilisation to have a stronger negative effect on inflation if this model was meaningful.

Second, the hysteresis model suggests that state dependence is positively related to unemployment duration and at some point the long-term unemployed cease to exert any threat to those currently employed. Consequently, they do not discipline the wage demands of those in work and do not influence inflation. The hidden unemployed are even more distant from the wage setting process. So we might expect that short-term unemployment is a better excess demand proxy in the inflation adjustment function. If the long-term unemployed do not place pressure on inflation, then, at best only a unique level of short-term unemployment consistent with stable inflation may exist. The uniqueness of this level depends on other aspects of the inflationary process, in particular whether the estimated models are nominally homogenous and whether hysteresis is present in the short-term unemployment rate or not (see Fair, 2000; Mitchell, 2001a).

Third, while the short-term unemployed may be proximate enough to the wage setting process to influence price movements, there is another significant and even more proximate source of surplus labour available to employers to condition wage bargaining – the underemployed. This pool of hours can be clearly redistributed among a smaller pool of persons in a relatively costless fashion if employers wish. It is thus reasonable to hypothesise that the underemployed pose a viable threat to those in full-time work who might be better placed to set the wage norms in the economy. In that case we might expect downward pressure on price inflation to emerge from both sources of excess labour.

This raises an interesting parallel to another aspect of the hysteresis hypothesis. Ball (1999: 230) argues that "hysteresis is reversible: a demand expansion can reduce the NAIRU" because "they … [employers] … would rather pay the training costs than leave the jobs vacant." A similar observation underpins the hysteresis models in Mitchell (1987, 1993). In a high-pressure economy, firms lower hiring standards and address the skill deficiencies of the long-term unemployed by offering on-the-job training. Mitchell and Muysken (2002a) demonstrate using gross flows data that when employers access both the short-term and long-term unemployed pools in an

expansion yet the long-term unemployed do not exert much influence on the inflation process. They argue that the labour market is structured in a way that increasing low-skill, low-pay fractional (part-time) jobs are being created which overcome the re-employment barriers facing the long-term unemployed. The 'primary' and 'secondary' jobs are functionally related (the secondary jobs allow firms to make adjustments to demand fluctuations, for example, without disturbing the employment structure of the primary labour market). Thus when employment growth is strong enough both pools of unemployed find employment opportunities. So while the long-term unemployed do have employment opportunities in an expansion they are in jobs that do not set the wage norms. However, once they become re-attached to the employed labour force, they may influence wage setting via underemployment, given that they will often only have part-time jobs available to them. As part-timers with some in-house training they become an entirely different proposition than when they were facing skill atrophy and motivation loss after more than 12 months without work.

This discussion leads to two major hypotheses:

1. That the short-term unemployment rate (STUR) constrains the annual inflation rate more than the overall unemployment rate (UR)? By implication we expect the long-term unemployment rate (LTUR) to be a statistically insignificant influence on the annual inflation rate.
2. That the degree of underemployment (UE) exerts a separate negative impact on the inflation process.

4. Model specification and results

4.1 Model specification

Following Mitchell and Muysken (2008b), we use a general autoregressive-distributed lag Phillips curve representation like:

$$(1) \qquad \dot{p}_t = \alpha + \sum_{i=1}^{n} \delta_i \dot{p}_{t-i} + \sum_{i=0}^{m} \beta_i u_{t-i} + \sum_{i=0}^{q} \gamma_i z_{t-i} + \varepsilon_t$$

where $\dot{p}_t$ is the rate of inflation, u is the unemployment rate, z is a cost shock variable (like import price inflation, capital costs), and the ε is a white-noise error term.

The parameterisations of the excess demand variable that we consider are all assumed to be $I(0)$ variables given they are bounded and are:

(a) The official unemployment rate (*UR*). In each case (following Gruen *et al*, 1999) we tried four-quarter moving average representations of the underutilisation variable to match it with the annualised change in the dependent variable. The high persistence in the underutilisation series means the results are very similar and are not reported;

(b) The level of the short-term unemployment rate (*STUR*) defined by ABS as those unemployment for less than 52 weeks as a percentage of the total labour force;

(c) The level of underemployment (*UE*) is derived from the ABS quarterly underutilisation series; and

(d) The difference between the levels and the filtered trend derived using a Hodrick-Prescott filter. The variables created are *UR Gap* and *STUR Gap*. This construct is

now commonly used and has been referred to in papers by the OECD and others as a test of the TV-NAIRU hypothesis (Boone, 2000; see also Mitchell, 2001a for more detail). We examine the validity of this inference below.

Within a similar framework to Equation (1), Fair (2000), Mitchell (2001a), and Mitchell and Muysken (2002a, 2002b, 2008b) find evidence that the estimated Phillips curve does not exhibit dynamics consistent with a constant NAIRU. They use a simple homogeneity test based on the lagged inflation term(s). Connolly (2001) has suggested that if the dependent variable is specified in an annual change form, the inclusion of lagged dependent variable biases this test towards accepting the null (of homogeneity). In practical terms, this argument may only matter if the test result is close. Mitchell (1987, 2001a) and Connolly (2001) have both found that the NAIRU dynamics in Australia are clearly absent.

4.2 Results and discussion

We initially develop a Phillips curve model for Australia using 4 lags on the annualised inflation terms (*D4LP*) and import prices (*D4LPM*), the level of the unemployment rate, a dummy variable, *DGST* (defined as 1 in 2000:3 and zero otherwise) to take into account the introduction of the Goods and Services Tax system in Australia in July 2000. We also test other influences that have been mentioned in the literature, by including variables to capture the cost of capital, interest spread, and payroll taxes and the like (Phelps, 1994, Modigliani, 2000). The other variables were not significant in the final tested-down specification. Using standard unit root tests (ADF and KPSS) we find that the inflation and import price inflation series are $I(1)$ and that they co-integrate, meaning that we can use them in a regression with stationary variables like the underutilisation measures. Our analysis ignores any broader interaction between cointegration and the related error correction dynamics.

Sequential testing down from the general equation using different measures of the underutilisation variable yielded the results shown in Table 2. In each case, the dynamics were so close and the coefficient estimates for the other variables were highly stable that a common specification is employed to aid comparison. In general, the diagnostics of all equations were satisfactory apart from some evidence of serial correlation, which could reflect the four-quarter change specification. AR(1) and AR(4) corrections did not alter the estimates significantly in any equation. The results reported are the uncorrected estimates.

Equation (2.1) in Table 2 describes a typical Phillips curve using the aggregate unemployment rate (*UR*). The unemployment rate exerts a negative influence on the rate of inflation (-0.073). Equation 2.1 reports the tested down lagged structure with the current level of the unemployment rate. There is scope to simplify this specification given that the hypothesis of equal and opposite signs on D4PM and D4PM(-1) appears reasonable and would mean that it is the acceleration of annual import prices that impacted on the annual inflation rate. Given we are more interested in the excess supply variables we do not report the simplification which hardly alters the remaining coefficient values.

A Chow breakpoint test for stability (from 1989Q4, the peak prior to the 1991 recession) revealed that Equation (2.1) was unstable.

The added effect of the underemployment variable (*UE*) is depicted in Equation (2.2). It is statistically significant which indicates that it exerts negative influence on annual inflation. In Equation (2.3), the degree of negative pressure on inflation exerted by the

significant *STUR* is -0.146, substantially above that estimated for *UR*. When *UE* is added it is statistically significant (Equation 2.4). The instability identified in Equation (2.1) following the 1991 recession also disappears once the *UE* variable is added. It is clear that the instability was related to the omission of the important *UE* variable, which provides support for one of our key hypotheses.

Equations 2.5 to 2.8 utilise the gap specification for the excess demand variable. Mitchell and Muysken (2008a) argue that the NAIRU concept remains on shaky theoretical grounds. The original theory underpinning the NAIRU provides no guidance about its evolution although unspecified structural factors should be involved to remain faithful to that theory. In this theoretical void, econometricians use techniques that allow for a smooth evolution although there is no particular correspondence with any actual economic factors. Some authors assert that a Hodrick-Prescott filter through the actual series captures the TV-NAIRU (for example Boone, 2000 among many). Of-course, the Hodrick-Prescott filter merely tracks the underlying trend of the unemployment and follows it down just as surely as it follows it up. The unemployment rate is highly cyclical and the TV-NAIRU proponents are silent on this apparent anomaly – why do the alleged structural factors cycle with the actual rate?

An inflation targeting dummy (from 1994Q2 = 1) was tried but was never significant, suggesting that there has been no fundamental shift in the inflation generating process as a result of the Reserve Bank of Australia announcing it was formally targeting the inflation rate.

Equations (2.5) and (2.6) compare *STUR Gap* with and without the *UE* variable. The results suggest that: (a) underemployment plays a significant constraining influence on inflation independent of the unemployment rate; (b) *STUR Gap* is highly significant and a 1 per cent deviation above the filtered value leads to a 0.5 per cent slowdown in the annual inflation rate; and (c) the specification is improved on Equations (2.1) to (2.4). In Equation (2.7) and (2.6) we make a similar comparison using the *UR Gap* variable. The preferred equation of the two includes *UE*. The constraining influence of the *UR Gap* variable is also smaller (in that it includes *LTU*). There is a minor preference for Equation (2.6) over Equation (2.8).

The different values of the coefficients on the *STUR* and *UR* variables suggest the following dynamics are plausible. A downturn increases short-term unemployment sharply, which reduces inflation because the inflow into short-term unemployment is comprised of those currently employed and active in wage bargaining processes. In a prolonged downturn, average duration of unemployment rises and the pressure exerted on the wage setting system by unemployment overall falls. This requires higher levels of short-term unemployment being created to reach low inflation targets with the consequence of increasing proportions of long-term unemployment being created. In addition, as real GDP growth moderates and falls, underemployment also increases placing further constraint on price inflation. The results taken together provide support for the hypotheses (1) to (2) outlined above.

The results indicate that a deflationary strategy using demand repression (tight monetary and fiscal policy) will be costly in terms of unemployment.

Table 2 Phillips curve regressions, Australia, 1978:1 to 2013:2

	Eq 2.1	Eq 2.2	Eq 2.3	Eq 2.4	Eq 2.5	Eq 2.6	Eq 2.7	Eq 2.8
C	0.65	3.37	0.88	3.45	0.17	1.76	0.21	2.09
	(2.22)	(4.99)	(2.59)	(5.10)	(1.47)	(2.96)	(1.79)	(3.65)
ΔLP(-1)	0.95	0.80	0.95	0.81	0.94	0.84	0.92	0.82
	(38.0)	(19.6)	(38.5)	(20.5)	(38.9)	(20.9)	(36.6)	(20.5)
UR	-0.073	-0.104						
	(1.97)	(2.91)						
STUR			-0.146	-0.178				
			(2.38)	(3.06)				
UR Gap							-0.329	-0.275
							(3.51)	(3.01)
STUR Gap					-0.503	-0.389		
					(4.06)	(3.05)		
UE		-0.322		-0.309		-0.206		-0.243
		(4.41)		(4.29)		(2.72)		(3.35)
ΔLPM	0.06	0.05	0.06	0.05	0.05	0.05	0.06	0.05
	(3.91)	(3.18)	(3.90)	(3.17)	(3.62)	(3.13)	(3.78)	(3.17)
ΔLPM(-1)	-0.04	-0.03	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03
	(2.58)	(2.10)	(2.55)	(2.11)	(2.18)	(2.06)	(2.16)	(1.95)
ΔGST	2.59	2.71	2.56	2.68	2.41	2.58	2.39	2.56
	(3.28)	(3.65)	(3.25)	(3.62)	(3.17)	(3.47)	(3.10)	(3.44)
R^2	0.937	0.945	0.938	0.945	0.942	0.945	0.940	0.945
SE %	17.6	16.5	17.5	16.4	16.8	16.4	17.1	16.4
SC(1)	0.015	0.002	0.245	0.005	0.094	0.015	0.036	0.006
SC(4)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
ARCH	0.522	0.028	0.498	0.027	0.316	0.041	0.439	0.065
RESET	0.056	0.094	0.047	0.077	0.063	0.083	0.049	0.057

Notes: SC(n) is the Breusch-Godfrey Serial Correlation LM(n) test, ARCH is a 1st order test for Autoregressive conditional heteroscedasticity, RESET is the Ramsey RESET test with 2 added terms. All test results are reported as prob values. SE% is the standard error as a percentage of the mean of the dependent variable and *t*-statistics are in parentheses.

6. Conclusion

The paper conjectures that there has been a fundamental shift in the way the labour market interacts with the inflation generating process in Australia around the time of the 1991 recession. The results suggest that the short-term unemployment rate (STUR) constrains the annual inflation rate more than the overall unemployment rate (UR) and that the level of underemployment (UE) exerts a separate negative impact on the inflation process.

It is clear that within-firm excess supply of labour is now an important disciplining factor on price inflation.

More detailed econometric work including cointegration and error correction analysis is indicated and will form the basis of further work.

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