

Response to issues raised in the Victorian Gas Access Review

Australian Energy Regulator

29 May 2012

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Dear Kevin,

Responses to issues raised in various submissions to the Victorian Gas Access Review

The Australian Energy Regulator (AER) has asked Deloitte Access Economics to provide detailed responses to three submissions received by the AER. They are:

- A real cost escalation report prepared by BIS Shrapnel (November 2011) on behalf of Envestra, SP Ausnet and Multinet (containing a discussion on DAE's previous forecasts);
- A BIS Shrapnel report (March 2012) prepared for APA Gasnet (containing Australian and Victorian forecasts); and
- A report prepared by Professor Jeff Borland for Envestra (containing responses to DAE's 2011 reports).

This report discusses the appropriate method for measuring and forecasting escalation in the price of labour in the utilities sector, as well as responses to criticisms and comments regarding DAEs forecasting methodology where appropriate.

Deloitte Access Economics has also previously responded to a range of related arguments put by other regulated entities, and many of those responses remain relevant here.

Yours sincerely,



Chris Richardson
Director
Deloitte Access Economics Pty Ltd

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Glossary

ABS	Australian Bureau of Statistics
AER	Australian Energy Regulator
AWOTE	Average weekly ordinary time earnings
EBA	Enterprise Bargaining Agreement
LPI	Labour Price Index
WPI	Wage Price Index

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1 Background

The Australian Energy Regulator (AER) requested that Deloitte Access Economics comment on the criticisms of Deloitte Access Economics' wage forecasting model and modelling approach raised in BIS Shrapnel's real cost escalation forecasts to 2017, as well as in Professor Borland's response to previous DAE comments regarding whether LPI or AWOTE is the best measure for labour cost forecasts. Additionally, the AER has requested DAE review the March 2012 forecasts for Victoria and Australia prepared by BIS Shrapnel.

The three reports which have been reviewed in this report are:

- *Labour cost escalation: Choosing between AWOTE and LPI*. Report for Envestra Limited, March 2012 (Borland (2012)).
- *Real cost escalation forecasts to 2017 – Victoria and New South Wales* (Nov 2011) BIS Shrapnel. Prepared for the Victorian gas distributors Envestra Limited, SP-Ausnet and Multinet Gas Pty Ltd (BIS Shrapnel 2011); and,
- *Real cost escalation forecasts to 2017 – Australia and Victoria* (March 2012) BIS Shrapnel. Prepared for the Victorian gas distributors Envestra Limited, SP-Ausnet and Multinet Gas Pty Ltd (BIS Shrapnel 2012) .

This document responds to a number of issues raised in those reports, including:

- Deloitte Access Economics' past forecasting performance;
- Deloitte Access Economics' labour cost forecasting methodology and approach; and,
- Deloitte Access Economics' labour productivity forecasts.

We also comment on the choice between the Labour Price Index / Wage Price Index (LPI/WPI) and Average Weekly Ordinary Time Earnings (AWOTE) as the appropriate wage measure to be considered in the AER's determinations, as well as changes to data released by the ABS which further affects the choice between AWOTE and LPI/WPI.

Note that previous reports prepared by DAE for the AER have referred to the total rates of pay, excluding bonuses series as the LPI. While this series is from the LPI publication, it is in fact a wage price index (WPI) series, and it is referred to as such in this report. To be clear, this does not represent any change to the underlying series used in the analysis or forecasts presented in this report, but to the name of the series only.

For the ease of exposition, and given that the Borland and BIS Shrapnel reports refer to the LPI, this report does the same.

We would also take this opportunity to note that we hold the analysis of Professor Borland and of BIS Shrapnel in high regard.

2 The best wage measure

This chapter discusses the appropriateness of using the LPI rather than AWOTE for wage forecasting purposes. A number of issues raised in the reports prepared by BIS Shrapnel report and Professor Jeff Borland are addressed.

2.1 The Deloitte Access Economics view

Deloitte Access Economics' view on the choice between LPI and AWOTE has been covered in numerous reports to the AER, most recently in our report to the AER of 2 March 2012.

DAE acknowledges that the LPI is not a perfect measure – some of the criticisms of it are reasonable. But the LPI is a rather better measure than AWOTE, and that gap is set to grow as the ABS drops back to only publishing AWOTE on a six monthly basis in the second half of 2012, as well the recent cessation of all AWOTE State by industry information.

Our view is consistent with that of the Australian Bureau of Statistics (ABS), which noted in the October 2005 issue of *Australian Labour Market Statistics* (catalogue 6105.0):

“Information on changes in the price of labour is available from the quarterly Labour Price Index (LPI). The LPI is compiled from information collected from businesses on changes in wage and non-wage costs. Information collected on wages is used to produce a Wage Price Index (WPI).”

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.”

As the above discussion from the ABS suggests, they see 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. As such, 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.

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”.

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.

Until the end of 2011, more series at the 'by State and by sector' level were available for AWOTE from the ABS 6302.0 release. This has now changed, however, and from 2012 the ABS will no longer be releasing any AWOTE data by State and industry.

However, it is possible to 'back out' reasonable estimates of LPI at the 'by State and by sector' level. Appendix E of our 15 August 2011 report for the AER discusses how Deloitte Access Economics does that. The resultant series are rather less volatile than the matching ABS AWOTE series.

They also display patterns over time quite consistent with the matching moves in Enterprise Bargaining Agreements (EBAs) – whereas AWOTE does not.

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.

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.

However, we agree with the following quote from Frank Gelber, Chief Economist and Director of BIS Shrapnel, which is drawn from evidence given before the Industrial Relations Commission of New South Wales (IRC 2011/325 – Crown Employees (Police Officers – 2009) Award) on 10 November 2011:

WALTON J, V-P: ...[I]n terms of measuring movements in wages of public sector employees across the nation over a period of time, how useful would the Labour Price Index be in estimating the movement in those wages?

WITNESS GELBER: Pretty good. We would prefer to use the Labour Price Index most of the time. It is only when we wanted to have a look at other things like an amount of overtime or work changes in composition that we use the others. We used to only have AWOTE but now that we have the Labour Price Index we have good data on it by sector, by private versus public sector and by industry sector and by State and so if you wanted average earnings in the public sector over a period of time you have a Labour Price Index for that, or you could take it down to a specific industry and the Police would probably fall under, I think what is it, Public Administration and Safety. If you wanted to look at that for New South Wales that is not ordinarily published and so if – you could ask the Australian Bureau of Statistics for a special run, which we have done at different times, and for some of the industry categories they will give you the state data and others maybe not. You just have you to ask them this or we

could ask them. we have not done that for this because there wasn't time, but you can actually get quite good data on that for effectively a basket of labour.

That is the task at hand here, and we agree with both the ABS and Frank Gelber of BIS Shrapnel that the LPI is the preferred measure for this type of analysis.

2.2 Empirical evidence supporting AWOTE vs LPI

Professor Borland provides supporting empirical analysis for using AWOTE rather than LPI by analysing the LPI, AWOTE, CPI and Labour productivity over the period 1997-98 to 2009-10. His argument is that labour productivity of 1.55% plus CPI of 2.9% gives a result much closer to AWOTE than LPI over the past 12 years (see page 6, Borland 2012).

DAE agrees that growth in wages will tend to average inflation plus productivity over time. Replicating Professor Borland's analysis using our measure of productivity (non-farm output divided by non-farm employment) reveals the averages shown in Table 2.1.

Table 2.1: Fundamental drivers of wages

Variable (average annual % change)	Borland (1997-98 to 2009-10 average)	DAE (1998-99 to 2009-10 average)	DAE (1998-99 to 2010-11 average)
Labour productivity	1.55%	0.83%	0.69%
LPI	3.6%	3.54%	3.57%
AWOTE	4.55%	4.54%	4.53%
CPI	2.9%	2.96%	3.01%
CPI + labour productivity	4.45%	3.78%	3.70%

Source: ABS, DAE, Borland (2012)

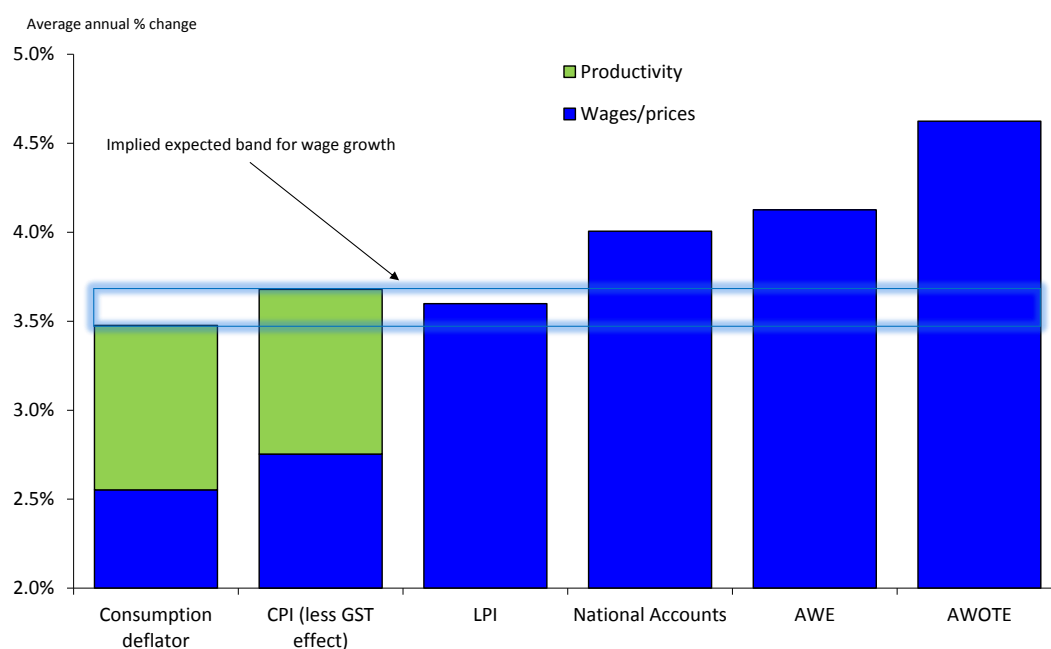
The table shows that, even without deducting one-off effects such as those arising from the introduction of the GST, inflation plus productivity equals 3.8%, which is much closer to our preferred measure of LPI than in is to AWOTE. Extending the time period to 2010-11, inflation plus productivity equals 3.7%, which is again much closer to LPI than AWOTE.

To examine this relationship in more detail, Chart 2.1 provides growth rates over the 12 years to 2009-10 for a range of wage variables. It begins with two different measures of prices, to which productivity growth has then been added:

- One measure of prices is that provided by the consumption deflator in the national accounts. It is a very broad-based indicator of consumer price pressures in the Australian economy.
- The other price measure noted here is more narrowly-based, but more readily recognisable – the Consumer Price Index.
- We have deducted the one off lift in prices attributable to the introduction of the GST from the latter. It should also be deducted from the former, but most analyses of the effect, including ours, focused on CPI impacts.

- Productivity growth here is measured in the simplest manner possible – the extent to which real output growth in the Australian (non-farm) economy has exceeded employment growth. This is DAE’s basic measure of productivity.

Chart 2.1: Yardstick assessment of different wages (1998-99 to 2009-10)



For the period since the LPI was introduced, growth in the two different measures of inflation fell within the Reserve Bank’s desired 2-3% target band for inflation – 2.6% for the consumption deflator and 2.8% for the CPI less GST effects.

Other things equal, the combination of those price inflation and productivity growth rates suggest wage growth might have been expected to average somewhere around 3½% to 3¾% per year: a band which has been identified in Chart 2.1.

Of the indicators in the chart above, only the LPI (at 3.6% a year) is close to that range. The national accounts measure is higher at 4.0%, AWE at 4.1% per year, while AWOTE is higher still at 4.6%. Note that:

- If a productivity rate of 1.55% – the estimate used by Professor Borland – were to be added to the CPI or consumption deflator, the average AWOTE growth is still well above the implied expected band for wage growth (which would be 4.1%-4.3%).
- Productivity estimates have fallen further over 2010-11. DAE estimates that productivity growth over the 13 years to 2010-11 has been 0.7% per annum, rather than the 0.8% used in the above analysis.
- Using GDP per hour worked instead sees the productivity rate fall from 1.52% per annum (in the 12 years to 2009-10) to 1.31% per annum (in the 13 years to 2010-11).

The above comparison doesn't necessarily suggest that the LPI is 'right' and AWOTE is 'wrong', but it provides useful insight into assessing whether there are large and systematic biases present in the LPI versus AWOTE.

Certainly 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.

Professor Borland states that "other factors have only a minor influence on AWOTE (accounting for 0.1% out of 4.55%)" (see page 12, Borland 2012). However on page 13 of the same report, Professor Borland lists many influences that "enter into the 'other factors' component of changes to the AWOTE and LPI", including changes in wages to adjust for working conditions (such as paying workers more for working in remote locations) or changes in relative demand for labour across industries (for example other industries competing with the mining sector for employees with mining industry related skills).

DAE agrees that there are many influences on both the AWOTE and LPI, and that these influences are not insignificant, particularly presently as the mining boom increases competition for workers.

2.3 Adjusting for compositional effects on productivity

Both DAE and Professor Borland agree that it is necessary to use the right measure of productivity for the right wage measure. Professor Borland states a preference for using AWOTE and unadjusted labour productivity (see page 11 of Borland 2012) because it is 'cleaner'.

The AER's Final Decision on Powerlink¹ argues (at page 49) that:

the labour price index (LPI) provides a better measure of labour cost increases than average weekly ordinary time earnings (AWOTE) because the LPI excludes compositional productivity effects.

Professor Borland argues in his report (Borland 2012) that in using a productivity adjusted LPI, Deloitte Access Economics is under-estimating changes to labour costs by an amount equal to the change in the skill composition of the workforce. That is, when using the LPI measure:

Change in Labour costs = Change in other factors - Change in composition productivity effects (page 6, Borland 2012)

More broadly, he argues that inflation plus productivity equals wage growth over a period of time. Deloitte Access Economics agrees with both these equations.

¹ AER Final decision, Powerlink Transmission determination 2012–13 to 2016–17.

Similarly, BIS Shrapnel argues that:

“... by applying the DAE productivity forecasts, the AER is over-correcting for productivity because DAE has underestimated the workforce composition productivity component.” (page 45, BIS Shrapnel, 2012)

As DAE has noted before, when constructing our forecasts we assume a zero value for workforce compositional productivity when forecasting both the LPI and the productivity adjustment that is applied to the LPI. Our November 2011 report (page 9) to the AER noted that:

That said, we value [compositional productivity] 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.*

Professor Borland disagrees with DAE’s view that the composition effect on labour productivity is empirically insignificant:

“There is a large difference between changes in LPI and AWOTE (0.95%). Since the effect of CPI on both LPI and AWOTE is the same, and other factors have only minimal effect, therefore the difference must be explained by a larger effect of labour productivity on AWOTE than on LPI. From the definitions of AWOTE and LPI we can treat this difference in labour productivity effect as [being] due to AWOTE incorporating a worker composition effect whereas LPI does not incorporate that effect” (page 12, Borland 2012)

BIS Shrapnel also asserts that it believes the workforce compositional effect has averaged between “0.5 to 1.0 per cent on average over the medium term, based on the observed difference between the rate of growth in AWOTE and the LPI” (see page 45, BIS Shrapnel 2012).

Deloitte Access Economics disagrees with both of these statements.

As noted previously in submissions to the AER, the LPI includes labour productivity derived from factors such as changes in the capital-labour ratio, technological advancement and changing organisational structure as well as measurement error which is inherent in any survey data. This labour productivity is distinct from that due to compositional effects.

Assuming that the difference between the AWOTE and the LPI can be attributed only to compositional effects is simply incorrect.

It is impossible to know with certainty the degree to which different influences account for the deviation in these wage measures. However, workforce compositional effects are *not* the only difference between AWOTE and the LPI, and Deloitte Access Economics is of the view that their influence is small.

DAE also remains happy with our view that, regardless of the valuation of the composition productivity effect, the net effect would be zero in our forecasting process, as the effect would be deducted from both LPI growth, and the productivity growth applied to the LPI.

That is, if DAE decided to apply a different forecast assumption (say that compositional productivity was greater than zero), this would alter our forecasts (our LPI forecasts in this case would be higher). Our measure of productivity would then also change (to include compositional productivity and, again, would be higher). These two (higher) forecasts would net out when adjusting for productivity, leaving the productivity adjusted forecasts identical to those that assume compositional productivity is zero.

Moreover, Deloitte Access Economics regards the compositional change in skill mix as 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.

BIS Shrapnel disagrees, stating:

While BIS Shrapnel believes the labour price index reflects movements in the underlying price of labour, the LPI does not fully capture movements in total labour costs per employee. As we pointed out in section 4.2, average weekly ordinary time earnings (AWOTE) is a better measure of the change in overall costs per employee, because it takes into account movements of employees to higher grades, changes in compositional effects from entry/exits of higher skilled/lower skilled (ie higher paid/lower paid) workers in an enterprise or industry, and also the payments above base rates of pay, such as bonuses, incentives, penalty rates and other allowances that are a normal part of an employee's earnings over the quarter or year. (page 37, BIS Shrapnel 2011 and page 39, BIS Shrapnel 2012)

If these compositional changes are taking place, then they should be having an impact on the productivity of the firm's workforce. That is, the higher skills should mean higher productivity – meaning that if the firm is 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.

The reason why the preferred wage series for forecasting purposes should exclude the impact of these factors is that the firm already benefits from the shift to a more skilled workforce. Were this to be compensated by the AER, the firm would benefit twice (once

through an increase in productivity from the higher skilled workforce, and once through the AER determination).

DAE has previously responded to an empirical example by Professor Borland which he argues shows that compositional productivity is significant. On page 14, Professor Borland states that our application of his data was incorrect as we used employment data for November, and earnings data for August. Professor Borland then goes on to say that the correct application of the data results in an increase of average earnings in the utilities sector of 0.5% from 2008-10.

Table 2.2 updates this table, and uses August employment and earnings data. Data for 2011 has also been added. It shows that the impact of compositional employment change on average wages in 2008 is a fall in 2009 by 0.8% points, before a rise of 0.3% in 2010 and 0.1% in 2011. Far from showing a 0.5% rise (as is suggested by Professor Borland), this indicates that, on average, the last three years has seen the utilities sector saving money by moving to a less skilled workforce.

Our example uses only the 1-digit ANZSCO level, as more detailed earnings data is not readily available. It is true that there may be skills upgrading within the 1 digit occupations shown in the table below. However, if a business is switching from low productivity staff to high productivity staff within a broad occupational classification, then the business reaps the benefit of increased productivity. This is a business decision, and as such should not enter into the workings for determining increases in wages.

Table 2.2: Impact on average wages of compositional change in employment in the utilities sector

	Wages as at August 2008 (\$)	Share (%) Aug-08	Share (%) Aug-09	Share (%) Aug-10	Share (%) Aug-11			
Managers	\$ 1,405.90	10.2%	10.5%	12.9%	9.9%			
Professionals	\$ 1,488.80	20.0%	17.3%	17.2%	21.2%			
Technicians and Trades Workers	\$ 1,083.30	24.1%	26.1%	25.3%	24.6%			
Community and Personal Service Workers	\$ 880.50	-	-	-	-			
Clerical and Administrative Workers	\$ 945.30	22.2%	18.6%	19.3%	20.0%			
Sales Workers	\$ 933.60	2.5%	2.0%	2.6%	2.6%			
Machinery Operators and Drivers	\$ 1,039.40	14.2%	17.7%	13.4%	12.0%			
Labourers	\$ 847.30	6.7%	7.9%	9.4%	9.0%			
All occupations								
Weighted average AWOTE	\$	1,141.22	\$	1,132.39	\$	1,135.71	\$	1,136.31
Change due to compositional effects				-0.8%	0.3%	0.1%		

2.4 Adjusting for labour productivity

The BIS Shrapnel reports raise some similar issues. For example, the argument from BIS Shrapnel in their 2012 report is that:

BIS Shrapnel believes that the 'unadjusted' industry labour productivity cannot be applied to the LPI. The LPI is an underlying measure of wage inflation and does not incorporate effects of changes to skill levels and improved productivity (ie workforce compositional productivity effects), while the AWOTE measure does....In other words, the AER effectively assumed that workforce compositional productivity for the utilities sector is close to zero and is therefore insignificant.

DAE has addressed the compositional productivity issues raised here in Section 2.3.

To clarify, Deloitte Access Economics derives an estimate of labour productivity based on a measure of 'output per worker'. At the industry level (such as, for example, the utilities industry), output is defined to be Gross Value Added, as published by the ABS in the national accounts. For estimates of productivity at the national and State level, output is measured by Gross Domestic Product and Gross State Product respectively. The number of workers is measured by total employment, as published by the ABS.

Forecasts of output and total employment at the national, State and industry level are derived using Deloitte Access Economics' macroeconomic model. These forecasts are used to construct labour productivity estimates ('output per worker').

At the 'by State by sector' level (for example, the Victorian utilities sector), Deloitte Access Economics believes that the labour productivity estimates (derived using the above measure of 'output per worker') are too volatile to use with confidence.

In effect, the small samples underlying ABS estimates of sectoral output and employment at the State level mean that productivity estimates drawn solely from the ABS data will represent statistical volatility rather more than genuine productivity trends.

Accordingly, our forecasts of labour productivity at this level are a weighted average of the labour productivity estimates for the relevant State as a whole and the relevant industry at the national level.

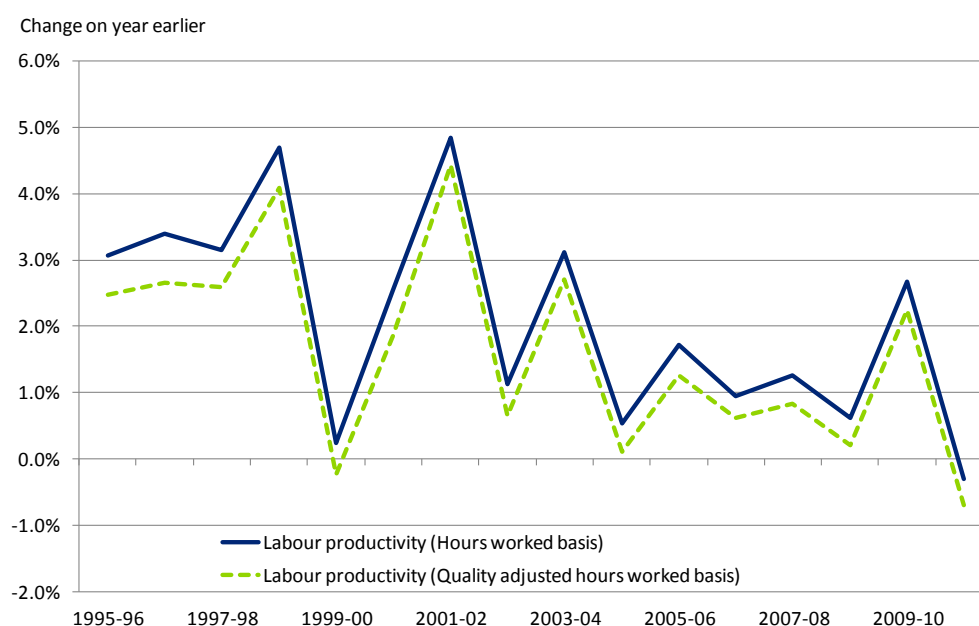
2.5 Adjusting for labour quality

Professor Borland also disagrees with Deloitte Access Economics' assumption that the labour quality adjustment is sufficiently small to exclude during the forecasting process. Professor Borland argues that there is much evidence of the positive effect of increases in education on the average quality of labour and productivity in Australia over long periods of time.

The example given was a study where the timeframe was 1960-2000. DAE agrees that over that period of time, significant advances in productivity and labour quality were made.

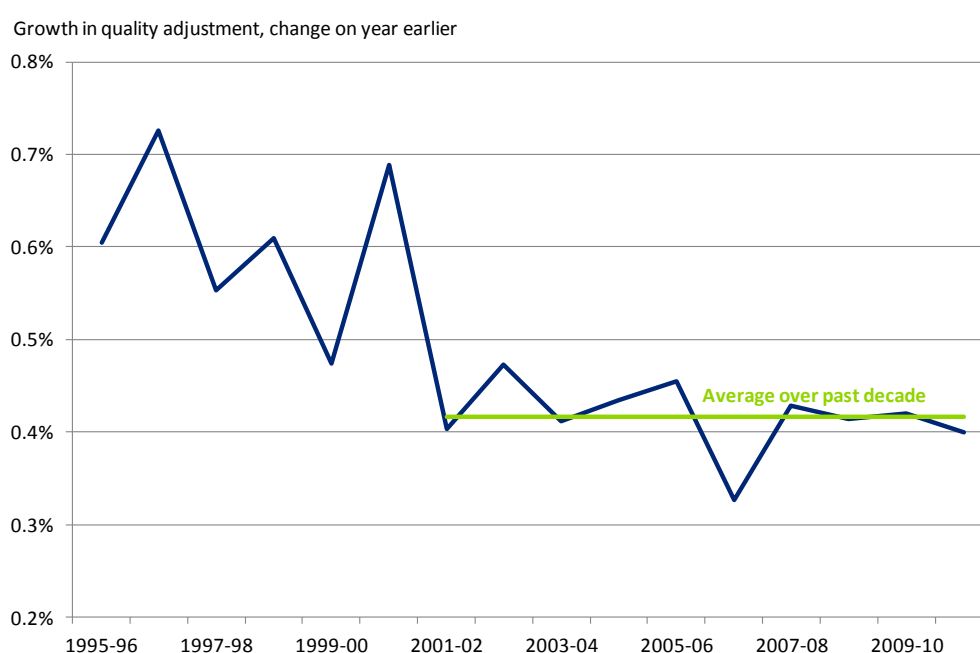
However, both labour productivity growth and the impact of labour quality have been falling over the past 15 years. Chart 2.2 shows growth in labour productivity and quality adjusted labour productivity published by the ABS. As the chart shows, both series have been trending down over time, and were negative in 2010-11.

Chart 2.2: Labour productivity and quality adjusted labour productivity, Australia



Perhaps more instructive is Chart 2.3, 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 2.3: Growth in quality adjustment, Australia



Based on this measure, the overall impact of changes in labour quality is, therefore, not large.

Professor Borland also states that the slow growth “in recent times” should not be considered a permanent feature of the Australian labour market. DAE agrees broadly with this statement – there are very few permanent features of the labour market over long time periods. However for the time period over which we are forecasting (that is, around a decade), DAE expects growth in labour quality to continue to decline.

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 and 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.)

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 Australian students ranked 15th in maths, 10th in sciences, and 9th in reading.

Those 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*”.²

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.

² See www.deewr.gov.au/search/results.aspx?k=Australian_Council_of_State_School_Organisations&s=All%20Sites

2.6 Data volatility

Deloitte Access Economics maintains that the greater level of volatility in the AWOTE data makes it a less reliable base for wage forecasting. The reason the volatility makes AWOTE less reliable is that it does not accurately reflect wage outcomes for utilities employees, and can result in “jumping off” problems at the beginning of the forecast period.

Indeed the unreliability of the AWOTE data is sufficient enough that the ABS has decided to cease publishing State by industry data from the beginning of 2012.

That is strong evidence of itself in the ‘AWOTE versus LPI’ debate.

One of the reasons for this change is the high standard error of the estimates for these series. In the case of the AWE/AWOTE publication, sample selection is stratified across States and across industries, but not both. That means that as the businesses in the sample change from quarter to quarter (and about 8% of the 5,000 do each time) there is no guarantee that the State by industry samples can be readily compared.

This problem obviously leads to questionable comparability of detailed AWE/AWOTE results from quarter to quarter as the changes may be driven by changes in the sample, rather than changes in wages.

The LPI, by contrast, suffers as little as possible from this problem because their sample follows specific “jobs” over an extended period (at least five years). This limits the rotation problems that the AWE/AWOTE series is suffering from.

Professor Borland argues on page 16 (Borland 2012) that the issue of volatility in AWOTE must be made in comparison with other sources of volatility, such as volatility in productivity, and argues that the difference in DAEs labour productivity forecast (of 2.3% in December 2010) for 2010-11 was incorrect by 2.6% (the actual was -0.3%). DAE maintains that less frequent data, which will increase the likelihood of “jumping off” problems, would produce less reliable forecasts.

Professor Borland then compares DAE and BIS Shrapnel forecasts of LPI and AWOTE for 2010-11 (page 16, Borland 2012). Three DAE forecasts are presented and compared to one BIS Shrapnel forecast. The comparisons show that both firms forecast the LPI accurately, while the BIS Shrapnel forecast for AWOTE was the same as the actual.

The argument is then made that this comparison provides no evidence to suggest that forecasting AWOTE is more difficult than forecasting the LPI. DAE would suggest that in order for such an assertion to be made, forecasts over a much longer time period would have to be examined.

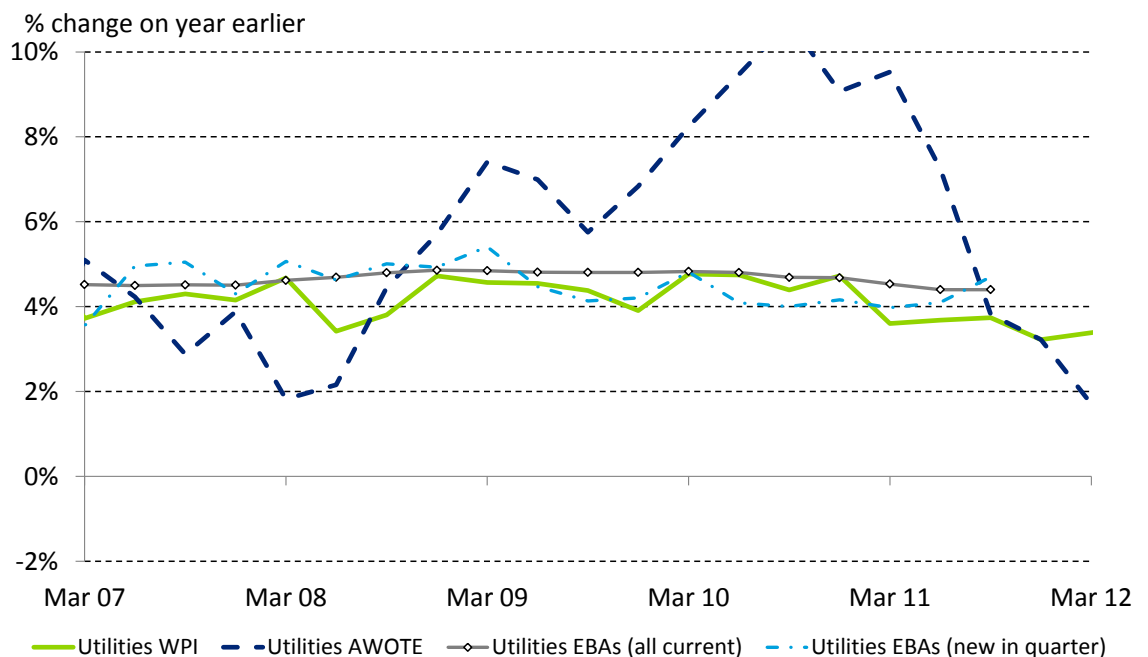
DAE maintains that forecasting two more volatile series (such as AWOTE and its associated productivity measure) is inherently more difficult than forecasting a more stable measure (the LPI) and its associated productivity measure.

We would also note that, even if a volatile series is accurately forecast, it does not mean that it should be used.

Accordingly, Deloitte Access Economics remains comfortable with its conclusion that the considerable volatility displayed by AWOTE is an important drawback to arguments supporting its use as a base by the AER in its determinations.

Indeed, the recent performance of various measures of wages in the utilities sector help illustrate that point. Chart 2.4 compares growth in the utilities sector WPI with a number of other wage growth measurements that are produced on a regular basis.

Chart 2.4: Measures of utilities sector wage growth



Source: ABS, Department of Education, Employment and Workplace Relations

The first measure shown is average weekly ordinary time earnings (AWOTE) for the national utilities sector. As the chart illustrates, the growth in this wage series is particularly volatile and, as we argue above, this volatility limits its use in forecasting.

The next series is the matching measure of wage growth in the utilities, but using the preferred WPI series.

The remaining two series come from the *Trends in Federal Enterprise Bargaining* publication produced by the Department of Education, Employment and Workplace Relations and cover growth in wages under enterprise bargaining agreements:

- The third series in the chart shows growth in wages under all agreements current during the quarter. We would expect movements in this measure to be broadly reflective of trends in the broader utilities sector – or in other words, when this series accelerates we would expect a similar acceleration in growth in the sectoral WPI.
- The final series shows annual growth that will occur under any agreements commencing in the quarter shown. This series is more indicative of immediate future trends in the first EBA series – if there were to be, say, a sustained decline in wage growth, then that would show up first in new agreements.

In general, the two EBA-related series bear a close resemblance to the LPI series.

In contrast, the AWOTE series bears little resemblance to the other measures.

2.7 Definition, coverage and compositional change

The BIS Shrapnel report argues that AWOTE rather than the LPI should be used by the AER because of the definition and coverage of the series.

The BIS Shrapnel report states on page 27:

“The LPI also does not reliably measure the changes in total labour costs which a particular enterprise or organisation incurs, because the LPI does not reflect the 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 onto 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. The AWOTE measure here also includes bonuses, incentives, penalty rates and other allowances, which are also part of an enterprises total wage bill.”

There are two broad arguments put here. The first is that the LPI is not sufficient because it does not include bonuses, incentive payments and other allowances. The second is that the LPI is insufficient because it does not capture the impact of promotions (or a changing workforce structure).

A few points are worth making on the issue of bonuses, incentive payments and other allowances. An initial, albeit small, point is that Deloitte Access Economics uses the series from the LPI publication for ‘total hourly rates of pay excluding bonuses’ rather than the ‘ordinary time hourly rates of pay excluding bonuses’ in our analysis and forecasts. The sole difference between these series is overtime (which is included in the measure used by Deloitte Access Economics). Deloitte Access Economics agrees that the LPI does not include bonuses, incentive payments and other allowances.

Deloitte Access Economics’ view is that the issue of bonuses, incentive payments and other allowances in the AWOTE wage measure is irrelevant. The AER makes determinations based on the *growth* in labour costs. In contrast, the inclusion of bonuses, incentive payments and other allowances will affect the *level* of the AWOTE series. The size (or level) of the wage bill is of rather less concern. Rather, it is the growth in wages which are more relevant.

Bonuses, incentive payments and other allowances will not have a noticeable impact on growth in the AWOTE series because, to be included in AWOTE the payments must be a “normal” part of an employee’s earnings. AWOTE is, after all, a measure of ‘ordinary time earnings’.

More specifically, in the case of bonuses only those that are paid regularly and frequently are included in the AWOTE data, with one-off or infrequent payments excluded.³ As noted above, while regular and frequent payments are legitimately included in AWOTE, Deloitte Access Economics expects that these would affect the level of wages, not the growth.

Deloitte Access Economics disagrees with the argument that AWOTE is a superior measure because it includes bonuses and similar payments.

The BIS Shrapnel report (at page 27, quoted above) notes that as individuals acquire skills they are promoted, and therefore move to a higher base level of pay. The LPI captures the increase in pay for a specific job, and does not capture the change in an individual's base level of pay when promoted.

Deloitte Access Economics does not believe the impact of this type of compositional change is significant, as noted in Section 2.3.

As also noted above, if the promotion reflects increasing productivity, then it would be double counting to include it.

³ The ABS National Statistical Service Statistical Clearing House contains more information regarding the coverage of AWOTE, including the questionnaire used by the ABS. See www.nss.gov.au.

3 Past forecasting performance

This chapter responds to the analysis and criticism of Deloitte Access Economics' previous forecasting performance by BIS Shrapnel and Professor Borland. It should be noted that these criticisms have been raised previously – most recently in relation to the AER's determination on Powerlink's revenue proposal in 2012. Many of the criticisms are identically worded, and as such our responses are little changed to our previous responses.

3.1 Providing detailed model methodology

Both the BIS Shrapnel reports and the Borland report criticise the lack of provision of methodology used by DAE:

"As insufficient detail is provided by Access Economics on its underlying methodology for the construction of the composite index, we cannot replicate Access Economics' (composite) labour productivity forecasts" (page 45, BIS Shrapnel 2011)

And

"Their method for forecasting remains a 'black box'. (page 17, Borland 2012)

Deloitte Access Economics' 15 August 2011 report contains information on the modelling approach and methodology. From a commercial viewpoint, we would add that there are reasonable limits on the extent to which an economic forecaster can be expected to outline the detailed equations (econometric or otherwise) used in producing forecasts. This would be akin to placing our models (which represent confidential intellectual property) into the public domain. We note that other forecasters such as BIS Shrapnel also do not provide this information in reports describing their forecasts.

Further methodological information can be found in our most recent AER report: "DAE – AER Powerlink response 2-03-12".

3.2 Revisions to productivity forecasts

Professor Borland correctly notes on page 17 (Borland 2012) that in the period between the September 2009 and December 2010 reports, our forecasts for employment growth were revised down while at the same time our forecasts for GDP growth were slightly revised up. Professor Borland uses the following quotes from our report of 24 April 2011 to contend that our upward revision to labour productivity is nonsensical: *'our forecasts for...national income growth rose'* and *'our forecasts for...employment went up.'*

This was an error in our wording: instead, the sentence should have read *'our forecasts for...employment went **down**.'* Since labour productivity measures output per worker, in an environment with rising national income and declining employment growth, it makes perfect sense that labour productivity would rise.

3.3 Forecast growth in labour productivity

The BIS Shrapnel report (from page 45) criticises the Deloitte Access Economics' productivity growth forecasts as "too optimistic". Deloitte Access Economics' 15 August 2011 report to the AER (at pages 52-53) explains the rationale for our productivity forecasts:

Reports by the Productivity Commission (2009), the House of Representatives (2010) and the Treasury suggest 70% of the rapid decline in productivity since 2003-04 is accounted for by:

- *Declining resource quality and large capital investment that has not yet translated into output in the mining sector;*
- *Capital investment and reduced rainfall in the electricity, gas and water sector; and*
- *Drought affecting the agriculture sector.*

Other possible causes of the decline in productivity growth include capacity constraints within the economy, following the very long period of uninterrupted economic growth.

That said, Deloitte Access Economics' assumption of productivity growth is stronger in the medium term than it has been in recent years, averaging close to 1.5% per year as boosts to efficiency from the strong levels of business investment begin to be seen across the economy.

...[T]he utilities sector is projected see a more volatile version of the national productivity trend in the short term. In the longer term – and as capital investment in the sector lifts – productivity growth should average a similar rate to the national, although it may be more volatile from year to year.

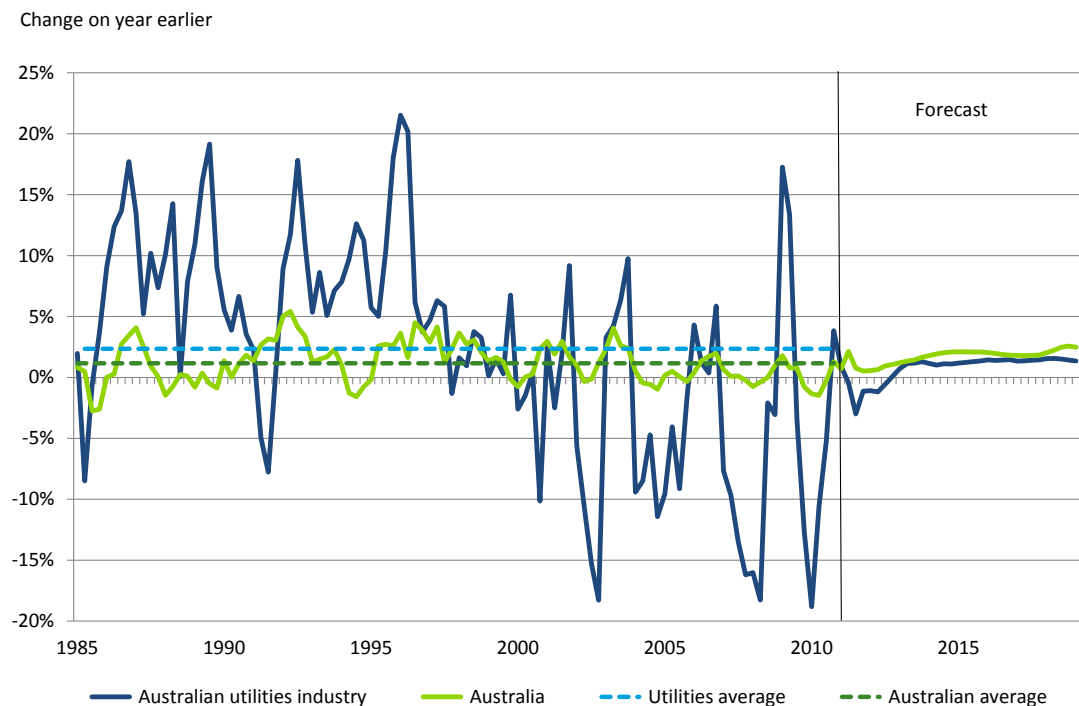
As the report explains, there are some well-recognised causes of the decline in Australia's productivity over the past decade. Deloitte Access Economics maintains the view that these are not influences that will persist going forward. Most particularly, the relatively recent increase in the level of business investment is generating a larger capital stock in the Australian economy generally and in the mining (and related) industry in particular. As noted in our report, that is expected to produce higher rates of labour productivity growth over the decade ahead compared with the recent past.

Chart 3.1 shows historical and forecast labour productivity in Australia and in the Australian utilities industry.

The forecasts are shown here on a year-to basis and are the similar to those used in our Powerlink response and also those in our 15 August 2011 report to the AER. Labour productivity is calculated as real Gross Domestic Product divided by total employment in the case of Australia, and real Gross Value Added divided by total employment in the case of the utilities industry.

Deloitte Access Economics does not believe that the labour productivity forecasts are optimistic. As the chart shows, the forecasts for labour productivity growth in the utilities sector are below the average seen over previous decades.

Chart 3.1: Forecast of productivity growth in Australia



Source: ABS, Deloitte Access Economics

Note that BIS Shrapnel argues (at pages 45 and 46) that “some of the increase in employment in the sector was due to the need to perform a range of office functions”, and that the utilities sector has seen “an average productivity growth of -3.6 per cent per cent per annum for Australia over the previous decade”.

The combination of those two arguments is actually a reason to expect the productivity performance of the utilities sector to lift. Unless that is expected to be an ongoing trend – that is, unless these ‘back office’ functions continue to grow rapidly – then productivity growth can be expected to rebound from the one off negatives arising from this trend.

In addition, the rise of regulation around mandatory renewable energy targets (MRET) has not helped productivity in the utilities sector – it has tended to benefit lower productivity parts of this industry rather than its higher productivity sector parts.

Nor has the investment certainty that has developed around carbon pricing over the past few years. Indeed, data for capital to labour ratios (see Chart 3.2) shows how those concerns have begun to play out in the market, with the long running increase in the ratio for utilities (both in absolute terms, and relative to all other industries) reversing sharply since 2007.

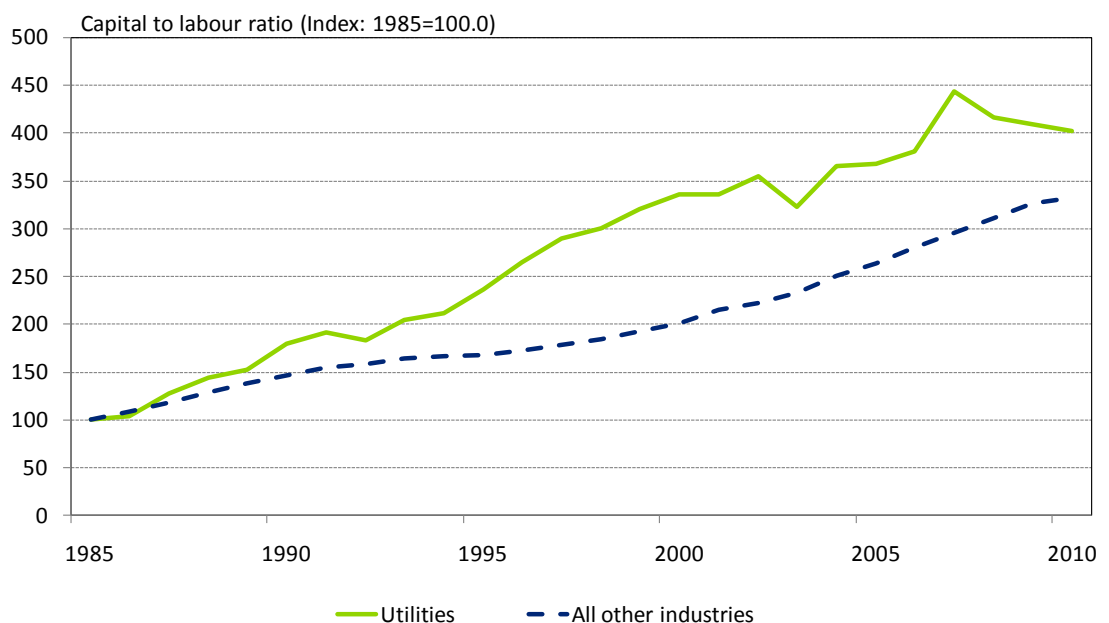
Droughts also lowered productivity in the utilities sector, with the water component of the sector most affected.

The Productivity Commission notes this too, stating in its Draft Report on Australia’s Urban Water Sector:

In recent years, Australia’s multi-factor productivity performance has been below average, which the Commission largely attributes to lags between high levels of investment and subsequent output in the mining industry, increased capital investment in the utility sectors — including water — and drought conditions reducing agricultural output.

It is also worth noting that productivity levels in the utilities sector are higher than most industries, but there are significant differences across the various sub-sectors of the utilities sector – electricity output is particularly high (more than twice the level of output per employee seen in the gas sector, itself currently well above that in the water and sewerage sector). As a result, compositional effects within the industry can drive overall productivity growth in differing directions.

Chart 3.2: Capital to labour ratios



However, the worst of the MRET effects on productivity have probably already happened, while further public enterprise investment continues to be driven by water- and energy-related projects undertaken by State-owned enterprises.

On balance, then, Deloitte Access Economics sees the very poor productivity performance of the utilities sector over the past decade as being much driven by one offs, including a string of droughts, the effect of mandatory renewable energy targets, a regulatory-driven boost to ‘back office’ employment levels, and a degree of weakness in capital investment.

Although the latter may linger – though time will tell whether the advent of a carbon price has improved certainty and hence the business investment environment or not – the adverse effect of some of these other factors on measured productivity in this sector has

already been considerable, and these negatives are projected to weigh less heavily on productivity growth in the utilities sector in the forecast period.

As seen in Chart 3.1 earlier, that turnaround in the productivity performance of the sector is not seen as imminent. Rather, it occurs over the longer term. (That chart also helps make clear that recent data have already shown a degree of improvement in productivity performance.)

BIS Shrapnel also questions in several places our method of creating productivity forecasts:

“Deloitte Access Economics’ application of long-term averages to generate productivity forecasts has previously been rejected by the AER” (page 47, BIS Shrapnel 2012)

And:

“In their December 2010 report to the AER, Access Economics reported that they measure labour productivity growth over an entire economic cycle (p.106). In other words, Access Economics removes the inherent volatility in annual productivity growth by creating a composite labour productivity measure based on national, industry and state-specific productivity movements. As insufficient detail is provided by Access Economics on its underlying methodology for the construction of the composite index, we cannot replicate Access Economics’ (composite) labour productivity forecasts.” (Page 45, BIS Shrapnel 2011)

BIS Shrapnel may have assumed that because our view is that productivity is best measured over the economic cycle, that we have applied an over the cycle methodology in order to forecast productivity. That is not the case.

Deloitte Access Economics undertakes forecasting on a quarterly basis. Our macroeconomic model and wage model forecast all variables (including wages, output, employment and productivity) on a quarterly basis. These variables are not smoothed before the forecast is completed and no trends or long term averages are forecast.

3.4 Revisions to the timing of easing wages growth

The BIS Shrapnel report (2011, page 81-84) also includes an assessment of Deloitte Access Economics’ forecasting performance. The main conclusions drawn by BIS Shrapnel are:

- *Over the medium-to-long term (ie beyond the first two years of the forecast period), DAE has consistently forecast — in each of its successive projections provided to the AER — that utilities wages growth will ease back and its growth will fall below the ‘All Industries’ average. This easing has not been borne out in actual growth as utilities wages growth has consistently remained above (or equal to) the ‘All Industries’ average.*

- *DAE's utilities wages forecasts are too pessimistic, particularly in relation to the All Industries average.*

A number of points in relation to the first issue are relevant. In previous reports for the AER, Deloitte Access Economics' forecasts of LPI growth in the utilities sector have typically been lower than our forecasts for LPI growth across all industries over the latter stages of the forecast horizon.

This profile is consistent with a realistic view of industry wage growth over the medium to long term. Indeed, Deloitte Access Economics does not expect wage growth in any industry to grow faster than the all industries average in perpetuity.

A substantial portion of the review undertaken by BIS Shrapnel of DAEs' forecasts analyses the timing of the expected fall in the utilities index below that of the All Industries index. BIS Shrapnel notes that:

To date utilities sector wages growth (measured by the LPI) has been above or equal to the national average since the index began in 1997. DAE, however, has consistently viewed higher utilities wage escalation (i.e. relative to the 'All Industries' average) as not sustainable. As a result, DAE has consistently projected utilities wage inflation to fall below the national 'All industries' average within two years (on average) and remain lower than the national average for the rest of the forecast period i.e over the medium-to-long-term. This is the consistent theme in all of DAE forecasts. However, whenever it becomes apparent that this expected 'drop-off' in utilities wages would fail to materialise (given stronger utilities wage inflation relative to the 'All industries' average), the 'drop-off' in utilities wages growth were simply delayed. (page 81, BIS Shrapnel 2011)

The BIS Shrapnel report (2012) predicts that the LPI (ordinary time earnings) will continue to grow above the all industries average over the forecast period to 2018.

DAE uses a slightly different series when forecasting wages growth (total hourly rates of pay excluding bonuses). The latest data (March 2012) for this series from the ABS shows Australian utilities growing by 3.4% over the year to March 2012 compared to growth across all industries of 3.6%. The data also shows lower growth across calendar year 2011, with utilities growing by 3.2% compared to 3.7% growth across all industries.

Indeed, since March 2011, year to growth in the utilities sector has been less than that seen for the all industries average in four out of the five quarters, and December 2011 saw the lowest year-to growth rate for utilities since 1999.

Additionally, DAE would note that while the utilities sector growth for total hourly rates of pay excluding bonuses has generally been above or equal to the national average, this has not exclusively been the case, with periods in 1999, 2001, 2008 and 2011 resulting in faster all industries growth than utilities growth.

Our consistent view that utilities LPI growth will fall below the All Industries growth within two years indicates our consistent view that it is unlikely that wages in one sector will rise faster than the average indefinitely. Indeed, the longer that wage growth in the utilities sector remained higher than that for the All Industries, the more likely it became that wage growth in the utilities sector would eventually fall.

That is exactly what it has now done.

That said, Deloitte Access Economics agrees that, compared to our forecasts of the all industries LPI, forecasts for the utilities LPI have generally underestimated actual growth. In contrast, forecasts by BIS Shrapnel have overestimated utilities LPI relative to all industries LPI.

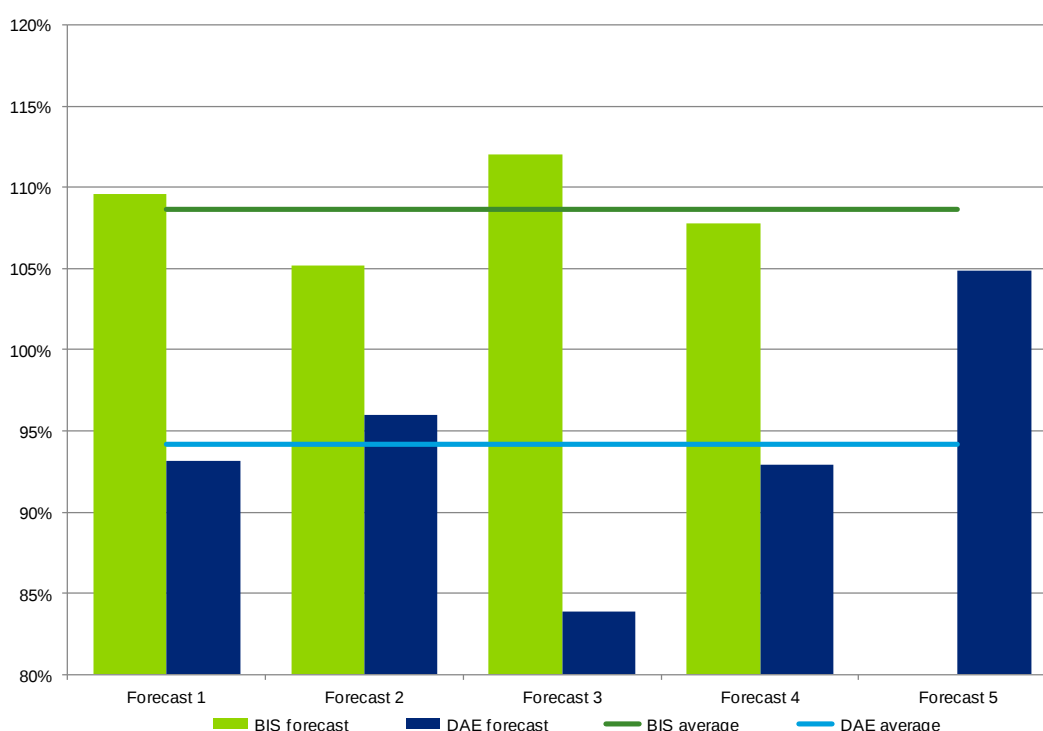
That comparison can be made by comparing the ratio of utilities LPI growth to all industries LPI growth (as forecast by Deloitte Access Economics and BIS Shrapnel) to the actual ratio of utilities LPI growth to all industries LPI growth (as published by the ABS).

Chart 3.3 below shows this comparison. Each column represents the average annual forecast for utilities LPI relative to the average annual forecast for the all industries LPI, as a ratio to the ABS actual relativities. In effect, the chart shows the BIS Shrapnel and Deloitte Access Economics forecast performance for the utilities LPI relative to all industries LPI.

An accurate forecast of the relativities between the utilities LPI and the all industries LPI would result in a value of 100% in the chart.

The chart shows that, as noted in both BIS Shrapnel reports, Deloitte Access Economics' utilities LPI forecasts have, on average, been too pessimistic in relation to the all industries average. However the chart also shows that, on average, the BIS Shrapnel utilities LPI forecasts have been too optimistic – and by a more notable margin – in relation to the all industries average.

Chart 3.3: Comparison of BIS Shrapnel and DAE forecasts



Source: Appendix F: Labour Cost Escalation Forecasts to 2016/17 – Australian and Queensland (BIS Shrapnel), Deloitte Access Economics

In brief, Deloitte Access Economics' forecasts for wage growth in the utilities sector have been, on average, too low because we have, on average, underestimated recent employment growth in the sector. However, that employment performance has deteriorated more recently, and hence so too has wage growth in the sector. The latter has now moved more into line with (indeed, below) our earlier expectations for it.

References

- Australian Bureau of Statistics (2004), *Labour Price Index: Concepts, Sources and Methods*, Catalogue 6351.0.55.001, Available: www.abs.gov.au
- BIS Shrapnel (2012), *Real cost Escalation Forecasts to 2017 – Australia and Victoria*, prepared for APA group.
- BIS Shrapnel (2011), *Real cost Escalation Forecasts to 2017 – Victoria and New South Wales*, prepared for the Victorian Gas Distributors – Envestra Ltd, SP-AUSnet, and Multinet gas Pty Ltd.
- Borland, J. (2011), *Labour Cost Escalation Report for Envestra*, unpublished
- Borland, J. (2012), *Labour Cost Escalation: Choosing Between AWOTE and LPI* (March 2012), Report for Envestra Limited, unpublished.
- Deloitte Access Economics (2012), *DAE – AER Powerlink response 2-03-12*.
- Deloitte Access Economics (2011), *Productivity measures to adjust LPI and AWOTE*, 8 November. Available: www.aer.gov.au
- Deloitte Access Economics (2007), *Labour Cost Indices for the energy sector*, 12 April. Available: www.aer.gov.au

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