Professor Jeff Borland

Labour Cost Escalation Report for

Envestra Limited

1. Introduction

1. I have been commissioned by Envestra Ltd. to provide advice on: '…your opinion, as an expert, as to which measure, being either the LPI or the AWOTE measure, produces forecasts of labour prices for the purposes of real labour cost escalation over the access arrangement period, being 1 July 2011 to 30 June 2016 which are arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances ("the test"). Also please comment on any other matters relevant to the forecasting approach taken by the AER's consultant on labour costs, Access Economics.' My terms of reference are attached to this report.

2. My current position is Professor of Economics at University of Melbourne. I have worked at University of Melbourne since 1988, and have held the position of Professor since 2001. In 2010 I was visiting Professor of Australian Studies at Harvard University. I have also held visiting positions at University of Iowa, University of Wisconsin-Madison, and Australian National University. My main area of research expertise is on the operation of labour markets in Australia. I have published research papers on topics including wage determination, unemployment, earnings inequality, and trade unions. These publications have been in leading international and Australian journals such as Industrial and Labor Relations Review, British Journal of Industrial Relations, Economica, Economic Record, and Journal of Economic Surveys. I am a Fellow of the Academy of Social Sciences in Australia (2002), and in 1997 was awarded the Medal for Excellence in Scholarship in the Social Sciences by the Academy. I have undertaken consulting projects for agencies including the OECD, IMF, Productivity Commission, ACCC, Commonwealth Grants Commission, and Commonwealth Department of Education, Employment and Workplace Relations.

3. In preparing this report I have read and drawn on the following source materials:

   - BIS Shrapnel (2010), Real Cost Escalation Forecasts to 2015/16 – Queensland and South Australia (Report prepared for Envestra Ltd.).
   - Access Economics (2010b), Forecast Growth in Labour Costs: Queensland and South Australia (Report prepared for the Australian Energy Regulator), 13 December.
   - Access Economics (2010a), Forecast Growth in Labour Costs: March 2010 Report (Report prepared for the Australian Energy Regulator), 16 March.
   - Access Economics (2009), Forecast Growth in Labour Costs (Report prepared for the Australian Energy Regulator), 16 September.
   - Australian Energy Regulator (2011a), Draft Decision: Envestra Ltd Access Arrangement Proposal for the Queensland Gas Network.
   - Australian Energy Regulator (2011b), Draft Decision: Envestra Ltd Access Arrangement Proposal for the South Australian Gas Network.

- Australian Energy Regulator (2010), Final Decision - Public: Jemena Gas Networks Access Arrangement Proposal for the NSW Gas Network.
- Australian Bureau of Statistics (2004), Labour Price Index: Concepts, Sources and Methods, catalogue no. 6351.0.55.001.
- Australian Bureau of Statistics (2005), Australian Labour Market Statistics, October, catalogue no. 6105.0, pages 14-19.

2. AWOTE and LPI - Summary of main argument

4. Changes in AWOTE will incorporate the effects of:

   (i) Increases in workforce productivity that are due to changes in the skill composition of the workforce (what I will refer to as 'Composition productivity effects'). For example, a higher share of high skill workers and a lower share of low skill workers in the workforce will increase average workforce productivity, and hence increase AWOTE;

   (ii) Increases in workforce productivity that are due to increases in the productivity of individual workers (what I refer to as 'Worker productivity effects'). For example, workers may become more productive from working with better capital equipment, or may exert higher effort and hence produce more output per hour due to introduction of a new compensation scheme such as pay-for-performance; and

   (iii) Other factors unrelated to worker productivity (what I refer to as 'Other effects'). For example, catch-up in wages for increases in the CPI will be incorporated into changes in AWOTE.

5. Changes in LPI will not incorporate the effects of composition productivity effects (i), are likely to partly incorporate worker productivity effects (ii), and will entirely incorporate other effects (iii).

6. In my opinion, according to the test, the best measure to use in forecasting a labour productivity-adjusted measure of changes to labour costs is AWOTE. I assume that arriving at a measure of the change in real labour costs involves beginning with a measure of the change in earnings, and then adjusting for changes in labour productivity and in prices. The basis on which I conclude that AWOTE is, according to the test, the best measure, is that: AWOTE incorporates the effects on earnings of all the components of productivity improvement that will be included in the adjustment for labour productivity, but LPI does not. Hence, to use LPI as the earnings measure, which for example does not incorporate composition productivity effects, and then adjust for changes to labour productivity, is to double-adjust for productivity changes. Because of the double-adjustment, the measure of the change in labour costs derived using LPI will under-estimate the true change in labour costs.

7. As an example, suppose that AWOTE increases by 5%, of which 2% is due to a composition productivity effect, 1% is due to a worker productivity effect, and 2% is due to other effects such as catch-up for price inflation; and suppose that LPI

increases by 2 ½ % reflecting a 2% increase due to other effects and ½% due to the worker productivity effect (which I am assuming LPI partly incorporates). Adding together the composition productivity effect and worker productivity effect gives a total increase in labour productivity of 3%. Using AWOTE to calculate the labour productivity adjusted increase in labour costs gives an increase of 2% (equals 5% increase in AWOTE minus 3% increase in productivity). Hence adjusting AWOTE for labour productivity gives a measure of the change in labour costs that occurs due to other (non-productivity) effects. But using LPI to calculate the productivity adjusted increase in labour costs gives a change of minus 1/2% (equals 2 ½% increase in LPI minus 3% increase in labour productivity). Hence using LPI under-estimates the true change in labour costs net of labour productivity effects. (To arrive at a measure of the change in real labour costs it is also necessary to adjust for the change in prices. Making this adjustment, using the 2% price inflation assumed in the example, would give the result of a 0% change in real labour costs using AWOTE, but a minus 2 ½% change in real labour costs using LPI. Hence the conclusion that LPI under-estimates the true change in labour costs remains.)

8. Hence on this basis I disagree with the following conclusion of the AER in its Draft Decision on the SA gas network (2011a, p.148) (see also the Draft decision on the Queensland gas network (2011a, p.140)):

'The AER considers that Access Economics' assumptions reasonably reflect the offsetting impacts of productivity on wages and overall unit costs of labour, and that they are therefore arrived at on a reasonable basis and reflect the best possible forecast in the circumstances.'

The problem with the methodology used by Access Economics is that its measure of labour costs uses the LPI measure for earnings and then adjusts this measure for changes in productivity. Following my argument in paragraphs 6 and 7, since the LPI measure does not include at least some components of the effects of improved labour productivity on earnings, the methodology used by Access Economics is adjusting twice for productivity, and therefore will under-estimate true changes to the cost of labour.

3. AWOTE and LPI – Composition productivity effects

9. A composition effect on the average labour productivity of a firm's workforce occurs where changes to the proportions of workers in different skill categories occur across time. For example, if up-skilling occurs so that the proportion of high-skill workers increases, and the proportion of low-skill workers decreases, the average skill level, and hence labour productivity of the firm's workforce, will rise. Since higher skill workers have earnings greater than low-skill workers, the up-skilling will be associated with an increase in the average earnings of the firm's workforce.

10. Changes in the skill composition of the workforce are an on-going feature of the Australian labour market. The table below shows the proportion of employment in the electricity, gas, water and waste services (EGWW) industry by occupational categories in November 2008, 2009 and 2010. (This table has been calculated using data from ABS, Labour Force Australia, Detailed, Quarterly, catalogue no.

6291.0.55.03, E09_aug96.) It can be seen that over each 12 month period there are quite substantial shifts in the shares of employment in each occupation. For example, the share of machinery operators and drivers decreases from 15.7% to 13.8% from 2008 to 2009, and then increases back to 14.2% in 2010. These shifts will cause changes in the average skills and productivity of the workforce in the EGWW industry, and hence in average earnings.

Table 1: Shares of employment by occupation in the Electricity, Gas, Water and Waste Services industry – November 2008 to 2010

	November 2008	November 2009	November 2010
Manager	12.2	10.6	11.2
Professional	17.6	16.3	14.2
Technicians and Tradespersons	23.6	27.6	25.4
Clerical and Administrative	19.6	19.5	22.4
Salespersons	3.4	2.4	3.0
Machinery Operators and Drivers	14.2	13.8	15.7
Labourers	9.4	9.8	8.3
Total employment	148,000	123,000	133,000

11. The AWOTE measure incorporates the effects of changes in the skill composition of the workforce on earnings, whereas the LPI measure does not. Hence, for example, where there is up-skilling in the workforce, AWOTE will incorporate the effect of there being higher average earnings, whereas the LPI will not. Therefore, in this case, the AWOTE measure would give higher estimates of the change in earnings than the LPI measure (and opposite where there is down-skilling). In Appendix 1 I provide a detailed analysis of how AWOTE and LPI type earnings series can give different measures of changes in earnings due to composition productivity effects.

12. As an example, suppose there were just 2 types of workers: low skill workers who are paid $100 per week; and high skill workers who are paid $200 per week. Suppose a business starts out hiring exclusively low skill workers. Suppose the firm keeps its total number of workers unchanged, but between year 1 and year 2 it replaces one-half of its low-skill workers with high-skill workers; and then between year 2 and year 3 replaces the rest of its low-skill workers with high skill workers. At the same time suppose that there are no changes to the productivity or earnings of either high skill or low skill workers. Hence the average earnings of the firm's workers will increase from $100 to $150 between years 1 and 2, and $150 to $200 between years 2 and 3. What will happen to the alternative measures of changes to earnings in this example? An AWOTE-type measure is calculated incorporating changes to the skill composition of employment across time. Using AWOTE, average earnings in year 1 are $100, average earnings in

year 2 are $150 (equal to (0.5)x($100) + (0.5)($200)), and average earnings in year 3 are $200. Hence there is a 50% increase in average earnings from year 1 to 2, and then a 33% increase in earnings between years 2 and 3. An LPI-type measure keeps the composition of employment constant in calculating the change in earnings. Hence it will say that there has been a 0% change in earnings both between years 1 and 2, and between years 2 and 3. In both years 1 and 2 the LPI uses the same weights – 100% for low-skill workers and 0% for high-skill workers; and since earnings of each type of worker have not changed, there will be no change in LPI. Similarly, in both years 2 and 3 the LPI will use weights of 0.5 for low-skill workers and 0.5 for high-skill workers; and again, since earnings of each type of worker do not change, there will be no change in LPI.

13. In the example in paragraph 12, an AWOTE-type measure, calculated allowing for the skill composition of employment to change across time, will show a 50% increase in average wages from year 1 to 2, and then a 33% increase in earnings between years 2 and 3. By contrast, an LPI-type measure, which keeps the composition of employment constant in calculating the change in earnings, will say that there has been a 0% change in average earnings both between years 1 and 2, and years 2 and 3. Hence the AWOTE reflects the rise in labour costs for the firm due to the higher average skill level and productivity of its workforce, whereas the LPI does not. The LPI treats the firm as if it is still paying $100 to each worker in each year, whereas in fact by year 3 the earnings of each worker have doubled to $200. One response to this example might be to say that the changes in average earnings in this example reflect changes in labour productivity. This is correct. But since the rate of change in labour productivity will be subtracted from the rate of change in earnings to arrive at a labour productivity-adjusted measure of the increase in labour costs, it is appropriate that the earnings measure should also incorporate the effect of labour productivity on earnings. To not do so would give a downward biased measure of the firm's true change in labour costs. In the example above, the average productivity of the firm's workforce increases by 50% between years 1 and 2 (assuming high skill workers are twice as productive as low skill workers). Hence, taking the LPI measure (0%) and subtracting the change in labour productivity (50%) would give the false conclusion that labour costs had fallen by 50%. Instead, the true situation, that adjusting for productivity the firm's labour costs are unchanged, is only found by taking the AWOTE measure (50%) and subtracting the change in labour productivity (50%). To reiterate, what is happening for the firm is that it must pay average earnings to workers that are 50% higher, but its workers are also on average 50% more productive – So the firm's costs of producing a unit of output have not changed. This is correctly identified when AWOTE is used as the measure of earnings, but using LPI gives the incorrect finding that the firm's labour costs have decreased by 50%.

14. In summary, in my opinion the best earnings measure to use for forecasting changes to labour costs, where there is to be an adjustment for changes to labour productivity, must incorporate the effects on average earnings of changes to the average skill and productivity of the workforce. To not do so will cause an under-estimate of the true labour productivity adjusted change in a firm's labour costs. Therefore the best measure for forecasting changes to labour costs, according to

the test, is AWOTE, because it does incorporate effects on average earnings of changes to the average skill and productivity of the workforce.

15. BIS Shrapnel argue that the appropriate earnings measure for forecasting labour costs for an employer is AWOTE. This is on the basis that a valid measure of labour costs should incorporate changes to the skill composition of the workforce. For example, it is argued (BIS Shrapnel, p.27):

'The LPI...does not reliably measure the changes in total labour costs...because the LPI does not reflect changes in the skill levels of employees within an enterprise or industry. As skills are acquired, employees will be promoted to a higher grade or job classification, and with this promotion will move to a higher base pay. So the change in the cost of labour over, say a year, includes increases in the base pay rates (which the LPI measures) and the higher average base pay level. The AWOTE captures both these elements, while the LPI only captures the first element. Basically, promoting employees to a higher occupation does not necessarily show up in the LPI, but the employer's total wages bill (and average unit labour costs) is higher, as is AWOTE.'

16. Access Economics argue that the appropriate earnings measure for forecasting labour costs for an employer is the LPI. One rationale is that a valid measure of labour costs should not incorporate changes to the skill composition of the workforce. It is stated (Access Economics, 2010b, p.xv) that:
'...compositional changes arising from the business cycle, changed educational levels, the pace of recruitment and retirement, the degree of outsourcing, changed relativities in the employment of men and women and compositional changes arising from shifts in average hours worked can all distort AWOTE as a proxy for 'changes in the price of labour.'

And that (p.xvi):

'If these compositional effects are occurring, then they should also be having an impact on the productivity of the sector's workforce. That is, the higher skills should mean higher productivity – meaning that if the utilities are choosing to have a higher skilled workforce then, other things equal, that higher skilled workforce should be able to achieve the same output than would otherwise be achieved with fewer (less skilled) workers.'

17. I agree with the reasoning of BIS stated in paragraph 15. For the reasons I have explained, in my opinion, according to the test, AWOTE is the best measure because it incorporates effects of changes to workforce composition on labour productivity. I do not agree with the reasoning of Access Economics in paragraph 16. It is correct that higher skills should mean high labour productivity, and that a higher skilled workforce should be able to produce a higher output. But as I have explained it is also the case that a higher skilled workforce will be associated with the firm paying higher average earnings to workers. By having an earnings measure that incorporates the effects of labour productivity on earnings, and then subtracting labour productivity, both effects are being taken account of – that the firm pays higher wages, but that it benefits from higher worker productivity. By only subtracting the effects of worker productivity, and not taking account of the

effect of productivity on earnings, as happens when LPI is used as the measure of earnings, the measure of labour costs that is obtained will under-estimate the true change in a firm's labour costs.

18. It is also important to note that changes in AWOTE due to composition effects do appear to primarily reflect changes in the average quality or skill of the workforce, and hence will reflect changes to the productivity of a firm's workforce. For example, the Access Economics report (2010b, p.xv) mentions a variety of factors as potential compositional influences on AWOTE. Of the factors they mention, most – such as business cycle, education, gender, recruitment/retirement – will change the skill composition of the workforce. For example, where workers obtain extra educational qualifications this will increase average skills and productivity in the workforce; or where the rate of retirement is lower than the rate of recruitment then this is likely to increase the average age of the workforce, and again increase average skills and productivity. Hence these are situations where changes in AWOTE will reflect changes to the average productivity of a firm's workforce due to changes in workforce composition. Other factors mentioned by Access Economics are changes to hours of work and outsourcing. Here it is important to note that – by using AWOTE and hence considering earnings for workers doing 'ordinary time' – hours of work are held fixed, which means that this will not be a source of compositional change. With regard to outsourcing, this is a factor that could affect the skill composition of a firm's workforce and hence average skills and productivity that would be reflected in changes in AWOTE. The 'quid pro quo' to this change, however, should be that costs associating with employing contractors will change to reflect the workers who have shifted from being part of the firm's own workforce to working as contractors via outsourcing.

4. AWOTE and LPI – Worker productivity effects

19. By changes to the productivity of individual workers – what I refer to as worker productivity effects - what I mean is where a worker's output per hour of labour increases for reasons unrelated to increases in the skill of that worker. (Where a worker's skill increases, thereby raising productivity, this will be included in the composition productivity effect. For example, if a worker achieves a higher level of skill such as via formal qualifications this will increase the proportion of workers with that higher level of skill.) Possible sources of worker productivity effects could be improved capital equipment that allows a worker to produce more output with an hour of labour, or changes to HR practices, such as introduction of pay-for-performance compensation, that raise worker effort and hence output per hour of labour.

20. The AWOTE incorporates the effect of changes to productivity of individual workers on earnings. To see how AWOTE incorporates the effect of changes to worker productivity, consider again the example from paragraph 12. Suppose that between years 2 and 3, there is the introduction of new IT capital equipment used by high skill workers that raises their productivity and that this is reflected in an increase in earnings for high skill workers from $200 to $250. Recall as well that the earnings of low skills workers were assumed to be $100, and that between years 2 and 3 the proportion of high skill workers increases from 50% to 100%. Hence between years 2 and 3 the AWOTE-type measure of average earnings increases from $150 to $250. (In year 2 AWOTE is equal to

(0.5)($100)+(0.5)($200), and in year 3 AWOTE is equal to (1)($250).) This increase of $100 incorporates both the effect of the shift in composition towards high skill workers ($75), and also the effect of increases in the productivity of high skill workers ($25).

21. LPI is likely to incorporate worker productivity effects on earnings that occur, although not entirely. The ABS publication describing the method for calculating the LPI (2004, p.11) describes how:

'...no adjustment is made for productivity changes within the production process that arise from factors such as capital investment, technological change, more efficient organisational arrangements, and entrepreneurial activities.'

However, it is also noted (2004, p.12) that:

'...price changes from the following are not reflected in the index series: changes in the nature of work performed (eg., different tasks or responsibilities).'

I interpret these descriptions to mean that, where worker productivity effects occur without affecting how jobs are structured (the collection of tasks for which a worker is responsible), then LPI should incorporate worker productivity effects. In other words, where a job stays the same between two consecutive LPI survey dates, it will be included in calculation of changes to the LPI. But where changes to worker productivity are associated with changes to the structure of jobs, then worker productivity effects will not be incorporated into LPI. This is because where a job is only present at one of two consecutive survey dates, it would not be included in calculation of changes to the LPI. The LPI only incorporates changes in wages for jobs that remain the same between intervening survey dates.

22. Note however that, even if LPI was to incorporate all worker productivity effects on earnings, it would not affect my opinion that, according to the test, AWOTE is the best measure of changes to earnings for calculating a labour productivity-adjusted measure of changes to labour costs. This is because LPI will still definitely not incorporate the effect of composition productivity effects.

5. AWOTE and LPI – Other issues

23. Access Economics present two other main arguments for why the appropriate earnings measure for forecasting labour costs for an employer is the LPI:

First, it is argued that benchmarking the LPI and AWOTE measures against data on price inflation and productivity suggests that LPI is the measure that more appropriately represents changes to the cost of labour. The benchmarking is based on the idea that (Access Economics, 2010b, p.90):

'Over a long enough period of time...wages can be expected to reflect longer-term economic building blocks of incomes. That is, wages will reflect price growth on the one hand, and productivity growth on the other.'

From analysis of data for the 'last 12 years' it is concluded that (2010b, p.91):

'...the combination of those price inflation and productivity growth rates suggest wage growth might have been expected to average somewhere around 3 1/2% to 3 ¾% per year...Of the various labour costs indicators...only the LPI (at an average

of 3.6% a year) and the measure of earnings used in the national accounts (3.8%) are close to that range.'

And hence (2010b, p.91):

'...this simple test against a common sense yardstick implies no particular bias in the LPI measure, but calls into question the extent to which AWOTE has outpaced what economic fundamentals might expect as longer term wage growth.'

• Second, it is argued that the greater volatility of the AWOTE than LPI series makes LPI the preferred measure for wage forecasting. After a comparison of volatility of the LPI and AWOTE series, it is stated that (Access Economics, 2010b, p.88):

'These compositional effects and the resultant volatility make AWOTE a poor base for undertaking wage forecasts for the utilities sector. The volatility in the series does not accurately reflect wage outcomes for utilities employees, and can result in starting point (or 'jumping off') problems at the beginning of the forecast period.'

These two matters are addressed in paragraphs 24 to 26.

24. **Benchmarking exercise**. I have sought to replicate the benchmarking exercise presented in the Access Economics report (2010b, pp.89-90). I was not able to do this directly as the report does not include any information on sources for the data series used, or on how the measures of average annual rates of change in the wage and price series were constructed. The data sources I have used in my benchmarking for measuring CPI, AWOTE, LPI and Labour productivity, and the methodology for calculating average annual rates of change in these series, are described in Appendix 2. I have done the benchmarking over the period 1997-98 to 2009-10. I have chosen this period because 1997-98 is the earliest time period for which data on LPI are available, and 2009-10 is the latest time period for which National Accounts data on labour productivity are available. I calculate average annual rates of change as follows:

- Labour productivity: 1.55%
- LPI: 3.6%
- AWOTE: 4.55%
- CPI: 2.9%

Hence I find that CPI + Labour productivity = 4.45%. This corresponds much more closely to the AWOTE measure (4.55%) than the LPI measure (3.6%). The rationale for the benchmarking exercise is that a measure of wage changes that corresponds to 'labour market fundamentals' should over the long-term show a similar rate of change to the rate of change in CPI plus rate of change in labour productivity. From this exercise I therefore conclude that AWOTE is reflecting changes to the fundamental drivers of wages more closely than LPI.

25. **Volatility**. It is correct from inspection of the data series that the AWOTE series exhibits greater volatility than the LPI series. This has implications for what would be the preferred series for measuring past quarter-to-quarter changes in earnings. And it is important to note that it is to this context – as an indicator of earnings changes that have occurred in the past - that the ABS is referring when it

nominates the LPI as the 'preferred indicator of changes in wage rates' (ABS, Labour Price Index: Concepts, Sources and Methods, catalogue no.6351.0.55.001, p.44). However I do not believe that the same implication applies to comparisons of AWOTE and LPI as series for forecasting future changes in earnings. In forecasting it is not necessary to simply rely on two observations of earnings as is the case for measuring quarter-to-quarter past changes in earnings. Instead, it is possible to use a longer time series of data as the basis for forecasts. This allows trend components and structural determinants of changes in earnings to be distinguished from short-term variation. For AWOTE it is also possible to use data on the level of earnings as the basis for forecasting; and here the ABS notes (ABS, Australian Labour Market Statistics, October 2005, catalogue no.6105.0, p.17) that '...estimates of the level of earnings show a lot less volatility, and provide a valuable time series of earnings data.' Hence, as a basis for forecasting of changes to earnings, provided there is a sufficiently long time series of data available, there seems to be no difference between AWOTE and LPI that could be attributed to differences in short-term volatility of those series.

26. In their report Access Economics (2010b, pages 88-89) use the example of the growth in utilities earnings over the year to August 2010 being estimated by AWOTE to be 10.7% to illustrate what they argue to be the high volatility of AWOTE. They then describe a counter-factual exercise in which 1% of workers are fired from the utilities workforce and a new group of the same size is hired. Earnings of the group that is fired are assumed to be one-half of average earnings of the remaining 99%. It then follows that earnings of the group that is hired would need to be a multiple of 14 times average earnings in order to explain how average earnings could increase by 10.7%.

27. In my opinion this counter-factual exercise is misleading. The reason it is misleading is that in fact labour turnover and changes to the size of employment in the utilities sectors will be much higher than Access Economics assume. This means that the size by which earnings of new workers being hired must exceed the average of existing workers is much less than a multiple of 14. First, workers who ceased a job during the year ending February 2010 as a proportion of total workers in the year ending February 2010 (most recent time period for which data are available) is about 16%. (Data from ABS, Labour Mobility, catalogue no.6209.0, February 2010, Table 11, Populations 1 and 4.) Hence it is reasonable to assume that the quarterly rate of labour turnover is 4%. Second, during the time period for which Access Economics takes earnings data from AWOTE, from August 2009 to 2010, total employment in the Electricity, Gas, Water and Waste Services industry increased from 125,600 to 148,700. (Data from ABS, Labour Force Australia, Detailed, Quarterly, catalogue no.6291.0.55.003, T04, A2551581R). Hence, a more reasonable version of the Access Economics counter-factual could be cast as follows. Think of 4% of workers being fired, and those workers having earnings one-half the average of the remaining 99% of the workforce, for whom we assume average earnings are $100,000. Then think of there being an addition of 22% to the workforce (of which 4% is replacing the fired workers, and 18% is the measured increase in employment from August 2009 to 2010). In this case I calculate that the average earnings of the new workers would only need to be 45% above the average of the existing workforce. This compares to the amount suggested by Access Economics of 1400%. That is, the AWOTE data from

August 2009 to 2010 can be justified with earnings for the new workers that are 1/28th of the amount that is suggested in the report of Access Economics.

6. Access Economics' forecasts of productivity growth

28. I have reviewed the forecasts of changes to labour costs in Queensland and SA made in the following reports from Access Economics:

- Access Economics (2010b), Forecast Growth in Labour Costs: Queensland and South Australia (Report prepared for the Australian Energy Regulator), 13 December, Tables 10.1, 10.2, pages 67-68, 76.
- Access Economics (2010a), Forecast Growth in Labour Costs: March 2010 Report (Report prepared for the Australian Energy Regulator), 16 March, Tables 6.5, 6.7, pages 69, 79.
- Access Economics (2009), Forecast Growth in Labour Costs (Report prepared for the Australian Energy Regulator), 16 September, Tables 9.4, 9.5, pages 66, 74.

29. I have used the forecasts of changes to real wages and labour costs in the reports from Access Economics to derive the graphs of their forecasts of changes to productivity that are shown below. The graphs are supported by a more detailed tabular presentation of data in Appendix 3. Each graph shows how forecasts of changes to productivity differ between the final report of 13 December 2010, and the two earlier reports from 16 March 2010 and 16 September 2009. In each report I have considered the 5 years from 2011-12 to 2015-16. Each number in the graphs is the average annual forecast change from the 13 December 2010 report minus the average annual forecast change from the earlier report. For example, consider all industries in Queensland between the 13 December 2010 and 16 March 2010 reports. Figure 1 shows that, in their 13 December 2010 report, Access Economics forecast that average growth in productivity in all industries in Queensland between 2011-12 and 2015-16 would be 0.72 percentage points per annum higher than in their 16 March 2010 report.

Figure 1: Changes in forecasts of labour productivity between Access Economics' reports of 13 December 2010, 16 March 2010 and 16 September 2009 - Queensland

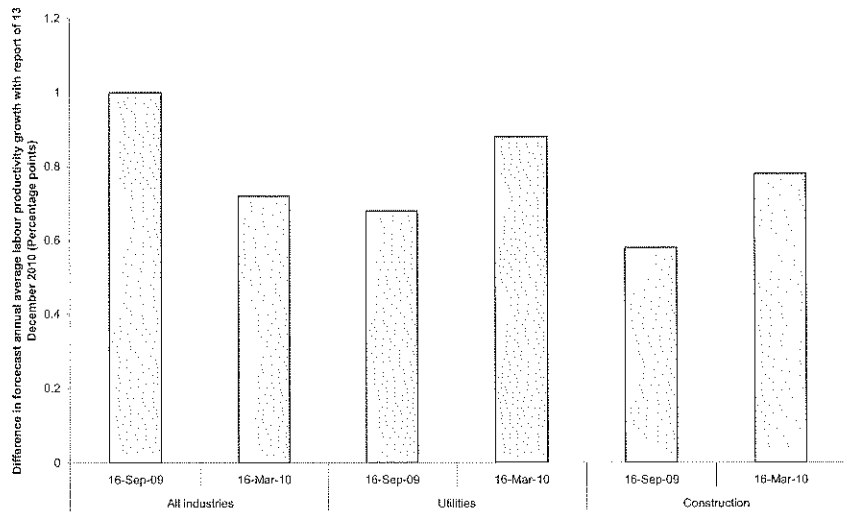
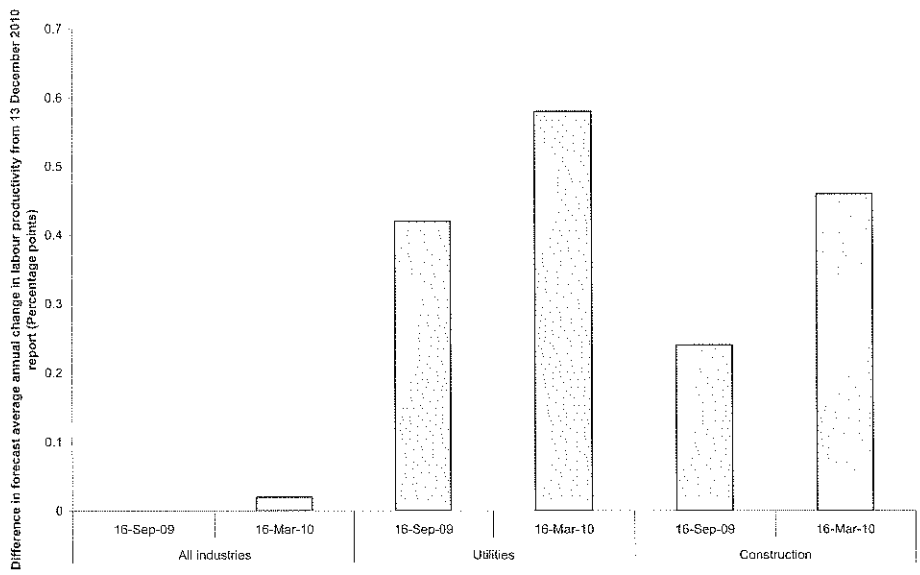


Figure 2: Changes in forecasts of labour productivity between Access Economics' reports of 13 December 2010, 16 March 2010 and 16 September 2009 – South Australia



30. The main feature evident from comparison of the reports is that Access Economics have made substantial increases in their forecasts of average annual growth in productivity from 16 September 2009 and 16 March 2010 to 13 December 2010. For example, in the 13 December 2010 report it is forecast that average annual growth in productivity in the utilities sector in Queensland from 2011-12 to 2015-16 will be 0.88 percentage points higher than in the 16 March 2010 report.

31. I make several observations on the changes in forecasts of labour productivity growth in the reports from Access Economics. First, these must be regarded as substantial revisions. Where average growth in labour productivity in Australia is about 1.5% per annum, changes in forecasts of around 0.8% in Queensland and 0.5% in SA, are a large fraction of what are likely to be the actual rates of productivity growth. Second, the revisions to forecasts of productivity growth are larger in the utilities sector and construction sector than for all industries in both Queensland and SA.

32. My review of the reports from Access Economics has not found any discussion to explain the changes in forecasts of labour productivity that have been made between the reports of 16 September 2009 and 16 March 2010, and the final report of 13 December 2010. In the report of 13 December 2010 I have found discussion of productivity on pages viii and pages 47-49, and there is general discussion of wages growth in Queensland and SA on pages 67-83. The paragraph on page viii suggests that Access Economics has increased its estimates of productivity growth in the medium term '...as boosts to efficiency from the strong levels of business investment begin to be seen across the economy.' However, there is no discussion of why the effects would be so substantial as to cause such a large increase in forecast productivity growth, or why it would be larger in the utilities and construction sectors than overall. The discussion on pages 47-49 of the report from 13 December 2010 is taken virtually word-for-word from the discussion on pages viii-ix of the report from 16 September 2009. That the same discussion could be included in the two reports certainly does not in any way provide a basis for understanding why the forecast of productivity growth would have changed. As well, the discussion on pages 67-83 of wages growth in Queensland and SA in the report from 13 December 2010 is similar to the discussion of wages growth in Queensland and SA on pages 66-82 in the report from 16 September 2009; hence this also provides no basis for understanding the changes in forecasts of productivity.

33. In my opinion the substantial magnitude of the change in forecasts of productivity made by Access Economics would require a large change in underlying conditions or modelling assumptions to be justified. I have not been able to find any discussion of such changes to underlying conditions or modelling assumptions in the reports from Access Economics. In the absence of such large changes in underlying conditions or modelling assumptions it raises the possibility of non-robustness in the forecasting method.

7. Conclusion

34. The AWOTE series is, in my opinion, on both theoretical and practical grounds, the best series according to the test to be used as the basis for forecasts of future labour costs. First, in deriving a productivity adjusted measure of labour costs, it is necessary for the earnings measure used to incorporate effects of changes to labour productivity – both due to composition effects and increases in the productivity of individual workers; otherwise the measure of changes to labour costs will under-estimate true changes in labour costs. It is the AWOTE series that best reflects the effects of changes to average worker productivity on earnings. That AWOTE reflects labour market fundamentals has been confirmed by the benchmarking exercise I have undertaken which shows that – over the longer-

term – the rate of change in AWOTE is closely related to the sum of the rates of change in the CPI and labour productivity. Second, for forecasting future earnings, and on the basis of the length of the time series of data available, I am not aware of practical problems with using AWOTE that would not also exist for other earnings series such as LPI.

35. Comparison of reports by Access Economics from 13 December 2010 with 16 March 2010 and 16 September 2009 shows that Access Economics have made substantial upward revisions in the forecasts of growth in productivity in the report of 13 December 2010. I have not been able to find any satisfactory explanation of these upward revisions in the report of 13 December. In order to be justified the substantial magnitude of the change in forecasts of productivity however would require a large change in underlying conditions or modelling assumptions.

36. I confirm that I have undertaken this engagement having regard to the Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia. I have read those Guidelines and I confirm I have made all the inquiries that I believe are desirable and appropriate and no matters of significance that I regard as relevant have, to my knowledge, been withheld from the Court.

Jeffrey Ian Borland
March 23, 2011

Appendix 1:

Suppose there are 2 skills groups (High and Low). Let s_H and s_L represent respectively the proportions of high skill and low skill workers. Let w_H and w_L represent respectively the earnings of high skill and low skill workers. Hence we can express the average earnings as: $w = s_H w_H + s_L w_L = \sum_{i=L,H} s_i w_i$.

Now introduce a time dimension. We use superscripts to denote time periods (t=1,2). Hence we can think of average earnings at time 1 as: $w^1 = s_H^1 w_H^1 + s_L^1 w_L^1$.

The change in average earnings between times 1 and 2 is therefore equal to:
$\Delta w = w^2 - w^1 = s_H^2 w_H^2 + s_L^2 w_L^2 - s_H^1 w_H^1 - s_L^1 w_L^1$.

Using the formula for decompositions of changes over time, this can be rewritten as:
$\Delta w = w^2 - w^1 = \Delta s_i \cdot w_i + s_i \cdot \Delta w_i - \Delta s_i \cdot \Delta w_i$
(where, for example, $\Delta s_i \cdot w_i = (s_H^2 - s_H^1)w_H^1 + (s_L^2 - s_L^1)w_L^1$).

Here $\Delta s_i \cdot w_i$ is the effect on average earnings due to changes in the proportions of high skill and low skill workers, $s_i \cdot \Delta w_i$ is the effect on average earnings due to changes in the earnings of high skill and low skill workers, and $\Delta s_i \cdot \Delta w_i$ is the effect on average earnings due to the interaction of changes to the proportions of high skill and low skill workers, and changes in the earnings of each skill group.

Numerical example 1:

	Time 1		Time 2	
	Share of workers	Earnings	Share of workers	Earnings
High skill	0.5	200	0.75	300
Low skill	0.5	100	0.25	120

Average earnings at time 1: \$150 (for example, equals (0.5)(200)+(0.5)(100))
Average earnings at time 2: \$250

Change in average earnings due to changes in proportions of high skill and low skill workers = \$25 (equals (0.75-0.5)\$200 + (0.25-0.5)(\$100))
Change in average earnings due to changes in wages of high skill and low skill workers = \$60

Change in average earnings due to interaction of changes to proportions of high skill and low skill workers and changes in earnings of each skills group = $15

In this example the increase in average earnings is explained by:
A shift in the composition of employment towards high skill (high earnings) workers
An increase in the earnings of high skill and low skill workers
A shift in the composition of employment towards workers who have had relatively larger increases in earnings (that is, high skill workers)

Now introduce the possibility of an alternative measure of average earnings which holds fixed across time the share of workers in each skill group. Using the same logic as above we can think of the change in this measure of average earning as being decomposed to:

$$\Delta w = w^2 - w^1 = s_H^2 w_H^2 + s_L^2 w_L^2 - s_H^1 w_H^1 - s_L^1 w_L^1 = s_H(w_H^2 - w_L^1) + s_L(w_L^2 - w_H^1) = s_i \cdot \Delta w_i$$

Comparing the two measures of average earnings, recognising that the first corresponds to AWOTE and the second to LPI, and assuming that the proportions of workers in each skill group are the same for each measure of average earnings, the difference in changes in AWOTE and LPI will be:

$\Delta w^{AWOTE} - \Delta w^{LPI} = \Delta s_i \cdot w_i + s_i \cdot \Delta w_i - \Delta s_i \cdot \Delta w_i - s_i \cdot \Delta w_i = \Delta s_i \cdot w_i - \Delta s_i \cdot \Delta w_i$.

Hence, differences in the change in average earnings between AWOTE and LPI is explained by:
Change in composition of workforce between high skill and low skill workers; and
Interaction of the change in the composition of the workforce and changes in earnings of workers by skill group
(Both of which are incorporated into the AWOTE but not the LPI measure.)

Numerical example 2:

Use same example as above.
Using the LPI measure:
Average earnings at time 1: $150
Average earnings at time 2: $210
Hence the increase in average earnings using the LPI measure is explained by the increase in earnings of high skill and low skill workers.
The difference in changes in average earnings between the AWOTE and LPI measures ($250-$210 = $40) is explained by the change in workforce composition ($25), and interaction effect ($15).

As one further exercise, now suppose that the proportions of high skill and low skill workers in the alternative earnings measures differ. For example, suppose that the proportions of high skill and low skill workers used in AWOTE are as in the numerical example above, but

suppose that the proportions of high skill and low skill workers in LPI at time 1 are respectively 0.4 and 0.6.

Now:

$$\Delta w^{AWOTE} - \Delta w^{LPI} = \Delta s_i^{AWOTE} \cdot w_i + s_i^{AWOTE} \cdot \Delta w_i - \Delta s_i^{AWOTE} \cdot \Delta w_i - s_i^{LPI} \cdot \Delta w_i = .$$

$$\Delta s_i^{AWOTE} \cdot w_i + [s_i^{AWOTE} - s_i^{LPI}] \cdot \Delta w_i - \Delta s_i^{AWOTE} \cdot \Delta w_i$$

This introduces an extra potential source of difference to the change in average earnings from the AWOTE and LPI measures; an effect due to differences in the proportions of high skill and low skill workers in the measures.

Numerical example 3:

Use same example as above for AWOTE. Assume the proportions of high skill and low skill workers in LPI at time 1 are respectively 0.4 and 0.6.

AWOTE:
Average earnings at time 1: $150
Average earnings at time 2: $250

LPI:
Average earnings at time 1: $140 (equals (0.4)($200) + (0.6)($100))
Average earnings at time 2: $192 (equals (0.4)($300) + (0.6)($120))

Hence difference in change in earnings between AWOTE and LPI equals:
($250-$150) – ($192-$140) = $48

Difference is explained by:
Shift in composition of workforce towards high-skill workers: $25
AWOTE having relatively larger share of skill group of workers who receive higher wage increases than LPI: $8 (equal to (0.5-0.4)($300-$200) + (0.5-0.6)($120-$100) = $10 - $2 = $8)
Interaction effect of changes to proportions of workers in low skill and high skill groups and changes to earnings for those skill groups: $15

In principle therefore a difference in changes in earnings as measured by AWOTE and LPI can be explained by:

(i) Change in the skill composition of the workforce – The AWOTE measure incorporates the effects of changes in the skill composition of workforce, whereas the LPI measure does not. Hence, for example, where there is up-skilling in the workforce AWOTE will incorporate the effect of there being a higher proportion of high skill workers, whereas the LPI will not. Therefore in this case the AWOTE measure would give higher estimates of the change in earnings than the LPI measure (and opposite where there is down-skilling) (other things equal);

(ii) Differences in the skill composition of the workforce between AWOTE and LPI – Where AWOTE and LPI measures have different proportions of workers in the skill groups, and wage changes differ between workers in different skill categories, there will be different measures of changes in earnings from AWOTE and the LPI. For example, if AWOTE is measured assuming a larger share of high skill workers, and earnings of high skill workers increase by more than for low-skill workers, the AWOTE measure will give a larger increase in earnings than the LPI measure (other things equal); and

(iii) Differences in the interaction of changes in the skill composition of the workforce and changes to wages of workers by skill group. The AWOTE measure incorporates effects of changes in the skill composition of workforce, whereas the LPI measure does not. Hence, for example, where there is up-skilling in the workforce, and earnings of high skill workers increase by more than for low-skill workers, AWOTE will give higher estimates of change in earnings than LPI (and opposite where there is down-skilling) (other things equal).

In practice (ii) seems not likely to be a major source of differences between AWOTE and LPI as the weights in LPI are adjusted on an annual basis (ABS, 6351.0.55.001, p.12); and (iii), representing as it does the effect of the interaction between changes in skill composition and changes in earnings, should generally be relatively small. Hence, the main source of differences in measured changes in earnings between AWOTE and the LPI is likely to be changes in the skill composition of the workforce.

Appendix 2:

I used the following data series from the ABS website:
AWOTE (full-time adult): ABS, Average Weekly Earnings, 6302.0, Table 3, series A2734023X
CPI (all goods; 8 capital cities): ABS, CPI, 6401.0, Tables 1 and 2, series A2325846C.
LPI(ordinary time hourly rate of pay excluding bonuses): ABS, Labour Price Index, 6345.0, Table 1, series A2603609J
GDP per hour worked: ABS, National Accounts, 5206.0, Table 30, series A2309464A.

I took data on GDP per hour worked from 1997-98 (84.8) to 2009-10 (102.0). I took data on average AWOTE for Aug-1997 to May-1998 ($716) to Aug-2009 to May-2010 ($1231.25). I took data on CPI from December 1997 (120.0) to December 2009 (169.5). I took data on the LPI from December 1997 (67.3) to December 2009 (104.2).

For each series I calculated the average annual rate of change as the rate, which when compounded over 12 years, took the measure from its base value to end value. That is, the rate, r, is derived from:
End value = Base Value x $(r)^{12}$.

Using this method, annual average rates of increase in each series are:
Labour productivity: 1.55%
LPI: 3.6%
AWOTE: 4.55%
CPI: 2.9%

Appendix 3:

The table below shows how forecasts of changes to real labour price productivity adjusted, changes to real labour price, and changes to productivity differ between the final report of 13 December 2010, and the two earlier reports from 16 March 2010 and 16 September 2009. In each report I have considered the 5 years from 2011-12 to 2015-16. Each number in the table is the average annual forecast change from the 13 December 2010 report minus the average annual forecast change from the earlier report. For example, consider the entry of -0.3% for the difference in change in real labour price productivity adjusted for all industries in Queensland between the 13 December 2010 and 16 March 2010 reports. This is showing that in their 13 December 2010 report, Access Economics forecast that average growth in real labour price productivity adjusted in all industries in Queensland between 2011-12 and 2015-16 would be 0.3 percentage points per annum lower than in their 16 March 2010 report. (Note that the difference in the change in real labour price minus the difference in the change in labour productivity equals the difference in the change in real labour price productivity adjusted.)

Table 1: Changes in forecasts of average annual changes in real labour price productivity adjusted, real labour price and labour productivity between Access Economics' reports of 13 December 2010, 16 March 2010 and 16 September 2009

		Difference between report from 13 December 2010	
		And report from 16 September 2009	**And report from 16 March 2010**
Queensland			
All industries	Change in real labour price productivity adjusted	-0.48	-0.30
	Change in real labour price	+0.52	+0.42
	Change in labour productivity	+1.00	+0.72
Utilities	Change in real labour price productivity adjusted	-0.22	-0.52
	Change in real labour price	+0.46	+0.36
	Change in labour productivity	+0.68	+0.88
Construction	Change in real labour price productivity adjusted	-0.16	-0.14
	Change in real labour price	+0.74	+0.64

	Change in labour productivity	+0.58	+0.78
South Australia			
All industries	Change in real labour price productivity adjusted	-0.06	-0.6
	Change in real labour price	+0.06	+0.58
	Change in labour productivity	0	+0.02
Utilities	Change in real labour price productivity adjusted	-0.36	-0.06
	Change in real labour price	+0.06	+0.52
	Change in labour productivity	+0.42	+0.58
Construction	Change in real labour price productivity adjusted	-0.44	-0.08
	Change in real labour price	-0.20	+0.38
	Change in labour productivity	+0.24	+0.46

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23 March 2011

Professor Jeff Borland
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MELBOURNE VIC 3010

Dear Professor Borland

Envestra Limited – South Australian and Queensland Access Arrangement Reviews

We act for Envestra Limited in relation to the AER's review of Envestra's Access Arrangements for South Australia and Queensland.

Envestra Limited has engaged you to prepare an expert report in connection with the AER's review of Envestra's Access Arrangements for South Australia and Queensland.

The purpose of this letter is to confirm your terms of reference and to confirm the matters which Envestra Limited wishes you to address in your report and the requirements the report must comply with to be capable of use in the AER review.

Terms of Reference

In its Draft Decisions in respect of the South Australian and Queensland Access Arrangements the AER has rejected the proposal by Envestra to use Average Weekly Ordinary Time Earnings (**AWOTE**) as the measure with which to forecast labour prices for the purposes of real cost escalation. The AER has instead concluded that the appropriate measure to use for such forecasts is the Labour Price Index (**LPI**).

Envestra seeks your opinion, as an expert, as to which measure, being either the LPI or the AWOTE measure, produces forecasts of labour prices for the purposes of real labour cost escalation over the access arrangement period, being 1 July 2011 to 30 June 2016 which are arrived at on a reasonable basis and represent the best forecast or estimate possible in the circumstances ("the test").

Also please comment on any other matters relevant to the forecasting approach taken by the AER's consultant on labour costs, Access Economics.

In providing your opinion, you should have regard to the relevant requirements of rules 74(2)

and 91 of the National Gas Rules.

Rule 74(2) provides:

"A forecast or estimate:

(a) must be arrived at on a reasonable basis; and

(b) must represent the best forecast or estimate possible in the circumstances."

Rule 91 provides:

"Operating expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of delivering pipeline services."

Use of Report

It is intended that your report will be included by Envestra in its response to the AER's Draft Decision. The report may be provided by the AER to its own advisers.

The report must be expressed so that it may be relied upon both by Envestra and by the AER.

The report will be reviewed by Envestra's legal advisers and will be used by them to provide legal advice to Envestra as to its rights and obligations under the National Gas Law and National Gas Rules. You will be required to work with these legal advisers and Envestra personnel to assist them prepare Envestra's submissions in response to the draft and final decisions made by the AER.

Compliance with the Code of Conduct for Expert Witnesses

Attached is a copy of the Federal Court's Practice Note CM 7, entitled "Expert Witnesses in the Federal Court of Australia", which comprises the code of conduct for expert witnesses in the Federal Court of Australia (**the Code of Conduct**).

Please read and familiarise yourself with the Code of Conduct and comply with it at all times in the course of your engagement by Envestra.

In particular, your report prepared for Envestra should contain a statement to the effect that the author of the report has read the Code of Conduct and agrees to comply with it.

Your report must also:

1 give details of the expert's qualifications and of the literature or other material used in making the report;

2 state all of the questions or issues that the expert has been asked to address;

3 state all of the factual premises upon which the report proceeds; and

4 otherwise comply with the Code of Conduct.

It is also a requirement that the report be signed by the expert and include a declaration that the expert has made all the inquiries which the expert believes are desirable and appropriate and that no matters of significance which the expert regards as relevant have, to the expert's knowledge, been withheld from the report.

Please also attach a copy of these terms of reference to the report.

Terms of Engagement

Your contract for the provision of the report will be directly with Envestra Limited. You should forward to Envestra Limited any terms you propose govern that contract as well as your fee proposal. Your invoices for the production of the report are to be addressed and sent to Envestra Limited.

Contact with us

We request that you contact us or Envestra Limited by telephone in the first instance to discuss any requests for the provision of data or your preliminary conclusions. All enquiries to Envestra Limited should be made to Craig de Laine or Geoff Barton.

Please sign a counterpart of this letter and forward it to Envestra Limited to confirm your acceptance of the engagement by Envestra.

Yours faithfully

Johnson Winter & Slattery

Enclosed: Federal Court of Australia Practice Note CM 7, "Expert Witnesses in Proceedings in the Federal Court of Australia"

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Signed and acknowledged by Professor Jeff Borland

Date 23/3/2011