

## IN THE FAIR WORK COMMISSION

Fair Work Act 2009

s.156 - 4 yearly review of modern awards

4 yearly review of modern awards - Penalty Rates

(AM2014/305)

### WITNESS STATEMENT OF SERENA YU

I, Serena Yu, [REDACTED], say as follows:

1. I refer to the following evidence given by me in this proceeding:
  - a. my research report entitled “Evaluating the impact of Sunday Penalty Rates in the NSW Retail Industry” dated 30 October 2015 (the **Yu Report**); and
  - b. my statement dated 5 November 2015 (the **Yu Reply**) in which I replied to a report by Ms Lynne Pezzullo dated 2 November 2015 which advanced a number of criticisms of the Yu Report (**Pezzullo Report A**).
2. I have been provided with a further report by Ms Pezzullo dated 2 December 2015 in which Ms Pezzullo addresses the Yu Reply (**Pezzullo Report B**). I have been requested by the Shop, Distributive and Allied Employees’ Association to provide my opinion in relation to the contents of Pezzullo Report B.
3. I have reviewed the Pezzullo Report B and respond to it below. In the limited time available I have focused on Ms. Pezzullo’s two central arguments:
  - a. that there exists a trend-break in the employment data used in the Yu Report; and
  - b. that her alternative modelling of the data provides a more accurate analysis of the effect of increases in Sunday penalty rates in the NSW retail industry.

The opinions expressed below are based on my expertise as set out in my evidence previously given to the Commission.

### **Summary of response**

4. Having considered the matters raised by Ms Pezzullo, my key conclusions are as follows.
  - a. The results set out in the Yu Report are not affected by different state employment trends, and there was no structural break in the employment trend data used in the report. Consequently, the comparison of retail employment outcomes in NSW to counterfactual outcomes in Victoria remains statistically sound.
  - b. The analysis set out in the Yu Report can be improved by incorporating and addressing three suggestions raised by Ms Pezzullo. However, consistent with the results of the Yu Report, these revised estimates and analysis establish that the five increases in Sunday penalty rates in NSW did not have a systematic effect on aggregate employment outcomes in the NSW retail industry.
  - c. That the alternative model advanced by Ms Pezzullo is seriously flawed in its specification, lacks testing for the robustness of its results, and does not provide an evaluation of the employment effects arising from the increases in Sunday penalty rates in NSW.

### **Trend analysis**

5. Paras 3.2 and 3.3 of the Pezzullo Report B concern whether there are different trends in NSW and Victorian employment in the data analysed in the Yu Report; the importance of any trend break for drawing conclusions from the analysis; and testing for whether such a break exists. As discussed in para 7a in the Yu Reply, I agree that the existence of comparable state employment trends prior to (but not after) the increase in NSW Sunday penalty rates is important to the analysis in the Yu Report.
6. There are three reasons why the trend-break analysis in paras 3.2 and 3.3 of the Pezzullo Report B does not invalidate the results in the Yu Report.

- i. *First*, volatility in the employment data in NSW for the period from late 2007 to 2010 does not invalidate the existence of common employment trends in NSW and Victoria. Rather, Figures 1 and 2 in the Yu Reply (and Figures 2 and 3 in the Yu Report) show the existence of long term parallel trends in NSW and Victorian retail employment. These long term trends strongly support the use of Victoria as an appropriate counterfactual to outcomes which occurred in NSW following the increase in Sunday penalty rates.
- ii. *Secondly*, contrary to the statements in paras 3.3d and 3.3e of Pezzullo Report B, there is no actual structural break in the NSW employment data. This can be tested because Ms. Pezzullo provides the obvious hypothesis for what may have induced the alleged structural break in late 2007– the impact of the global financial crisis (GFC, referred to in paras 3.3a and 3.4a in Pezzullo Report B). Ms. Pezzullo does not test this hypothesis in her statistical analysis of employment trends (paras 3.3d to 3.3j).
- iii. I have extended Ms Pezzullo’s analysis in para 3.3e, using November 2007 as the trend-break point, as identified by Ms. Pezzullo. I agree with Ms. Pezzullo that, in the absence of any control variables, the trend in NSW before and after this point is different. However, with the addition of control variables to account for the impact of the GFC<sup>1</sup>, this is no longer the case. In Table 1 below, the large p-value of 0.1441 shows that, after controlling for the effects of the GFC, there is no statistical difference in the coefficients on the time trend variable before and after November 2007 in NSW retail employment<sup>2</sup>.

**Table 1. Test of NSW employment trends**

<b>Model</b>	<b>Test of equivalence of coefficients on time trend variable (p-value)</b>
Least squares regression of NSW employed persons on time trend only	0.0051***
Least squares regression of NSW employed persons on time	0.1441

<sup>1</sup> As noted on p.16 of the Yu Report, “Controls for observed state-specific factors are contained in the vector **X ss**, and includes time-varying, state-level unemployment rates, employment to population ratios, and state retail sales. These variables are particularly important for controlling for potential state level effects of the economic crisis of 2008 and 2009”.

<sup>2</sup> P-values indicated by \*\*\* p<0.01 are regarded as highly significant, \*\* p<0.05 as statistically significant, and \* p<0.1 as weakly significant. Large p-values (>0.1) indicate a statistically insignificant result.

- iv. *Thirdly*, as explained in paras 11k and 18 of the Yu Reply, the inclusion of state-specific trends did not materially alter the results in the Yu Report. This inclusion significantly weakens the reliance on the assumption of common employment trends in NSW and Victoria and adds a further robustness check to the analysis.
7. In para 3.7d.ii Ms Pezzullo states that “*even in terms of Yu’s model, the introduction of Sunday penalty rates has an effect of lowering employment that persists, due to the statistically significant impact in the first year*”. I reject this conclusion for the following reasons:
- a. A conclusion of this type – effectively testing the hypothesis that there was a persistent employment effect – should be validated with standard statistical tests, not a visual inspection as per Figure 3.2. The relevant statistical test was undertaken in the Yu Report<sup>3</sup>, concluding that there was no persistent negative employment effect arising from the five increases in Sunday penalty rates.
  - b. It is based on an analysis which excludes most of the control variables used in the Yu Report, including state-level employment-to-population ratios, unemployment rates, and retail sales. As a consequence, Figure 3.2 is highly oversimplified.
  - c. The conclusion appears to be based principally on and is presented by reference to the highly simplified graphical illustration in Figure 3.2. That graph is drawn by reference to what I regard as an unduly small scale of measurement on the vertical axis.

### **Revised analysis**

8. Having reviewed the criticisms of the analysis set out in both the Pezzullo Reports, I consider that my analysis as originally advanced in the Yu Report can be improved by accommodating and addressing three suggestions raised by Ms Pezzullo.

#### *The inclusion of state-specific employment trends*

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<sup>3</sup> Yu Report, p.21: “A test on the sum of the five years’ coefficients showed that the cumulative effect was not statistically different from zero”

9. In para 3.6 of Pezzullo Report A, it was suggested that state-based time trends should also be tested. I agree. This acts as a robustness check on the assumption of common employment trends across Victoria and NSW, and is also recommended by Angrist & Pischke (2009, p.178) As set out in para 11(k) of the Yu Reply, I proceeded to test this in my analysis (as set out in Table 5 of Appendix A of the Yu Reply).

*The specification of time-effects*

10. Para 3.7(a) of Pezzullo Report B states that equation (2) and Table 4 in the Yu Report does not include period-specific effects. In equation (1) and (2) of the Yu Report, the passage of time is accounted for using a time trend variable. Imbens & Wooldridge (2009, equation 36) suggest that the preferred specification is to use period-specific dummy variables. My understanding is that the same point is being made in the first sentence of para 3.7a of the Pezzullo Report B. I agree that this is a preferable approach.

*Exclusion of data from the year 2000*

11. In para 3.3h of the Pezzullo Report B, it is suggested that it is preferable to commence the analysis from 2001 to remove the potential effects on the data from the introduction of the GST. While I disagree with the analysis that the introduction of the GST in 2000 generated a structural break in 2003 in the data, I accept that it is possible that the introduction of the GST in July 2000 may have induced state-specific employment effects which should be disentangled from the research results in the Yu Report.

*Conclusions from revised analysis*

12. I have revised the estimates set out in Table 3 of the Yu Report having regard to the above matters. That is, I have sought to identify whether the five increases in Sunday penalty rates in NSW had a systematic effect on aggregate employment outcomes in the NSW retail industry by undertaking the analysis set out in the Yu Report, save that I have also included state specific trends, period-specific effects using period-specific dummy variables and by commencing the analysis with data from 2001 rather than 2000.
13. Table 2 below presents the revised key estimates (revised from Table 3 of the Yu Report). As before, the estimates were mostly statistically insignificant, of both positive and negative directions, and a range of magnitudes. Two differences were identified from this revised analysis from that originally conducted:

- a. The statistically significant negative effect of the increases in penalty rates on employment outcomes in NSW in the first year was greater than originally identified (a reduction in total employment of 7.7% compared to 4.7% and a reduction in aggregate hours of 7.1% compared to 6.1%).
  - b. The revised analysis identified a weakly significant *positive* effect on employment in the second year, where no statistically significant effect on employment or hours had been identified in the original analysis.
14. The results of the revised estimates and analysis were otherwise consistent with the original analysis in the Yu Report and the conclusion that the five increases in Sunday penalty rates in NSW did not have a systematic effect on aggregate employment outcomes in the NSW retail industry.

**Table 2. Effects of increase in NSW retail Sunday penalty rates on aggregate employment**

Variable	Total employment		Aggregate hours	
Change in Sunday penalty rates				
July 1, 2010	-0.077***	(0.027)	-0.071**	(0.030)
July 1, 2011	0.059*	(0.031)	0.056	(0.042)
July 1, 2012	-0.043	(0.050)	-0.078	(0.066)
July 1, 2013	0.010	(0.043)	0.021	(0.047)
July 1, 2014	-0.013	(0.037)	-0.041	(0.036)
n	114		114	
R-square	0.972		0.970	

#### **Alternative modelling advanced by Ms Pezzullo**

15. In section 4 of the Pezzullo Report B, Ms Pezzullo presents a revised modelling approach to the employment effects arising from higher Sunday penalty rates in the NSW retail industry. As outlined below, I have significant concerns about the specification of the model, the absence of robustness checks on the analysis and the nature of the conclusions reached from the analysis.
16. The model, as specified in para 4.14, bears some serious weaknesses. Key amongst these include the following:

- a. The omission of variables controlling for the impact of the GFC. Despite highlighting their importance in para 3.4a, Ms. Pezzullo seeks to exclude them due to potential “reverse causality” (para 3.18a). However controlling for labour market conditions and the business cycle is standard in such studies of employment effects (e.g. Card, 1992) and the “reverse causality” argument – that retail employment in NSW determined state-wide labour market conditions during the GFC – is highly infeasible. Ms. Pezzullo also did not test the impact of excluding such important variables. In Table 3 in the Yu Report, these variables were shown to be highly significant.
  
- b. In para 4.18, Ms. Pezzullo asserts that there is high correlation between the sales variable and the time trend. This is not shown in her results. She then cites “issues in interpreting the individual coefficients”, but does not elaborate upon them<sup>4</sup>. By reason of these “issues”, Ms Pezzullo excludes the time-trend variable in her model, without explaining why she did not consider dropping the retail sales variable instead. As a consequence, the results in Tables 4.3 to 4.5 are based on a model which does not take account of the passage of time. This is important because employment tends to grow over time with population and labour force growth. As a result, Ms Pezzullo has not accounted for employment effects in different years, for example, the adverse employment changes in 2009 (during the GFC).
  
- c. Ms Pezzullo is incorrect in her statement in para 4.17 that “heteroscedasticity-consistent standard errors are generally smaller” than those in her tables. The opposite is the case; they are generally *greater* than those in her tables<sup>5</sup>. As a consequence, without further tests, we can have limited confidence in the statistical significance of any of her results<sup>6</sup>.

17. The Pezzullo Report A set out a long list of model specification tests to evaluate the robustness of analysis presented in the Yu Report. Ms Pezzullo states in the Pezzullo

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<sup>4</sup> Multicollinearity would not be an “issue” as it does not violate any assumptions of least squares regression and is not grounds for omitting variables. The omission of important variables can induce bias in the resulting estimates.

<sup>5</sup> Gujarati (2004), p417: “HTC-corrected standard errors are considerably larger than the OLS standard errors and therefore the estimated t-values are much smaller than those obtained by OLS”.

<sup>6</sup> A basic assumption of regression analysis is that there is no heteroscedasticity (**HTC**) in the data. If HTC does exist in the data, it means that we cannot be confident in the statistical significance of our results. It is straightforward to produce HTC-consistent standard errors (also known as robust standard errors) to redress this issue, as presented in the Yu Report (Tables 3 to 6).

Report B that “the tests I recommended in my First Report are standard, valid tests that should be conducted” (para 2.1b). Ms Pezzullo has not however performed most of these tests on her own modelling. In particular, she has not undertaken:

- a. The RESET test for functional form misspecification (Pezzullo Report A, para 3.22b)
- b. Stability tests (Pezzullo Report A, para 3.22c)
- c. Augmented Dickey-Fuller test for non-stationarity (Pezzullo Report A, para 3.27)
- d. Tests for endogeneity (Pezzullo Report A, para 3.31)
- e. Tests for multicollinearity (Pezzullo Report A, para 3.31)

In addition, Ms. Pezzullo did not test for heteroscedasticity, which was corrected for in the Yu Report.

18. Putting to one side the above criticisms, the modelling set out in Part 4 of Pezzullo Report B does not yield any significant results or clear conclusions about the employment effects arising from higher Sunday penalty rates. The only concluding statement in para 4.21g is that “behaviour in NSW may have moved towards that in Victoria as Sunday penalty rates in NSW have moved to the level in Victoria”. This statement is unclear in its meaning. However, more importantly, it is based on line (g) in Table 4.5. This result, a p-value of 0.2, indicates that the model was *unable* to establish a statistically significant difference between retail employment in NSW and Victoria post-2010.

## References

- Angrist, J. D., and Pischke, J.-S. (2009), *Mostly harmless econometrics*. Princeton University Press, New York.
- Card, David (1992): .Using regional variation to measure the effect of the Federal Minimum Wage, *Industrial and Labor Relations Review*, 46, 22.37.
- Gujarati, DN (2004), *Basic Econometrics 4<sup>th</sup> Edition*, Tata McGraw Hill.
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**18 December 2015**

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**SERENA YU**