AusNet Electricity Services Pty Ltd

Electricity Distribution Price Review 2016–20

Appendix 8C: CIE Labour Price Forecast Report

Submitted: 30 April 2015

FINAL REPORT

Labour price forecasts

Prepared for
CitiPower, Powercor Australia and AusNet Services

17 December 2014

THE CENTRE FOR INTERNATIONAL ECONOMICS
www.TheCIE.com.au

The Centre for International Economics is a private economic research agency that provides professional, independent and timely analysis of international and domestic events and policies.

The CIE's professional staff arrange, undertake and publish commissioned economic research and analysis for industry, corporations, governments, international agencies and individuals.

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Summary

CitiPower, Powercor Australia and AusNet Services have engaged the Centre for International Economics (the CIE) to prepare projections of wages growth, both nominal and real, consistent with the Australian Bureau Statistics (ABS) measure of the Wage Prices Index (WPI) for electricity, gas, water and waste services (hereafter called 'utilities') and construction over the period from 2014 to 2020.

The determination of wage rates and wage growth is a complex issue and requires a comprehensive, economy-wide analytical approach which takes consideration of the linkages and interactions between industries, regions, commodity and services markets as well as factor markets. This is why we used a general equilibrium model of the Australian and regional economies, CIE-REGIONS, to project the wage growth for Australia and Victoria.

The CIE-REGIONS model identifies 53 industries – including one utility industry and three construction industries – in eight Australian States and Territories.

Computable general equilibrium (CGE) models like CIE-REGIONS are built according to economic theories, that is, firms maximise their profits while households maximise their utility given income from employment and capital income. CGE models capture the linkage and interaction between industries, between commodity and factor markets and between regions. For example, growth in one industry, such as agriculture, in Victoria will have impacts on other sectors:

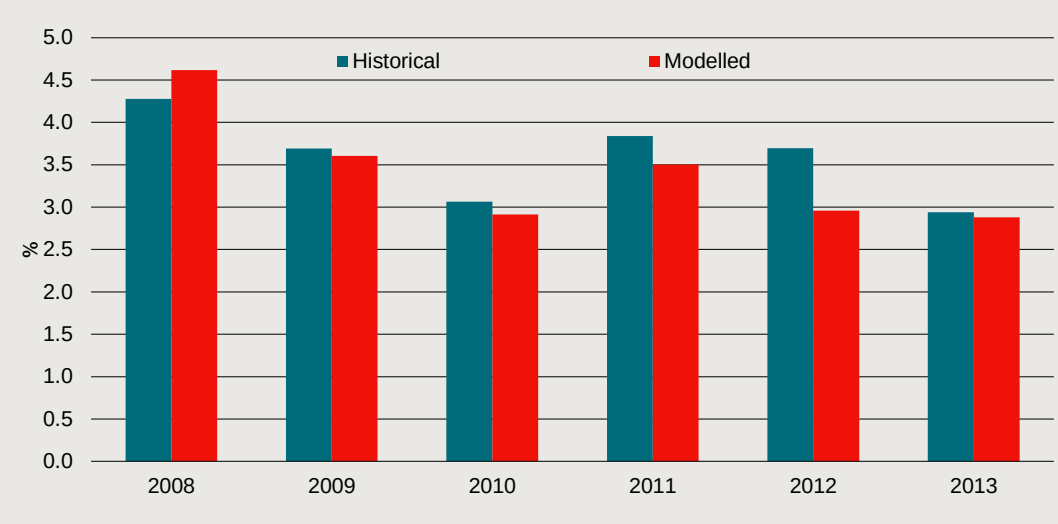
- less workers will be available in the labour market for other sectors, pushing up the labour price in general;
- there will be greater demand for inputs (machines, materials and so on) which are produced by other industries; and
- these changes will flow into higher incomes, which further increases the demand for goods and services.

More specifically, the CIE has carried out the projection task in two stages. The first stage is to identify the most important drivers in wage growth according to both economic theory as well as a simulation of the model against historical developments. It has been found that the labour supply, economic growth and/or productivity improvement, as well as the capital stock are the most important drivers. With these drivers being identified and the historical data being inputted, the CIE-REGIONS model is relatively closely correlated with actual historical outcomes for national nominal wage rate changes (chart 1).

Looking into the future, Australia's economic growth is expected to be slower in the next few years before reverting to long term growth at about 3.5 per cent. The investment boom in the resources sector is over, and the mining industry will enter into a period characterised as high output along with lower commodity prices. Fuelled by historically low interest rates and high foreign investment, housing construction is likely to cushion the declining growth in civil engineering construction.

Public investment may also ease the softening of the civil engineering construction sector. In addition, agriculture may also contribute to growth due to strong overseas demand, partly boosted by trade deals with Korea, Japan and China.

1 Model simulated historical national nominal wage growth rate



Data source: CIE-REGIONS simulations

Tables 2 and 3 report the real and nominal wage growth for both Australia and Victoria and specific industries.

Along with the overall economic growth, it is projected that the wage growth rate will peak in 2016. This is a result of the surge in economic activity in Australia.

Wage growth in Victoria is projected to be lower than the national average. This is due to two factors. First, the assumed economic growth in Victoria is generally slower than the national average, leading to lower demand for labour. Second, the labour supply in Victoria is slightly higher consistent with projected population growth.

2 Projected real wage growth

	2014	2015	2016	2017	2018	2019	2020	average
	%	%	%	%	%	%	%	%
Australia								
National average	1.05	1.33	2.23	1.69	1.67	1.72	1.82	1.74
Construction	1.33	1.52	2.64	1.99	2.03	2.02	2.11	2.05
Electricity, gas, water and waste	1.04	1.34	2.36	1.81	1.78	1.82	1.88	1.83
Victoria								
State average	0.52	1.17	1.82	1.54	1.50	1.55	1.62	1.53
Construction	0.77	1.34	2.31	1.88	1.86	1.89	1.95	1.87
Electricity, gas, water and waste	0.61	1.25	1.99	1.65	1.61	1.66	1.73	1.65

Source: CIE-REGIONS simulations

Wage growth in construction is higher than the average across all sectors for both Australia and Victoria. This aligns with the higher activity in the housing construction sector and public investment in infrastructure.

3 Projected nominal wage growth

	2014	2015	2016	2017	2018	2019	2020	average
	%	%	%	%	%	%	%	%
Australia								
National average	3.76	3.58	4.73	4.19	4.17	4.22	4.32	4.20
Construction	4.04	3.77	5.14	4.49	4.53	4.52	4.61	4.51
Electricity, gas, water and waste	3.75	3.59	4.86	4.31	4.28	4.32	4.38	4.29
Victoria								
State average	3.31	3.42	4.32	4.04	4.00	4.05	4.12	3.99
Construction	3.56	3.59	4.81	4.38	4.36	4.39	4.45	4.33
Electricity, gas, water and waste	3.40	3.50	4.49	4.15	4.11	4.16	4.23	4.11

Source: CIE-REGIONS simulations

Note that the CIE's projections are from 2013 as this is the latest year for which annual data is available and reflecting the annual time period structure of the model. We have data available to June 2014 for the specific series we are forecasting. For the indices of interest, construction and utilities, the data to date suggests the WPI has increased more rapidly than the CIE's forecasts for 2014. This is the opposite for the National and Victorian WPI for all industries, with CIE's forecasts generally above actuals over the first six months (and nine months) of 2014. Once 2014 actual data becomes available for all quarters then forecasts should be replaced with actuals for this year.

1 Introduction

The CIE has been engaged by CitiPower, Powercor Australia, and AusNet Services to forecast wages growth across a number of industries at both a state and national level for the 2014-20 period. In doing so, we have sought to understand the historical movements of wages and the major economic drivers affecting these movements. We have then used the CIE-REGIONS economic model to develop projections, using inputs such as Gross State Product (GSP) and population projections.

CitiPower, Powercor Australia, and AusNet Services have asked the Centre for International Economics (CIE) to prepare projections of wages growth, both nominal and real, consistent with the Australian Bureau Statistics (ABS) measure of the Wage Prices Index (WPI) for electricity, gas, water and waste services (utilities), and construction. These two industries are Divisions D and E, respectively, as defined by the Australian and New Zealand Standard Industrial Classification (ANZSIC).

Forecasts for real and nominal wage growth are produced for both Victoria and Australia over the period from 2014 to 2020.

Below we set out the context for the forecasts, including the measurement of wage growth and the economic mechanisms determining wage growth before introducing the forecasting methodology.

Wage price index

Labour cost indices produced by the ABS generally attempt to measure one of two things:

- changes in the amount of income or earnings which can be influenced by wage rates and the number of hours worked, or
- changes in wage rates.

The Wage Price Index (WPI) attempts to measure the latter and is discussed in detail below.

Sampling method

The ABS adopts a two-stage sampling methodology to generate a sample of employee jobs for the WPI. The first stage selects a sample of businesses. Businesses selected in the first stage are asked to select a sample of jobs from their payrolls using instructions provided by the ABS.[1] In the case of a job becoming obsolete or possibly outsourced, a new job is selected. This sampling methodology implies that shifts in the underlying workforce composition can potentially impact movements in the WPI at the margin.

[1] ABS, Wage Price Index: Concepts, Sources and Methods, 2012

Development of WPI

WPI data is collected by the ABS through quarterly questionnaires, which include questions related to details of overtime provisions, any bonuses, commissions or incentive payments paid during the reference quarter, and any additional information about jobs that have unusual pay or working arrangements.

This information enables the ABS to understand the drivers of wage growth and adjust for:

- changes in the quality and quantity of work performed,
- bonuses,
- salary sacrificing, and
- workplace arrangements that trade-off between employee benefits and salary.[2]

As a result, these factors are likely to have a negligible impact on WPI growth across the industries of focus.

Measures reported for WPI

The ABS constructs a number of WPI measures with different characteristics.

- **Ordinary hourly rates** of pay **excluding bonuses**, which measures the quarterly change in ordinary time hourly rates of pay
- **Ordinary hourly rates** of pay **including bonuses**
- **Total hourly rates** of pay **excluding bonuses**, which measures the quarterly change in combined ordinary time and overtime hourly rates of pay
- **Total hourly rates** of pay **including bonuses**.

For the purpose of forecasting future labour costs for Citipower, Powercor Australia and AusNet Services, it is important to select a measure which closely reflects the characteristics of employment contracts entered into by electricity distributors.

It is understood that overtime is paid in the sector. As a result, the most appropriate measure was judged to be ***Total Hourly Rates*** *of Pay* ***Excluding Bonuses***. However, there has been no material difference historically between the total hourly rates WPI and ordinary hourly rate WPI.

Wage price index data by industry and state was obtained from the ABS by special request over the period September 2008 to June 2014.

[2] ABS, Wage Price Index: Concepts, Sources and Methods, 2012

Economic drivers of wage growth

The wage rate can be considered through the following frameworks.

- A market for labour, comprising the demand for labour and the supply of labour
  - demand is determined by the amount of additional production generated by additional labour (the marginal product). This in turn reflects factors such as demand/prices for Australian exports, skill levels, capital-labour ratios and productivity
  - supply is determined by individual decisions balancing income and leisure and demographic profile
  - in this case the wage equilibrium reflects the point where labour demand and supply are equal
- A negotiation between employers and employees with wage rates reflecting the relative negotiating powers. In reality, the picture is much more complicated as there are different wage rates across regions, sectors and occupations. Difficulties for a worker to move from one sector, region or occupation to another lead to differences in wage rates across sectors, regions and occupations, that may take time to reach equilibrium. Further, there are regulatory arrangements for wages such as minimum wage levels. These factors prevent instant adjustment in the labour market to a shock.

In sum, the determination of wage rates and wage growth is a complex issue and requires a comprehensive, economy-wide analytical approach which takes consideration of the linkages and interactions between industries, regions, commodity and services markets as well as factor markets. This is why we used a general equilibrium model of the Australian regional economies, CIE-REGIONS, to project the wage growth for Australia and Victoria.

Forecasting framework

As mentioned above, the CIE has used a general equilibrium modelling framework, centred around the CIE-REGIONS model, to forecast wage growth in two stages. The first stage was to gain an understanding of historical movements in wages growth and the major economic drivers affecting these movements. This confirmed that the CIE-REGIONS model can provide a logical assessment of the drivers of wages growth. Forecasts were then developed using the CIE-REGIONS model.

This framework has several advantages. First, our model has a detailed treatment of industries and regions, enabling the direct projection of wage growth at the national, regional, and industrial levels. In addition, our model is able to identify key drivers of wage growth such as economic growth, productivity and labour supply, giving us the capacity to formulate the projection in a structured manner.

Below we introduce the model and then discuss the modelling stages in more detail.

CIE-REGIONS model

The CIE-REGIONS model is a general equilibrium model of the Australian economies. It was developed by the CIE based on the publicly available MMRF-NRA model used by the Productivity Commission.[3] The CIE has updated the model and introduced a more detailed treatment of state/territory government fiscal revenues and expenditures.

A 53-sector version of the CIE-REGIONS model was used for this analysis because it separately identifies the sectors of interest (see table 1.1).

Some of the key features of CIE-REGIONS are that it:

- provides a detailed account of industry activity, investment, imports, exports, changes in prices, employment, household spending and savings and many other factors;
- identifies 53 industries and commodities (see table 1.1);
- accounts for Australia's six states and two territories as distinct regions including specific details about the budgetary revenues and expenditures of each of the eight state and territory governments and the Australian Government (the government finances in CIE-REGIONS align as closely as practicable to the ABS government finance data);
- provides a detailed account of labour demand and supply in each industry in each state/territory, based on economic theory and empirical data;
- specifically accounts for major taxes including land taxes, payroll taxes, stamp duties and others at the state level, as well as income taxes, tariffs, excise, the GST and other taxes at the federal level;
- traces out the impact of transfers between governments;
- accounts for differing economic fundamentals in the states (for instance, the mining boom in WA and Queensland);
- can produce results on employment and value added at a regional level; and
- can be run in a static or dynamic mode. The dynamic version allows the analysis to trace impacts over time as the economy adjusts, which is particularly useful over the short to medium term.

3 Productivity Commission 2006, *Potential Benefits of the National Reform Agenda*, Report to the Council of Australian Governments.

1.1 Sectors identified in the CIE-REGIONS model

	Sector		Sector
1	Sheep Cattle	28	Residential Building
2	Grains	29	Other Construction
3	Other Animal	30	Construction Services
4	Other Ag	31	Trade
5	Forestry	32	Accommodation Hotels Cafes
6	Fishing	33	Road Freight Transport
7	Coal	34	Road Passenger Transport
8	Oil	35	Rail Freight Transport
9	Gas	36	Rail Passenger Transport
10	Metal Ores	37	Transport Services
11	Other Mining	38	Water Transport
12	Meat Products	39	Air Freight Transport
13	Other Food Manufacturing	40	Air Passenger Transport
14	Textile Clothing Footwear	41	Communications
15	Wood Products	42	Financial Services
16	Paper Products	43	Dwelling
17	Print Publishing	44	Business Services
18	Refinery	45	Professional Technical Services
19	Chemicals	46	Public Services
20	Non-Metal Construction materials	47	Education
21	Basic Metals	48	Hospital Medical Services
22	Metal Products	49	Other Health Services
23	Transport Equipment	50	Community Care Services
24	Photographic and Scientific Equipment	51	Cultural Services
25	Electronic Equipment	52	Recreational Services
26	Other Manufacturing	53	Other Services
27	Utilities		

Source: CIE-REGIONS

Historical trend analysis

The CIE has considered historical movements in wage in order to understand the key drivers of wages and the extent to which these are adequately captured within the economic modelling framework. This involved:

- considering historical changes in wages;
- considering econometric approaches to developing forecasts — we have not reported this analysis as the limited data available did not allow for robust conclusions; and
- assessing the drivers of wages through using 'shocks' to macroeconomic variables such as labour supply, GSP/productivity and capital; and
- assessing the extent to which the CIE REGIONS model adequately traces these drivers through to actual historical outcomes.

The wage setting arrangement in the industries of interest was also investigated to gain further understanding of the historical movement of wage rates in these sectors.

Projections

Projections have been developed using the CIE-REGIONS model. This has used as the main inputs:

- projections of Gross State Product from State and Territory Treasuries;
- population projections from the Australian Bureau of Statistics; and
- export price changes as detailed in Appendix A.

Using these inputs, CIE-REGIONS has been used to project wages, as discussed further below.

2 Historical trend analysis

This chapter focuses on understanding historical movements in wage prices and the major economic drivers affecting these movements.

The historical analysis conducted involved identifying relevant properties of historical wages growth and examining the key historical drivers. The latter was completed by analysing historical developments and more formally through economic modelling.

Characteristics of the industries of interest

Occupational composition

Each industry has a different composition of occupation types depending on the characteristics of the goods or services provided. In turn, the level and growth of wages across these occupation types is likely to vary depending on the balance of demand and supply of people within each occupation type.

Table 2.1 below shows the composition of occupations for the two industries of focus in Victoria. The occupational composition of these industries at a national level is shown in Appendix B.

2.1 Composition of occupations in Victorian industries, 2014

Occupations	Utilities	Construction
	%	%
Managers	15.0	8.8
Professional	14.7	2.5
Technicians and trade workers	20.7	58.4
Community and personal service workers	0.0	0.0
Clerical and administration workers	27.8	8.1
Sales workers	2.2	0.8
Machinery operators and drivers	15.3	6.4
Labourers	4.1	15.0
Total	100	100

Notes: Utilities include Electricity, Gas, Water, and Waste Services.

Source: Labour Force, Australia, Detailed May 2014.

Table 2.1 shows that:

- in the construction sector, close to 60 per cent of employees are technicians and trade workers,
- the utilities sector has a broad mix of occupation types with 28 per cent of employees being clerical and administrative workers, and over 20 per cent being technical and trade workers.

Wage setting arrangements in Australian industries

The wage setting arrangements data is not available in detail for Victoria, but we can show the characteristics of the relevant sectors at the national level. Wage setting arrangements of employees can be grouped into three broad categories:

- award wages;
- collective agreements; and
- individual agreements.

Each industry has different wage setting arrangements depending on the occupation types employed and the nature of the industry. Table 2.2 below shows the distribution of wage setting arrangements for the two sectors of focus at the national level.

2.2 Wage setting arrangements across sectors, Australia

	Award only	Collective agreement	Individual agreements	Owner manager	Total
	%	%	%	%	%
Construction	10.0	23.1	55.4	11.5	100
Electricity, gas, water, and waste	3.1	66.9	28.6	1.4	100
Total	**15.2**	**43.4**	**37.3**	**4.1**	**100**

Note: The Employee Earnings and Hours, Australia 2012 release did not contain data on wage setting by sector.

Source: ABS, *Employee Earnings and Hours, Australia*, May 2010

It can be seen from the table that the wages of 55 per cent of employees in the construction sector are covered by individual agreements and the wages of two thirds of employees in the utilities sector are determined by collective agreements.

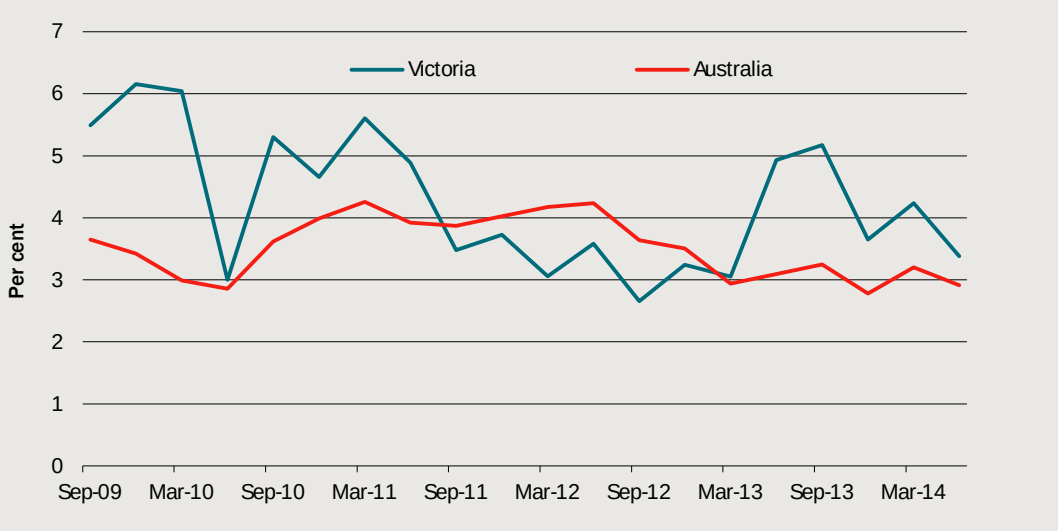
The structure of wage setting arrangement is highly related to the occupation structure in an industry. For example, the high proportion of individual agreements in the construction industry is due to the high proportion of tradespeople in the industry.

These differences in wage setting arrangements can in turn lead to deviations in wages growth. For example, over time, the wages growth of employees on the award category is likely to be more stable and consistent with the CPI than the wages growth of an employee that is covered by an individual agreement.

Historical wage growth

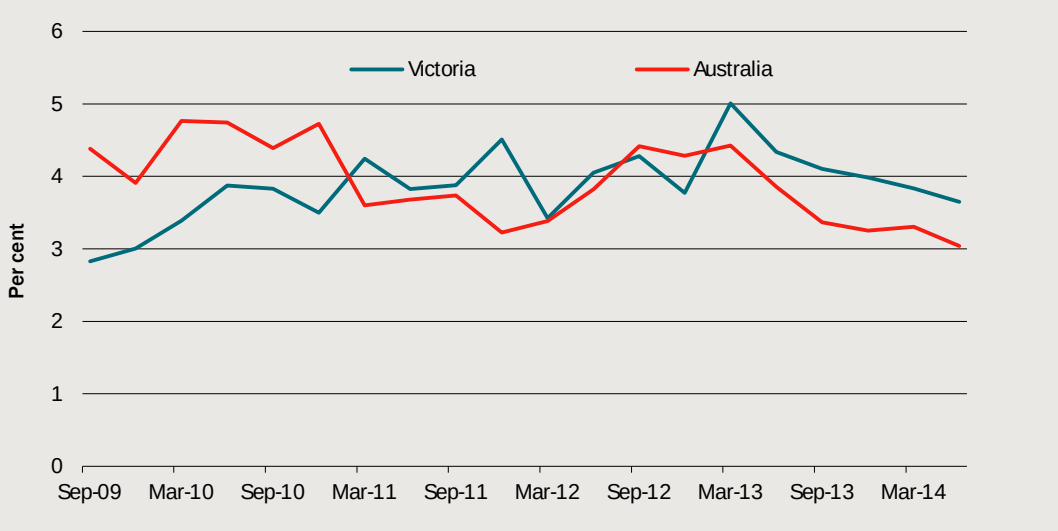
Charts 2.3 and 2.4 below show the WPI growth in construction and utilities for both Victoria and Australia. In general, there has been more volatility in wage growth in Victoria than in the nation as a whole.

2.3 Historical nominal WPI growth in construction industry



Data source: **ABS special request.**

2.4 Historical nominal WPI growth in utilities



Data source: **ABS special request**

More specifically, the charts show that:

- at a national level, wages growth across the sectors of focus have exhibited a downward trend to some degree since 2010;
- for the national and Victorian utilities sector, wages growth has had a relatively low level of volatility and averaged around 4 per cent since 2010; and
- for the construction sector, wages growth in Victoria has been higher than the national average (4.3 per cent per annum versus 3.5 per cent) and more volatile.

Key drivers of wage price movements

This section examines the key drivers of the historical wages growth to understand the main factors that will impact on wage projections. The analysis centres on the national aggregate (all sectors combined) real wage rate. This has been done in two steps using the CIE-REGIONS model. First, each of the economic variables was shocked with a 1 per cent change, and the impact on the national real wage rate were then compared to find out the most important factors affecting the wage rate.

Chart 2.5 shows the simulation results – this is the percentage change in average national real wage rate caused by a 1 per cent increase in relevant variables.

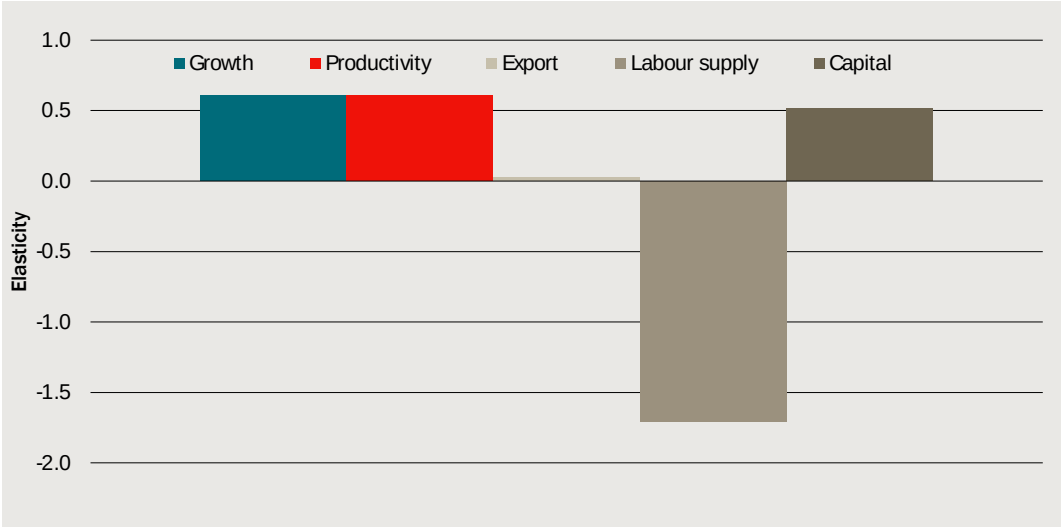
Economic growth and productivity improvement have the highest *positive* impact on wage growth. A one per cent increase in GDP or productivity leads to a 0.6 per cent increase in the real wage rate. This is largely determined by the labour cost share in the national economy.

A one per cent increase in the capital stock leads to about a 0.5 per cent increase in the wage rate. The higher capital stock increases the capital-labour ratio and increases the marginal productivity of labour, resulting in a higher real wage.

Higher export demand has a positive, but insignificant, impact on wage growth. A one per cent increase in export demand leads to a 0.03 per cent increase in the real wage rate.

By contrast, labour supply has a significant, *negative* impact on wage growth. A one per cent increase in labour supply would lead to a 1.7 per cent fall in the real wage rate.

2.5 Elasticity of economy-wide national real wage growth with respective to various economic drivers

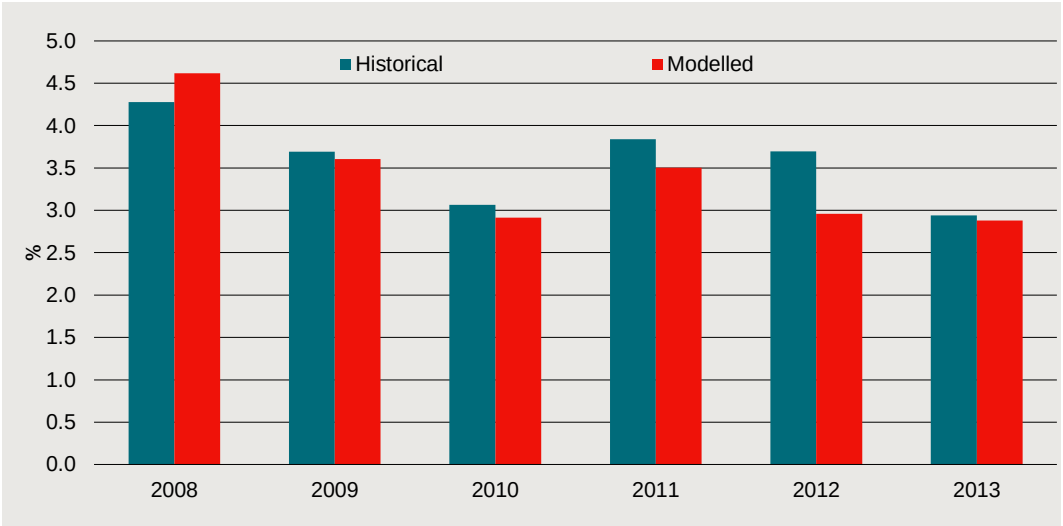


Data source: CIE-Regions simulation

With these factors identified, the next step was to input the historical values of these variables into the CIE-REGIONS model to examine the prediction power of the model. Chart 2.6 compares the model simulated economy-wide national nominal wage growth rate with historical data over the period from 2008 to 2013.

The correlation between the model and actuals is 85 per cent and the average levels are similar. The model would have predicted wages growth softening compared to actuals particularly in 2012. However, the model appears to include the main drivers that are relevant for wage changes in aggregate. Given this, we are comfortable that the CIE-REGIONS model is accounting for the drivers of wages and can be used to produce forecasts.

2.6 Comparison of historical and model simulated national nominal wage growth rate



Data source: ABS, CIE-REGIONS simulation

3 Projection assumptions and results

This chapter discusses the assumptions made in undertaking the economic modelling and discusses the projected wage growth over the 2014-20 period.

It is assumed that economic growth will slow down in the next two years before reverting to the long-run trend after 2016. The projected wage growth is within the historical range. Wage growth in Victoria is slightly lower than the national average, construction wage growth is above that national average across all sectors and utilities wage growth is slightly above the economy-wide average wage growth. Our projected wage growth rates are in the middle of recent projections by our peers.

Modelling assumptions

Gross domestic and state product

Slow growth will be a global phenomenon in the next few years. The US and European economies are struggling to recover from the global financial crisis (GFC), while the growth engines in the emerging economies are losing steam. For example, China, which had managed to maintain a growth rate of about 10 per cent per annum for three decades, has started to adjust down its growth target to around 8 per cent per annum. In fact, the International Monetary Fund (IMF) projects that China's average growth from 2013 to 2019 will be less than 7 per cent (IMF 2014).

The investment boom in the Australian resources sector is over, and the mining industry will enter into a period characterised as high throughput along with low commodity prices. Agriculture may contribute to economic growth due to strong overseas demand, partly boosted by trade deals with Korea, Japan and China. But agriculture is highly dependent on natural conditions and could be hindered by poor seasonal conditions in the short run (ABARES 2014a,b).

Residential construction will be another growth point as evidenced by booming property markets in major cities in the last two years. Public investment may further cushion the fall in the civil engineering construction due to the end of mining investment boom.[4]

Consequently, it is expected that Australia's economic growth will continue to be slow in the next couple of years before rising to over 3 per cent in 2016 and growing around the long term trend rate thereafter. The surge in national GDP growth in 2016 is mainly driven by the surge of GSP growth in Queensland. Large infrastructure investments are expected to lead to a surge in LNG production and an increase in overseas exports of 22.5 per cent in 2015-16 which, combined with improvement in the domestic sector, is

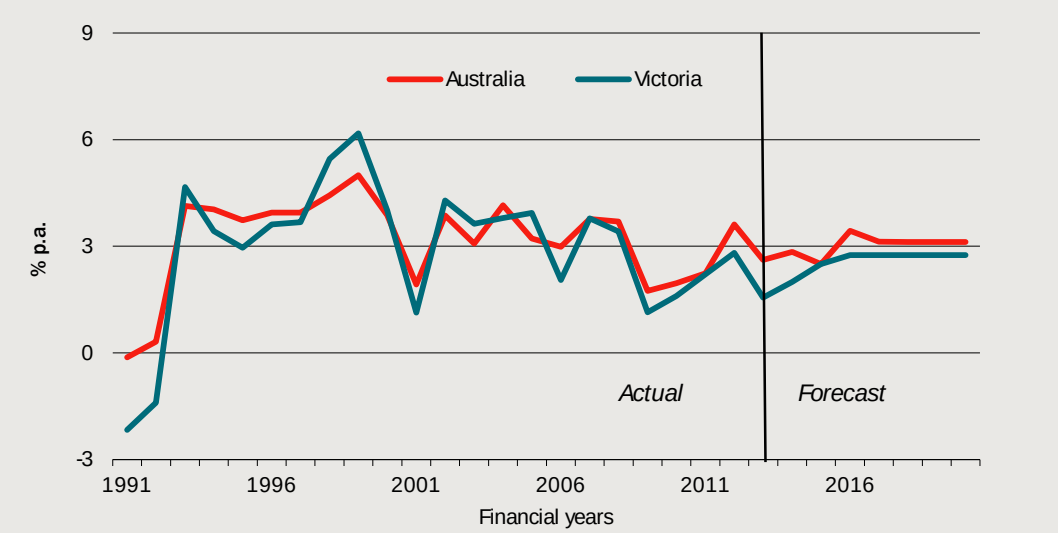
4 For example, see State of Victoria 2014.

forecast to boost economic growth to an 11-year high of 6 per cent in that year (State of Queensland 2014).

Economic growth in Victoria has been lower than the national average in recent years, due to the mining boom in other states such as Western Australia and Queensland. It is expected that this trend will continue over the forecast period (chart 3.1).

As is common practice for economic projections using CGE models, the productivity improvement is endogenous. That is, productivity is adjusted in aggregate to reach the assumed GDP/GSP growth targets, which are derived for Government projections. In particular, the productivity improvement in a state or territory is assumed to be the same across all industries. In general the productivity growth in Victoria is projected to be lower than the national average, which is consistent with the assumed GDP/GSP growth.

3.1 Historical and assumed gross domestic/state product growth

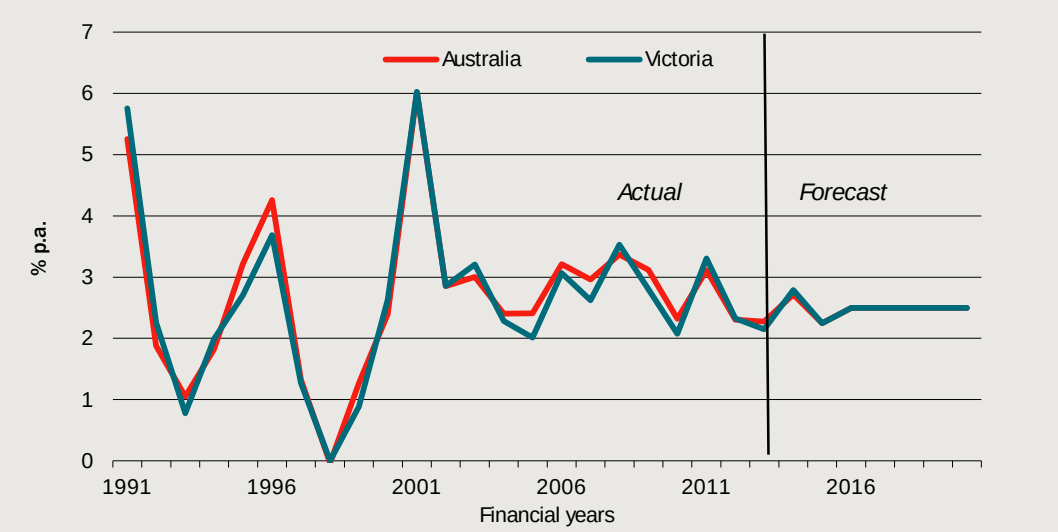


Data sources: The CIE; ABS National Accounts and State Accounts.

Consumer price index

As economic growth in Australia slows, there will be less pressure on inflation. It is assumed that the consumer price index (CPI) in Victoria and the nation will be around 2.5 per cent over the forecast period, according to forecasts from Federal and State Treasury Offices (chart 3.2). This is a reasonable assumption because it is the mid-point of the RBA target. It is evident from the chart 3.2 that the RBA has been managing the inflation rate quite well within this target in the past decade. The inflation rate in Australia used to fluctuate dramatically before 2001, but it has been kept in a narrower range between 2 and 3.5 per cent since 2002 despite the GFC and the mining boom happening during the period.

3.2 Historical and assumed CPI

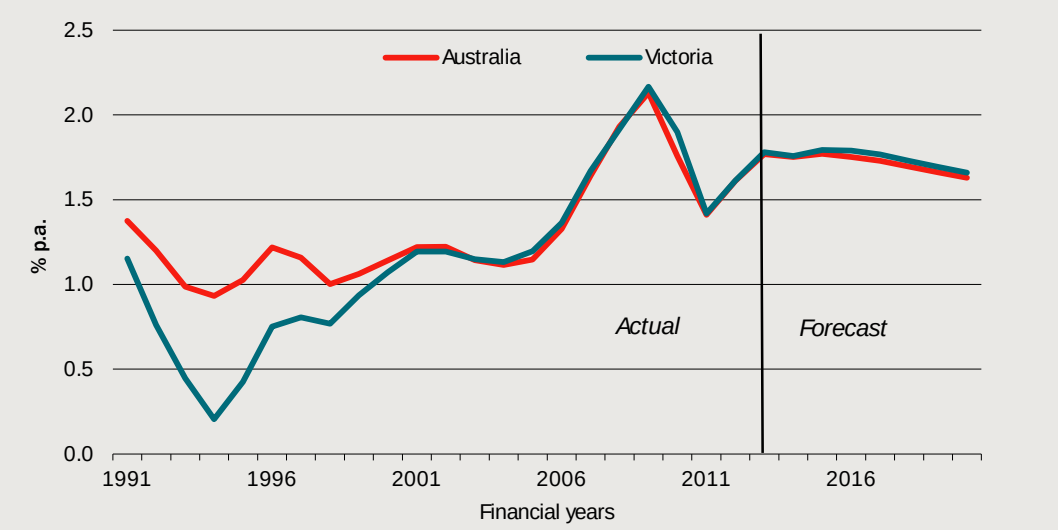


Data sources: The CIE; ABS Consumer Price Index.

Population growth

State population growth is drawn from the medium Series B of ABS population projections. Chart 3.3 shows the population growth assumption in Victoria and Australia.

3.3 Historical and assumed population growth



Data sources: ABS Population projections (Series B for forecasts).

Labour supply

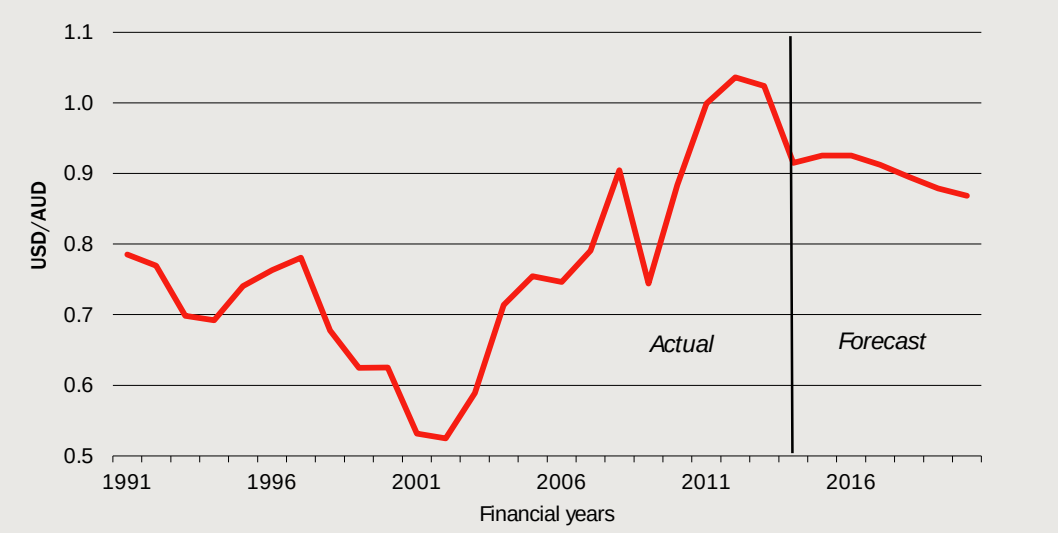
It is assumed that the total labour supply will move along with the population growth nationwide. This assumption abstracts from changes in demographic trends. Although ageing is a general trend, labour supply tends to adjust to this trend through delays to retirement, and/or uptake of more flexible employment options. Moreover, migration has been an important factor driving Australia's population growth, which helps to ease the pace of falling share of working age population. If labour supply was adjusted to grow at a slower rate than the population then this would lead to higher wage forecasts than presented in this report.

Labour is assumed to be partially mobile across borders and industries, leading to differences in wage rates between regions as well as between industries. This is a more realistic assumption than traditional CGE assumptions of perfect mobility of labour across industries within one region and sometimes perfect mobility of labour between regions.

Exchange rate

The Australian dollar experienced rapid appreciation after the GFC, due to the safe nature of the dollar as well as high demand for Australian minerals. It is commonly held that the high Australian dollar is not sustainable. The Australian Treasury assumed in the *2014-15 Budget* that the USD/AUD exchange rate will depreciate from over US$1/AS$ in 2013 to US$0.87 in 2020 (chart 3.4). This is used as the exchange rate assumption in our model. The exchange rate has depreciated since these forecasts. This would have minor impacts on real wage price changes and would also feed into changes in consumer prices. We have not adapted this assumption to maintain consistency with other inputs such as GSP projections.

3.4 Historical and assumed exchange rate



Data sources: The CIE; Australian Treasury.

Modelling results

With the above-mentioned assumptions, the CIE-REGIONS model has been used to project wage growth up to 2020. Tables 3.5 and 3.6 summarise the projected real and nominal wage growth respectively.

Several general observations may be made from the results.

- Wage growth in Victoria will be generally lower than the national average. This is consistent with the assumptions. As shown in chart 3.1, the assumed economic growth in Victoria is lower than the national average, leading to lower demand for labour. On the other hand, as chart 3.3 shows, the assumed population growth in Victoria is slightly higher than the national average, implying slightly higher growth in labour supply. Lower demand for labour together with slightly higher supply of labour results in lower growth in real wages in Victoria. Because the inflation assumptions in Victoria and Australia are similar, as shown by chart 3.2, the projected growth in the nominal wage rate displays a similar pattern.
- The projected wage growth in both Victoria and Australia will peak in 2016. This is a result of the underlying assumptions, particular around a surge in economic activity in Australia driven by LNG production in Queensland. The ramp up in LNG production is forecast to lead to 22.5 per cent growth in exports in 2015-16 which, combined with improvement in the domestic sector, is forecast to boost economic growth to an 11-year high of 6 per cent in Queensland in that year (State of Queensland 2014). As the economies are inter-linked, high growth in Queensland is expected to lead to higher demand for goods and services produced in Queensland as well as in other states and territories, driving up wage rates in other states and territories.
- The construction sector is projected to have higher than average wage growth for both Victoria and the whole nation, being more than 0.3 percentage points above the state/national average growth. This is consistent with the recent developments in the housing industry.
- The utilities sector is projected to have slightly higher (about 0.1 percentage point) growth than average wage growth for both Victoria and the whole nation.

3.5 Projected real wage growth

	2014	2015	2016	2017	2018	2019	2020	average
	%	%	%	%	%	%	%	%
Australia								
National average	1.05	1.33	2.23	1.69	1.67	1.72	1.82	1.74
Construction	1.33	1.52	2.64	1.99	2.03	2.02	2.11	2.05
Electricity, gas, water and waste	1.04	1.34	2.36	1.81	1.78	1.82	1.88	1.83
Victoria								
State average	0.52	1.17	1.82	1.54	1.50	1.55	1.62	1.53
Construction	0.77	1.34	2.31	1.88	1.86	1.89	1.95	1.87
Electricity, gas, water and waste	0.61	1.25	1.99	1.65	1.61	1.66	1.73	1.65

Source: CIE-REGIONS modelling

3.6 Projected nominal wage growth

	2014	2015	2016	2017	2018	2019	2020	average
	%	%	%	%	%	%	%	%
Australia								
National average	3.76	3.58	4.73	4.19	4.17	4.22	4.32	4.20
Construction	4.04	3.77	5.14	4.49	4.53	4.52	4.61	4.51
Electricity, gas, water and waste	3.75	3.59	4.86	4.31	4.28	4.32	4.38	4.29
Victoria								
State average	3.31	3.42	4.32	4.04	4.00	4.05	4.12	3.99
Construction	3.56	3.59	4.81	4.38	4.36	4.39	4.45	4.33
Electricity, gas, water and waste	3.40	3.50	4.49	4.15	4.11	4.16	4.23	4.11

Source: CIE-Regions modelling

Construction wage growth

As shown in tables 3.5 and 3.6, wage growth in the construction industry is projected to peak in 2016 at 2.6 per cent (real) and 5.1 per cent (nominal) for Australia and 2.3 per cent (real) and 4.8 per cent (nominal) for Victoria. Wage growth in the industry is projected to be higher than the average for both Victoria and the whole nation.

As mentioned above, the industry is expected to have significant structural change in the forecast period. With the end of the investment boom in the mining sector, the growth point of the industry will be shifted from civil engineering construction to housing construction fuelled by historically low interest rate and foreign investment. Housing Industry Australia (HIA) estimates that the number of new dwellings commenced in 2014 will reach a record high of 188,000, surpassing the previous record of 187,000 in 1994.

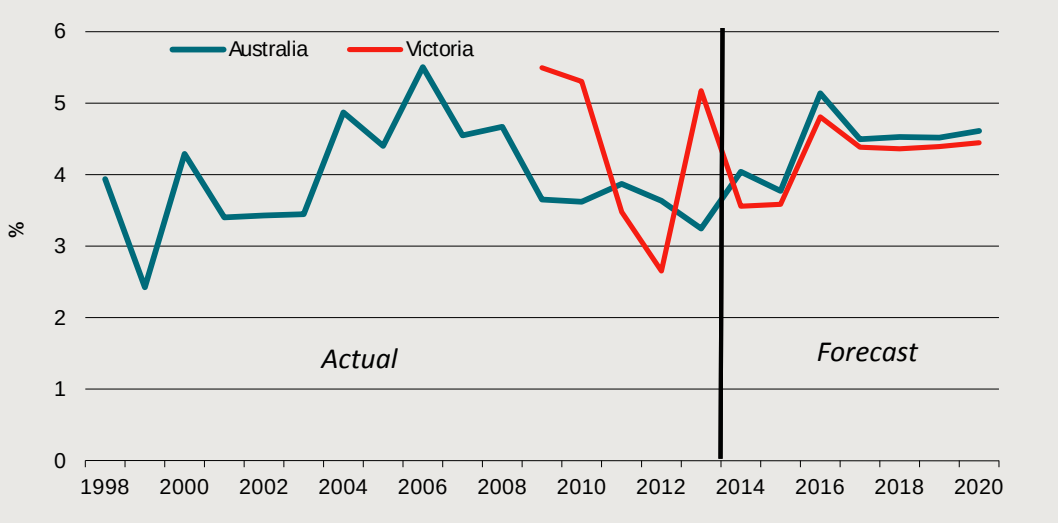
It is projected that the commencement of new dwellings may ease to 177,300 in 2016, while the renovation work of existing dwellings may pick up from 28.6 million in 2014 to 29.7 million in 2016 (HIA 2014).

Moreover, private investment (such as mining investment) other than housing accounts for 38 per cent of construction work, and about one third of construction work is for public investment. This suggests that the construction sector could be supported by growth in public investment. For example, the previous Victorian Government announced a record $27 billion investment package in the state's infrastructure between 2015 and 2018 (State of Victoria 2014), representing a 27 per cent jump from investment between 2011 and 2014.[5]

The peak of construction sector wage growth in 2016 is also affected by the overall wage growth in that year, which is in turn due to a surge in LNP production in Queensland as mentioned above.

Chart 3.7 compares the projected nominal wage growth in construction along with the historical growth for Australia and Victoria. Victoria has shorter time series data for the construction industry. It can be seen from the chart that our projection of future wage growth is within the range of historical variation.

3.7 Historical and projected nominal wage growth in construction



Data source: ABS, CIE-REGIONS simulations

5 Note that this has not been explicitly incorporated in the modelling.

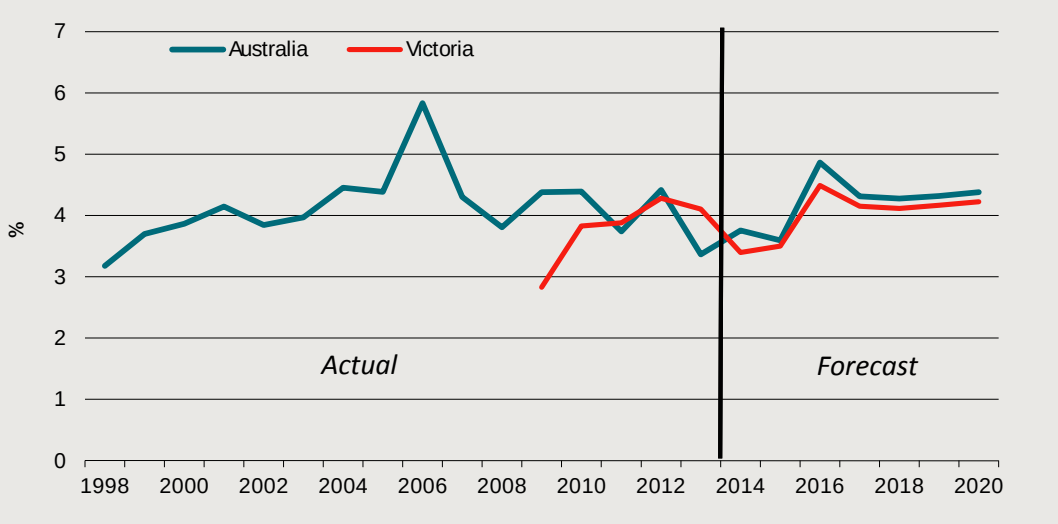
Utilities industry wage growth

As shown in tables 3.5 and 3.6, wage growth in the utilities industry is close to average wage growth across all sectors. It is less so for Victoria, but the utilities wage growth is only 0.1 percentage point higher than the state average.

The utilities sector is different from the construction sector in terms of the use of the sectors' products and/or services. While construction is primarily used by investment, utilities provide services to all the sectors and households in an economy. It also uses labour from a broad range of occupation categories, unlike construction.

Chart 3.8 compares our projected utilities wage growth along with historical growth for Australia and Victoria. Similarly the projected growth is within the range of historical variation.

3.8 Historical and projected nominal wage growth in utilities



Data source: **ABS, CIE-REGIONS simulations**

Comparison with other studies

All projections are subject to error. Errors can occur because the model does not account for all drivers or drivers themselves are subject to forecast errors, for example.

As a way of examining the reliability of projections, we compare our projections with those by our peers and identify the likely cause of the difference in projections.

In general our projected wage growth is within the range of recent projections, and the cause of discrepancy is largely due to differences in the view taken and/or assumptions of future economic development.

Table 3.9 compares wage growth rates projected by the CIE, Independent Economics (2014), and Independent Economics and Frontier Economics (2014) for the Australian Energy Market Operator (AEMO). In general, our projection is higher than those projections in the early years and lower in the later years of the projection period.

3.9 Comparison of wage growth projections

	All sectors National average				National Utilities	
	CIE	Independent	AEMO Medium	AEMO High	CIE	Independent
2014	3.76	2.90	3.14	3.15	3.75	3.50
2015	3.58	3.20	3.84	4.02	3.59	3.70
2016	4.73	3.90	5.07	5.40	4.86	4.30
2017	4.19	4.50	5.64	5.86	4.31	4.80
2018	4.17	4.60	5.31	5.43	4.28	4.90
2019	4.22		4.55	4.56	4.32	
2020	4.32		4.36	4.28	4.38	

Source: CIE, Independent Economics (2014), AEMO by Independent Economics and Frontier Economics (2014)

Despite differences in methodology, the likely causes of the differences are from underlying assumptions. For example, our assumed Australian GDP growth (2.8 per cent) and CPI (2.7 per cent) in 2014 are higher than those assumed by Independent Economics (2.3 and 1.6 per cent, respectively), and thus our projected wage growth is higher. By contrast, our assumed economic growth and inflation in later years are lower than those of Independent Economics, leading to lower wage growth.

Table 3.10 compares our projections for some of the key national variables with those by DAE (2014). In general our projected wage growth rate is higher than that of DAE. This is partly due to the difference in assumed economic growth and inflation. The CIE has used economic growth and inflation in the short term from Australian and State Treasuries.

3.10 Comparison of national average projections with DAE

	2014	2015	2016	2017	2018	2019	2020
GDP growth							
DAE	2.90	2.80	2.90	3.40	3.20	2.90	2.90
CIE	2.84	2.51	3.44	3.13	3.12	3.12	3.12
CPI							
DAE	2.70	2.50	2.50	2.90	2.50	2.40	2.40
CIE	2.71	2.25	2.50	2.50	2.50	2.50	2.50
Real wage growth							
DAE	-0.10	0.20	0.40	0.70	1.30	1.10	1.10
CIE	1.05	1.33	2.23	1.69	1.67	1.72	1.82
Nominal wage growth							
DAE	2.60	2.80	3.00	3.70	3.90	3.60	3.50
CIE	3.76	3.58	4.73	4.19	4.17	4.22	4.32

Source: DAE (2014), CIE

Note that the CIE's projections are from 2013 as this is the latest year for which annual data is available and reflecting the annual time period structure of the model. We have data available to June 2014 for the specific series we are forecasting. In table 3.11 we show a comparison of outcomes for the six months from December 2013 to June 2014 against the CIE 2014 forecast.

There is a relatively high amount of volatility in quarterly data. For the indices of interest – Victorian construction and Victorian utilities - the data to date suggests the WPI has increased more rapidly than the CIE's forecasts for 2014. This is the opposite for the National and Victorian WPI series for all industries, with CIE's forecasts generally above actuals over the first six months of 2014. Once 2014 actual data becomes available for all quarters then forecasts should be replaced with actuals.

3.11 Comparison of 2014 forecasts to available data

	Actual (annualised) [a]	CIE forecast 2014
	%	%
National WPI (all industries)	2.2	3.76
Victoria WPI (all industries)	2.6	3.31
Victoria construction WPI	5.3	3.56
Victoria utilities WPI	3.5	3.40

[a] Six months from December 2013 to June 2014.

Source: ABS special request; The CIE.

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A Detailed modelling assumptions

A.1 Gross domestic/state product growth assumptions

	2014	2015	2016	2017	2018	2019	2020
	% p.a.	% p.a.	% p.a.	%p.a.	%p.a.	%p.a.	%p.a.
New South Wales	3.00	3.00	3.00	2.75	2.75	2.75	2.75
Victoria	2.00	2.50	2.75	2.75	2.75	2.75	2.75
Queensland	3.00	3.00	6.00	4.00	3.50	3.50	3.50
South Australia	1.75	2.25	2.50	2.25	2.25	2.25	2.25
Western Australia	3.75	2.75	3.00	4.25	5.00	5.00	5.00
Tasmania	1.75	1.50	2.00	2.00	2.00	2.00	2.00
Northern Territory	5.00	6.00	3.00	4.00	3.50	3.50	3.50
ACT	2.25	2.75	2.50	2.50	2.50	2.50	2.50
Australia	2.84	2.51	3.44	3.13	3.12	3.12	3.12

Source: The Commonwealth of Australia (2014), State of Victoria (2014), State of New South Wales (2014), State of Queensland (2014), State of South Australia (2014), State of Western Australia (2014), State of Tasmania (2014), Australian Capital Territory (2014)

A.2 Consumer price growth assumptions

	2014	2015	2016	2017	2018	2019	2020
	% p.a.	% p.a.	% p.a.	%p.a.	%p.a.	%p.a.	%p.a.
New South Wales	2.58	2.25	2.75	2.50	2.50	2.50	2.50
Victoria	2.79	2.25	2.50	2.50	2.50	2.50	2.50
Queensland	2.79	2.25	2.50	2.50	2.50	2.50	2.50
South Australia	2.57	2.50	2.50	2.50	2.50	2.50	2.50
Western Australia	2.98	2.75	2.50	2.50	2.50	2.50	2.50
Tasmania	2.52	2.50	2.25	2.50	2.50	2.50	2.50
Northern Territory	3.69	3.00	2.80	2.50	2.50	2.50	2.50
ACT	2.21	2.25	2.50	2.50	2.50	2.50	2.50
Australia	2.71	2.25	2.50	2.50	2.50	2.50	2.50

Source: The Commonwealth of Australia (2014), State of Victoria (2014), State of New South Wales (2014), State of Queensland (2014), State of South Australia (2014), State of Western Australia (2014), State of Tasmania (2014), Australian Capital Territory (2014)

A.3 Population and labour assumptions

	2014	2015	2016	2017	2018	2019	2020
	% p.a.	% p.a.	% p.a.	%p.a.	%p.a.	%p.a.	%p.a.
New South Wales	1.29	1.32	1.33	1.32	1.29	1.26	1.24
Victoria	1.76	1.79	1.79	1.77	1.73	1.69	1.66
Queensland	2.23	2.09	2.05	2.02	1.98	1.94	1.90
South Australia	1.03	1.05	1.05	1.04	1.02	1.00	0.98
Western Australia	3.19	3.08	2.96	2.91	2.83	2.76	2.69
Tasmania	0.40	0.59	0.63	0.62	0.60	0.58	0.56
Northern Territory	1.95	1.96	1.72	1.70	1.67	1.63	1.60
ACT	2.04	2.04	1.95	1.92	1.89	1.85	1.81
Australia	1.75	1.77	1.75	1.73	1.70	1.66	1.63

Source: The Commonwealth of Australia (2014), State of Victoria (2014), State of New South Wales (2014), State of Queensland (2014), State of South Australia (2014), State of Western Australia (2014), State of Tasmania (2014), Australian Capital Territory (2014)

A.4 Industry exports

	2014	2015	2016	2017	2018	2019	2020
	% p.a.	% p.a.	% p.a.	%p.a.	%p.a.	%p.a.	%p.a.
Sheep Cattle	13.50	-9.10	-8.50	-1.14	2.28	0.88	2.14
Grains	20.29	-8.75	1.30	1.03	1.60	1.24	1.78
Other Animal	-0.83	2.63	8.25	6.91	5.31	3.62	6.40
Other Agriculture	10.99	-5.07	0.35	2.27	3.06	1.91	3.44
Coal	14.97	7.10	0.90	1.31	9.34	2.28	7.31
Oil	-2.34	-6.08	8.72	-7.39	0.31	-0.65	-4.47
Gas	26.02	0.97	12.99	59.55	36.12	28.70	2.67
Metal Ores	23.20	18.70	9.00	6.38	4.28	1.27	1.07
Other Mining	0.63	2.38	1.26	0.73	2.24	1.96	3.98
Meat Products	14.13	-8.93	-8.02	-0.74	2.62	1.88	2.59
Other Food	-0.83	2.63	8.25	6.91	5.31	3.62	6.40
Other sectors	2.50	2.50	2.50	2.50	2.50	2.50	2.50

Source: ABARES (2014a,b), BREE (2014), CIE assumptions

B Additional data

B.1 Composition of occupations in Australian industries, 2014

Occupations	Utilities	Construction
	%	%
Managers	13.0	10.2
Professional	17.3	3.4
Technicians and trade workers	24.2	51.5
Community and personal service workers	0.0	0.0
Clerical and administration workers	19.9	9.7
Sales workers	1.1	1.0
Machinery operators and drivers	14.9	7.9
Labourers	9.5	16.3
Total	100	100

Notes: Utilities include Electricity, Gas, Water, and Waste Services. Data on occupations by state by industry was not provided in the Labour Force Detailed Aug 2014 release.

Source: Labour Force, Australia, Detailed May 2014.

B.2 WPI (total hourly rates excluding bonuses)

	Australia		Victoria	
	Utilities	Construction	Utilities	Construction
	Index	Index	Index	Index
September 2008	98.2	98.6	99.0	98.3
December 2008	99.8	99.4	99.9	99.1
March 2009	100.7	100.4	100.3	99.3
June 2009	101.2	101.6	100.7	103.3
September 2009	102.5	102.2	101.8	103.7
December 2009	103.7	102.8	102.9	105.2
March 2010	105.5	103.4	103.7	105.3
June 2010	106.0	104.5	104.6	106.4
September 2010	107.0	105.9	105.7	109.2
December 2010	108.6	106.9	106.5	110.1
March 2011	109.3	107.8	108.1	111.2
June 2011	109.9	108.6	108.6	111.6
September 2011	111.0	110.0	109.8	113.0
December 2011	112.1	111.2	111.3	114.2
March 2012	113.0	112.3	111.8	114.6
June 2012	114.1	113.2	113.0	115.6
September 2012	115.9	114.0	114.5	116.0
December 2012	116.9	115.1	115.5	117.9
March 2013	118.0	115.6	117.4	118.1
June 2013	118.5	116.7	117.9	121.3
September 2013	119.8	117.7	119.2	122.0
December 2013	120.7	118.3	120.1	122.2
March 2014	121.9	119.3	121.9	123.1
June 2014	122.1	120.1	122.2	125.4

Notes: Utilities include Electricity, Gas, Water, and Waste Services.

Source: ABS special request

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