

# Four Yearly Review of Modern Awards – Penalty Rates (the Review)

AM2014/305

02 November 2015

Private and confidential

Mr Nick Tindley  
Executive Manager  
FCB Group  
Level 18, 607 Bourke Street  
Melbourne Victoria 3000

02 November 2015

Dear Mr Tindley

**Four Yearly Review of Modern Awards – Penalty Rates – AM2014/305 (the Review)**

Thank you for appointing me as an expert witness for the above matter.

Please find attached my report outlining my opinion in relation to the report authored by Ms Serena Yu of the University of Sydney Business School on "*Evaluating the impact of Sunday Penalty Rates in the NSW Retail Industry*".

I take full responsibility for the content of this report. My full curriculum vitae is attached in Appendix A.

Yours sincerely



**Lynne Pezzullo**  
Partner  
Deloitte Access Economics Pty Ltd

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## Appendices

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## Glossary

Abbreviation	Meaning
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ARA	Australian Retailers Association
MGA	Master Grocers Association
NRA	National Retail Association
NSW	New South Wales
VIC	Victoria
WHS	workplace health and safety

# 1 Introduction

## Qualifications and experience

- 1.1 I, Lynne Pezzullo, am the Lead Partner of the Health Economics and Social Policy team in Deloitte Access Economics Pty Ltd (Deloitte) in 1/9 Sydney Avenue, Barton in the Australian Capital Territory, Australia. I am an experienced Economist with over twenty five years of research and consulting experience. Specific and relevant experience includes the following.
- (a) I lead the ACT economics practice for Deloitte Access Economics. The Health Economics and Social Policy team is only part of this practice, with other parts of the practice including macroeconomics, microeconomics and economic modelling.
  - (b) As Managing Partner of Deloitte's ACT office I am also the financial and business manager of the ACT Deloitte office which includes Deloitte's ACT based financial advisory, consulting, risk, assurance and accounting practices.
  - (c) In this role, I provide advice, service and support to most of the Canberra office's clients. Most of these clients are outside of the health sector and include the Hindmarsh Group, Canberra Airport Group and ACTEW AGL. Many of these clients operate in the retail sector.
  - (d) I have undertaken a number of research projects that relate to workforce and related issues faced by the retail sector. Examples include analysis of the optometry workforce for Specsavers and Luxottica, analysis of the dental workforce for the Australian Dental Association, analysis of the GP workforce for the Australian Medical Association, analysis of the physiotherapy workforce for the Australian Physiotherapists Association, analysis of the accredited exercise physiologist workforce and analysis of the fitness industry and its workforce for Fitness Australia.
  - (e) Two examples of work that I have carried out on Award and labour market policy issues include: research for the Australian Nursing Federation (as it then was) in relation to the disparity of wages for nurses working in acute care and aged care in NSW, and the Regulation Impact Statement for the Fair Work Act 2010 (Cth).
  - (f) Two examples of studies I've led in relation to consumer and employee preferences include: Making Choices: Future dementia care: projections, problems and preferences for Alzheimers Australia, which utilised discrete choice modelling techniques to rank preferences; and a number of Regulation Impact Statements for SafeWork Australia in relation to workplace health and safety ('WHS'), including the RIS of the Harmonisation of WHS, which included substantial consultation with employees and their union representatives through mixed methods approaches to determine impacts of and views about proposed regulatory changes from the perspectives of industry, regulators and workers.
- 1.2 My curriculum vitae is attached at **Appendix 1**.

## My instructions

- 1.3 I have been engaged by Mr Nick Tindley (FCB Group), the lawyers acting on behalf of the Australian Retailers Association (ARA), Master Grocers Association (MGA) and National Retail Association (NRA) in the Four Yearly Review of Modern Awards – Penalty Rates – AM2014/305 (the **Review**).
- 1.4 Ms Serena Yu of the University of Sydney Business School has authored a report “Evaluating the impact of Sunday Penalty Rates in the NSW Retail Industry” (**Yu Report**) which has been submitted to the Fair Work Commission.
- 1.5 I have been instructed to provide a written report containing my opinion of the Yu Report. In doing so, I have been instructed to give consideration to the:
- (a) conceptual and analytical basis of the report;
  - (b) comparator used in the report; and
  - (c) regression specifications in the econometrics.
- 1.6 I provide my letter of instruction as **Exhibit A** to this report<sup>1</sup>.
- 1.7 Any other assumptions that I have chosen to adopt and the reasons for my choice are set out in the body of my report.

## Sources of information

- 1.8 I set out at **Appendix 2** a list of the documents on which I have relied in the preparation of this report. In addition, where I rely on publicly available material, I provide the source as an exhibit to this report or identify the website address.
- 1.9 The factual matters in my report are referenced to their source in the instructional documents or elsewhere, except that the summary of my conclusions (Section 2) is not so referenced.

## Structure of this report

- 1.10 In Section 2, I set out a summary of my conclusions.
- 1.11 In Section 3, I outline my opinions on Yu Report.
- 1.12 In Section 4, I set out the relevant declarations and also the limitations of the use of this report.

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<sup>1</sup> Letter of instruction dated 20 October 2015.

## 2 Summary of conclusions

- 2.1 I have reviewed the report authored by Ms Serena Yu of the University of Sydney Business School on “*Evaluating the impact of Sunday Penalty Rates in the NSW Retail Industry*” (Yu Report). My comments centre around the model specification but they take into consideration the conceptual and analytical basis of the report and the comparator used in the Yu Report.
- 2.2 Based on Yu’s models of aggregate employment and hours worked, I conclude the following:
- (a) Trends: the difference in trends observed in the employment and hours worked data for NSW and Victoria raises the question of whether Victoria is an appropriate control group for NSW. Because of a trend difference in NSW, I believe Yu’s model does not capture the trend effect appropriately for NSW.
  - (b) Empirical strategy: the graphical empirical strategy described in the Yu Report is not what was employed in the regression modelling. Consequently, it did not capture the effect of a rise in penalty rates as it had intended to.
  - (c) Statistical tests: the author of the Yu Report did not conduct appropriate statistical tests, as evidenced in Section 3, for time series data, likely rendering the estimated model biased.
  - (d) Endogeneity and multicollinearity, as explained in paragraph 3.31: Yu’s model of retail employment contains employment-related variables on the right hand side. Those variables appear to suffer from endogeneity, again possibly rendering the model results invalid. Multicollinearity, where the right hand side variables are related to each other, is another potential issue that can also reduce the robustness of conclusions.
- 2.3 Based on Yu’s model of working on Sundays, it is unclear whether the author has given consideration to the panel nature of the data used. Not utilising the appropriate panel data estimation techniques leads to incorrect standard errors, possibly resulting in inappropriate conclusions. Again, it is not clear from the Yu Report whether any specification tests were conducted.
- 2.4 In my opinion, the conclusions reached in the Yu report are unfounded due to the many issues identified with the modelling employed, as summarised in paras 2.1 to 2.3 above, and detailed in the next section 3.

## 3 My opinion of the Yu Report

### Introduction

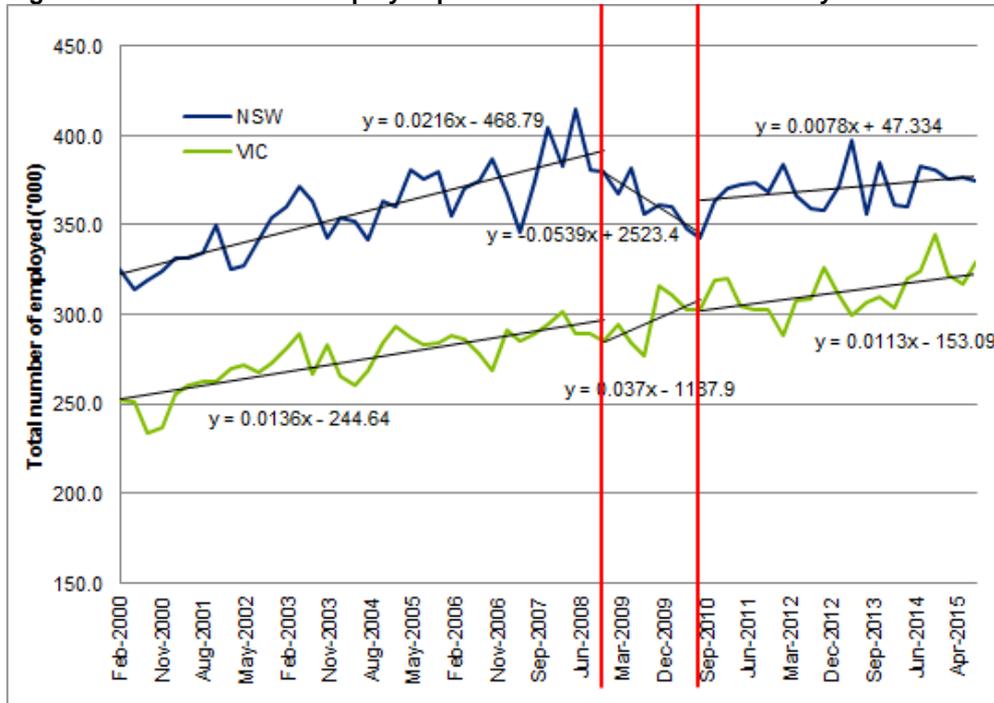
- 3.1 In this section, I set out my comments on the report “*Evaluating the impact of Sunday penalty rates in the NSW retail industry*” by Serena Yu of the University of Sydney Business School. The report was prepared for the Shop, Distributive and Allied Employees Association.
- 3.2 The report describes the results from research that sets out to investigate the increases in the Sunday penalty rates in the NSW retail industry between 1 July, 2010 and 1 July, 2014, and their effects on the following:
- (a) Total number of workers employed in the NSW retail industry;
  - (b) Aggregate hours worked in the NSW retail industry; and
  - (c) The probability of working on Sundays in the NSW retail industry.
- 3.3 In the following paragraphs, I comment on the approach taken by Yu to model aggregate employment and hours worked. Following that, I comment on the approach taken by Yu to model working on Sundays. My comments centre around the model specification but they take into consideration the conceptual and analytical basis of the report and the comparator used in the Yu Report.

### Aggregate employment and hours worked

#### Trend analysis

- 3.4 Figure 2 in Yu’s paper shows total retail employment in NSW and Victoria from August 1991 to May 2010, while Figure 3 shows aggregate retail full time hours and Figure 4 shows aggregate retail part time hours for the two states over the same period. Figure 6 shows total retail employment in NSW and Victoria from February 2000 to February 2015, while Figure 7 shows aggregate retail hours for the two states over the same 15 year period. It is clear from the figures that there are trends in the data. Focussing on the latter two figures, since they cover the period in the regression analysis,
- (a) the Victorian data shows an upward trend over the entire period, for both total employed and for total hours (Figure 3.1 and Figure 3.2).
  - (b) the NSW data shows an upward trend to about 2009 for both total employed and total hours, after which an upward trend is no longer apparent overall; rather, there is a downward trend from February 2009 to May 2010, and a trend after that time that is flatter than in the period prior to February 2009 (Figure 3.1 and Figure 3.2).

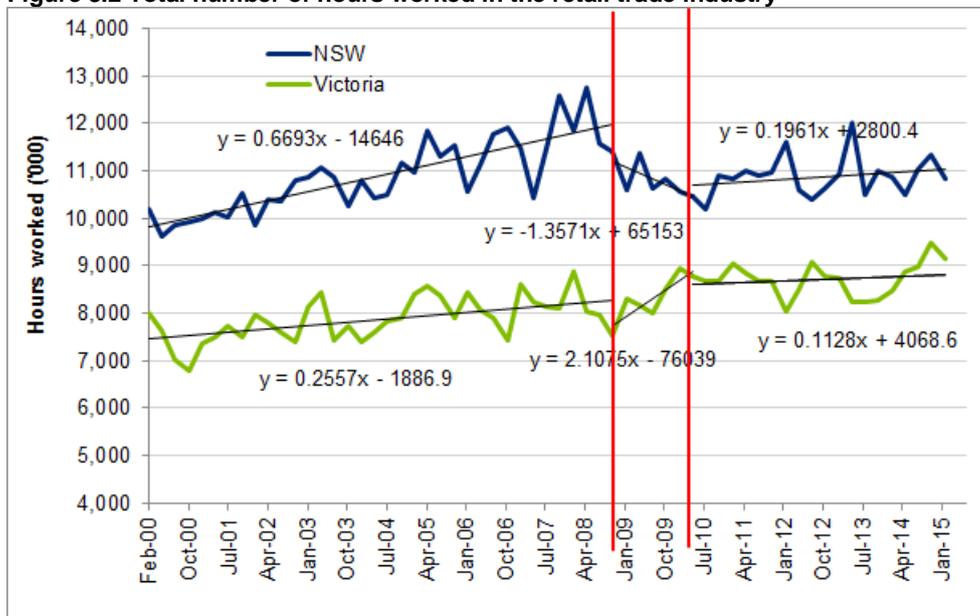
**Figure 3.1 Total number of employed persons in the retail trade industry**



Note: This is a part replication of Figure 6 in the Yu Report. The two red lines indicate the period February 2009 and May 2010.

Source: Australian Bureau of Statistics (ABS) Cat. No. 6291.0.55 (2015)

**Figure 3.2 Total number of hours worked in the retail trade industry**



Note: This is a part replication of Figure 7 in the Yu Report. The two red lines indicate the period February 2009 and May 2010.

Source: ABS Cat. No. 6291.0.55 (2015)

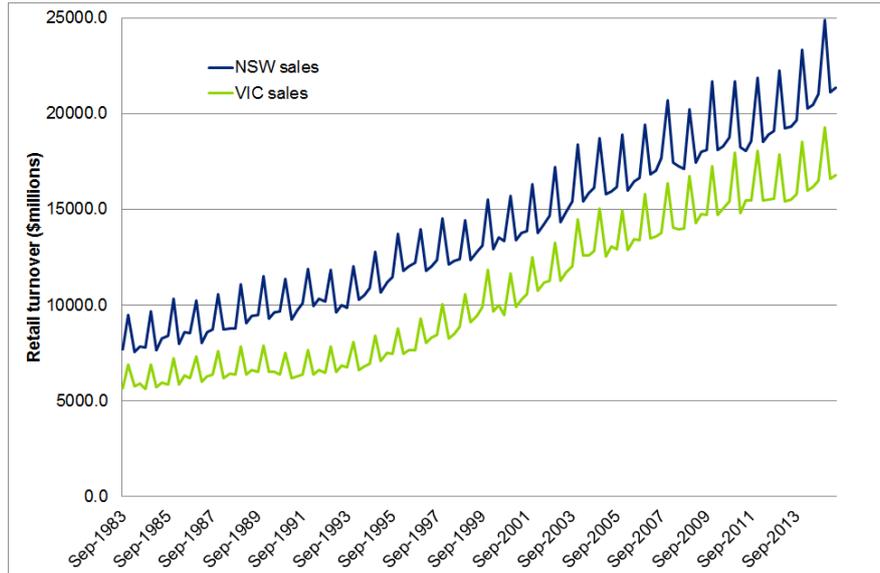
3.5 The diverging trends depicted in Figure 3.1 and Figure 3.2 indicate an issue with the appropriateness of comparing NSW with VIC. A critical assumption, which the author has rightfully

highlighted in the paper<sup>2</sup>, is that in order to identify a control group, the trends exhibited in this group (Victoria) should be identical to those in the treatment group (NSW). This raises the question of why only NSW and Victoria were compared rather than including other states and territories to provide a more complete picture of the effect of penalty rates on employment and hours worked across Australia.

- 3.6 More generally, Yu's model implicitly incorporates the assumption that the time trend parameter and the parameters on the variables in X are the same in the models for NSW and Victoria. The result from testing that assumption should be reported. If the assumption is incorrect, then the estimators of the parameters may be biased, potentially invalidating the results.
- 3.7 The regression model fitted to the data, as described in equation (1) and Table 3 of Yu's paper, contains a time trend. In the equation, the trend is denoted by  $\gamma_t$  and is described only as a 'time trend'. That description is ambiguous, since there are many possible ways to define a time trend. The table contains parameters called 'time trend effects', and I infer from the fact that there is a single time trend parameter in each column in the table and the model is linear (estimated by ordinary least squares) that the time trend is a linear time trend, of the form  $\gamma_t$ , where  $\gamma$  is the parameter to be estimated.
- 3.8 While the linear trend may be appropriate for the Victoria data, it may not be for the NSW data. In particular, it does not allow for the change in the slope of the trend after about 2009 (see Figure 3.1 and Figure 3.2). This, again, highlights the question of whether Victoria is an appropriate control group as well as the validity of the comparison techniques and hence findings.
- 3.9 The change in the slope of the trend in the NSW data may be explained by the change in penalty rates, or by other explanatory variables. For example, Figure 3.3 below shows retail turnover in NSW and Victoria from 1983 to 2014 (chain volume measure). (Yu's model uses 'state retail sales', but that variable is not defined. I define sales as retail turnover data from ABS Cat. No. 8501.0). There is no obvious change in the trend in the NSW sales series 2009, suggesting that the reductions in hours and employment in NSW since 2009 is not primarily driven by sales, but by something else.
- 3.10 I have not undertaken similar investigations of the other control variables in Yu's model, although such graphical analysis is indicative only. A properly specified and estimated multivariate model would provide a more powerful test.

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<sup>2</sup> Pg 10 of Yu Report. Without satisfying this condition, the analysis is invalidated.

**Figure 3.3 Retail turnover**

Source: ABS Cat. No. 8501.0 (2015)

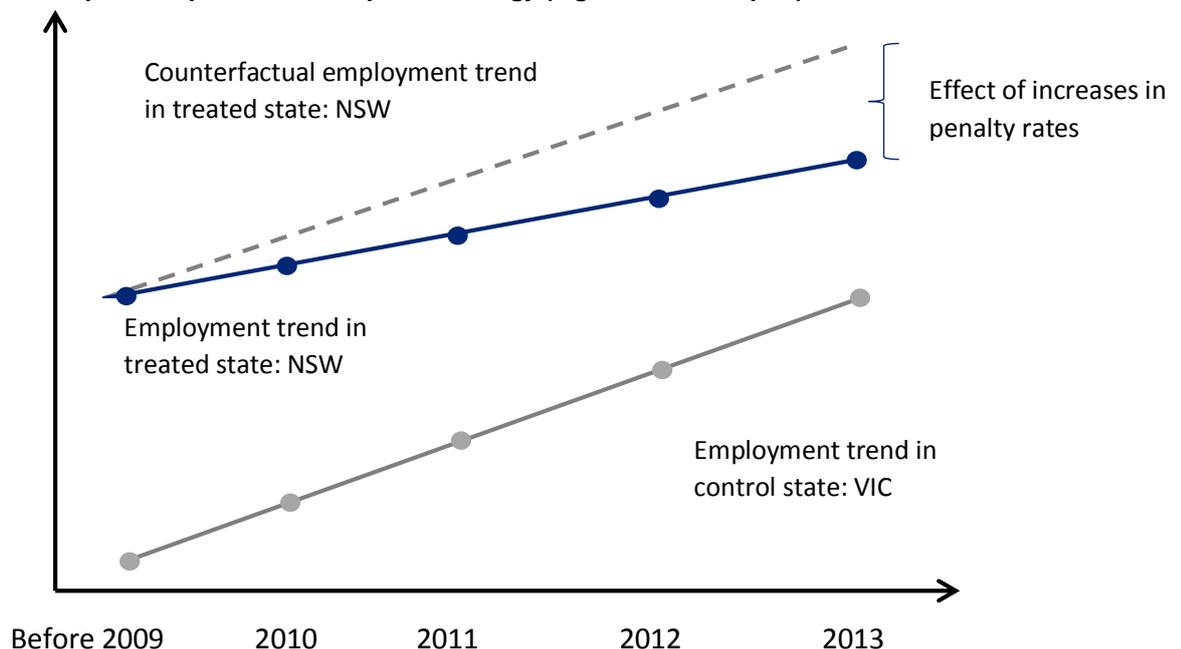
### Empirical strategy

- 3.11 Yu's model includes the dummy variables,  $D_{sk}$ , to model and test for the changes in retail employment and hours associated with the increases in Sunday penalty rates in NSW after 2009. The dummy variables 'denote whether the observation took place in NSW in a period after each penalty rate change' (Yu, p 16). That definition is ambiguous. For example, does it mean the quarter after the change, the year after the change, the period from the change to the end of the sample period or something else?
- 3.12 The standard Difference-in-differences (DID) (see, for example, the Imbens and Wooldridge (2009) reference in Yu's paper) uses data on two cross-sections (or waves of a panel), the first from a 'before' period and the second from an 'after' period. Each cross-section includes data on the controls and the treatments. The idea is to use the change in the average of the controls between the before and after periods to correct the change in the average of the treatments for changes that would have occurred in the absence of any treatment. Thus, the estimated treatment effect is the change in the average of the treatments less the change in the average of the controls.
- 3.13 Yu's approach does not do the equivalent of this. The equivalent to DID would be to include the  $D_{sk}$  dummy variables in the part of the model that applies to the Victorian data, and then test whether the coefficients on those variables are the same as those for the NSW part of the model. In other words, suppose that there was some other structural change in the economy that changed the intercepts for both NSW and Victoria. Yu's model assumes that the intercepts are constant over the entire sample period, but any change in the intercept for NSW would influence the coefficients on the  $D_{sk}$  dummy variables.
- 3.14 Under Yu's assumption that the slope of the trend is constant over the entire sample period, it is not actually necessary to use data from Victoria – the data for NSW from before the first change in the Sunday penalty rates would have given the slope. The same argument applies for the parameters on the X variables. But as noted in paragraph 3.6, if the slope of the trend for NSW (or

any of the other parameters) is different from that for Victoria, then incorporating the Victorian data in the model, without the necessary modification to the model, would not be appropriate.

- 3.15 The ambiguity in the model specification with respect to the  $D_{sk}$  dummy variables is just one of the many issues I encountered while reviewing this report. Poor chart and table labelling is another example. For instance, Table 3 in the Yu Report is titled “Aggregate employment effects”, yet the table presents two types of results – total employment and aggregate hours. In Figure 7, while it is titled “Aggregate retail hours in NSW and Victoria”, it did not include a legend to indicate which data series is for NSW and which is for Victoria. There are many instances where the reader has to go back and forth in the report to attempt to derive the intention. There are also occurrences where it appears from the units of reporting that transformations may have been made (e.g. taking natural logarithms of the sales data), although this is not specified by Yu, nor whether the quarterly retail sales data was obtained from monthly retail sales data.
- 3.16 Coming back to the dummy variables,  $D_{sk}$ , I have assumed from comments elsewhere in the paper that the dummy variables refer to the period from each change in Sunday penalty rates to the next change.<sup>3</sup>
- 3.17 In that case, the dummy variables allow for intercept changes rather than trend changes. Compare that with Yu’s Figure 1 (see Figure 3.4 for a replicate), which suggests a trend change. In fact, the specification of the dummy variables implies a model in which the solid blue line in Yu’s Figure 1 is replaced by a series of lines parallel to the dashed line (Figure 3.5).

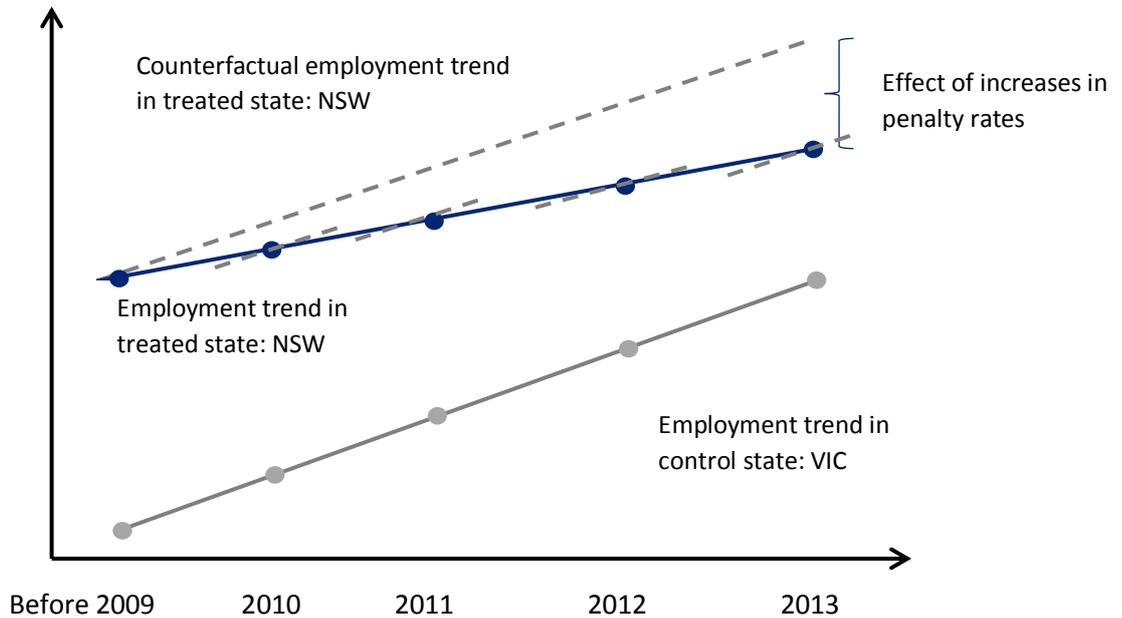
**Figure 3.4 Graphical explanation of empirical strategy (Figure 1 in Yu Report)**



Source: Yu (2015)

<sup>3</sup> For example, on page 21, Yu writes that ‘... while the number of employees fell by 4.7 percent in NSW following the initial increase in Sunday penalty rates in 2010, the magnitude and directions of the effects thereafter varied and were statistically significant.’

Figure 3.5 Actual empirical strategy employed in the Yu Report



Source: Based on Figure 1 in the Yu Report

3.18 In other words, Yu’s model does not test the possibility suggested in her Figure 1. It does not allow for changes in the trends of employment and aggregate hours. Rather it tests that, at each increase in Sunday penalty rates, there is a step change in employment and aggregate hours. In between those step changes, hours and aggregate employment increase at the rate they would have in the absence of the increases in Sunday penalty rates.

3.19 A model corresponding to Yu’s Figure 1 is given by<sup>4</sup>

$$y_{NSW,t} = \alpha_{NSW} + \gamma t + \beta_1 DD_{NSW,t} + \tau_1 DD_{NSW,t} t + \delta X_{NSW,t} + \varepsilon_{NSW,t}$$

$$y_{VIC,t} = \alpha_{VIC} + \gamma t + \delta X_{VIC,t} + \varepsilon_{VIC,t}$$

3.20 or, more generally,

$$y_{st} = \alpha_s + \gamma t + \sum_{k=1}^5 \beta_k D_{sk} + \sum_{k=1}^5 \tau_k D_{sk} t + \delta X_{st} + \varepsilon_{st}$$

**Statistical tests**

3.21 The ABS data represents employment, and hours worked over time i.e. it is time series data. It is standard in models on time series data to test for serial correlation in the errors, but Yu does not present the results from such tests.<sup>5</sup> Serial correlation in the residuals invalidates estimates of standard errors not taking it into account; and, more generally, may be a sign of misspecification of

<sup>4</sup> Here, all variables and parameters except for  $DD_{NSW,t}$  and  $\tau_1$  are defined as in Yu’s paper. For example,  $y_{NSW,t}$  and  $y_{VIC,t}$  are the  $y_{st}$  variables in Yu’s paper. The commas in the subscripts are added for clarity.  $DD_{NSW,t}$  is a dummy variable equal to one in the time period from immediately after the first increase in Sunday penalty rates in NSW (1 July 2010) to the end of the sample period and equal to zero otherwise, and  $\tau_1$  represents the change in the slope of the trend after 1 July 2010. If my understanding of the  $D_{sk}$  variables is correct, then  $DD_{NSW,t} = D_{NSW,1} + \dots + D_{NSW,5}$ .

<sup>5</sup> It is standard in models on time series data to test for serial correlation because ‘... testing for serial correlation can be used to detect dynamic misspecification. Furthermore, static and finite distributed lag models often have serially correlated errors even if there is no underlying misspecification of the model. Therefore, it is important to know the consequences and remedies for serial correlation for these useful classes of models.’ See the introduction to chapter 12 of Wooldridge (2013). A similar argument is made in chapter 7 of Asteriou and Hall (2011).

the model. For example, missing lags of variables typically results in serial correlation in the residuals. Many models on time series data contain lags, yet Yu's model is static – there are no lags.<sup>6</sup>

- 3.22 More generally, the paper presents no tests of the specification of the model. Therefore, the reader is not able to judge the adequacy of the model. Such tests include:
- (a) Tests based on residual diagnostics, especially for serial correlation such as those described in Wooldridge (2013, chapter 12) or Asteriou and Hall (2011, chapter 7).
  - (b) The RESET Test (Regression Specification Error Test), which tests for general functional form misspecification e.g., Wooldridge (2013, chapter 9).
  - (c) Stability tests, for testing whether the parameters in the model are stable over time, such as Chow test (e.g, Wooldridge (2013, chapter 7).
- 3.23 Many such tests are included in the EViews econometrics package.
- 3.24 Yu's paper does not consider the possibility that the data is integrated (non-stationary), rather than stationary around a linear trend. The simplest case of integrated data is the random walk, the model

$$y_t = \varphi y_{t-1} + e_t$$

in which  $\varphi = 1$ . (Here,  $e_t$  is an uncorrelated error term.) In this case,  $y_t$  is said to be integrated of order one, or  $I(1)$ . A simple model that is stationary around a linear trend is given by

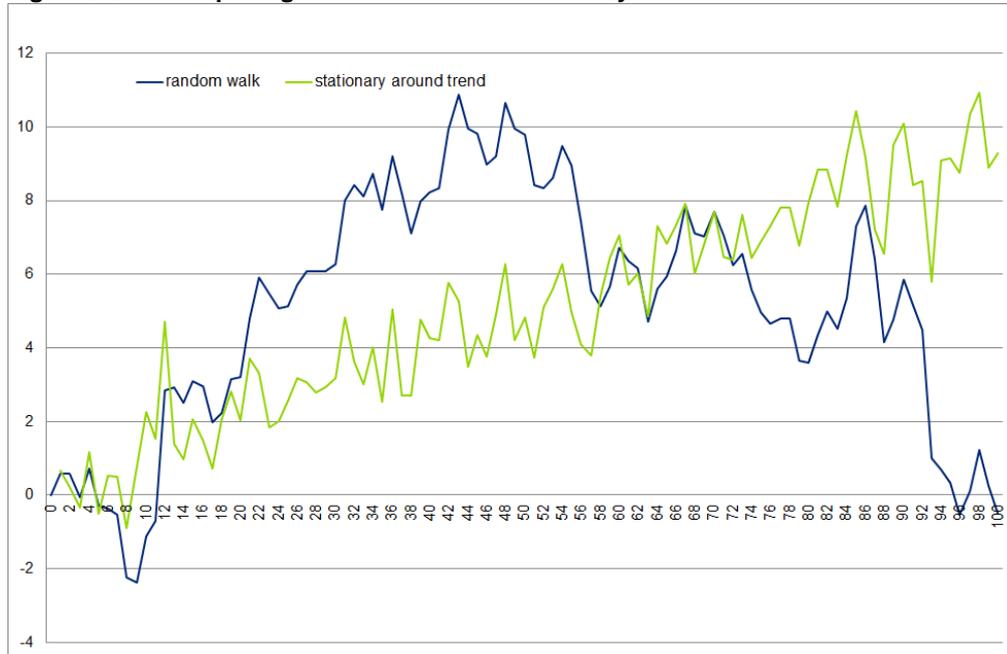
$$y_t = \alpha + \gamma t + e_t$$

- 3.25 Data from a random walk can 'wander around' whereas data that is stationary around a linear trend will lie along the trend line. The following Figure 3.6 illustrates both, using simulated data. The errors driving the two processes are standard normal, the two models use the same errors and the slope on the trend is 0.1.

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<sup>6</sup> For example, inspection of the chapters in Wooldridge (2013) or Asteriou and Hall (2011) on time series data gives many examples of models with lags.

Figure 3.6 Data depicting a random walk vs. stationary around a linear trend



Source: Simulated data generated by Deloitte Access Economics.

- 3.26 If the data is integrated, then the usual hypothesis testing would be invalid.<sup>7</sup> Therefore, testing for integration is an important step in any analysis of time series data.
- 3.27 To investigate the adequacy of the using stationary models with a linear trend, as Yu's paper does, unit roots tests<sup>8</sup> were conducted on the data, focussing on the employment data and retail turnover<sup>9</sup>. In the employment data, an Augmented Dickey-Fuller test rejected the null hypothesis of I(1) data in favour of the alternative that the employment data is stationary around a trend.<sup>10</sup> The stationary models with linear trends used by Yu may therefore be reasonable.
- 3.28 However, in the case of the retail turnover data, the null hypothesis that the data is I(1) is not rejected. It makes no sense, econometrically, to use an I(1) variable as an explanatory variable for a stationary variable.<sup>11</sup>
- 3.29 Yu does not indicate whether the 'retail sales data' is real or nominal. It is preferable to use data adjusted for inflation. For example, using nominal data implies that retailers do not recognise that

<sup>7</sup> Wooldridge (2013, chapter 11.3) notes that 'the usual inference procedures are very susceptible to violation of these assumptions when the data are not weakly dependent, because then we cannot appeal to the law of large numbers and the central limit theorem.' Similarly on p. 640 he notes that 'The problem is that ...  $y_{t-1}$  is I(1), and so the usual central limit theorem that underlies the asymptotic standard normal distribution for the t statistic does not apply: the t statistic does not have an approximate standard normal distribution even in large sample sizes.'

<sup>8</sup> Unit root tests test the null hypothesis that the data is I(1). For example, in the model  $y_t = \phi y_{t-1} + e_t$  the test is for the null hypothesis  $H_0: \phi = 1$  against the stationary alternative that  $\phi < 1$ . The most common test for a unit root is the Augmented Dickey Fuller test (e.g., Wooldridge (2013), chapter 18.2).

<sup>9</sup> I had insufficient time to also test for hours.

<sup>10</sup> See Wooldridge (2013), chapter 18.2 for a description of this test.

<sup>11</sup> Roughly speaking, in large samples a variable that 'wanders around' cannot explain a variable that follows a distinct trend. With respect to using an I(1) variable as an explanatory variable, Wooldridge (2013, chapter 11.3) notes that 'Using time series with strong persistence of the type displayed by a unit root process in a regression equation can lead to very misleading results ...'

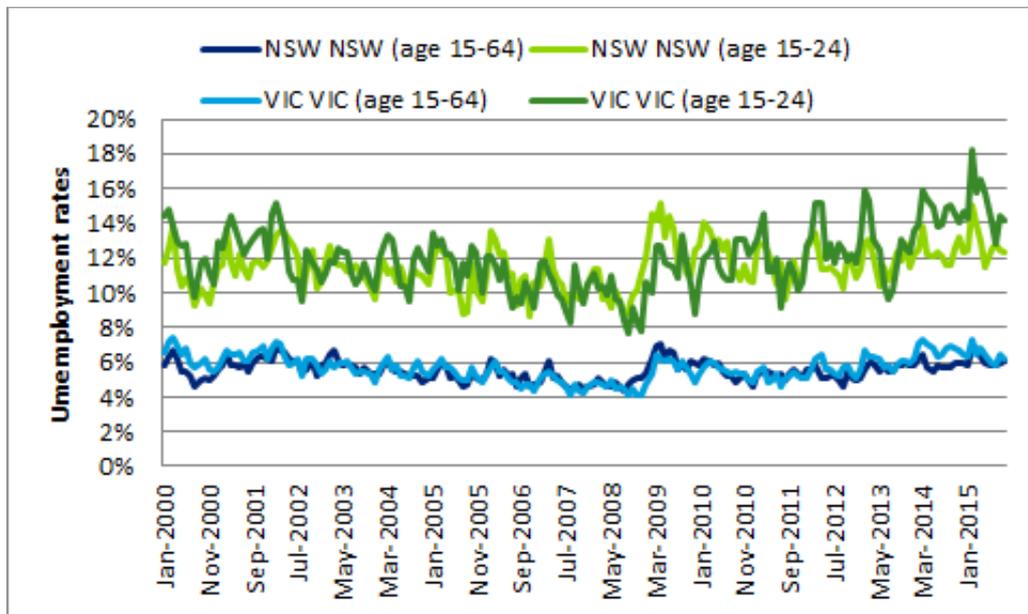
inflation increases the dollar value of sales, and would mistake an increase in prices for an increase in volumes, and would put on extra staff as the dollar value of turnover increases, even if there is no change in the volume of goods sold.

- 3.30 The employment data is sourced from ABS 6291.0.55.003. That source also contains data on persons employed full-time and employed part-time. Given that the part-time employee explanatory variable is statistically significant in the Working on Sundays model (see Yu’s Table 4) and a separate Working on Sundays model is estimated for part-time workers (see Yu’s Table 5), it is perhaps surprising that there is not more analysis in the paper on the numbers of persons employed full-time and employed part-time.

**Endogeneity and multicollinearity**

- 3.31 Yu’s model of retail employment contains employment-related variables on the right hand side. Those variables may be endogenous. For example, other things equal, an increase in retail employment of young people would increase the youth employment to population ratio and decrease the youth unemployment rate, suggesting a negative correlation between the latter two variables included in Yu’s model. I acknowledge that there are a number of factors that lead to changes in the youth employment to population ratio and the youth unemployment rate, however such endogeneity will lead to bias in the ordinary least squares estimators of the parameters and it does appear to be a real problem with the specification. Moreover, there may be multicollinearity if variables on the right hand side are correlated with each other. Figure 3.7 illustrates that, in the period to 2009, youth and total unemployment to population ratios were trending down, but since 2009, both started trending up. So multicollinearity may also be a problem in the data; however, Yu does not discuss whether she has considered this or not.

**Figure 3.7 Youth and total unemployment rates for NSW and VIC**



Source: ABS Cat. No. 6291.0.55 (2015) and ABS Cat. No. 3101.0 (2015)

## Probability of working on Sunday

- 3.32 The HILDA data forms a panel – it contains observations on the same individuals over time. It is standard in panel data to allow for the possibility of individual effects. A model is given by

$$y_{ist} = \alpha_s + \mu_i + \gamma t + \sum_{k=1}^5 \beta_k D_{sk} + \delta X_{ist} + \varepsilon_{ist}$$

- 3.33 where the  $\mu_i$  are the individual effects. A variety of methods can be used to estimate a linear model on panel data, such as

- (a) Ordinary least squares
- (b) Fixed effects estimation
- (c) Random effects estimation

- 3.34 The second and third take into account the panel nature of the data, whereas the first treats the data as a series of unrelated cross-sections. OLS is biased if individual effects are present and they are correlated with the variables in X. For example, are there unobserved variables that help to explain the decision to work on Sundays and are also correlated with the included explanatory variables?

- 3.35 The paper does not state which method is used to estimate the model.<sup>12</sup>

- 3.36 If OLS is used to estimate the model, then the panel nature of the data should be taken into account in estimating the standard errors. (The errors corresponding to each individual may be correlated because of the individual effects.) The paper does not indicate whether this is done.

- 3.37 Similarly, Yu's model implicitly incorporates the assumption that the parameters on the variables in X are the same in the models for NSW and Victoria. The result from testing that assumption should be reported. If the assumption is incorrect, then the estimators of the parameters may be biased, potentially invalidating the results. There are, however, unexplained differences between the model specification and the results reported. For example, equation (2) in Yu's paper has a time trend ( $\gamma_t$ ) and also the variable for state-specific effects ( $\alpha_i$ ), but neither are in her Table 4, and it is not clear why both have been removed or else the findings not reported.

- 3.38 It is common in models on panel data to include wave dummy variables.<sup>13</sup> No such variables are included in the models in Yu's paper. The parameters on the dummy variables for the changes in Sunday penalty rates therefore also include the effects of all unobserved variables, and the paper does not include an argument as to whether ignoring this will invalidate the results.

- 3.39 Yu's paper includes a reference to 'an overall loss of welfare' (p 22). Without an explicit model for welfare, it is not possible to make statements about welfare.

<sup>12</sup> Page 16 of Yu's paper states that OLS is used to estimate equation (1) (for hours and employment), but it is not clear how Yu's equation (2) is estimated (for Sunday penalty rates). In non-panel data, the linear probability model is estimated by OLS, but it is preferable to use fixed effects or random effects in panel data.

<sup>13</sup> In discussing the specification of models on panel data, Wooldridge (2013, chapter 13.3) notes that '*Just as in independently pooled cross sections, allowing the intercept to change over time is important in most applications.*'

- 3.40 The paper does not show the results of any tests of the specification of the model. Those tests include panel versions of the specification tests listed above, as well as panel-data specific tests.<sup>14</sup> Therefore, the reader is not able to judge the adequacy of the model.

### Robustness checks

- 3.41 The paper estimates the model over a period with no policy intervention in order to check the robustness of the analysis. The weaknesses identified above also apply in the placebo models; the placebo models are similarly flawed and do not ensure robustness. Moreover, even if the approach were appropriate, the 5% level of significance in the tests implies that there is a nineteen out of twenty chance that the key parameters would not be statistically significant in the placebo model. So it is not surprising that the key parameters are not significant. More stringent tests of the approach would include:
- Applying the general approach in a situation in which there is a generally acknowledged effect from a policy change. It would be a cause for concern if the approach did not conclude that there was an effect.
  - Undertaking a Monte Carlo experiment in which data is generated from an artificial model mimicking the situation under consideration, and apply the approach to that artificial data.
- 3.42 In other words, an approach that is able to 'find' an effect when one is present is preferable to an approach that does not find an effect when one is not present.

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<sup>14</sup> See, for example, Baltagi (1999).

## 4 Declarations and limitations

### Method

- 4.1 My conclusions are based on my training and experience as an Economist, the Yu Report provided to me and my consideration of factors that I believe are relevant.

### Assistance in the preparation of this report

- 4.2 In arriving at my conclusions in this matter, I have been assisted by Deloitte personnel (employed or subcontracted) who have carried out certain work under my direction. I have reviewed their work in order to form my conclusions. The opinions expressed in this report are my own.

### Relationships

- 4.3 Neither Deloitte or I, nor any employees involved in the preparation of this report, are the auditors, tax agents, or accountants for the parties referred in paragraph 1.3 above, nor has Deloitte or any of the aforementioned provided any other professional services to the parties in the past which in our opinion are relevant to our decision to accept this engagement.

### Fees

- 4.4 The fees received or receivable in relation to this assignment are based upon agreed hourly rates for time incurred. No part of the fees for this assignment is contingent on the outcome of the Review.

### Limitations

- 4.5 This report should not be construed as expressing opinions on matters of law, which are outside my expertise and for the Fair Work Commission to determine. However, it necessarily reflects my understanding thereof.
- 4.6 In preparing my report, I recognise that I am an expert witness, not a witness of fact. My understanding of the relevant facts comes from my instructions and the documents with which I have been provided.
- 4.7 I understand that this report may be made available to the parties involved in this Review, to their advisers and to the Fair Work Commission. It has been prepared for use in this matter. In all other respects, this report is confidential. This report has been prepared for the sole purpose of assisting the Review in consideration of the issues that are the subject of my instruction (set out in paragraphs 1.3 to 1.7) above and should not be distributed to or relied on by any other party for any other purpose. Neither Deloitte, nor any of its employees or agents, accept any liability or responsibility for loss suffered by any party as a result of the circulation, publication, reproduction, or other use of this report.
- 4.8 I reserve the right to review and alter the conclusions reached in this report, should information that is relevant to my assumptions or conclusions come to my attention after the date of this report.
- 4.9 In preparing this report, I have considered the documents and materials set out in Appendix 2. I have not examined original documentation (unless otherwise stated). I have not been asked to, nor have I conducted an audit or otherwise verified the completeness and accuracy of the material

made available to me. Accordingly, I do not accept any responsibility for any errors that result from reliance thereon.

### Expert declaration

- 4.10 In preparing this report, I have complied with the requirements of the following professional code of conduct or protocol, being APES 215 *Forensic Accounting Services* issued by the Institute of Chartered Accountants in Australia.
- 4.11 In accordance with APES 215 *Forensic Accounting Services* issued by the Accounting Professional and Ethical Standards Board, I have assessed the professional competence and objectivity of the third parties who have provided opinions and in my opinion, the work performed is appropriate and reasonable.
- 4.12 I have made all the inquiries that I believe are desirable and appropriate and confirm that no matters of significance that I regard as relevant have, to my knowledge, been withheld from the Fair Work Commission.



Lynne Pezzullo

02 November 2015

## Appendix 1 - CV of Lynne Pezzullo

# Lynne Pezzullo



Lead Partner, Health Economics and Social Policy, Deloitte Access Economics  
Managing Partner Canberra, Deloitte Touche Tohmatsu  
Adviser to the CEO on Responsible Business

Direct: 02 6175 2000  
Email: lpezzullo@deloitte.com.au  
Location: Canberra

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### Lynne Pezzullo has extensive experience in analysis and advice relating to health, economics, social policy and reform

#### Background

Lynne Pezzullo is the Lead Partner of Health Economics and Social Policy, Deloitte Access Economics Pty Ltd and the Managing Partner of Deloitte Canberra.

Her specialties and capabilities include health, economic and social policy expertise and advice, cost benefit / cost effectiveness analysis, workforce issues, analytical research, intergenerational financing, pharmacoeconomics, evaluations and dynamic modelling.

#### Skills & expertise

- Health reform, financing and insurance
- e-Health
- Workforce analysis
- Acute, primary care and allied health services,
- Social housing, families and Indigenous policy and services analysis
- Aged, disability and other care services
- Health and social policy program and service evaluation
- Cost benefit and cost effectiveness analysis
- Pharmaceuticals and devices – assessments, reimbursement and pricing

#### Professional and academic qualifications

BEC (First Class Honours), University of Adelaide (1986), PhD ANU (in progress, commenced 2012, Australian Centre for Economic Research in Health and Research School of Population Health)

Reviewer for the Medical Journal of Australia and British Medical

Journal.

Expert advisor to the World Health Organization 2006-2011, and to the ACT NDIS Panel 2012-2014.

ACT Telstra Business Woman of the Year Award, 2008.

**Professional experience snapshot**

- Mar 11 – current, Lead Partner, Health Economics and Social Policy, DAE
- Sep 11 – current, Managing Partner Canberra, Deloitte Touche Tohmatsu
- Jul 06 – Mar 11, Director, Access Economics Pty Limited, and chair of board
- 2005-06 Associate Director, Access Economics
- 2000-05, Senior Economist, Access Economics
- 1990-96 Director/Executive Office, Department of Foreign Affairs and Trade
- 1989-90 Executive Officer, International Policy Branch, AUSAID
- 1988-89 Senior Research Officer, International Economy Branch, Department of Treasury
- 1987-88 Research Officer, Department of Defence
- 1987-89, Tutor, Department of Economics, Australian National University

**Project examples – workforce analyses**

- Report for the Department of Health & Human Services, Victoria, *Strategic workforce action plan for real-time prescription monitoring in Victoria* (in progress)
- Report for Royal Australasian College of Physicians, *Physicians of the future – workforce discussion paper* (in progress)
- Report for AHPRA (Australian Health Practitioner Regulation Agency), *Decision Regulation Impact Statement (RIS) on cosmetic medical and surgical procedures and workforce* (in progress)
- Report for Specsavers, *Modelling the Australian optometry workforce* (in progress)
- Report for the Australian Medical Association, *Economic analysis of integrating non-dispensing pharmacists into general practice* (2015)
- Report for Exercise & Sports Science Australia, *Value of Accredited Exercise Physiologists in Australia* (2015)
- Report for the Australian Physiotherapy Association, *Economic analysis of the implications of physiotherapists' prescribing of medication* (2015)
- Report for Accident Compensation Corporation New Zealand, *Workforce health and safety literature search - benefits of evidenced based policy* (2015)
- Report for Meridian Lawyers, *The modern face of weekend work: survey results and analysis* (2014-15)
- Report for Victorian WorkCover Authority, *Reimbursement rates for medical workforce items* (2014)

- Report for Department of Health & Human Services, Victoria, *The Victorian generalist workforce* (2014)
  - Report for Australian Diabetes Educators Association, *Benefits of credentialed diabetes educators (CDEs) to people with diabetes and Australia* (2014)
  - Report for WentWest Limited, *Providing advice on GP practice consolidation trends and workforce remuneration* (2013)
  - Report for Fitness Australia, *Fitness Industry Workforce report:2010-2020* (2013)
  - Report for the Australian Dental Association, *The cost of operating a dental practice in Australia* (2013)
  - Report for Primary Health Care, *Toowoomba special needs: Preliminary Assessment of a District of Workforce Shortage* (2012)
  - Report for Safe Work Australia, *Decision RIS for model Work Health and Safety Regulations and Codes of Practice on Mines* (2012)
  - Report for SafeWork SA, *RIS: Model Work Health and Safety Regulations in South Australia* (2012)
  - Report for Health Workforce Australia, *Evaluation strategy for the Health Workforce Australia Simulated Learning Environments Program* (2012)
  - Report for Fitness Australia, *State of the Industry* (2012)
  - Report for Safe Work Australia, *Decision RIS for National Harmonisation of Work Health and Safety Regulations and Codes of Practice* (2011)
  - Report for Safe Work Australia, *Consultation Regulation Impact Statement for model Work Health and Safety Regulations and Codes of Practice on Mines* (2011)
  - Report for Department of Health (Federal), *Review of the International Recruitment Strategy for medical workforce* (2011)
  - Report for Department of Health (Federal), *Review of Additional Assistance Scheme for GP workforce* (2011).
  - Report for the (then) Department of Employment, Education and Workplace Relations, *RIS for the Fair Work Act 2010 (Cth)* (2010)
  - Report for Safe Work Australia, *Decision RIS for a model Occupational Health and Safety Act* (2009)
  - Report for Australian Nursing Federation, *Nurses in residential care* (2009)
  - Report for Luxottica, *Modelling the optometry workforce* (2006)
- 
- Report for Department of Social Services, *Evaluation of place-based income management* (2015)
  - Report for Healing Foundation, *CBA of healing programs* (2014)
  - Report for Civil Chaplaincies Advisory Committee (CCAC), *The Economic and Social Benefits of Civil chaplaincies* (2014)
  - Report for The Butterfly Foundation, *Cost effective care models to address eating disorders in Australia* (2014)
  - Report for Baxter Healthcare, *Economic contribution of Baxter Healthcare* (2014)
  - Report for Alzheimer's Australia NSW, *Dementia prevalence estimates and projections* (2014)
  - Report for SmartWard, *Economics Benefits of SmartWard* (2014)

**Project examples –  
substantial modelling  
components and  
critiques**

- Report for Australian Society of Anaesthetists, *Review & Critique of Economic Evaluation of Ultrasound Guidance for Major Vascular Access & Percutaneous Neural Blockade in Assessment Report for MSAC application no 1183* (2014)
- Report for Therapeutic Goods Administration, *Regulatory Impact Statement (RIS) for the registration of HIV Home Self-Test (HST) devices in Australia* (2014)
- Report for Healing Foundation, *Prospective cost benefit analysis of healing centres* (2014)
- Report for The Garvan Institute for Medical Research, *Potential Benefits of the Garvan Institute Genomic Medicine Program* (2014)
- Report for National Stroke Foundation, *Understanding stroke impact across Australia* (2014)
- Report for Janssen Pharmaceutical KK Japan, *Economic impact of Hepatitis C and its pharmacotherapies in Japan* (2013-14)
- Report for National Prescribing Service, *Financial & Health Benefits realised from the National Prescribing Service* (2013)
- Report for Novartis Pharma AG, Basel Switzerland, *Burden of eye diseases and preventable blindness in various countries* (2013)
- Report for Department of Health (Federal), *Productivity Benefits of Health Expenditure* (2013)
- Report for Ministry of Social Development NZ, *Peer Review - Estimating costs of family violence in New Zealand* (2013)
- Expert comment for WorkSafe Victoria, *Review and critique of WorkHealth research outputs* (2013)
- Report for Bio Innovation SA, *Economic verification for BioSA* (2013)
- Report for Medicines Australia, *Modelling the impact of variations on PBS pricing policy options* (2013)
- Report for ORYGEN Research Centre, *Review funding modelling for a proposed National System of Youth Mental Health* (2013)
- Report for Specsavers, *Critique of 'The Australian optometric workforce 2009' manuscript (Kiely et al, 2010)* (2011)
- Report for Distilled Spirits Industry Council of Australia, *Review of 'The range and magnitude of alcohol's harm to others'* (2010)
- Report for Accident Compensation Corporation New Zealand, *Peer review of 'Total economic and social cost of injury' study* (2010)
- Report for Medicines Australia, *Critique of the CSES report 'The impact of PBS reforms on PBS expenditure and savings'* (2009)
- Report for Alzheimer's Australia, *Making choices: Future dementia care: projections, problems and preferences* (April 2009)
- Report for National Alcohol Beverage Industry Council, *Collins and Lapsley report review: avoidable costs* (2008)
- Report for Distilled Spirits Industry Council of Australia, *Injury risk and drinking: technical critique* (2008)
- Report for Department of Health (Federal), *Critique of the Evaluation of the Second Round Coordinated Care Trials* (2007)

The examples provided are a short selection of the complete CV, tailored for this purpose.

## Appendix 2 - Information provided and relied on

- ABS 2015, '6291.0.55.003 - Labour force, Australia, detailed, quarterly, Aug 2015', <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Aug%202015?OpenDocument>, last accessed 29 October 2015.
- ABS 2015, '6291.0.55.003 - Labour force, Australia, detailed, quarterly, Feb 2015', <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Feb%202015?OpenDocument>, last accessed 29 October 2015.
- ABS 2015, '8501.0 - Retail trade, Australia, Aug 2015', <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8501.0Aug%202015?OpenDocument>, last accessed 29 October 2015.
- Asteriou D. and S.G Hall 2011, Applied Econometrics, Palgrave MacMillan, New York USA.
- Baltagi, B. H. 1999, Specification tests in panel data models using artificial regressions. *Annales d'Économie et des Statistiques*, 55-56, 277-298.
- Imbens, G. W., and Wooldridge, J. M. 2009, Recent developments in the econometrics of program evaluation. *Journal of Economic Literature*, 47: 5-86.
- Wooldridge, J. M. 2013, *Introductory Econometrics A Modern Approach*, South-Western, Cengage Learning, Mason USA.
- Yu S 2015, 'Evaluating the impact of Sunday penalty rates in the NSW retail industry', A report prepared for the Shop, Distributive and Allied employees Association (SDA), <https://www.fwc.gov.au/documents/sites/awardsmodernfouryr/AM2014305-expert6-SDA-040915.pdf>, last accessed 29 October 2015.

# Exhibit A – Letter of instruction from FCB Group



LEVEL 18, 607 BOURKE ST, MELBOURNE VIC 3000  
ACN 125 440 242

20 October 2015

Lynne Pezzullo  
Deloitte Access Economics  
1/9 Sydney Avenue  
Barton, ACT 2600

Dear Ms Pezzullo

#### Four Yearly Review of Modern Awards – Penalty Rates

We act on behalf of the Australian Retailers Association (ARA), Master Grocers Association (MGA) and National Retail Association (NRA) in relation to the above matter.

You are engaged by FCB to provide your expert opinion in relation to the report "Evaluating the Impact of Sunday Penalty Rates in the NSW Retail Industry" provided by Ms Serena Yu of the University of Sydney Business School (Yu Report).

Given your previous reports filed in the above matter we understand it is unnecessary to set out for you the background to the Four Yearly Review.

We ask that you provide a written report containing your opinion of the Yu Report. In doing so, we ask that you give consideration to the conceptual and analytical basis of the report, the comparator used in the report and the regression specifications in the econometrics.

If you require further information please do not hesitate to contact me.

Yours Faithfully

Nick Tindley

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