The Structural and Frictional Volume Underutilisation Rate (SAFVUR) in Australia

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Abstract

Even though Australia’s trend unemployment rate has risen from a local trough of 4.1 per cent in March 2008 to 5.5 per cent in March 2013 and Australia’s latest available trend underemployment rate (7.1 per cent in February 2013) is well above the unemployment rate, there is an ongoing discussion in Australia about the extent of labour market slack and how close this country is to full employment.

In this paper, a comprehensive measure of the extent of labour market slack, called the Structural and Frictional Volume Underutilisation Rate (SAFVUR), is presented for Australia to contribute to this discussion. This is an extension of the Observable Structural and Frictional Unemployment Rate or OSFUR (Connolly 2011), through the inclusion of an estimated minimum underemployment rate. Incorporating underemployment with unemployment is an important extension because Mitchell and Muysken (2008) have shown that both underemployment and components of unemployment (especially short-term unemployment) are important in explaining the relationship between the inflation rate and labour market slack (a.k.a. the Phillips Curve) in Australia. In forming the SAFVUR, both unemployment and underemployment are converted to volume (hours) terms (in contrast, the OSFUR is a headcount
measure). This is important because an underemployed person is, on average, seeking fewer additional
hours of work per week than an unemployed person.

As part of the process of generating the SAFVUR, the OSFUR estimates from Connolly (2011) are
extended back to the early 1970s. The Volume Labour Force Underutilisation Gap (the difference
between actual and potential hours worked, based on the SAFVUR) is also calculated. It is estimated to
be 5.0 per cent in February 2013 (in trend terms), implying that there is likely to be a higher extent of
labour market slack in Australia than many commentators recognise.

* This paper reflects the author’s views and does not necessarily represent those of the Department of
Education, Employment and Workplace Relations or the Australian Government. The author would like
to thank staff of the Economic Analysis, Forecasting and Advice Section of DEEWR for assistance with
data updating and discussion of issues, without implicating them in the results for this paper.
1. Importance of the Issue

Even though Australia’s trend unemployment rate has risen from a local trough of 4.1 per cent in March 2008 to 5.5 per cent in March 2013 and Australia’s latest available trend underemployment rate (7.1 per cent in February 2013)\(^1\) is well above the unemployment rate, there is an ongoing discussion in Australia about the extent of labour market slack and how close this country is to full employment.

Some commentators claim that full employment in Australia is reached with an unemployment rate of five per cent. For example, Lim, Dixon and Tsialpis (2009) estimated that the so-called Non-Accelerating Inflation Rate of Unemployment or ‘NAIRU’ was 5 per cent in 2008 (the end of their sample period). If this is was and still is the case, this would imply that Australia is close to full employment.

Many of these commentators also consider that we should keep the unemployment rate at or above five per cent through interest rate and fiscal policy, because this would avoid risking a sustained rise in the inflation rate. For example, Rick Battelino (2010, p. 98), who at the time was a Deputy Governor of the Reserve Bank of Australia (RBA) wrote\(^2\) in late 2010 when the unemployment rate was around 5¼ per cent, that:

> ...spare capacity is limited. This means that the economy cannot grow much above its potential rate without causing a rise in inflation. With a large amount of money continuing to flow into the

\(^1\) Source: ABS (2013), *Labour Force, Australia, March 2013*, ABS Catalogue Number 6202.0. For this paper, the ABS definition of underemployment is used. The underemployed are composed mainly of part-time workers who want to, and are available to, work longer hours, but there is also a minority of full-time workers who are working short hours for economic reasons. See the Glossary in the above-mentioned ABS publication for a full definition of underemployment.

\(^2\) See Professor Bill Mitchell’s web log, “NAIRU mantra prevents good macroeconomic policy” of 19 November 2010 at http://bilbo.economicoutlook.net/blog/?p=12441, for further analysis of this aspect of Rick Batellino’s speech to CEDA on 18 November 2010.
country over the next couple of years as a result of the resources boom, the challenge will be to manage the economy in a way that keeps economic growth on a sustainable path, with inflation contained. This is what the Bank is trying to do... For this reason, the Board of the Reserve Bank decided at its meeting earlier this month that it would be prudent to make an early, modest tightening to guard against such an outcome [upward pressure on inflation].

If the unemployment rate can actually be sustained below five per cent and/or if labour market slack can be reduced through reducing the underemployment rate, there would be unnecessary costs in keeping the unemployment rate at five per cent or above and in failing to reduce the underemployment rate. These costs would occur to unemployed and underemployed people and their families, to the Government’s Budget position and to the economy more generally. If, say, the minimum sustainable rate of unemployment is actually four per cent, then keeping the unemployment rate at five per cent is equivalent to keeping around 120,000 people unemployed unnecessarily. If all of these unemployed people are receiving Newstart Allowance or Youth Allowance (Other), this would cost the Australian Government around an extra $1.4 billion a year in unemployment payments alone. There would also be a potential loss of tax revenue from people not doing paid work. Over time, there are likely to be additional dynamic gains in reducing the unemployment rate through a larger labour force and employment base, because a lower unemployment rate is likely to induce people to join the labour force.

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This is based on a conservative calculation, using the author’s estimate of the average rate of payment for Newstart Allowance and Youth Allowance (Other) combined for 2011-12 and not including associated payments such as Rent Assistance. This estimate was done using expenditure figures from the DEEWR Portfolio Additional Estimates Statement 2012-13 (page 44) and the average number of people receiving Newstart Allowance and Youth Allowance (Other) during 2011-12 from DEEWR’s Labour Market and Related Payments: a monthly profile, February 2013. The current (2012-13) average rate of payment of unemployment allowances would be higher than this, because these allowances are indexed to the Consumer Price Index. Also, this estimate is based on a reduction in unemployment alone, whereas an associated reduction in underemployment could also reduce the number of people on Newstart Allowance and Youth Allowance (Other).
force or refrain from dropping out of the labour force. There could also be further dynamic gains through a larger private capital stock (if real interest rates were lower on average) and a larger public capital stock and better health and educational status of the workforce (through redirection of Government expenditure away from unemployment payments).

2. Existing Measures of Labour Market Slack

Measures of full employment and the equilibrium unemployment rate that were available for Australia up until mid-2011 were reviewed in Connolly (2011). He discussed limitations with the existing measures, such as the so-called Non-Accelerating Inflation Rate of Unemployment or ‘NAIRU’.

He also provided a new measure, the Observable Structural and Frictional Unemployment Rate (OSFUR), which overcame some of the limitations of the existing measures. This measure is based on detailed unpublished ABS Labour Force Survey data on the number of unemployed people classified by their reasons for unemployment, with further information on very short-term unemployment. The measure is simple and observable in the sense that it is calculated directly from ABS data, whereas some other measures are highly unobservable in that highly technical econometric estimates are needed to generate them. For instance, Gruen, Pagan and Thomson (1999) describe one of their preferred

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4 The term, ‘equilibrium’ unemployment, is used in this paper as a generic term for the minimum sustainable unemployment rate, when the labour market returns to a state of equilibrium or rest after recovering from a disturbance (such as a recession or a boom). This is in preference to other terms, such as the ‘NAIRU’, which have more specific meanings and definitions. While the author recognises that some readers might object to this term for various reasons such as that they don’t believe there is a stable equilibrium in the labour market, they would like to point out that alternative generic terms, such as the natural rate of unemployment, are even more objectionable.

5 Of course, as many people have pointed out, the term, ‘NAIRU’, is a misnomer because even if it is present, the inflation rate would be rising permanently, not accelerating. As pointed out in Connolly (2008), it is the natural logarithm of the price level that would be accelerating in this situation.
estimates as being a two-sided time-varying Non-Accelerating Inflation Rate of Unemployment estimated with a Kalman filter.

Connolly (2011, page 13) described the construction of the OSFUR as follows:

For the purposes of this estimate, the structurally unemployed are defined as those who are former workers (that is, they have not worked for two weeks or more in the last two years) and those who have never worked before\(^6\). These people could also be described as labour market outsiders. As with the estimates of total frictional unemployment presented in the previous Section, there is a preferred and alternative estimate of frictional unemployment in the OSFUR. The difference between the two measures is that the OSFUR measure is for those who are not structurally unemployed (these people can also be considered to be labour market insiders, in the sense that they would be closer to the labour market and available job opportunities than the labour market outsiders) and not for all unemployed people. This enables the problem of double counting those who are both structurally and frictionally unemployed to be circumvented. The preferred estimate is the number of people who are not structurally unemployed who have been unemployed for under four weeks. The alternative estimate is the number of people who are not structurally unemployed who have been unemployed for under 13 weeks.

One of the potential problems with the OSFUR mentioned in the conclusions of Connolly (2011, page 20) is that it did not include underemployment. This potential problem is addressed in analysis used for this current paper.

There have been a number of measures of overall labour market slack in which both unemployment and underemployment and in some cases hidden unemployment, are combined.

\(^6\) That is, for two weeks or longer.
The simplest of these is the ABS’s labour force underutilisation rate, which is released by the ABS\(^7\) for the middle month of each quarter back to the start of the ABS monthly Labour Force Survey in February 1978. This is simply the addition of the unemployment rate and the underemployment rate (the ratio of the number of underemployed to the labour force). In other words, this is a headcount measure. A problem with headcount measures such as this is that it is likely to be an inaccurate measure of the volume of excess labour supply. This is because the unemployed are, on average, willing to supply more hours of labour per week per person than the underemployed. The ABS has also published an extended labour force underutilisation rate, in which hidden unemployment is also incorporated. The ABS does this by including two categories of people who are close to being attached to the labour force\(^8\).

A more sophisticated measure, also from the ABS, is the volume labour force underutilisation rate. The volume is measured in thousands of hours per week and is obtained by multiplying the number of unemployed or underemployed people by an estimate of the additional hours per week that would be supplied if these people’s labour were to be fully utilised. For unemployed people, the additional hours are the number of hours sought. For underemployed full-time workers, the additional hours are the difference between the hours actually worked and the hours usually worked. For underemployed part-time workers, the additional hours are the number of extra hours preferred.\(^9\) As far as the author can

\(^7\) This is released in ABS (2013), *Labour Force, Australia, March 2013*, ABS Catalogue Number 6202.0.

\(^8\) These two categories are: discouraged jobseekers; and people who were actively looking for work, were not able to start work in the reference week for the ABS Labour Force Survey (and so were not classified by the ABS as being unemployed) but were able to start work within four weeks. Source: ABS (2013), *Persons Not in the Labour Force, September 2012*, ABS Catalogue Number 6220.0. The number of people in these two categories is included in both the numerator and the denominator of the extended labour force underutilisation rate.

\(^9\) The information in this paragraph is obtained from ABS (2012), *Australian Labour Market Statistics, July 2012*, ABS Catalogue Number 6105.0.
tell, the current series of the ABS volume measures of unemployment, underemployment and labour underutilisation are only available for August of each year from 2002 through 2011 (as of April 2013).

The Centre of Full Employment and Equity (CofFEE) at the University of Newcastle (in Australia) had for many years during the 2000s, publicly released a set of indicators of labour market slack called the CofFEE Labour Market Indicators (CLMI). As explained in Mitchell and Carlson (2000), these are volume (hours) measures. There are a number of them, with various adjustments for underemployment (either just the part-time underemployed who are looking for full-time work, or all the part-time underemployed) and hidden unemployment. As of 19 April 2013, the latest available set of CLMIs on CofFEE’s website was for August 2011.

All of these measures are estimates of the total excess labour supply, without any adjustment for how effective people in various categories of unemployment, underemployment or hidden unemployment are in finding and/or keeping jobs and resisting upward pressure on wages.

Also, these measures are only available for a limited time (none are available before 1978 and the latest ABS volume series is unavailable before 2002 and none of the volume measures are available after 2011) or with a limited frequency (the latest ABS volume measures are only available once a year).

3. New Measures of Labour Market Slack incorporating Underemployment

In this Section, a new set of measures of labour market slack incorporating underemployment are presented, that overcome many of the limitations of existing measures.

These are volume (hours) measures and have been produced for the middle month of every quarter from August 1966 through February 2013. In order to enable this in as consistent a manner as possible,
it has been necessary to use different assumptions from those used for the volume measures by the ABS and CoFFEE. It has also been necessary to make a number of assumptions in the early years where published data for some of the statistics are unavailable. While this tends to reduce the quality of the estimates in the early years, the effect of this is limited by the fact that unemployment, underemployment and part-time employment rates were very low in these early years.

The following two measures were generated:

- The new volume measure of total labour market slack is the volume labour force underutilisation rate (VLFUR); and

- The new volume measure of structural and frictional labour market slack is the Structural and Frictional Volume Underutilisation Rate (SAFVUR).

In order to generate these, it was necessary to generate a series for Possible Hours Worked (PHW), which was used as the denominator for both series. The generation of these three series is now explained.

3.1 - Volume Labour Force Underutilisation

The first step in this process is to generate total volume of labour force underutilisation (VLFUt) in millions of hours lost per quarter as follows:

\[
VLFUt = \{UNp, a, t \times AHWFE_p, a, t \\
+ UD_{m, ft, t} \times (AHWFEm, ft, t - AHWUDm, ft, t) + UD_{f, ft, t} \times (AHWF Ef, ft, t - AHWUDf, ft, t) \\
+ UD_{m, pt, t} \times AHPUDm, pt, t + UD_{f, pt, t} \times AHPUDf, pt, t \} \times 13/1000
\]

Where: VLFU is the volume of labour force underutilisation in millions of hours/quarter;

\[
UN \text{ is unemployment in thousands of people;}
\]

\[
UD \text{ is underemployment in thousands of people;}
\]
AHWFE is the average hours worked per week by fully employed people;

AHWUD is the average hours worked per week by underemployed people;

AHPUD is the mean extra hours preferred per week by underemployed people;

the subscripts m, f and p refer to males, females and persons, respectively;

the subscripts ft, pt and a refer to full-time, part-time and all workweek statuses, respectively;

and the subscript t refers to the time period in quarters.

In equation (1), the variables for unemployment and underemployment are reported in thousands of persons, while the variables for hours worked or preferred are per week. This is why the conversion factor of 13/1000 is used to convert the result to millions of hours per quarter.

The formula used to generate the estimated average number of hours worked by fully employed full-time workers by gender is:

$$AHWFE_{g, ft, t} = \frac{(AHW_{g, ft, t} * E_{g, ft, t} - AHWUD_{g, ft, t} * UD_{g, ft, t})}{(E_{g, ft, t} - UD_{g, ft, t})}$$  \hspace{1cm} (2)

where \(AHWFE\), \(AHWUD\) and \(UD\) are as described above;

\(AHW\) is the average hours worked per week by all workers (whether fully employed or underemployed);

\(E\) is employment (thousands of persons);

subscripts ft and t are as described above; and

the subscript, \(g\), stands for gender (male or female).

The formula used to generate the estimated average number of hours worked by fully employed part-time workers by gender is:

$$AHWFE_{g, pt, t} = \frac{AHW_{g, pt, t} + UD_{g, pt, t} / E_{g, pt, t} * AHPUD_{g, pt, t}}{}$$  \hspace{1cm} (3)

where variables and subscripts are as described above.
The estimate of hours lost through full-time underemployment differs from that used by the ABS in its volume measure of labour underutilisation. The ABS uses the difference between actual and usual hours worked for underemployed full-time workers\textsuperscript{10}. However, as far as the author can tell, the ABS doesn’t release statistics on usual hours worked by underemployed full-time workers except on very irregular occasions\textsuperscript{11}. This meant that this method was not able to be used for the new measure.

This method also differs from the CoFEE indicators in that CoFEE states in various releases on its website that it only includes part-time underemployment in its estimates. It also differs in that mean hours preferred are used in the current measure, whereas CoFEE used a complicated formula based on the bands of hours worked per week, whether part-time workers preferred to work more hours per week or not and whether such people preferred to work full-time or not.

This method also differs from the ABS in its treatment of hours lost by unemployed people. The ABS uses the hours preferred by unemployed people, but the current method uses the actual hours worked by employed people. There are two reasons for this divergence from ABS methods. The first is the belief that unemployed people would generally take the hours offered to them if they were to move into employment, which is likely to be close to the average hours worked by currently employed people and would generally not be able to insist on working their preferred hours when first moving into employment. The second reason is that data on hours of work preferred by unemployed people are only

\textsuperscript{10} This information is obtained from the feature article titled, “Volume Measures of Labour Force Underutilisation” in ABS (2012), Australian Labour Market Statistics, July 2012, ABS Catalogue Number 6105.0.

\textsuperscript{11} One of these exceptions was in the feature article titled, “Volume Measures of Labour Force Underutilisation” in ABS (2012), Australian Labour Market Statistics, July 2012, ABS Catalogue Number 6105.0. At the bottom of this article, the authors stated that in August 2011, the hours of work per week preferred were 24.0 hours for male full-time underemployed workers and 18.3 hours for female full-time underemployed workers. However, it is not clear that these preferred hours were derived as the difference between actual and usual hours worked.
available for a limited time\textsuperscript{12}, whereas hours actually worked are available by gender and full-time/part-time status back to August 1966\textsuperscript{13}.

The ABS currently only regularly publishes data on mean hours of extra work preferred per week by underemployed male and female part-time workers for September each year in its publication, \textit{Underemployed Workers} (Catalogue Number 6265.0). This is available annually back to 1994 and the value for September of each year is reallocated to August, which is the closest middle month of a quarter (the ABS uses the same reallocation process in generating its volume measures of labour force underutilisation). Before then it was available for May 1991, May 1988 and May 1985\textsuperscript{14}. Between May 1985 and August 2012, data were generated for missing observations by linear interpolation. Before May 1985, values were set at their May 1985 values (22.0 hours for men and 18.0 hours for women). It seems unlikely that the actual values would have been much higher than this, because this number of additional hours would be enough to move a part-time worker working average part-time hours at the time into full-time employment. They are unlikely to have been much lower than this, because the tighter labour market before the mid-1980s meant that this amount of additional work was a realistic aspiration for underemployed part-time workers. After August 2012, values are set at the August 2012

\textsuperscript{12} It is even difficult to obtain recent estimates of the hours preferred by unemployed people. For example, in the latest (July 2012) release of the ABS publication, \textit{Job Search Experience} (Cat. No. 6222.0), there is information on the bands of hours preferred by unemployed people by gender, but no information on the average hours preferred. These bands are wide and the upper band is unbounded (i.e., 40 hours or more), so it is not feasible to construct an accurate estimate of preferred working hours of unemployed people using this source.

\textsuperscript{13} However, hours actually worked by underemployed full-time workers are only available from the ABS back to February 1978. Before then, for the analysis in this paper, they were set to their post-1977 averages of 19½ hours for men and 22 hours for women.

\textsuperscript{14} The author would like to thank Caroline Daley, former ABS outposted office to DEEWR, for assistance in obtaining estimates for the early years for preferred hours worked by underemployed workers.
levels (16.1 hours for men and 13.2 hours for women). The results of these assumptions and interpolations about mean extra hours preferred by underemployed part-time workers are shown in Figure 1.

Figure 1: Mean Extra Hours per Week Preferred by Underemployed Part-time Workers

Source: Derived as explained above from ABS (2013 and previous issues), Underemployed Workers, ABS Cat. No. 6265.0. While the data are in original terms, they are only available from the ABS once a year (at most), for months (May in the early years and September in later years) where there isn’t a pronounced seasonal pattern, so they are assumed to be the same as seasonally adjusted data.

Data on male and female full-time underemployment are available from the ABS Labour Force Survey back to February 1978 in original terms15. These data were converted to seasonally adjusted terms by the author using the SEASABS seasonal adjustment program (details are available on request).

This information is not available before then in a form which is consistent with the data from February 1978 onwards16. The data were backcast econometrically for the period from August 1971 (for men and

15 This information was obtained from SuperCube ST EM2 from ABS (2013), Labour Force, Australia, Detailed - Electronic Delivery, March 2013, ABS Catalogue Number 6291.0.55.001.
boys) or November 1971 (for women and girls) through November 1977 using the econometric model of male and female full-time underemployment described in Appendix A. Before then, both were set at 0.6 per cent, which is around the average for the period from November 1971 through November 1977. Also, as shown in Figure 2, the male share reached this level in the good labour market conditions of the late 1980s, while the female share has regularly been around this level, except during poor economic and labour market conditions.

Figure 2: Male and Female Full-time Underemployment Shares, Australia

The data from February 1978 onwards is for people who normally work full time but are working short hours in the reference week for the ABS Labour Force Survey for economic reasons. The series described in footnote 14 above have been backcast by the ABS to include people who have been stood down as being employed. For the data that are available before February 1978, people who were stood down (for less than four weeks, without pay, and were waiting to be called back to work) were classified as being unemployed (see, for example, page 3 of ABS (1977), *The Labour Force, November 1977*, ABS Catalogue Number 6203.0), but separate data for people in this category do not appear to be available from the ABS.
Source: The numerator (the number of male and female full-time underemployed people) was obtained from SuperCube ST EM2 from ABS (2013), Labour Force, Australia, Detailed - Electronic Delivery, March 2013, ABS Catalogue Number 6291.0.55.001, and converted to seasonally adjusted terms using the SEASABS program by the author. The denominator (male and female full-time employment levels) was based on seasonally adjusted statistics from Spreadsheet 1 in the same ABS release, but with adjustments for ABS labour force redefinitions as shown in Connolly (2008).

The data for underemployed male and female part-time workers from February 1978 onwards were obtained by subtracting data on full-time underemployment from total underemployment\(^\text{17}\). Before 1978, the estimates were obtained from the ABS publication, The Labour Force, November 1977, ABS Catalogue Number 6203.0 (and previous issues).

### 3.2 Possible Hours Worked

The next step was to generate a series for possible hours worked if labour force underutilisation were to be eliminated, to use as the denominator for the VLFUR and the SAFVUR.

This was simply the sum of the volume of labour underutilisation, $VLFU_t$, and the hours actually worked by employed civilians (which was obtained by multiplying total employment by average hours worked, then converting it to millions of hours per quarter). The formula is as follows:

$$PHW_t = VLFU_t + E_t \times AHW_t$$  \hspace{1cm} (4)

Where $PHW_t$ is possible hours worked;

\(^{17}\) The ABS releases series (in original, seasonally adjusted and trend terms) on male and female total underemployment for the middle month of each quarter in Spreadsheet 22 (file 6202022.xls) of Labour Force, Australia, March 2013, ABS Catalogue Number 6202.0 (and previous issues).
VLFU, E, AHW and the subscript, t, are as described above; and

All variables are summed across genders and full-time/part-time status.

3.3 Volume Labour Force Underutilisation Rate

The Volume Labour Force Underutilisation Rate, VLFUR, is the volume of labour force underutilisation, expressed as a percentage of possible hours worked, i.e.:

\[ VLFUR_t = \frac{VLFU_t}{PHW_t} \times 100 \]  

Where the variables are as previously described.

The VLFUR, together with the equivalent measure (CLMI CU7) from CofFEE, are shown in Figure 3.

Figure 3: The Volume Labour Force Underutilisation Rate, Australia
Sources: The Volume Labour Force Underutilisation Rate or VLFUR was constructed as shown in this paper from detailed ABS Labour Force Survey data (including from Underemployed Workers, which is a supplementary survey to the Labour Force Survey). The CoFFEE Labour Market Indicator CU7 was obtained from http://e1.newcastle.edu.au/coffee/indicators/indicators.cfm. Both series are in seasonally adjusted terms.

The VLFUR and the equivalent measure (CU7) from CoFFEE were virtually the same between February 1978 and February 2001 (CU7 is not available before February 1978). After this, until August 2011 which is the last available release for CU7, each indicator has moved in the same direction, but the CU7 measure has been 1 to 1 ½ percentage points above the VLFUR. This most probably reflects different treatment of the ABS Labour Force Survey redefinitions that were introduced from April 2001 onwards.

Next, the trend VLFUR was calculated from the seasonally adjusted values, using a seven-term Henderson centred moving-average process (which is the same or very similar to the process used by the ABS for trending its quarterly labour force data). A comparison of the seasonally adjusted and trend series is provided in Figure 4.

Figure 4: Trend and Seasonally Adjusted Volume Labour Force Underutilisation Rate, Australia
Sources: The seasonally adjusted Volume Labour Force Underutilisation Rate or VLFUR was constructed as shown in this paper from detailed ABS Labour Force Survey data (including from Underemployed Workers, which is a supplementary survey to the Labour Force Survey). The trend was calculated by the author as a 7-term Henderson centred moving average of the seasonally adjusted data.

As can be seen from Figure 4, the seasonally adjusted and trend series are generally very close to each other, indicating that the irregular component of the VLFUR is relatively small. There are relatively minor exceptions at times of labour market volatility or around the time of changes in the trend, such as in the mid-late 1970s and just before the Global Recession adversely affected the Australian labour market.

3.4 Structural and Frictional Volume Underutilisation Rate

The Structural and Frictional Volume Underutilisation Rate (SAFVUR) comprises the Structural and Frictional Volume Unemployment Rate (SAFVUER) and the Structural and Frictional Volume Underemployment Rate (SAFVUDR).

In comparison with the total volume labour force underutilisation rate, the SAFVUR is a measure of the proportion of the total that is structural and frictional and so would be harder to reduce and would be less likely to place downward pressure on wage growth.

The first of the components of the SAFVUR is defined as follows:

\[
SAFVUER_t = OSFUR_t \times LF_t \times AHW_t \times 13/1000/PHW_t
\]  

(6)

Where SAFVUER is as described above;

OSFUR is the Observable Structural and Frictional Unemployment Rate as described in
Connolly (2011)\(^{18}\); and

LF is the labour force (thousands of persons); and

AHW, PHW and the subscript \(t\) are as described above.

In order to derive an estimate of the SAFVUDR, historical data for the volume underemployment rate (VUDR) were examined. The VUDR is defined as follows:

\[
VUDR_t = \frac{VUD_t}{PHW_t} \times 100
\]  
(7)

Where \(VUD_t\) is the volume of underemployment (in millions of hours per quarter) and is defined as follows:

\[
VUD_t = \{UD_{m, ft, t} \times (AHWF_{m, ft, t} - AHWUD_{m, ft, t}) + UD_{f, ft, t} \times (AHWF_{f, ft, t} - AHWUD_{f, ft, t})
+ UD_{m, pt, t} \times AHPUD_{m, pt, t} + UD_{f, pt, t} \times AHPUD_{f, pt, t}\} \times \frac{13}{1000}
\]  
(8)

Where variables and subscripts are as described above.

The series for the VUDR is shown in Figure 5. The VUDR was consistently around 0.6 per cent from August 1966 through August 1974. During all this time, the Australian labour market was generally recognised as being close to full employment.

\(^{18}\) Connolly (2011) derived two measures of the OSFUR: the preferred (where the frictional unemployment rate was estimated to be the unemployment rate for labour market insiders who had been unemployed for four weeks or less); and the alternative (where the frictional unemployment rate was estimated to be the unemployment rate for labour market insiders who had been unemployed for 13 weeks or less). For the sake of simplicity and because the preferred measure was argued by Connolly (2011) to be a more plausible representation of the frictional unemployment rate, the preferred measure is used as the OSFUR measure for the rest of the current analysis.
There was then a sudden increase in the unemployment rate, brought on by an economic recession in the aftermath of the first oil crisis and exacerbated by a very high wage growth rate and restrictions on immigration. The VUDR rose to 1 per cent within a quarter, then proceeded to continue rising for the next few years.

**Figure 5:** The Volume Underemployment Rate, Australia

Source: The Volume Underemployment Rate or VUDR was constructed as shown in this paper from detailed ABS Labour Force Survey data (including from *Underemployed Workers*, which is a supplementary survey to the Labour Force Survey). The series is in seasonally adjusted terms.

After plateauning in the late 1970s and early 1980s, the volume underemployment rate then rose sharply in the recession of the early 1980s. Following this, it fell slowly during the good labour market conditions of the middle and late 1980s. It has followed the same pattern since, rising quickly and sharply in recessions and economic downturns and then falling slowly during economic recoveries. In this manner, it has ratcheted up over time.
It is not possible to define the structural and frictional underemployment rate in the same way that the OSFUR was defined by Connolly (2011). None of the three components of the OSFUR are directly applicable to structural and frictional unemployment. The first component of the OSFUR is the unemployment rate for those who've never worked before. This is obviously not applicable to underemployment, because if someone hasn't worked before, they are clearly not underemployed. The second component of the OSFUR is the unemployment rate for former workers (i.e., those who haven't worked for the past two years). However, people who have been underemployed for two years or longer are not necessarily particularly disadvantaged in the labour market and in many ways would be better placed than those who have been unemployed for a short while. The third component of the OSFUR is the unemployment rate for labour market insiders (i.e., those who are not former workers and have worked before) who have been unemployed for a short while (this represents frictional unemployment). Once again, those who have been underemployed for a short while are not particularly disadvantaged in the labour market and do not face the same potential labour market mismatch problems as those who have just become unemployed.

Instead of attempting a directly analogous approach to that used for the OSFUR, the structural and frictional volume underemployment rate is set at 0.6 per cent as this represents the baseline level achieved in the full-employment conditions of the late 1960s and early 1970s.

In the analysis for Connolly (2011), the OSFUR was only calculated back to May 2001; i.e., with the current set of ABS Labour Force Survey definitions (including backcast data from a set of redefinitions implemented in 2004). For the analysis for this paper, the OSFUR was estimated back to February 1970. The process for doing this is explained in Appendix B.

When the SAFVUER is combined with a SAFVUDR of 0.6 per cent of possible hours worked, the SAFVUR is formed and its seasonally adjusted and trend values are shown in Figure 6.
Sources: Constructed from ABS Labour Force Survey data using the methods explained in this paper. Data are in seasonally adjusted terms and trend terms. The trend was calculated by the author as a 7-term Henderson centred moving average of the seasonally adjusted data.

As can be seen in Figure 5, the SAFVUR was low at around 1½ to 2 per cent in the early 1970s, when the Australian economy was recognised as being close to full employment. It then rose after the first oil crisis in the middle 1970s. From then it ratcheted up following the recessions of the early 1980s and early 1990s. After peaking at 6.7 per cent in August 1993, it fell almost continuously to reach a recent trough of 3.1 per cent in August 2008. After that, it rose, largely in response to the Global Recession, although the rise was muted compared with the effects of the recessions of the early 1980s and early 1990s (Australia did not actually encounter a technical economic recession during the Global Recession). It still hasn’t recovered substantially from the effects of the Global Recession.
4. The Extent of Labour Market Slack in Australia

Now that the measures of the previous Section have been estimated, a new and more accurate measure of the extent of labour market slack in Australia can be calculated as the gap (difference) between the SAFVUR and the VLFUR. The seasonally adjusted and trend values of this gap are shown in Figure 6.

Figure 6: The SAFVUR Gap, Australia

Sources: The seasonally adjusted series is constructed from ABS Labour Force Survey data using the methods explained in this paper. The trend was calculated by the author as a 7-term Henderson centred moving average of the seasonally adjusted data.

This gap was very low at around 1 per cent in the early 1970s when the Australian labour market was commonly recognised as being close to full employment, rose sharply in 1974 in the aftermath of the first oil crisis and has not yet returned to the low levels of the early 1970s. It tends to rise sharply during and after recessions and other economic downturns, but then come down slowly when the good
economic times return. Its latest value of 5.0 per cent (trend) in February 2013 indicates that there is a substantial amount of labour market slack in Australia. This level is not unusual, however, as the average trend SAFVUR gap since February 1970 has been 4.7 per cent.

5. Conclusions

A new and more accurate measure of the extent of labour market slack in Australia, the SAFVUR, has successfully been constructed. This is an extension of the OSFUR (Connolly 2011) in two ways: the incorporation of the structural and frictional underemployment rate and the conversion of both unemployment and underemployment from headcount to volume (hours) terms. The incorporation of underemployment is important because, as Mitchell and Muysken (2008) have shown, both underemployment and components of unemployment (especially short-term unemployment) are important in explaining the relationship between the inflation rate and labour market slack (a.k.a. the Phillips Curve) in Australia.

The combination of these two changes leads to an estimate of labour market slack that is currently around 2½ percentage points higher than when the preferred OSFUR is used: that is around five percentage points instead of around 2½ percentage points. In other words, the current estimate is about double the current gap between the actual trend unemployment rate and the current preferred OSFUR. This gap is also a lot higher than some labour market commentators and financial participants seem to believe. For example, if someone used a ‘rule of thumb NAIRU’ of 5 per cent and ignored underemployment, their estimate of labour market slack would currently only be around ½ of a percentage point. This finding of a larger degree of labour market slack may have implications for monetary and fiscal policy.

The SAFVUR gap is substantially higher than the OSFUR gap because the effect of incorporating underemployment has almost completely dominated the effect of converting both unemployment and

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19 i.e., as of February 2013.
underemployment from headcount to volume terms. Indeed, the current seasonally adjusted estimates of the headcount (OSFUR) and volume (SAFVUER) measures of the structural and frictional unemployment rate are the same at 3.0 per cent.

The analysis required to calculate the SAFVUR has enabled it and the OSFUR to be estimated back to the start of the 1970s. While a number of simplifying assumptions have needed to be made to estimate data in the early years when the ABS did not publish particular series and it has not yet been feasible to estimate accurate adjustments for all of the structural breaks as a result of ABS Labour Force Survey redefinitions, these issues are not serious enough to invalidate the results. A key reason for this is that part-time employment (particularly among men and boys) and underemployment and long-term unemployment (which is used as a proxy for unemployed people who are former workers) were so low in the early 1970s that even a moderate error in estimates of their levels or the preferred hours of work per week by underemployed part-time workers would not make much difference to the results. It should also be borne in mind that the latter estimate is probably conservative, as it is equal to the maximum level observed in actual ABS data. Nevertheless, some further analysis could be useful to reduce remaining structural breaks in the data from ABS Labour Force Survey redefinitions.

This extension of the data back in time shows that while the current extent of labour market slack, as indicated by the SAFVUR gap, is only slightly higher than its four-decade average, it is higher than at any time during the 1970s (as can be seen from Figure 6). This indicates that Australia may still have a substantial way to go before reaching full employment.
Appendix A

An Econometric Model of Male and Female Full-time Underemployment

In this Appendix, a quarterly econometric model of male and female full-time underemployment, developed by the author, is described. Next, its use to backcast estimates of male and female full-time underemployment for the period between November 1971 and November 1977 (inclusive) is explained.

In this model, the ABS definition of full-time underemployment is used; i.e., people who usually work full-time, but are working short hours in the reference week for the ABS Labour Force Survey for economic reasons (these are described by the ABS as “stood down, on short time, insufficient work”). The model is of the shares\(^{20}\) of male and female full-time underemployed people in male and female full-time employment, respectively. In other words, it is a headcount, not a volume, measure (the adjustment for hours worked by full-time underemployed people is described in the main body of this paper). These shares are shown in Figure A1.

\(^{20}\) In proportions rather than percentages.
Figure A1: Male and Female Full-time Underemployment Shares, Australia

Source: The numerator (the number of male and female full-time underemployed people) was obtained from SuperCube ST EM2 from ABS (2013), Labour Force, Australia, Detailed - Electronic Delivery, March 2013, ABS Catalogue Number 6291.0.55.001, and converted to seasonally adjusted terms using the SEASABS program by the author. The denominator (male and female full-time employment levels was based on seasonally adjusted statistics from Spreadsheet 1 in the same ABS release, but with adjustments for ABS labour force redefinitions as shown in Connolly (2008).

In order to ensure that the backcast data are non-negative, the natural logarithm of these shares is taken. The dependent variables for the two equations are as follows:

\[
\ln(SUD_{g, ft, t}) = \ln(\frac{UD_{g, ft, t}}{E_{g, ft, t}}) \quad (A1)
\]

where \(\ln\) stands for the natural logarithm of a variable;

\[SUD\] stands for the share of the underemployed among all workers;
the subscript, \( g \), stands for gender (either male or female);

the subscript, \( ft \), stands for full-time; and

the subscript, \( t \), stands for the time period (quarter).

As shown in Figure A1, the shares appear to respond to economic and labour market developments, spiking upwards during recessions and other economic downturns, but recovering quickly when these downturns end. Hence, the underemployment shares are expected to respond to the full-time unemployment rates for the same gender and the key economic variables that determine employment: real non-farm GDP per adult, real labour costs to business, the terms of trade (the ratio of export to import prices) and the growth rate of business credit. Just as with the dependent variable, logarithms are taken of each of the explanatory variables (except for the growth rate of business credit, which is calculated as a quarterly change in logarithms). This is because taking logarithms expresses the variables in proportional form, and a proportional relationship among the variables is expected. A side benefit of using the double-logarithmic functional form is that the estimated coefficients are also elasticities.

Before estimating the equations, the order of integration or stationarity of the variables was tested using the Augmented Dickey Fuller and weighted symmetric tau tests. Both the dependent and explanatory variables were estimated to be I(1). An Engle-Granger (tau) test for cointegration showed that the dependent variable for males was cointegrated with its explanatory variables when no lagged dependent variables were used in the test, but otherwise did not appear to be cointegrated. A similar test of the variables for females showed that the dependent variable was cointegrated with its explanatory variables when zero to three lagged dependent variables were used in the test, but otherwise did not appear to be cointegrated. Details of these tests are available from the author. Given these time-series properties of the variables, the Engle-Granger error-correction model is an appropriate method of modelling the relationship between dependent and explanatory variables. This model consists of estimating long-run relationships in levels of the variables in the first stage of
estimation, then estimating equations for quarterly changes in the variables and including lagged residuals from the first-stage equations as explanatory variables in the latter equations.

**Male full-time underemployment share**

After deleting the variable for the terms of trade, which was statistically insignificant, the preferred first-stage equation for the male share was:

\[
\ln(SUD_{m,nt}) = -8.25 + 0.302 \times \ln(UR_{m,nt})
\]

\[
- 0.824 \times \ln(RGDP_{nf,t}/P_t) + 1.540 \times \ln(RLC_t)
\]

\[
- 5.75 \times \Delta \ln(BC_t)
\]

\begin{align*}
(-9.69) & & (5.26) \\
(-3.16) & & (3.86) \\
(-7.72) & & (A2)
\end{align*}

where \( UR_{m,nt} \) is the male full-time unemployment rate;

\( RGDP_{nf,t} \) is real non-farm GDP;

\( P_t \) is the adult civilian population;

\( RLC_t \) is real labour costs to business;

\( BC_t \) is business credit;

other variables, mathematical operators and subscripts are as described above; and

the values in brackets underneath the coefficient are t-statistics.

All of these explanatory variables are statistically significant and have the expected sign. The most noteworthy feature of these results is that the male full-time underemployment share is highly elastic with respect to the growth rate of business credit.

The diagnostic tests for this equation are as follows:

Adjusted R-squared = 0.597; F-test (for zero slopes) = 52.4 [0.000];
LM Heteroscedasticity test = 1.241 [0.265]; Durbin-Watson = 1.10 [0.000, 0.000];
Jarque-Bera test (for normality of errors) = 1.59 [0.450];
Ramsey’s Reset2 test (for functional form) = 0.708 [0.402]; and
Condition(X) number = 268.

The diagnostic tests show that the equation is acceptable (the numbers shown in square brackets after the test outcomes are the probabilities), especially given the volatility of the dependent variable. The low Durbin-Watson statistic often occurs in the first stage of an error-correction model, as the short-term dynamics of the relationship are modelled in the second stage of the model.

After deleting insignificant variables, the preferred equation for the second-stage of the error-correction model is:

\[
\Delta \ln(SUD_{m,ft,t}) = 0.0161 - 0.446 * ECT_{m,ft,t-1} \\
(1.24) \quad (-4.97)
\]

\[
- 0.244 * \Delta \ln(SUD_{m,ft,t-1}) + 0.840 * \Delta \ln(UR_{m,ft,t}) \\
(-2.81) \quad (4.35)
\]

\[
- 4.36 * \Delta \ln(RGDP_{nf,t}/P_t) + 1.27 * \Delta \ln(RLC_t) \\
(-2.64) \quad (1.59)
\]

\[
- 1.85 * \Delta \{\Delta \ln(BC_t)\} \quad \text{(A3)} \\
(-1.99)
\]

where the operator, \(\Delta\), stands for the quarterly change in a variable;

\(ECT_{m,ft,t-1}\) is the error-correction term (residual from equation A2, lagged one quarter)

for the logarithm of the share of male full-time underemployment; and

other variables, subscripts, operators and values in brackets are as described above.
Most of these explanatory variables are statistically significant and all have the expected sign. The most noteworthy feature of these results is that the quarterly change in the male full-time underemployment share is highly elastic with respect to the growth rate of real non-farm GDP per adult.

The diagnostic tests for this equation are as follows:

Adjusted $R^2$ = 0.356; F-test (for zero slopes) = 13.7 [0.000];

LM Heteroscedasticity test = 2.72 [0.099];

Durbin-Watson = 2.16 [0.668, 0.935]; Durbin’s h = -2.32 [0.020];

Jarque-Bera test (for normality of errors) = 26.5 [0.000];

Ramsey’s Reset2 test (for functional form) = 0.129 [0.720]; and

Condition(X) number = 2.4

The diagnostic tests show that the equation is generally acceptable (the numbers shown in square brackets after the test outcomes are the probabilities), especially given the volatility of the dependent variable. A lower adjusted $R^2$ statistic is regularly obtained in the second-stage regression, because quarter-to-quarter changes are more volatile than the levels of most variables.

The variables and coefficients from equations A2 and A3 were combined and used to backcast the male full-time underemployment share from August 1971 through November 1977. In order to do this, it was also necessary to backcast the growth rate of business credit before the September quarter of 1976. This was done using data on total lending from Foster and Stewart (1991) and an estimate of the share of business lending in the total. Details of the process used are available from the author. The backcast series for the male full-time underemployment share is shown in Figure 2 in the main body of this paper.
**Female full-time underemployment share**

After deleting insignificant variables, the preferred first-stage equation for the female share was:

\[
\text{Ln}(\text{SUD}_{ft,t}) = -5.37 - 0.748 \times \text{Ln}(\text{ToT}_{t}) - 4.18 \times \Delta \text{Ln}(\text{BC}_{t})
\]

\[\text{(A4)}\]

\[
(-137.66) \quad (-10.92) \quad (-6.63)
\]

where ToT stands for the terms of trade (ratio of export to import prices); and other variables, subscripts, operators and values in brackets are as described above.

All of these explanatory variables are statistically significant and have the expected sign. Just as with the male share, a very noteworthy feature of these results is that the female full-time underemployment share is highly elastic with respect to the growth rate of business credit. The finding that the female full-time share is negatively and significantly related to the terms of trade (and the male share isn’t) is mildly surprising, because female full-time workers have a low share (and male full-time workers have a high share) of some of the industries, particularly Mining, where employment is likely to be boosted by a high terms of trade. However, this finding is not counter-intuitive, because the male and female shares of underemployed workers in full-time employment are both very low (averaging 1.0 and 0.6 per cent, respectively, between February 1978 and November 2012) and the characteristics of this small proportion of underemployed full-time workers could differ from the characteristics of fully employed full-time workers.

The diagnostic tests for this equation are as follows:

- Adjusted R-squared = 0.487; F-test (for zero slopes) = 67.1 [0.000];
- LM Heteroscedasticity test = 1.302 [0.254]; Durbin-Watson = 1.42 [0.000, 0.000];
- Jarque-Bera test (for normality of errors) = 0.327 [0.849];
- Ramsey’s Reset2 test (for functional form) = 0.379 [0.539]; and
- Condition(X) number = 6.1.
The diagnostic tests show that the equation is acceptable (the numbers shown in square brackets after the test outcomes are the probabilities), especially given the volatility of the dependent variable. The low Durbin-Watson statistic often occurs in the first stage of an error-correction model, as the short-term dynamics of the relationship are modelled in the second stage of the model.

After deleting insignificant variables, the preferred equation for the second-stage of the error-correction model is:

\[
\Delta \ln(\text{SUD}_t, f_t, t) = 0.00252 - 0.710 \times ECT_{f, f_t, t-1} \\
(0.18) \quad (-8.18)
\]

\[
- 0.923 \times \Delta \ln(\text{T}_t) - 3.04 \times \Delta \{\Delta \ln(\text{BC}_t)\}_t \\
(-1.78) \quad (-2.82)
\]

(A5)

where \( ECT_{f, f_t, t-1} \) is the error-correction term (residual from equation A4, lagged one quarter); and other variables, subscripts, operators and values in brackets are as described above.

All of these explanatory variables are statistically significant and all have the expected sign, with the exception of the constant term, where the sign and non-statistical significance is unimportant in economic and policy terms. The female full-time underemployment share is highly elastic with respect to the growth rate of business credit in the short term as well as the long term.

The diagnostic tests for this equation are as follows:

Adjusted R-squared = 0.323; F-test (for zero slopes) = 23.0 [0.000];

LM Heteroscedasticity test = 4.99 [0.025];

Durbin-Watson = 1.96 [0.328, 0.532];

Jarque-Bera test (for normality of errors) = 10.5 [0.005];

Ramsey’s Reset2 test (for functional form) = 0.191 [0.663]; and

Condition(X) number = 1.5
The diagnostic tests show that the equation is generally acceptable (the numbers shown in square brackets after the test outcomes are the probabilities), especially given the volatility of the dependent variable. A lower adjusted R-squared statistic is regularly obtained in the second-stage regression, because quarter-to-quarter changes are more volatile than the levels of most variables.

The variables and coefficients from equations A4 and A5 were combined and used to backcast the female full-time underemployment share from November 1971 through November 1977. The backcast series is shown in Figure 2 in the main body of this paper.
Appendix B

Estimating the OSFUR between February 1970 and February 2001

In this Appendix, the methods used for estimating the Observable Structural and Frictional Unemployment Rate (OSFUR) between February 1970 and February 2001 are explained and a time-series chart of the OSFUR is presented.

Before May 2001 (in terms of data for the middle month of each quarter), duration of unemployment was measured by the ABS since the last full-time job, whereas after this date, it was measured since the last job, whether full-time or part-time. While this would normally be expected to have led to a noticeable structural break in the data, this was less apparent for the OSFUR. This is because while the redefinition led to reductions in the number of former workers and those who had never worked before, they also led to an offsetting increase in the number of labour market insiders who had worked for less than one (preferred OSFUR measure) or three (alternative OSFUR measure) months.

Data for the components of the OSFUR were obtained from Supertable ST UQ1 (April 1986 to April 2001) from ABS, Labour Force, Australia, Detailed, Quarterly, February 2013 (and previous issue, ABS Catalogue Number 6291.0.55.003) for this period. Before this and back to February 1978, they were obtained from the relevant issues of ABS, The Labour Force, Final (ABS Catalogue Number 6203.0). Data on unemployed people who are former workers and those who have never worked before is available separately back to August 1980 and for August 1979 and August 1978. For the other periods in 1980, 1979 and 1978, it is available for the combined total of unemployed people who are either former workers or who have never worked before. This does not matter for the OSFUR because both of these categories are components of the OSFUR.

Before February 1978, data are available (from the relevant issues of ABS, The Labour Force, Final, ABS Catalogue Number 6203.0) for unemployed people who have never worked before and for labour market insiders who have been unemployed for less than four weeks, but not for unemployed people who are former workers (with the two-year threshold).
However, it was feasible to estimate the number of unemployed people who are former workers using the relationship between this variable and the number of long-term unemployed people. This relationship is shown in Figure B1, for the period (August 1980 through November 2000) when both are available for each quarter with consistent definitions that would also be relevant before February 1978 (viz; based on duration since last full-time job).

As can be seen from Figure B1, both series are very similar to each other for the first two years of the common consistent series (August 1980 to August 1982) and on many occasions after this. They also have very similar averages over this period. Accordingly, the number of unemployed people who are former workers before February 1978 is assumed to be the same as the number of long-term unemployed people.
Figure B1: **Numbers of Former Workers and Long-term Unemployed People, Australia**

[Graph showing the numbers of former workers and long-term unemployed people over time, with two lines representing each category.]

Sources: Supertable ST UQ1 (April 1986 to April 2001) and Spreadsheet 15b (6291015b.xls) from ABS, *Labour Force, Australia, Detailed, Quarterly, February 2013* (and previous issue, ABS Catalogue Number 6291.0.55.003) and ABS (various issues), *The Labour Force, Final*, ABS Catalogue Number 6203.0. Both series are in original terms.

With these data and assumptions, it is feasible to construct a series for the OSFUR going back to February 1970. The series before May 2001 that was constructed from the ABS data is in original terms. It was converted to seasonally adjusted terms using the multiplicative moving average process in TSP International and the result, together with the series from May 2001 onwards, is shown in Figure B2.
Figure B2: Observable Structural and Frictional Unemployment Rate (OSFUR), Australia

Sources: Constructed from ABS Labour Force Survey data using the methods explained in this Appendix. See Connolly (2011) for further information.
References


