Deloitte Access Economics

Productivity measures to adjust LPI and AWOTE

Australian Energy Regulator

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Deloitte.

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Dear Toby,

Productivity measures to adjust LPI and AWOTE

The Australian Energy Regulator (AER) has asked Deloitte Access Economics to provide comments on adjusting different wage measures for productivity.

Deloitte Access Economics has previously argued in reports for the AER that, for the purposes required by the AER, the Labour Price Index (LPI) is a superior wage measure to average weekly ordinary time earnings (AWOTE).

This report discusses the appropriate method to adjust the LPI series for productivity growth in order to arrive at a measure of unit labour cost growth, focussing on the points raised by Borland (2011).

Yours sincerely,

Chris Richardson
Director
Deloitte Access Economics Pty Ltd

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ABS	Australian Bureau of Statistics
AER	Australian Energy Regulator
AWOTE	Average weekly ordinary time earnings
LPI	Labour Price Index
PISA	Programme for International Student Assessment
WPI	Wage Price Index

1 Accounting for labour quality

1.1 The LPI is the preferred wage measure

As Deloitte Access Economics has previously argued in reports, the LPI should be the preferred wage measure of the AER.

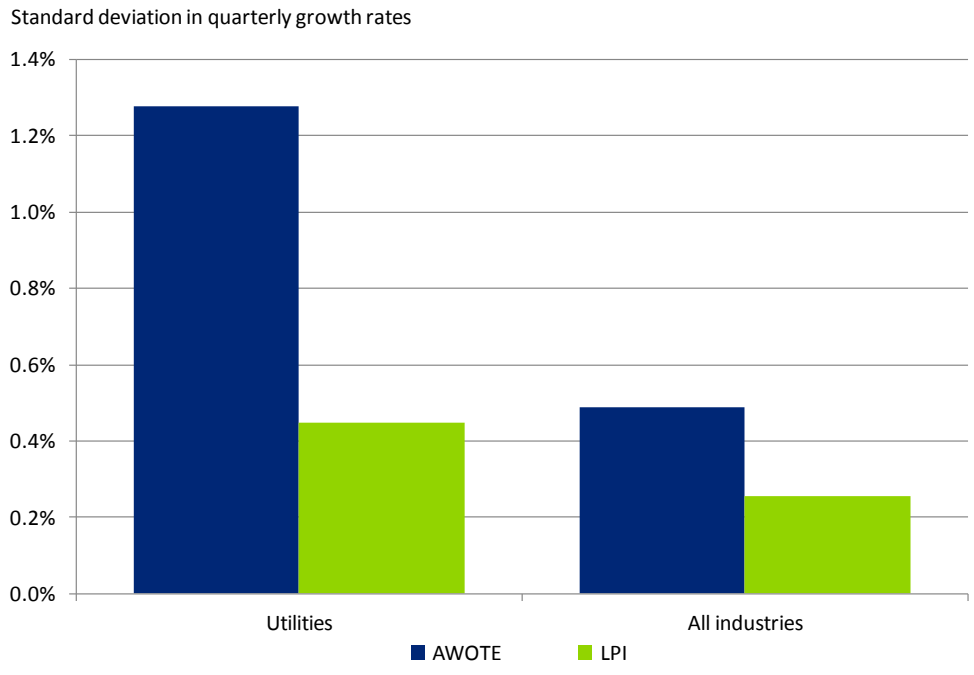
The Australian Bureau of Statistics (ABS) (ABS 2005) has noted that:

> *"The WPI was first compiled for the September quarter 1997 and is the main ABS measure of changes in wages. The WPI measures quarterly changes over time in the cost to an employer of employing labour, and is unaffected by changes in the quality or quantity of work performed."*

This discussion suggests that the ABS sees the LPI as their preferred measure for "changes in the price of labour".

Indeed, the LPI was originally developed because of the shortcomings of existing wage measures for this type of analysis. For example, AWOTE is affected by shifts in the composition of employment. If a sector employs relatively more high-paid full-time workers over time (as has happened, for example, in the manufacturing sector as low skilled jobs have been lost to competitors in developing Asia), then that will tend to raise measured AWOTE even if the wage levels for a given level of skill have not changed at all.

Chart 1.1: Standard deviation in quarterly wage growth, ten years to December 2010



Source: ABS, Deloitte Access Economics

Those compositional effects tend to make AWOTE far more volatile than the LPI. Chart 1.1 above shows the standard deviation in quarterly growth for AWOTE and LPI in the utilities sector and across all industries over the past decade. The chart shows that AWOTE has been notably more volatile than the LPI over that period.

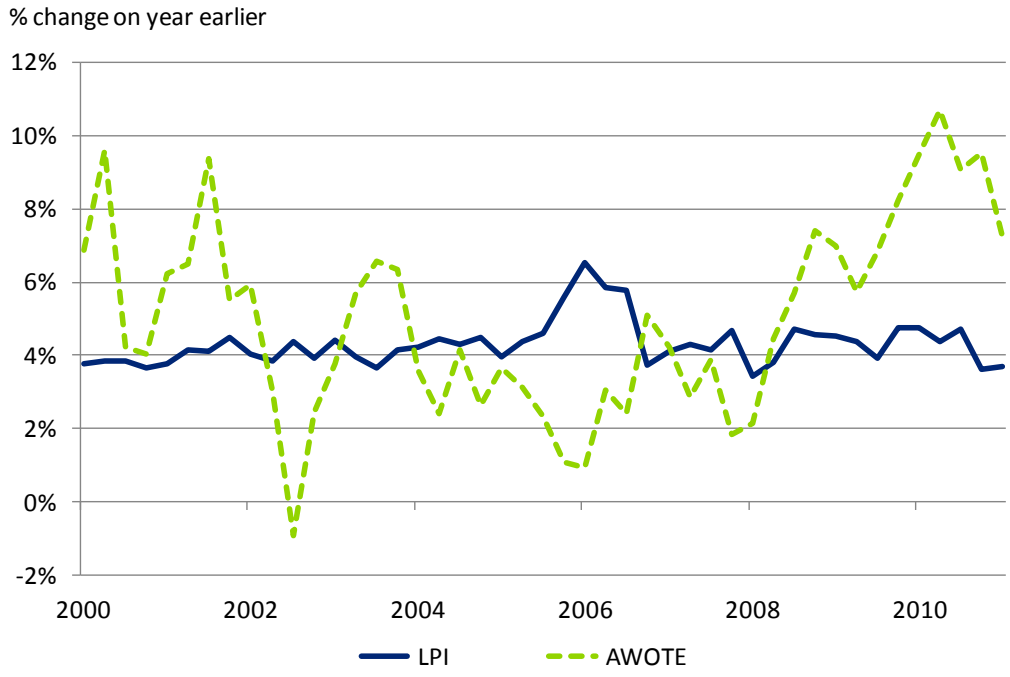
These volatility problems become more pronounced at greater levels of disaggregation, with the difference in volatility more pronounced in the utilities sector than across all industries as a whole (quarter-to-quarter changes are some three times more volatile for the AWOTE measure than the LPI measure).

As the analysis at issue for the AER is not merely at the sectoral level, but at the sectoral by State level, these volatility problems rapidly compound even further than the degree of difference seen in Chart 1.1.

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.

The latter point is highlighted by Chart 1.2 below. It shows year-to growth in AWOTE and LPI for the utilities sector.

Chart 1.2: Growth in AWOTE and LPI, Australian utilities sector



Source: ABS, Deloitte Access Economics

More broadly, 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".

1.2 Drawbacks in using the LPI

That said, 'best measure' is not the same as 'perfect measure', and there are also drawbacks to using the LPI.

First, the LPI is published by State and by sector separately, but not by State and by sector. That is, the LPI for NSW is published, and the mining sector LPI is also published, however the NSW mining sector LPI is not. The latter data is only available by special request and, in the case of small sample sizes, the ABS does not release their estimates. In contrast, more series at the 'by State and by sector' level are available for AWOTE from the ABS 6302.0 release.

Second, it is sometimes relevant that the composition of the workforce is changing. That is particularly true in analysing the implications of wage developments for the Australian economy as a whole. For example, promotions are easier to obtain during a sustained expansion, reflecting the strength of cyclical demand rather than pure productivity. Other things equal, that adds to total incomes in the economy, but doesn't show up in the LPI (which does not 'recognise' that people at a certain seniority today are, on average, different to those who were at that level some years past).

Borland (see below) terms this latter channel 'composition productivity effects'.

As the LPI has only existed since 1997, and Australia's long economic expansion began in 1992, there is an argument that the LPI has understated true 'like-for-like' wage gains across most of the time it has been in existence.

However, that bias is unlikely to have been large, and must be measured against the rather more significant types of problems with AWOTE measures discussed above (and highlighted even at the national level in Chart 1.1 and Chart 1.2).

1.3 Changes in labour quality

Other differences between the LPI and AWOTE wage measures are also relevant, and are the focus of this report. Borland (2011) argues that AWOTE captures the impact of:

- increases in workforce productivity that are due to changes in the skill composition of the workforce ('composition productivity effects');
- increases in workforce productivity that are due to increases in the productivity of individual workers ('worker productivity effects'); and,
- other factors unrelated to worker productivity ('other effects'), such as catch-up in wages for increases in the CPI.

Borland (2011) argues that changes in the LPI will not incorporate composition productivity effects, are likely to only partly incorporate worker productivity effects, and will entirely incorporate other effects.

Deloitte Access Economics agrees with this statement, including the point that the LPI does not account for composition productivity effects.

That result is a function of the compositional effects noted above in Section 1.2. Just as the AWOTE wage measure is shifted by changes in the composition of full-time and part-time workers, it is also shifted by changes in the composition of high-skill and low-skill workers.

Two points are worth noting here. **First**, does it make sense for the AER to pay for compositional change in a firm's workforce?

As Borland (2011) notes at his Paragraph 17, "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".

That is, compositional change in skill mix is a business choice. If the business chooses to pay for a skill mix with a higher (or lower) average wage, then it also gets the associated productivity benefit (loss) of that decision.

As stated by Access Economics (2010), "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 more (lesser skilled) workers."

Hence if the AER compensates a business for compositional effects that have seen a shift to a more skilled workforce, then the AER would be effectively paying twice (and businesses would be left with an incentive to move to more skilled workers over time). Therefore, the fact that the LPI does not incorporate compositional productivity does not, in Deloitte Access Economics' opinion, alter the view that it is a superior measure of labour cost growth relative to AWOTE.

Second, the fact that the LPI does not account for compositional productivity has implications for the productivity adjustments which need to be made to estimates of changes in labour cost.

The AER requires estimates of labour cost growth less labour productivity growth – the result being an estimate of unit labour cost growth. If such productivity adjustments are made to a wage measure, then it is appropriate for the productivity adjustment to 'match' the wage measure to which it is being applied.

As the LPI excludes compositional effects, in theory the productivity measure used to adjust the LPI series should also exclude compositional effects. Quality adjusted labour productivity – which takes into account the rising skill and experience level of the workforce over time, and could therefore be expected to grow at a slightly slower pace than unadjusted labour productivity – is therefore, in theory, the appropriate measure to apply to the LPI. In contrast, as AWOTE includes compositional effects, the unadjusted (or traditional) labour productivity measure, which also includes compositional effects, should be applied.

2 The size of the quality adjustment

That raises the specific question of just how large any adjustment for compositional change is likely to be.

There are two key drivers of compositional productivity:

- Genuine compositional change in the workforce. This is the key example provided by Borland (2011), and involves firms changing the composition of their workforce from low skilled workers to high skilled workers. As a result of this change, the productivity of the firm's workforce and the average wage paid by the firm will both rise.
- Rising skill and experience levels of individual workers over time. Overall average skill levels of individual workers tend to gradually rise over time and this increases the proportion of workers with higher skills.

These two drivers are discussed in turn.

2.1 Compositional change

This is the issue noted above in Section 1.2 in the Access Economics reports for AER, and covered by Borland in Section 1.3.

How much might genuine compositional change in the workforce contribute to compositional productivity?

As noted above, compositional change involves shifting from low skill to high skill workers (or, indeed, vice versa) over time. Measured at the national level, and assuming that the low skill workers that leave a given firm or industry are rehired elsewhere, the overall impact on compositional productivity would be zero.

However that result would not translate to the case of an individual firm, and would not necessarily apply for components of the Australian economy, such as the utilities industry.

The latter question therefore becomes an empirical one.

Table 1 in Borland (2011) provides a benchmark for quantifying the impact of compositional change on wage costs in the utilities sector in recent years.

The table below replicates that used by Borland (2011), but adds the relevant wages for these occupations as at August 2008. (It would be preferable to use the wages attaching to these occupations in the utilities sector itself, rather than for Australia as a whole, but these data aren't available at that level of disaggregation. However, using a proxy of occupational wages at the national level is unlikely to have an impact on the following results.)

The additional feature in Table 1 below is that, when weighted for relative wages across these occupations, it shows that composition productivity effects in the utilities sector should have been reducing the average wage payable in the sector by about 0.8 percentage points in each of the last two years.

Table 2.1: Impact on average wages of compositional employment change in utilities

	Wages as at August 2008 ($)	Share (%) Nov-08	Share (%) Nov-09	Share (%) Nov-10
Managers	$ 1,405.90	12.2	10.6	11.2
Professionals	$ 1,488.80	17.6	16.3	14.2
Technicians and Trades Workers	$ 1,083.30	23.6	27.6	25.4
Community and Personal Service Workers	$ 880.50	-	-	-
Clerical and Administrative Workers	$ 945.30	19.6	19.5	22.4
Sales Workers	$ 933.60	3.4	2.4	3.0
Machinery Operators and Drivers	$ 1,039.40	14.2	13.8	15.7
Labourers	$ 847.30	9.4	9.8	8.3
All occupations				
Weighted average AWOTE		$ 1,133.47	$ 1,123.90	$ 1,115.07
Change due to compositional effects			-0.8%	-0.8%

Source: Australian Bureau of Statistics, Deloitte Access Economics

These calculations indicate that the utilities sector has been saving money by, on average, moving to a less skilled workforce.

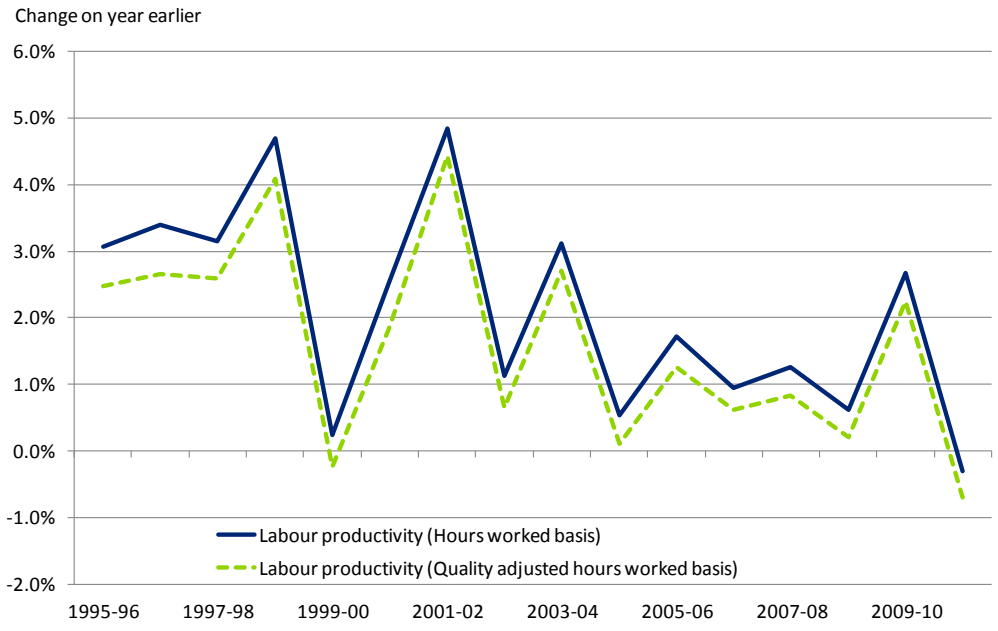
That is, compositional change in the sector has not had a significant impact on productivity (and therefore average wages) in recent years.

Indeed, the effect has been the opposite of that described by Borland (2011).

2.2 Rising average levels of skill and experience

A second key driver of compositional productivity is rising skill and experience levels of individual workers. The ABS releases estimates of quality adjusted labour productivity at the national level on an annual basis. Quality adjusted labour productivity data is not available at the industry or State level.

Chart 2.1: Labour productivity and quality adjusted labour productivity, Australia

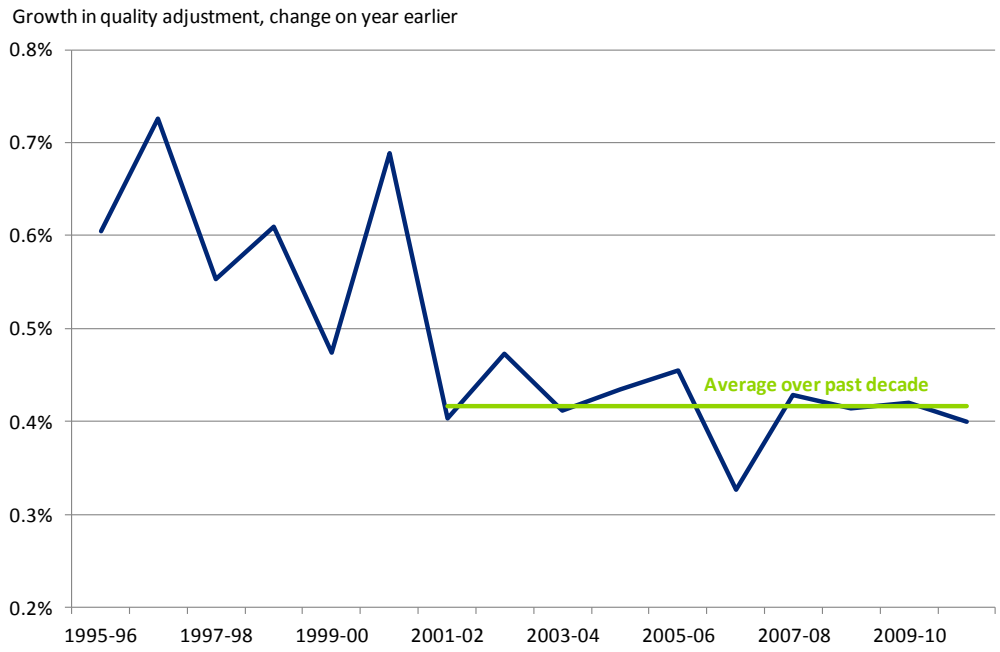


Source: ABS Cat. No. 5204.0

Chart 2.1 above shows growth in labour productivity and quality adjusted labour productivity published by the ABS. As the chart shows, both series have been trending down over time, and were negative in 2010-11.

Perhaps more instructive is Chart 2.2 which shows the difference between those two series, highlighting the growth in the quality adjustment of labour in Australia over time. The chart below shows a clear downward trend in the growth of labour quality over time. Over the past decade, annual growth in quality adjustment has been relatively low, averaging only slightly more than 0.4% per year.

Chart 2.2: Growth in quality adjustment, Australia



Source: ABS Cat. No. 5204.0, Deloitte Access Economics

Based on this measure of it, the overall impact of compositional productivity is, therefore, not large.

Moreover, there are reasons to expect it to continue to decline over time.

The quality adjustment estimated by the ABS is largely driven by levels of educational attainment – that is, a quantity-based measure of quality.

The lift in retention rates from year 7/8 through to year 12 between 1982 and 1992 was notable, with the share of students finishing high school more than doubling to 78% over that decade. However, the latest data (ABS 4221.0) show that the ratio was still only 78% in 2010. (It fell for a time, and picked up more recently, but overall retention rates essentially levelled off some years ago.)

The lost productivity potential from that is very high.

In addition, the ABS indicator is likely to have used some years of schooling measure, whereas the latest international research (Hanushek and Wößmann, *Education Quality and*

Economic Growth, World Bank 2007) suggests it is actually test scores (that is, quality) rather than the quantity of schooling which is the key to skill improvements.

And, on that score, the news is less good for Australia.

The Programme for International Student Assessment (PISA) is a worldwide evaluation of the scholastic performance of 15-year-olds coordinated by the OECD. In the 2009 results – the latest – Australian students ranked 15th in maths, 10th in sciences, and 9th in reading.

However Australian scores have been falling, making us the only high-performing nation to show a statistically significant decline in reading literacy between 2000, when PISA began, and 2009.

The difference in average scores between students from low socioeconomic families and those from high SES families increased in reading, maths and science between 2006 and 2009. The report on Australia's PISA results claim that this gap *"places an unacceptable proportion of 15-year-old students at serious risk of not achieving levels sufficient for them to effectively participate in the 21st century work force and to contribute to Australia as productive citizens"*. [1]

Or, in other words, not only has the quantity improvement in Australian schooling levelled off, but the quality (as measured by international testing) has been declining, suggesting that quantity-based quality adjustments (such as those calculated by the ABS) overstate the gap, and that whatever the gap is – positive or negative – it is likely to be getting worse rather than better as a result of declining marks.

[1] See www.deewr.gov.au/search/results.aspx?k=Australian_Council_of_State_School_Organisations&s=All%20Sites

3 Our forecasting approach

Our methodology for providing forecasts of labour cost growth to the AER involves subtracting estimates of labour productivity from forecasts of LPI growth.

As noted in Chapter 1, the productivity growth which is deducted from the LPI should be quality adjusted.

However, as noted above, Deloitte Access Economics does not believe that the value of the quality adjustment is large.

Indeed, our forecasting approach values the quality adjustment at zero.

That said, we value it at zero both in forecasting the LPI, and in forecasting the productivity adjustment to be applied to the LPI.

Hence even if our valuation of this effect is wrong, that does not affect our projections for the productivity adjusted LPI, as that would involve offsetting adjustments to both the LPI and to the productivity measure applied to the LPI.

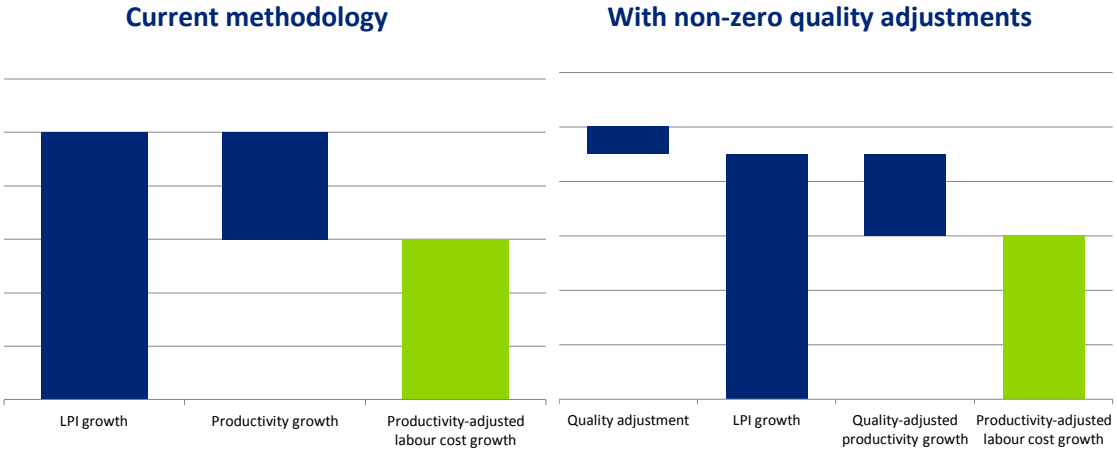
Deloitte Access Economics' wage forecasting methodology initially generates a generic wage variable. Those wage forecasts derived from this process are then used to generate separate forecasts for a number of different wage variables including, for example, AWE, AWOTE, national accounts-based average earnings, as well as the LPI.

That forecasting process has two implications:

- Deloitte Access Economics' existing methodology implicitly assumes that the labour quality adjustment is zero; and,
- to the extent that the quality adjustment is different from zero, it would automatically net out in Deloitte Access Economics calculations of productivity-adjusted LPI growth, as it would be deducted from both productivity growth and from LPI growth.

A graphical representation of the two methodologies is shown in the charts below. The final productivity-adjusted labour cost growth estimate is identical in both cases.

Chart 3.1: Graphical representation of alternative forecast methodologies



4 Any forecasting bias is insignificant

The LPI is not a perfect measure of wage growth. However it does have some notable advantages over other measures, including AWOTE.

The extent that any minor forecasting bias does arise through the impact of compositional productivity (in particular through rising labour quality over time), the affect on the LPI series would be outweighed by the volatility and unreliability of the AWOTE measure.

As noted by Access Economics (2010), *"any such bias is unlikely to be large, and must be balanced against the rather more significant types of problems with AWOTE measures"*.

This is the 'bigger picture' for the AER, which requires a reliable and accurate measure of labour cost growth.

In effect, the judgment call is whether volatility and other problems in AWOTE outweigh any issues around quality adjustment in LPI measures.

As described in Chapter 1, the impact of workforce compositional effects on wage volatility makes AWOTE a poor measure of labour costs in 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.

In addition, and as noted above, if the productivity growth applied to the LPI forecasts should allow for a non-zero adjustment for quality changes, then the same is true for the LPI forecast itself (meaning that there would be no net change to the productivity-adjusted LPI forecasts in Deloitte Access Economics' reports for the AER).

Furthermore, the ABS has signalled a shift away from average weekly earnings measures, including AWOTE. As noted by the ABS in the February 2011 release of AWOTE data (on 19 May 2011):

> *"**The frequency of the average weekly earnings series will change from quarterly to biannual in 2012**. It is intended that the May 2012 publication will be the last quarterly issue and the November 2012 publication the first produced on a biannual basis. From 2013 onwards, AWE data will be produced twice a year relating to May and November. A fifteen month notice period is being given to ensure AWE users have sufficient notice of the change."*[2]

These two issues – the considerable volatility of AWOTE and the change to less frequent release dates – underscore Deloitte Access Economics' continuing preference for using LPI data rather than AWOTE data.

[2] Australian Bureau of Statistics, Average Weekly Earnings, Australia, Feb 2011, Available: www.abs.gov.au

References

Australian Bureau of Statistics (2005), *Australian Labour Market Statistics,* (Catalogue No. 6105.0), October, Available: www.abs.gov.au

Access Economics (2010), "Forecast growth in labour costs: Queensland and South Australia", *Report for the Australian Energy Regulator,* 13 December, Available: www.aer.gov.au

Borland, J. (2011), *Labour cost escalation report for Envestra Limited*, 23 March

Hanushek and Wößmann (2007), *Education Quality and Economic Growth*, World Bank

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