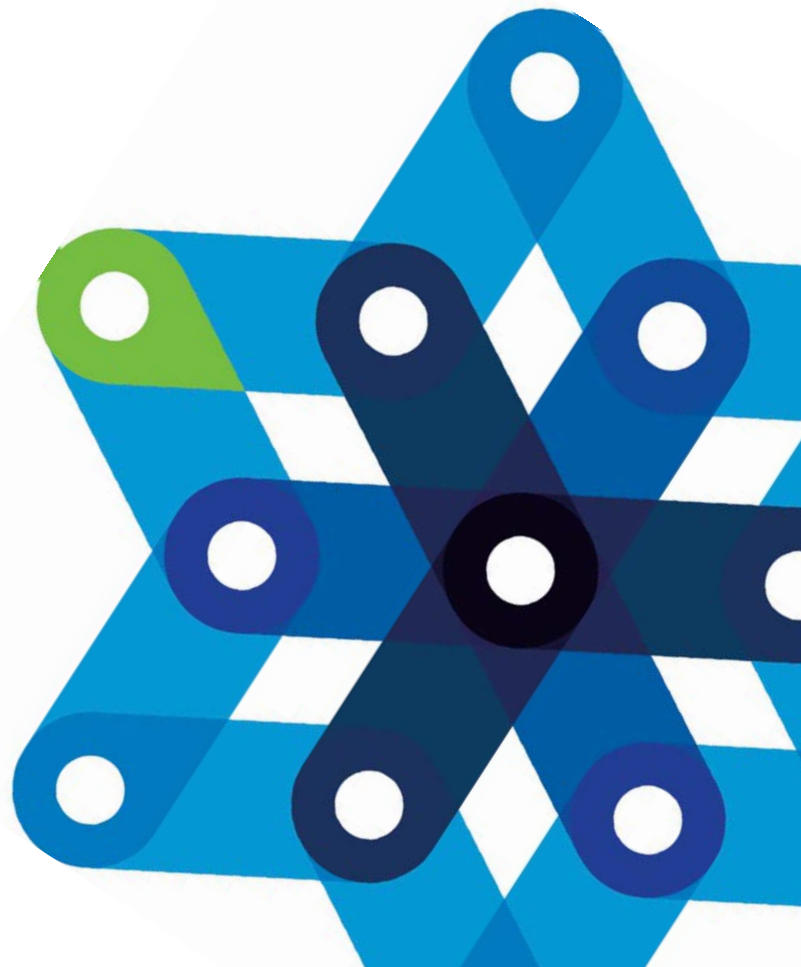




Government of **Western Australia**
Department of **Treasury**

Volatility in Monthly Labour Force Data Trade

May 2019



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Volatility in Monthly Labour Force Data

This paper outlines the issues that impact the monthly Labour Force data used by Treasury and other forecasters for analysis and forecasting of labour market indicators for the State, including employment, unemployment and workforce participation.

Monthly labour market data is volatile, particularly at the State level. There are often large swings in employment growth or for the unemployment rate in any given month. For example, monthly employment growth for Western Australia (WA) ranged between -0.9% and 1.3% in the three years to February 2019. This compares to average monthly growth of 0.04% over the same period.

This paper considers measurement issues relating to labour force statistics, which can contribute to volatility in monthly data, and which from month to month at least partially obscure underlying trends in labour market conditions. The volatility of monthly data is a key reason why Treasury prefers annual average measures of labour force indicators.

Figure 1 shows the distribution of monthly employment growth for WA and Australia since the beginning of the current Labour Force series (which began in February 1978) published by the Australian Bureau of Statistics (ABS). This clearly shows that while the mean monthly growth is comparable between WA and nationally, monthly growth in WA is more variable than at the national level. Figure 2 shows similar distributions for the percentage point change in the monthly unemployment rate for WA and Australia.

Given observed volatility, monthly labour force data for WA is generally treated with caution. Annual average data is more stable and is Treasury's primary growth measure for forecasting and economic commentary.

Figure 1: Comparison of Western Australia and national monthly employment growth rates

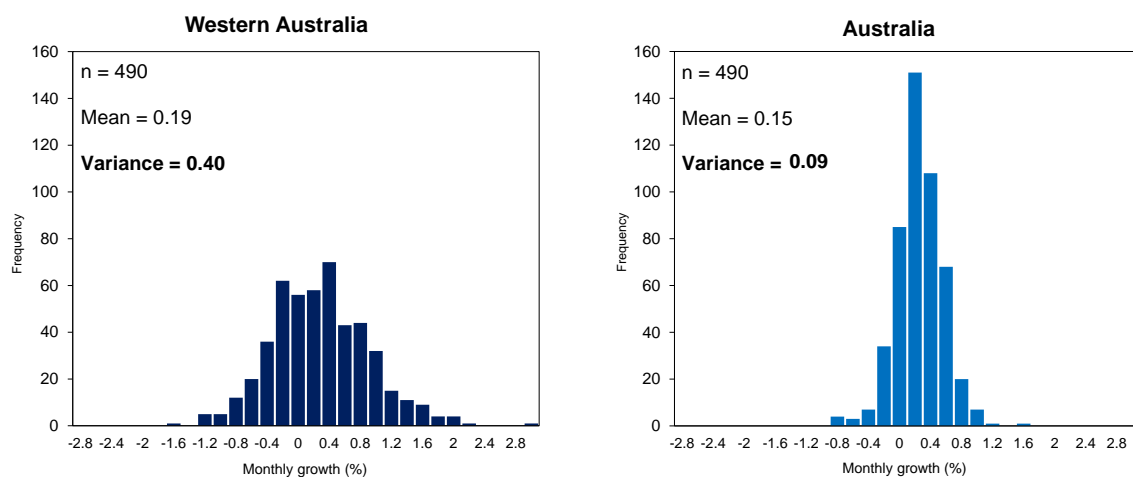
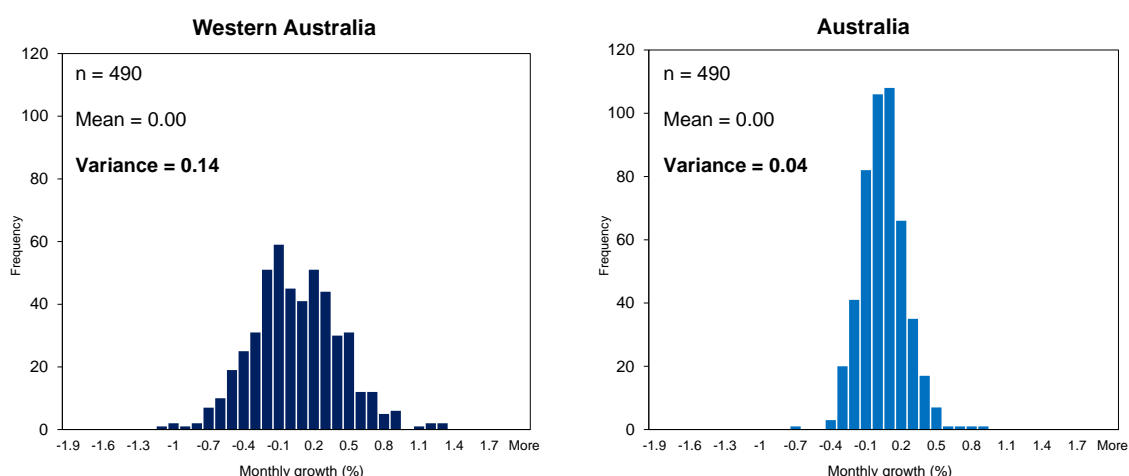


Figure 2: Comparison of the change in the monthly unemployment rate for Western Australia and Australia

State Comparison

At the State-level, more populous States tend to have a narrower distribution of change in the level of labour force indicators than States with smaller populations (see Appendices 1 and 2 for State-level analysis). Tables 1 and 2 summarise the mean, range and variance measures for monthly employment growth rates and percentage point change in the monthly unemployment rate for the States. This shows a larger variance for the States relative to the national measure, and for the smaller States relative to the more populous States.

Table 1: Monthly employment growth (%) - State comparison (March 1978 to December 2018)

| | NSW | Vic. | Qld. | WA | SA | Tas. | Aust. |
|----------|-------|-------|-------|--------------|-------|-------|--------------|
| Max | 2.00 | 2.27 | 2.08 | 3.39 | 2.36 | 3.24 | 1.47 |
| Mean | 0.13 | 0.15 | 0.22 | 0.19 | 0.09 | 0.08 | 0.15 |
| Min | -1.99 | -1.87 | -1.24 | -1.63 | -2.44 | -3.71 | -0.98 |
| Variance | 0.26 | 0.29 | 0.32 | 0.40 | 0.40 | 0.89 | 0.09 |

Table 2: Percentage point change in monthly unemployment rate – State comparison (March 1978 to December 2018)

| | NSW | Vic. | Qld. | WA | SA | Tas. | Aust. |
|----------|-------|-------|-------|--------------|-------|-------|--------------|
| Max | 1.18 | 1.29 | 1.08 | 1.25 | 1.22 | 1.92 | 0.86 |
| Mean | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Min | -0.89 | -0.90 | -1.16 | -1.12 | -1.22 | -1.66 | -0.79 |
| Variance | 0.09 | 0.10 | 0.11 | 0.14 | 0.15 | 0.30 | 0.04 |

Sampling appears to at least partly contribute to volatility in the monthly labour force data, particularly for the smaller States.

Sampling Issues

The ABS Labour Force Survey is based on a sample of approximately 26,000 private dwellings, covering approximately 0.32% of the Australian population aged 15 years and over. The sample is intended to be representative, so specific target samples are set for each jurisdiction to achieve a reliable sample.

Table 3 shows the current ABS sample design for the Labour Force Survey. The sampling fraction shown in Table 3 is influenced by population and response rates in each State and

Territory to achieve the target sample. These sampling fractions are reviewed periodically. Table 3 shows the July 2018 sample design sampling fractions.

The target sample for WA is 11% of the national sample, which is broadly in line with the State's proportion of the national civilian population aged 15 years and over in 2017-18 (10.3%). Notably, South Australia has 11.9% of the national sample, but accounts for only 7.1% of the national civilian population. Smaller sample sizes at the State level (and especially for smaller States) may lead to greater volatility than for larger States and at the national level, which are more stable. This may be due to changes within a smaller sample having a greater proportional impact that is extrapolated to the entire population, amplifying its impact on the data. By comparison, larger sample sizes should be more reflective of the population, so that changes within the sample will have less proportional effect and less impact on the data.

Table 3: ABS Labour Force Survey Sample Design, July 2018

| | NSW | Vic. | Qld. | WA | SA | Tas. | NT | ACT | Aust. |
|---|----------|----------|----------|----------|----------|---------|---------|----------|----------|
| 2018 State sampling fraction* | 1 in 445 | 1 in 438 | 1 in 416 | 1 in 310 | 1 in 218 | 1 in 99 | 1 in 52 | 1 in 169 | 1 in 339 |
| Target sample (households) | 6,029 | 5,169 | 4,306 | 2,833 | 3,048 | 2,088 | 1,323 | 865 | 25,660 |
| Share of target sample (%) | 23.5 | 20.1 | 16.8 | 11.0 | 11.9 | 8.1 | 5.2 | 3.4 | 100.0 |
| Share of civilian population 2017-18 (original %) | 32.0 | 26.0 | 19.8 | 10.3 | 7.1 | 2.2 | 0.9 | 1.7 | 100.0 |

* The probability of an address within each respective state being selected for the survey.

Households included in the Labour Force Survey are interviewed each month for eight months, with one-eighth of the sample replaced each month. The eight sub-samples are referred to as 'rotation groups', with seven of the eight rotation groups common from one month to the next. The incoming rotation group is generally selected from the same geographic areas as the outgoing one. This methodology is intended to ensure that changes in the indicators reflect changes in the labour market conditions, rather than sampling issues.

For more information on the Labour Force Survey methodology, please see [Labour Statistics: Concepts, Sources and Methods, Feb 2018](#) (ABS 6102.0.55.001).

While the survey is designed to limit the volatility attributable to changes in the sample, in some instances the employment characteristics of the incoming and outgoing rotation groups in a given month appear to be mismatched. This may be attributable to changes in underlying labour market conditions, or due to sampling issues.

This can be seen in Table 4, where the incoming rotation groups in November and December 2018, and January 2019 had significantly higher unemployment rates than the outgoing sample. The weighting applied to rotation groups within the sample means that the incoming and outgoing rotation groups are not necessarily directly comparable (although the exact nature of the weighting is not published). Notwithstanding weighting adjustments, the increase in the unemployment rate in these months is indicative of a higher proportion of unemployed people being captured in the survey. This has coincided with elevated unemployment rates in seasonally adjusted terms in those months.

Table 4: Unemployment rates within the sample, Western Australia

| WA | Unemployment rate (%) | | | WA seasonally adjusted unemployment rate (%) |
|----------|-----------------------|-------------------|------------------|--|
| | Incoming rotation | Outgoing rotation | Unmatched sample | |
| Aug 2018 | 6.3 | 6.0 | 7.4 | 6.4 |
| Sep 2018 | 4.0 | 6.9 | 10.1 | 6.1 |
| Oct 2018 | 4.0 | 9.3 | 7.3 | 5.7 |
| Nov 2018 | 8.3 | 4.3 | 5.0 | 6.6 |
| Dec 2018 | 7.9 | 4.1 | 8.8 | 6.4 |
| Jan 2019 | 8.6 | 4.8 | 11.4 | 6.8 |
| Feb 2019 | 4.4 | 6.4 | 8.8 | 5.9 |

By comparison, the sharp decline in the seasonally adjusted unemployment rate to 5.9% in February 2019 from 6.9% in January (after revisions) coincided with a relatively low rate of unemployment within the incoming rotation group that month. As can be seen in Table 4, this dynamic also occurred in October, where there was also a relatively high unemployment rate in the outgoing rotation group and a lower unemployment rate in the incoming rotation group. This contributed to the seasonally adjusted unemployment rate falling to 5.7% in October.

In the case of December 2018, the ABS advised that the incoming rotation group had a significantly lower proportion of full-time employment than the outgoing rotation group. This partially contributed to a 4,368 person (or 0.3%) decline in full-time employment in WA in original terms (which is the raw, unadjusted data). This was the first December decline in original terms since the current series began. Seasonal adjustment in December further exacerbated the monthly result, magnifying the decline in employment further to 1.1% or 15,311 people. As employment usually increases in December, the original data was adjusted downwards to account for that seasonal pattern. That exacerbated the decline in the original data in December.

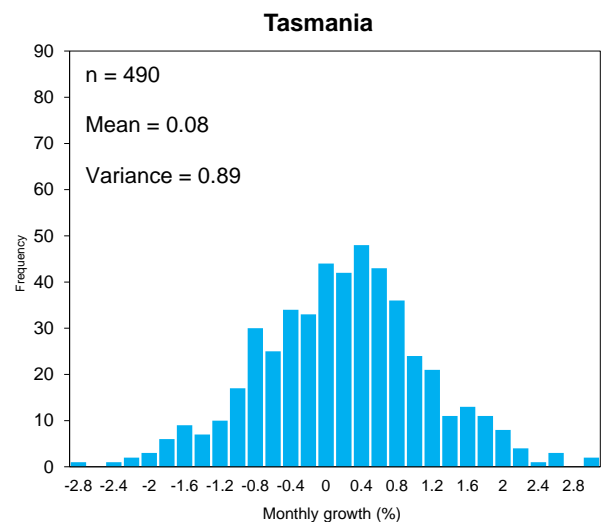
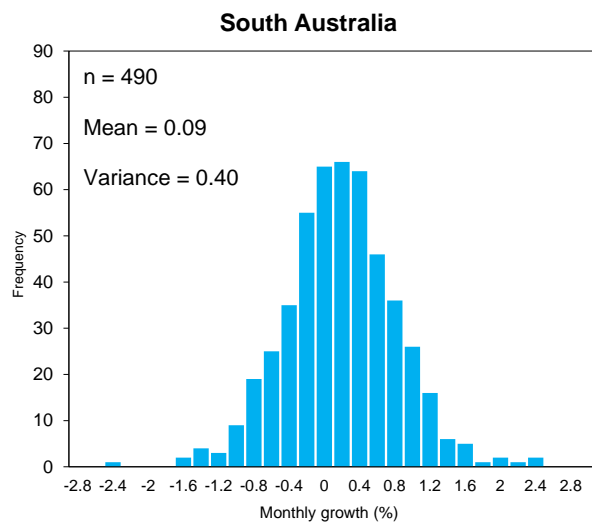
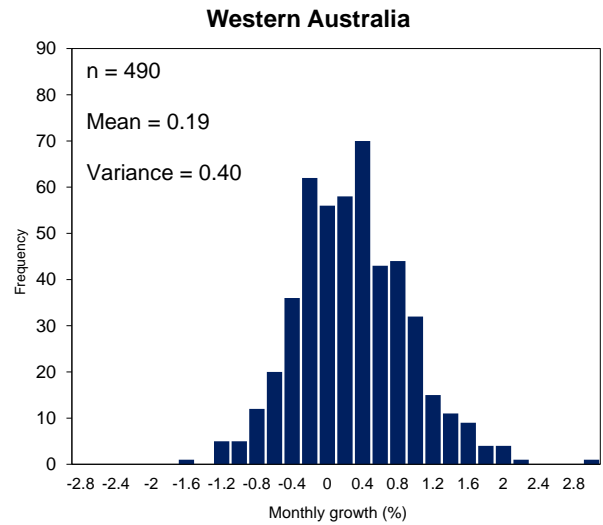
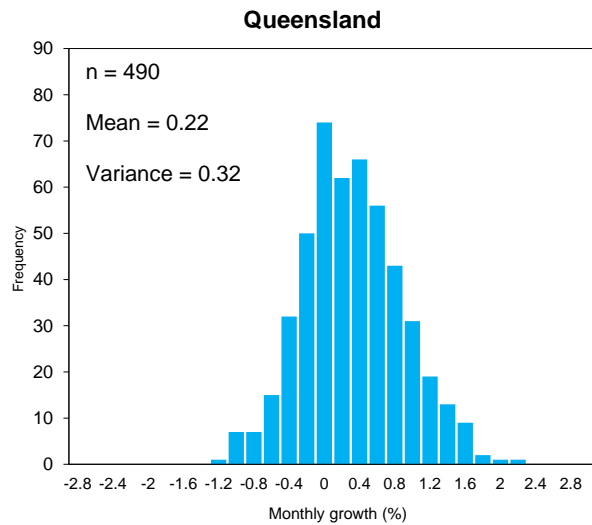
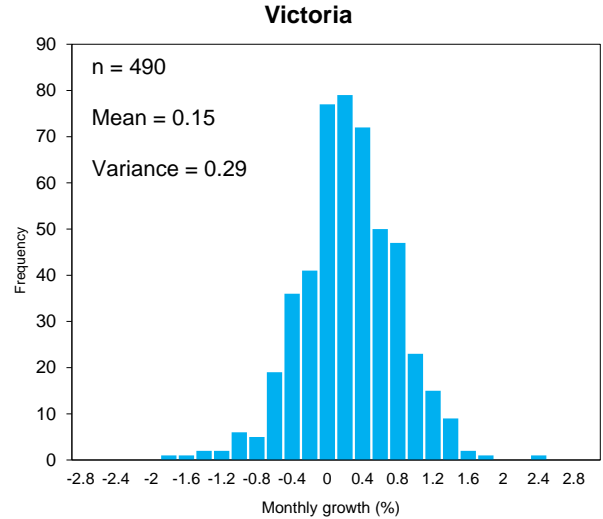
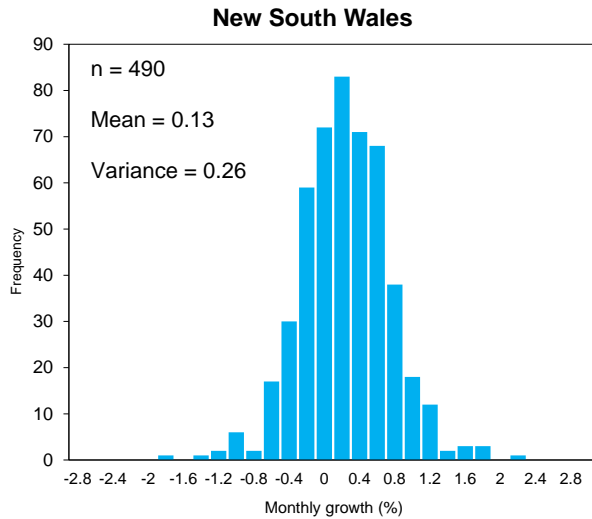
The unmatched common sample shown in Table 4 refers to people already included in the scope of the survey that reported in the current month, but did not report in the previous month. The re-introduction of these people to the common sample may also contribute to volatility, though the size of the unmatched sample tends to be smaller than the incoming and outgoing rotation groups in any given month.

It is important to note that while sampling issues (particularly the incoming and outgoing rotation groups) can contribute to monthly volatility, they are not materially responsible for longer term underlying changes in labour force indicators.

The volatility of monthly data, which can obscure longer-term underlying trends, is a key reason why Treasury prefers annual average measures of employment growth, and annual unemployment and participation rates. Annual averages do provide clear information on long-term underlying trends.

Appendix 1

Monthly employment growth – State comparison March 1978 – December 2018



Appendix 2

Percentage point change in monthly unemployment rate - State comparison March 1978 – December 2018

