LABOUR COSTS GROWTH FORECASTS

This report was prepared for the
Australian Energy Regulator
by Econtech Pty Ltd.

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Background

The Australian Energy Regulator (AER), in accordance with its responsibilities under the National Electricity Rules (NER), is required to make transmission determinations for SP AusNet and VENCorp for the regulatory periods commencing 1 April 2008 and 1 July 2008. A transmission determination includes a revenue determination that requires the AER to assess the transmission network service providers' claims regarding expected capital and operating expenditure.

Labour costs are a key input into electricity transmission expenses of SP AusNet and VENCorp. In their revenue proposals, it was stated that the wage growth index for the electricity industry in Victoria over the future regulatory period for SP AusNet and VENCorp would come in at 5.7 per cent (around 2.8 percent per annum above the CPI).

Against this backdrop, the AER has commissioned Econtech to review the annual labour cost growth forecasts submitted by stakeholders' utility businesses.

Labour Cost Measure

There are a number of different ways to measure labour costs. In this report, four main measures of wages are examined.

- The Average Weekly Earnings (AWE) survey estimates average weekly earnings of employees across Australia. Estimates of average weekly earnings are derived by dividing estimates of weekly total earnings by estimates of the number of employees. Estimates are classified by sector, state or territory, industry and sex in three levels - Full-time Adult Ordinary Time Earnings; Full-time Adult Total Earnings; and Total Earnings All Employees.
- The Labour Price Index (LPI) includes wages and salaries, overtime, bonuses (only in the labour price including bonuses index), annual and public holiday leave, superannuation, payroll tax and workers' compensation. In constructing the Labour Price Index (LPI), information is first collected from a representative sample of employee jobs within a sample of approximately 4,800 employers selected from the ABS Business Register. The LPI is not impacted by increases in hours worked or changes in the composition of the employee workforce. The LPI is only available from 1997-98, limiting the depth of econometric analysis that can be performed using it.
- The data for Mean Weekly Earnings (MWE) is collected from the Employee Earnings, Benefits and Trade Union Membership Survey conducted throughout Australia as a supplement to the ABS monthly Labour Force Survey (LFS). The survey provides data on weekly earnings of employees, their entitlement to paid leave, superannuation coverage and trade union membership. To calculate MWE, the total earnings of a group is divided by the number of employees in that group. The MWE measure differs from the other three measures in that it is based on data collected from a household (employee) interview survey. The other three measures are based in whole or part on an employer written survey and so may be more reliable. Also, the MWE is only available on an annual basis, and refers to August of each year, while the other measures are all available on a quarterly basis.

- The data for average compensation of employees is reported in the national accounts. Specifically, total compensation of employees from the national accounts is divided by the number of employees from the LFS. This use of two different sources of information may contribute to volatility in this measure. Compensation of employees includes both wages and salaries and employers' social contributions such as employer superannuation. Compensation of employees has the advantage of being the only indicator of labour costs that is publicly available by state by industry. However, the other three measures are available at the same level from the ABS special request service.

For the purpose of this study, the detailed unpublished state by industry AWE data appears to be the best source for labour cost movements. At the detailed state by industry level, it is less volatile than the MWE and average compensation measures, and it is available for a longer historical period than the LPI.

Previous Studies

There are many studies that forecast labour costs in Australia. For the purpose of this report, Econtech has focused on the following reports, which have been submitted by SP Ausnet and/or VenCorp in the submission to AER. These studies are:

- Sinclair Knight Merz (SKM), Escalation Factors Affecting Capital Expenditure Forecasts, February 2007;
- Access Economics, Wage Growth Forecasts in the Utilities Sector, November 2006;
- Access Economics, Labour Cost Indices for the Energy Sector, April 2007; and
- BIS Shrapnel (BIS), Outlook for Wages to 2012/13, March 2007

Each report uses a different measure of labour cost. In the Sinclair Knight Merz (SKM) report, labour costs are measured using AWE. For Access Economics, labour costs are measured using average compensation of employees (on a national accounts basis) at the national level. However, the specific measure of labour costs for each state is not clear. BIS uses average weekly ordinary time earnings and also refer to the LPI.

One key issue in assessing the labour cost forecasts in the earlier studies is the lack of clear and detailed methodology in each report. While the data sources are identified, the methodology used to convert these data sources into the detailed labour cost forecasts for Victoria is unclear. Therefore, it is difficult to fully assess or evaluate the labour costs forecasts presented in these reports.

In contrast to previous studies, Econtech's approach for this analysis is carefully detailed in Section 4. This allows readers to assess Econtech's methodology and even replicate the results.

Econtech's Modelling Approach

Econtech has developed a Labour Cost Model (LCM) that provides forecasts for labour costs by state by industry over the period 2006/07 to 2015/16. The LCM allows an independent assessment of labour cost conditions for the Mining, Electricity, Gas & Water Supply and

Construction industries (and indeed all the 17 ANZSIC broad industries) in each state and territory.

The LCM forecasts are fully consistent with Econtech's Murphy Model 2 (MM2) modelling outputs including the existing national wage forecast and the state and industry employment forecasts. MM2 is Australia's leading national, industry and state forecasting model updated quarterly. The MM2 state forecasts cover gross state product, CPI, investment, consumption and demand, whilst the industry forecasts include production, investment, employment and exports and imports for the 17 ANZSIC industry divisions. More details on MM2 are available in Attachment A.

Overall labour market forecasts in MM2 are used as inputs into the LCM model. As MM2 is a macro-CGE model, the labour market forecasts that are used in the LCM are grounded in sound economic theory. For instance, as labour market condition tightens, the MM2 will predict an increase in wages. Over the long term, the Australian economy would converge to a natural rate of unemployment. As such, total employment figures depend on total labour supply.

The labour market forecasts that are fed into the LCM from MM2 include labour demand, state and industry employment and wages. The MM2 is a consistent model where the state and industry figures are consistent with the national figures. This feature flows on to the LCM. As such, one key feature of the LCM model is that it overcomes the limitation of other existing forecasts of wages in Australia by ensuring that its detailed forecasts at the state and industry level are fully consistent with the forecasts at the national level.

As noted above, the wage measure that Econtech has used is the unpublished average weekly earnings by state by industry obtained from the ABS.

The main elements of our forecasting approach are as follows.

1. Econtech's MM2 model is used to forecast average wages at the national level and employment by industry and employment by state.

2. Regression equations are used to forecast industry and state wage relativities. In this approach, wage relativities between industries are affected by industry employment demand (as measured by an industry's share of national employment). Both industry and state wage relativities are modelled in a flexible dynamic framework that also allows for trend-related effects.

3. The final step is to convert the forecasts of state wage relativities and industry wage relativities to forecasts of wage relativities by state by industry. A procedure known as the Residual Allocation System (RAS) is used. The RAS procedure is applied separately to forecasts of total compensation and employees, and average wages are then calculated by dividing compensation by the number of employees. This approach has the advantage that the final forecasts of wages by state by industry are fully consistent with the national wage forecasts supplied by MM2 in the first step.

Results

Following ten years of strong growth, GDP growth is expected to moderate slightly over the next ten years. This, in turn, is expected to lead to more modest employment growth over the same period. However, with employment growth currently above trend, the unemployment rate is expected to come in at around 4.6 per cent in 2006-07 (a thirty year low) and remain below 5 per cent in the next few years.

With historically low unemployment, wages growth is forecast to continue to edge up to around 5 per cent, before moderating. National wages growth is expected to come in at an annual average of 4.6 per cent over the period 2006-07 to 2015-16.

The strong outlook in wages is expected to exert some upward inflationary pressures. However, the AUD is expected to stay above 80 US cents, reducing inflationary pressures in the short term. Strong productivity growth, supported by high business investment, is expected to moderate inflation in the medium term. As such, on balance, we expect inflation to maintain its normal path of 2-3 per cent per annum, consistent with the Reserve Bank's target.

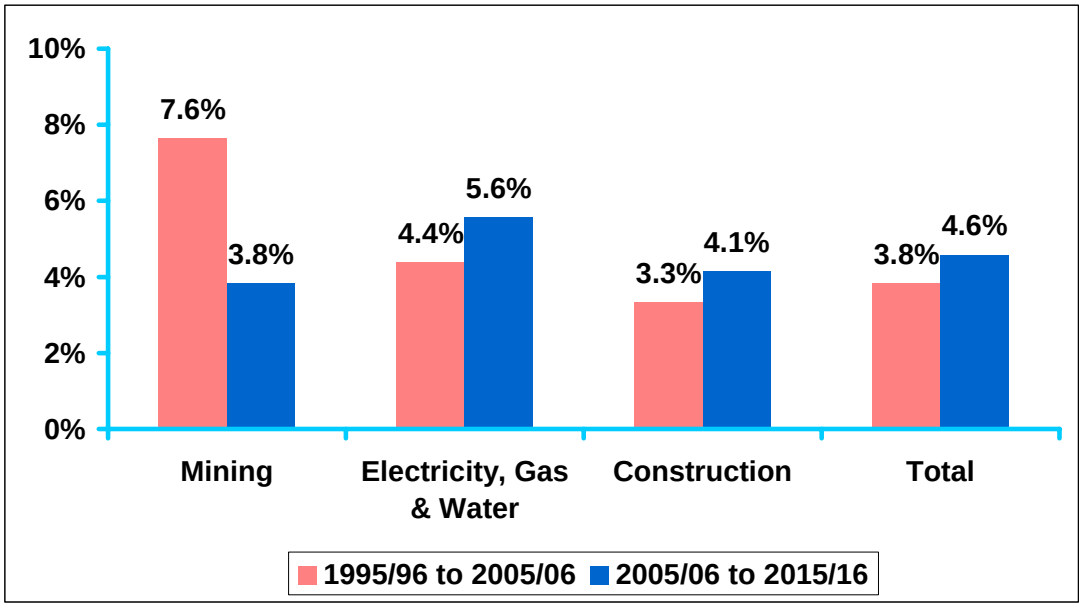
Table A
Key Macroeconomic Variables (%)

	Real GDP growth	Unemployment rate	Employment growth	CPI inflation	Wage growth
history					
1995-96	4.1	8.1	2.9	4.2	5.2
1996-97	3.9	8.3	0.8	1.3	4.8
1997-98	4.5	8.0	1.2	0.0	2.7
1998-99	5.2	7.4	1.9	1.3	3.5
1999-00	4.0	6.5	2.2	2.4	3.6
2000-01	1.9	6.5	2.0	6.0	3.9
2001-02	3.8	6.7	1.4	2.9	4.0
2002-03	3.2	6.2	2.5	3.1	2.3
2003-04	4.1	5.8	1.6	2.4	4.0
2004-05	2.7	5.3	2.9	2.4	4.0
2005-06	2.9	5.1	2.5	3.2	4.6
forecasts					
2006-07	3.0	4.6	2.6	2.8	4.3
2007-08	3.5	4.4	2.1	2.3	4.9
2008-09	2.7	4.3	2.0	2.9	4.9
2009-10	3.1	4.3	1.4	3.0	5.3
2010-11	3.6	4.5	1.0	2.5	5.2
2011-12	3.6	4.6	1.0	2.2	5.1
2012-13	3.0	4.7	0.7	2.3	5.0
2013-14	2.5	5.0	0.3	2.3	4.5
2014-15	2.3	5.3	0.1	2.0	3.5
2015-16	2.4	5.5	0.2	2.2	3.5

Source: MM2

Chart A shows ten-year historical and forecast compound average wage growth rates for the Mining, Electricity, Gas & Water, and Construction sectors in Victoria. The chart shows that the compound growth rate for the Electricity, Gas & Water industry has been historically higher than for both the Construction industry and Victoria as a whole. This trend is expected to continue over the forecast period, with industry wage growth estimated at an average annual rate of 5.6 per cent over the ten years to 2015/16. In comparison, after experiencing strong labour cost growth over the last ten years, growth in wages in the Mining industry is expected to return to more modest levels over the next ten years, as the mining boom eases.

Chart A
Ten Year Compound Labour Cost Growth Rates in Victoria



Source: LCM

Greater details are provided in Table B. It can be seen in Table B that the estimated year-to-year labour cost growth rates are quite volatile for some industry sectors.

Table B
Labour Cost Growth Rates in Victoria, 2005-06 to 2015-16 (%)

	Mining	Electricity, Gas & Water	Construction	Overall Victoria
1995-1996	14.9%	3.9%	4.4%	3.7%
1996-1997	18.7%	3.4%	3.5%	1.7%
1997-1998	23.8%	9.0%	11.1%	4.8%
1998-1999	2.5%	0.2%	-5.7%	1.4%
1999-2000	-8.8%	11.8%	-6.4%	1.6%
2000-2001	-1.7%	6.6%	3.6%	4.6%
2001-2002	-6.4%	7.5%	2.7%	4.9%
2002-2003	31.4%	1.0%	15.9%	7.7%
2003-2004	15.9%	-2.0%	4.1%	4.6%
2004-2005	2.8%	2.8%	-0.7%	2.7%
2005-2006	5.2%	4.1%	7.2%	4.4%
2006-2007	5.7%	1.8%	2.1%	2.9%
2007-2008	4.3%	5.9%	4.6%	5.5%
2008-2009	3.9%	6.0%	4.3%	5.1%

	Mining	Electricity, Gas & Water	Construction	Overall Victoria
2009-2010	3.8%	7.6%	4.9%	5.4%
2010-2011	3.5%	7.0%	4.9%	5.2%
2011-2012	3.6%	6.2%	4.8%	5.1%
2012-2013	3.9%	5.9%	4.8%	5.0%
2013-2014	3.8%	5.6%	4.4%	4.5%
2014-2015	3.2%	5.0%	3.4%	3.5%
2015-2016	2.7%	4.7%	3.4%	3.5%

Source: LCM

The labour cost estimates in this report can also be compared to BIS labour cost estimates at the industry level. In making this comparison, it is first appropriate to examine any differences between the estimates at the broader national level. The table below provides the key macroeconomic forecasts used in this analysis (Econtech) and those provided by BIS Shrapnel.

Table C
Growth Forecast by Econtech and BIS Shrapnel, National Level

	CPI forecast		Wages		Productivity	
	Econtech	BIS	Econtech	BIS	Econtech	BIS
2005-06	3.2	3.2	4.6	4.8		0.6
2006-07	2.8	3.1	4.3	4.1	0.4	0.8
2007-08	2.3	3.0	4.9	5.8	1.4	1.5
2008-09	2.9	2.9	4.9	4.9	0.7	2.5
2009-10	3.0	2.3	5.3	4.4	1.6	2.5
2010-11	2.5	2.9	5.2	5.3	2.5	0.9
2011-12	2.2	3.2	5.1	5.6	2.6	0.8
2012-13	2.3	3.2	5.0	5.4	2.2	0.9
2013-14	2.3	n.a	4.5	4.8	2.2	2.3
2014-15	2.0	n.a	3.5	4.4	2.2	1.5
2015-16	2.3	n.a	3.5	5.4	2.3	2.2
2008-2014	2.5	2.9*	5.0	5.1	2.0	1.6
2006-2016	2.5	n.a	4.6	5.0	1.8	1.6

Source: Econtech and BIS Shrapnel
Note: 2008-2014 indicates the compound growth rate between 2007/08 and 2012/13. Similarly, 2006-2016 indicates the compound growth rate between 2005/06 and 2015/16.
*5 years to 2012-13.

Table C shows that BIS and Econtech have a similar overall forecast for wages over the period 2007/08 to 2012/13. Over this period, both BIS and Econtech expects wages growth of around 5.1 per cent per annum. Over the longer period 2005/06 to 2015/16, BIS has higher wages growth than Econtech.

The three main drivers that influence wage growth are inflation, productivity growth and the tightness of the labour market. Each of these is now discussed in turn.

- Both Econtech and BIS expect higher inflation in the future. While Econtech forecasts some inflationary pressure over the period 2008-11, inflation is expected to ease in the outer years, consistent with the RBA target zone of 2-3 per cent inflation. BIS, on the other hand, expects inflation to remain high throughout the forecast period, at 2.9 per cent per annum.

- Over the forecast period 2008-13, Econtech expects overall national productivity to increase by 1.9 per cent per year. In comparison, BIS expects lower annual productivity growth of 1.5 per cent.
- Both Econtech and BIS expect wages growth to be stronger than would be expected based on CPI inflation and productivity growth alone. This is consistent with the tightness of the labour market.

Table D shows the labour cost growth forecast for the Electricity, Gas & Water Industry by Econtech, BIS Shrapnel and Access Economics. In comparison to BIS, Econtech expects higher growth in labour costs over the period 2008 to 2014. Econtech's forecast is consistent with the historic pattern of wages growth in the utility sector exceeding the average for all industries, at both the Victorian and national levels.

The main driver of this continued strong utility wages growth into the future is that of skill shortages and the competition the industry faces from industries such as the construction industry and the mining industry for the same type of skilled workers. With the mining and construction boom expected to last for another couple of years, this will continue to boost wages in these industries. In turn, wages for the utility sector will also need to increase, so as to continue to attract skilled workers.

Table D
Wage Growth Forecast in the Utility Sector (%)
In Australia

	Econtech	BIS	Access Economics
Nominal Wage			
2008-2014	6.3%	5.5%*	4.3%
2006-2016	5.7%	5.5%	4.5%
Real Wage			
2008-2014	3.7%	2.7%*	2.3%
2006-2016	3.2%	n.a.	2.1%

In Victoria

	Econtech	BIS	Access Economics
Nominal Wage			
2008-2014	6.4%	n.a.	4.2%
2006-2016	5.6%	n.a.	4.4%
Real Wage			
2008-2014	3.7%	n.a.	2.3%
2006-2016	3.0%	n.a.	2.0%

Source: Econtech, Access Economics and BIS Shrapnel
Note: 2008-2013 indicates the compound growth rate between 2007/08 and 2012/13. Similarly, 2006-2016 indicates the compound growth rate between 2005/06 and 2015/16
*5 years to 2012-13

1. Introduction

The Australian Energy Regulator (AER), in accordance with its responsibilities under the National Electricity Rules (NER), is required to make transmission determinations for SP AusNet and VENCorp for the regulatory periods commencing 1 April 2008 and 1 July 2008. A transmission determination includes a revenue determination that requires the AER to assess the transmission network service providers' claims regarding expected capital and operating expenditure.

Labour costs are a key input into electricity transmission expenses of SP AusNet and VENCorp. In their revenue proposals, it was stated that the wage growth index for the electricity industry in Victoria over the future regulatory period for SP AusNet and VENCorp would come in at 5.7 per cent (around 2.8 percent per annum above the CPI).

Against this backdrop, the AER has commissioned Econtech to review the annual labour cost growth forecasts submitted by SP AusNet and VENCorp in Victoria.

This report is structured as follows.

- Section 2 outlines the results from previous studies in forecasting labour cost growth in Australia.
- Section 3 describes Econtech's modelling approach in forecasting labour cost growth.
- Section 4 presents the Econtech forecasts of labour cost growth.
- Section 5 compares Econtech's forecasts with the previous studies.

While all care, skill and consideration has been used in the preparation of this report, the findings refer to the terms of reference of the AER and are designed to be used only for the specific purpose set out below. If you believe that your terms of reference are different from those set out below, or you wish to use this report or information contained within it for another purpose, please contact us.

The specific purpose of this report is to develop a nationally consistent set of independent forecasts of labour costs for each Australian state and territory. This includes the labour cost growth forecasts for the Mining, Electricity, Gas & Water Supply, and Construction industries of each state and territory.

The findings in this report are subject to unavoidable statistical variation. While all care has been taken to ensure that the statistical variation is kept to a minimum, care should be taken whenever using this information. This report only takes into account information available to Econtech up to the date of this report and so its findings may be affected by new information. Should you require clarification of any material, please contact us.

2. Labour Cost Measures

There are a number of different ways to measure labour costs. The Australian Bureau of Statistics, alone, publishes several labour cost indicators - such as Average Weekly Earnings, Labour Price Index, Mean Weekly Earnings and Compensation of Employees.

Each different measure of labour costs should reflect labour market conditions. However, the measures will vary in terms of their coverage and structure. Hence, depending on the intended use, some measures will be more appropriate than others. This section first explains the differences in the measures and then discusses the suitability of these measures for use in estimating electricity transmission and distribution expenses.

2.1 Alternative Labour Cost Measures

This section examines the four alternative ABS labour cost indicators that were mentioned above. These measures are Average Weekly Earnings (ABS cat. no. 6302), Labour Price Index (ABS cat. no. 6345), Mean Weekly Earnings (ABS cat. no. 6310) and Compensation of Employees (ABS cat. no. 5206). Each of these measures is now discussed in turn[1]. Further, Table 2.1 at the end of this sub-section provides a quick comparison of the four measures.

Average Weekly Earnings (AWE)

In constructing the AWE, the data is collected through a sample survey of approximately 5,500 employer units that have been selected from the ABS Business Register. The AWE survey measures the average weekly earnings of all employed wage and salary earners, with the following exceptions.

- Members of the Australian permanent defence forces;
- employees of enterprises primarily engaged in agriculture, forestry and fishing;
- employees of private households;
- employees of overseas embassies, consulates, etc.;
- employees based outside Australia; and
- employees on workers' compensation who are not paid through the payroll.

Also excluded are the following persons who are not regarded as employees for the purposes of this survey:

- casual employees or employees on leave without pay, on strike or stood down, who did not receive pay during the reference period;
- directors who are not paid a salary;
- proprietors/partners of unincorporated businesses;
- self-employed persons such as subcontractors, owner/drivers, consultants; or
- persons paid solely by commission without a retainer.

[1] The discussion on each measure is drawn from information contained in the explanatory notes of the related ABS publications.

The AWE survey data is used to estimate the average weekly earnings of employees across Australia. Estimates of average weekly earnings are calculated by dividing estimates of weekly total earnings by estimates of the number of employees. Estimates are classified by sector, state or territory, industry and sex in three levels:

- Full-time[2] Adult[3] Ordinary Time Earnings[4];
- Full-time Adult Total Earnings[5]; or
- Total Earnings All Employees.

The ABS explains that changes in the averages are affected not only by changes in the level of earnings of employees, but also by changes in hours worked and the overall composition of the wage and salary earner segment of the labour force. These compositional effects may include variations over time in:

- the proportions of full-time, part-time, casual and junior employees;
- the occupational distribution within and across industries;
- the distribution of employment between industries; and
- the proportion of male and female employees.

Labour Price Index (LPI)

In constructing the Labour Price Index (LPI), information is first collected from a representative sample of employee jobs within a sample of approximately 4,800 employers selected from the ABS Business Register. The survey targets all employing organisations in Australia (private and public sectors) except:

- enterprises primarily engaged in agriculture, forestry or fishing;
- private households employing staff; and
- foreign embassies, consulates, etc.

Further, all employee jobs are targeted, except for the following:

- Australian permanent defence force jobs;
- non-salaried directors;
- proprietors/partners of unincorporated businesses or working proprietors/owner managers of Pty Ltd companies;
- persons paid by commission only;
- employees on workers' compensation who are not paid through the payroll;

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[2] Full-time employees are permanent, temporary and casual employees who work the normal hours for a full-time employee in their occupation. If agreed or award hours do not apply, employees are regarded as full-time if they ordinarily work 35 hours or more per week.

[3] Adult employees are those employees 21 years of age or over and those employees who, although under 21 years of age, are paid at the full adult rate for their occupation.

[4] Weekly ordinary time earnings refers to one week's earnings of employees (for the reference period) attributable to award, standard or agreed hours of work. It includes bonuses and other incentive payments. It excludes overtime payments and payments not related to the reference period.

[5] Weekly total earnings of employees is equal to weekly ordinary time earnings plus weekly overtime earnings.

- ‘non-maintainable’ jobs (i.e. expected to be occupied for less than six months); and
- jobs for which wages and salaries are not determined by the Australian labour market.

For the survey, each employer first selects a sample of jobs from their workplace(s) and provides the ABS with information on these jobs, including detailed pricing specifications. In subsequent quarters they provide details of payments made to the current occupants of these same jobs.

In contrast to the AWE, the LPI is designed to reflect pure price changes. This means that the LPI should not be affected by changes in the quality or quantity of work performed, or by changes in the composition of the employee workforce. The following are examples of changes which are not reflected in index movements:

- changes in the nature of work performed (e.g. different tasks or responsibilities)
- changes in the quantity of work performed (e.g. the number of hours worked)
- changes in the characteristics of the job occupant (e.g. age, successful completion of training or a qualification, grade or level, experience, length of service, etc.)
- changes in the location where the work is performed.

Mean Weekly Earnings

The data in the Mean Weekly Earnings publication is collected from the Employee Earnings, Benefits and Trade Union Membership Survey conducted throughout Australia as a supplement to the ABS monthly Labour Force Survey (LFS).

The LFS covers people aged 15 years and over, but excludes:

- members of the permanent defence forces;
- certain diplomatic personnel of overseas governments, customarily excluded from census and population estimates;
- overseas residents in Australia; and
- members of non-Australian defence forces (and their dependants).

The supplementary surveys also exclude students at boarding schools, patients in hospitals, residents of homes (e.g. retirement homes, homes for people with disabilities), and inmates of prisons.

The latest (2006) LFS covered around 34,000 private dwelling households and special dwelling units (after removing households which had no residents in scope for the LFS). The Employee Earnings, Benefits and Trade Union Membership Survey covered almost 29,000 of these (after taking into account scope, coverage and subsampling exclusions).

The survey provides data on weekly earnings of employees, their entitlement to paid leave, superannuation coverage and trade union membership. To calculate mean weekly earnings, the total earnings of a group is divided by the number of employees in that group.

Thus mean weekly earnings is a similar concept to average weekly earnings. However, the two data series can be quite different. The main reason for the differences is due to

differences in the data used to calculate both estimates. The mean weekly earnings measure is based on data collected from a household (employee) interview-type survey, while the average weekly earnings measure is based on data collected from an employer written survey. As discussed above, the scope of these surveys is also different, with the AWE series excluding both employees in Agriculture, forestry and fishing; and Private households employing staff.

Similar to in the AWE publication, the ABS also note that mean weekly earnings may be affected not only by changes in the level of earnings but also by changes in the overall composition of the employee workforce. These compositional impacts include changes in:

- proportions of full-time and part-time employees;
- number of hours worked; or
- the mix of occupations and industries.

Compensation per Employee

Total compensation of employees by State by Industry is published by the ABS in its annual Australian National Accounts: State Accounts (cat. no. 5220). These state estimates are essentially a dissection of the Australian estimates contained in catalogue number 5204.

Compensation of employees includes both wages and salaries, and employers' social contributions such as employer superannuation.

To estimate Compensation per Employee, total compensation of employees from the national accounts is divided by the number of employees from the LFS. This use of two different sources of information may contribute to volatility in this measure.

Compensation of employees has the advantage of being the only indicator of labour costs that is publicly available by state by industry. However, the other three measures are available at the same level from the ABS special request service.

Table 2.1
Alternative Labour Cost Measures

	Average Weekly Earnings	Mean Weekly Earnings	Labour Price Index	Compensation of Employees
Definition	Divides total weekly earnings by number of employees to get average weekly earnings	Divides total weekly earnings by number of employees to get mean weekly earnings	Estimates the average compensation paid to particular job categories	Divides total compensation by the number of employees to get average compensation
Released	Quarterly	Annually	Quarterly	Quarterly/Annually[6]
Cat. No.	6302.0	6310.0	6345.0	5220.0
Data Collection Method	Employer survey	Household survey	Employer survey	Household and employer surveys and government department data
No. of Observations	5,500	29,000	4,800	N/A
Labour cost includes:	Remuneration paid to an employee at regular time intervals: ▪ Wages and salaries in cash[7] ▪ Paid leave ▪ Holidays	Remuneration paid to an employee at regular time intervals: ▪ Wages and salaries in cash[2] ▪ Paid leave ▪ Holidays	▪ Ordinary time hourly rates of pay ▪ Total hourly rates of pay[8] ▪ bonuses ▪ annual leave ▪ public holiday leave ▪ superannuation, ▪ payroll tax ▪ workers compensation.	Remuneration payable to an employee in the accounting period: ▪ Wages and salaries in cash ▪ wages and salaries in kind ▪ employers' social contributions.
excludes:	▪ Superannuation ▪ Termination pay ▪ Payments in kind	▪ Superannuation ▪ Termination pay ▪ Payments in kind		

[6] Quarterly estimates are available at the national level, whilst State level estimates are released annually.
[7] Wages and salaries include overtime.
[8] This includes overtime.

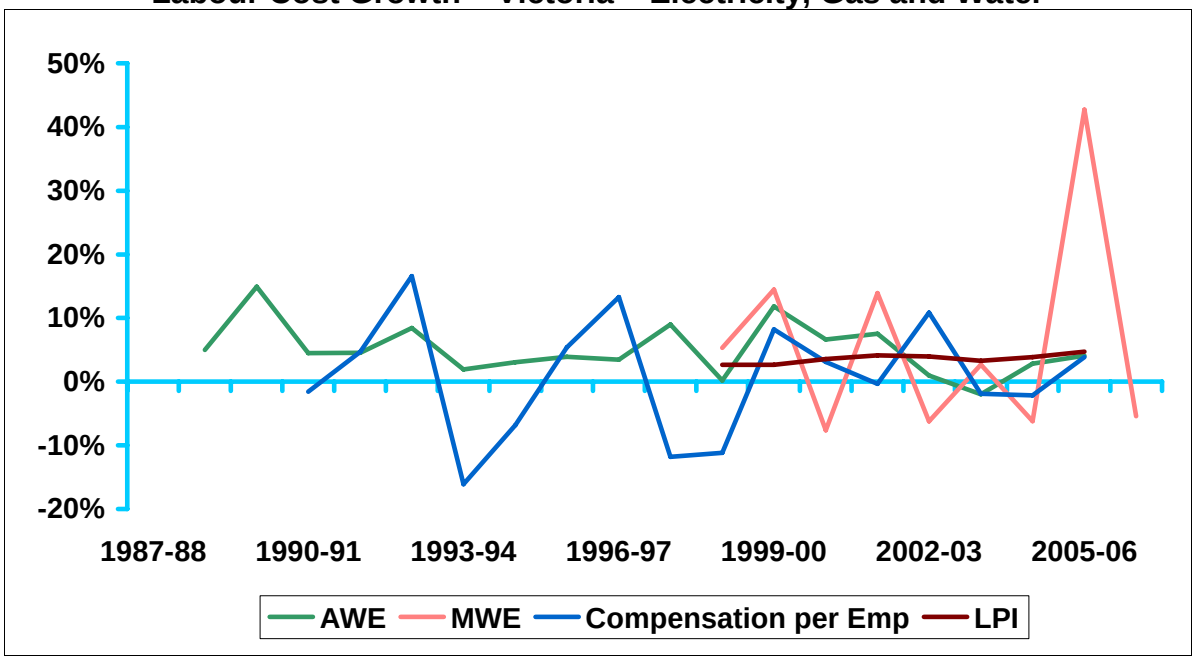
	Average Weekly Earnings	Mean Weekly Earnings	Labour Price Index	Compensation of Employees
Excluded Employees	▪ Defence force personnel ▪ Agriculture, forestry and fishing employees ▪ Employees of private households	▪ Defence force personnel	▪ Defence force personnel ▪ Agriculture, forestry and fishing employees ▪ Employees of private households	▪ N/A
Comments	Changes in the AWE are affected by changes in the composition of the workforce and changes in the number of hours worked in a time period	Changes in mean weekly earnings are affected by changes in the composition of the workforce and changes in the number of hours worked in a time period	The LPI does not reflect changes in the composition of the workforce, changes in the quantity of work performed or changes in the skill level of employees	This measure is derived from the sources used to construct the national accounts. As such it provides labour costs by state by industry and is consistent with the national accounts

Source: ABS

2.2 Appropriate Measures for Estimating Growth in Labour Costs

The chart below shows the historical data for each of these labour cost measures. In this chart, the Electricity, Gas and Water industry in Victoria is used as an example of the differences in the labour cost measures at the detailed state by industry level.

Chart 2.1
Labour Cost Growth – Victoria – Electricity, Gas and Water



Source: ABS

For the purpose of this study, the detailed unpublished state by industry AWE data appears to be the best source to measure labour cost movements. At the detailed state by industry level, it is less volatile than the MWE and average compensation measures, and it is available for a longer historical period than the LPI.

3. Previous Studies on Forecasting Labour Costs

This section reviews some of the earlier studies that forecast labour costs in Australia, particular in the utility sector in Victoria. There are many studies that forecast labour costs in Australia. For the purpose of this report, Econtech has focused on the following reports, which have been submitted by SP Ausnet and/or VenCorp in the submission to AER. These studies are:

- Sinclair Knight Merz (SKM), Escalation Factors Affecting Capital Expenditure Forecasts, February 2007;
- Access Economics, Wage Growth Forecasts in the Utilities Sector, November 2006;
- Access Economics, Labour Cost Indices for the Energy Sector, April 2007; and
- BIS Shrapnel (BIS), Outlook for Wages to 2012/13, March 2007.

3.1 Measures Used in Previous Studies

The first step when examining the findings of previous studies is to identify the labour cost measure that was used in the study. As discussed in the previous section, the choice of labour cost measure can influence the size of wage growth that is forecast. This is illustrated in the BIS report, where their forecast growth rates of average weekly ordinary time earnings is about 0.8 percentage points higher than their forecast growth rate of the Labour Price Index.

- In the Sinclair Knight Merz (SKM) report, labour costs are measured using the average Australian weekly earnings.
- For Access Economics, labour costs are measured using average earnings (on national accounts basis) at the national level. However, the specific measure of labour costs for each state is not clear.
- BIS uses the average weekly ordinary time earnings as the indicator to reflect wage cost changes (or unit labour costs, net productivity increases).

3.2 Forecasting Methodology

One key issue in assessing the labour cost forecasts in each of the earlier studies is the lack of detailed methodology in each report. While the data sources are identified, the methodology used to convert these data sources into the detailed labour cost forecasts is unclear. For example, reports that use published ABS average weekly earnings as the basis for their labour cost forecasts would need to apply some sort of analysis to get the detail that they require. This is because the ABS only produces average weekly earnings by industry, and not by industry by state. The only published wage-related data that is available by state and industry is total compensation, on an annual basis.

Therefore, without a clear and detailed methodology, it would be difficult to fully assess or evaluate the labour costs forecasts presented in these reports. Nonetheless, this sub-section summarises the information provided in each report.

Sinclair Knight Merz (SKM) Report

In the Sinclair Knight Merz (SKM) report, labour costs are measured using average Australian weekly earnings. Based on historical data, SKM concluded that over the period 2002 to 2006, average weekly earnings outpaced CPI by 8 per cent.

SKM noted that the annual nominal wages growth projected by Access Economics[9] for the utilities sector on a national basis was higher than the RBA's projections for the CPI. Furthermore, in SKM report, it was stated that "SKM's projections for labour increases have been based on forecast from the Australia Treasury with a differentiation between general labour and site labour…"[10]

According the 2006/07 Budget, the wage price index is expected to increase by 4 per cent per annum over the next few years.[11] While SKM's labour cost forecasts for general labour appear to be consistent with the Treasury's figures, the labour cost forecast for site labour outpaced that of the Treasury figures. In addition, there is no mention of how the forecast of labour costs in the utility sector compare with the national forecast. As such, it is difficult to provide a full assessment of the SKM forecast.

Table 3.1 shows the forecasts of labour costs growth by Access Economics and SKM. It shows that SKM expect site labour costs to grow at a much faster rate than the wage price index growth forecasts presented in the 2006/07 Budget (of 4 per cent per annum). It should also be noted that, the labour cost growth forecasts produced by SKM are at the national level. However, to assess the submissions by SP AusNet and VenCorp, it is the labour cost of Victorian utility sector that is crucial.

Table 3.1
Annual Labour Costs Growth Rate, 2007 – 2013 (%)

Source	2007	2008	2009	2010	2011	2012	2013
AE	5.9%	5.2%	3.4%	3.4%	3.9%	3.4%	3.4%
SKM							
General Labour	4.0%	4.0%	3.7%	3.7%	3.8%	3.7%	3.8%
Site Labour	5.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
CPI	2.5%	2.5%	2.5%	2.5%	2.4%	2.6%	2.5%

Source: SKM

BIS –Outlook for wages to 2012/13

In the BIS Shrapnel report, labour costs are measured by using average weekly ordinary time earnings (AWOTE). BIS claim that this measure best reflects the increase in wages cost changes (or unit labour costs, net productivity increases) for business and the public sector across the economy. However, as noted before, the ABS does not publish the AWOTE by state by industry. As a result, in the BIS report only provides labour cost forecasts by

[9] Access Economics, *Wage growth forecasts in the utilities sector*, 17 November 2006, pp i
[10] Sinclair Knight Merz, Escalation Factors Affecting Capital Expenditure Forecasts, pp 30
[11] Australian Government, *Budget Paper No. 1 Budget Strategy and Outlook 2006-07 - Statement 3:Economic Outlook*, section 3-27, pp 29

industry and by state separately. It does not provide labour cost forecasts specifically for the Victorian utility sector.

Growth of AWOTE in the electricity, gas and water sector is forecast to average 5.7 per cent per year (compared to the national average of 5.2 per cent per year) over the next six years to 2012/13. The real wage is expected to increase by 2.8 per cent per year, with CPI inflation coming in at 2.9 per cent per year.

Another measure of wages growth used in the BIS Shrapnel report was the Labour Price Index (LPI). This CPI style measure of changes in wage and salary costs is based on a weighted combination of a surveyed 'basket' of jobs. The LPI excludes the effect of changes in the quality or quantity of work performed and the compositional effects of shifts with the labour market. However, BIS Shrapnel believes the LPI is likely to underestimate the true wage inflationary pressures as it does not capture situations where an individual is given a promotion (and higher wage) as a way to retain them in a tight labour market.

Table 3.2 shows the expected LPI growth by industry sector and by state. It shows that the utilities sector has experienced a higher 5 year average LPI growth rate than that of the other sectors.

Table 3.2
Labour Price Index Growth by Industry Sector, and by State, 2002/06 (%)

	2002	2003	2004	2005	Jun-06	Sep-06	Dec-06
Industry							
Mining	3.4	3.2	3.2	4.9	5.7	5.9	6.5
Electricity, gas & water	4	4.5	4.7	3.8	6.8	6	5.9
Construction	2.8	3.7	4.3	4.9	5.4	4.9	5.1
State							
Victoria	3.4	3.4	3.3	4.3	3.8	3.5	3.5

Source: BIS Shrapnel

BIS Shrapnel focussed on the AWOTE to measure labour costs growth, as they believe it better reflects the increase in wage cost changes for businesses and the public sector across the economy. Table 3.3 presents the BIS AWOTE forecast for Australia and the utility sector, as well as forecasts for CPI inflation and productivity.

Table 3.3
BIS Forecast for AWOTE Growth and CPI Inflation (%)

	2006	2007	2008	2009	2010	2011	2008-13
AWOTE - Australia	4.9	4.4	5.6	4.9	4.5	5.3	5.2
AWOTE - Electricity, gas & water	1.5	4.4	6.2	5.4	5.1	6.1	5.7
Official CPI	3.2	3.1	3.0	2.9	2.3	2.9	2.9
BIS CPI	2.3	2.8	3.3	3.1	2.6	2.9	3.0
Overall Labour Productivity	0.6	0.8	1.5	2.5	2.5	0.9	1.5
Productivity - Electricity, gas & water supply	-10.8	7.5	-0.5	1.6	3.0	1.0	0.8

Source: BIS Shrapnel

Although there is no clear explanation of how the wages for the utility sector is forecast, BIS provides some information on the macroeconomic assumptions that drive the wage forecast. For instance, BIS expects headline GDP to hold in 2008. As such, GDP is expected to increase by 2.8 per cent in 2008/09. This view on GDP is in line with both consensus and Econtech's forecast.

Additionally, BIS' assumed that baseline CPI inflation will increase by an annual average of 3 per cent over the period 2008-13. This implies there are periods where inflation is above RBA's target range of 2-3 per cent. Indeed, BIS forecasts CPI to come in at 3.2 per cent for 2011/12 and 2012/13.

Separately, the report also states that official/headline CPI inflation is forecast to be 2.9 per cent per year. This implies an average annual real wage growth of 2.7 (or 2.8) per cent, depending the measure of price inflation.

On the productivity side, in the BIS analysis, overall productivity in Australia is expected to increase by 1.5 per cent per annum. In comparison, productivity growth in the utility sector is forecast to be lower, at 0.8 per cent per year.

There is a gap between real wage growth and productivity growth. While it is not clearly explained in the BIS report, the gap probably reflects the tightness in labour market conditions as well as the change in awards/wage reforms in Australia.

Access Economics – Labour Cost Indices for the Energy Sector

The Access Economics report measured labour costs by using the average LPI. Their report concentrated on expected wage outcomes across several sectors.

Table 3.4 shows the forecast wage growth in three component sectors at the national level, as well as overall LPI growth in Victoria from the Access Economics analysis. The forecasts provide an average rate of growth for each of the next three financial years and from 2005/06 to 2015/16.

Table 3.4
LPI Growth at the National level by industry sector (%)

Industry	2006/07	2007/08	2008/09	Next 3 yrs	Next 10 yrs
Nominal LPI					
Mining	6.8	6.3	5.3	6.1	5.3
Electricity, gas & water supply	5.6	5.7	5.1	5.5	4.5
Construction	4.8	6.1	3.8	4.9	4.1
Victoria	3.7	4.4	4.4	4.2	4.5
Real LPI					
Mining	2.2	4.3	4.9	3.8	2.9
Electricity, gas & water supply	1.1	3.7	4.7	3.2	2.1
Construction	0.3	4.1	3.3	2.6	1.8
Victoria	-0.7	2.5	4.0	1.9	2.1

Source: Access Economics

In the Access Economics report, state level labour price forecasts were modelled as offsets from the national results, with additional adjustments made to ensure the results were consistent with the overall national total. State growth for nominal LPI for each industry was modelled by considering:

- industry growth in LPI;
- a component for excess overall State LPI growth; and
- a component for excess industry productivity growth in the State.

Estimates of sectoral labour indexes were calculated in real terms, and transformed into nominal estimates by adding back in the change in the GDP deflator (an estimate of overall price growth in the economy). Access Economics explain that they chose this method as a way to treat wages as a cost to businesses. This was done to more accurately reflect the productivity and the underlying price factors that drive wage growth.

The macroeconomic outlook outlined in the Access Economics report expected recent interest rate rises would continue to see demand growth moderate, which in turn would hold back output growth through 2007. They also assumed that the spending and tax cut promises by the Commonwealth government would not result in another interest rate rise. Overall, Access Economics expected demand would be less of an inflation risk in 2007 and 2008.

The main differences between the forecasts presented in the 2007 Access Economics labour costs forecast report and the forecasts in the previous Access Economics 2006 report are in the period from June 2011 to June 2014, where wages are anticipated to rise around 3 percentage points more than the initial forecast. Also, wage growth in the 2006/07 period was below initial expectations.

The differences between the first and second report by Access Economics largely reflect updates to the latest macroeconomic data. This illustrates how, given the dynamic nature of forecasting, macroeconomic models would generally be impacted by changes in the economy. At the same time, Access Economics also explains that the differences also reflect the implementation of their new macroeconomic model, which allows for more detailed flowthrough effects of the impact of capital investment to productivity.[12]

Table 3.5 shows the forecast wage growth in three component sectors in Victoria. The forecasts provide an average rate of growth for each of the next three financial years and from 2005/06 to 2015/16. Specifically, over the next 10 years, nominal wages in the utility sector are expected to increase by 4.4 per cent per annum. At the same time, real wages in the utility sector are expected to increase by 2.0 per cent per annum.

[12] Access Economics, Labour Cost Indices fore the Energy Sector, 12 April 2007, pp 62

Chart 3.5
LPI Growth by industry sector in Victoria (%)

Industry	2006/07	2007/08	2008/09	Next 3 yrs	Next 10 yrs
Nominal LPI					
Mining	6.8	6.3	5.3	6.1	5.3
Electricity, gas & water supply	5.6	5.7	5.1	5.5	4.5
Construction	4.8	6.1	3.8	4.9	4.1
Victoria	3.7	4.4	4.4	4.2	4.5
Real LPI					
Mining	2.2	4.3	4.9	3.8	2.9
Electricity, gas & water supply	1.1	3.7	4.7	3.2	2.1
Construction	0.3	4.1	3.3	2.6	1.8
Victoria	-0.7	2.5	4.0	1.9	2.1

Source: Access Economics

Thus, each of the studies described in this section provides forecasts of labour costs. However, as discussed at the beginning of this section, there are no clear and detailed methodologies presented in these previous studies, making it difficult to assess the accuracy of the forecasts presented in these reports. In contrast, the following section clearly outlines Econtech's approach to this analysis. This allows readers to assess Econtech's methodology and even replicate the results.

4. Modelling Approach Used in this Analysis

This section describes in detail the modelling approach used in this analysis. Specifically this section outlines the modelling in terms of the main three steps: 1) data collection; 2) data construction; and 3) regression analysis. The advantage of a clear detailed outline of modelling approach is that it allows readers to assess Econtech's methodology and even replicate the results. More details on the modelling approach, including the model equations and coefficients, are available in Attachment E and the spreadsheets accompanying this report.

To assist the AER in reviewing the annual labour cost growth forecasts in the revenue proposals submitted by SP AusNet and VENCorp, Econtech has developed a Labour Cost Model (LCM) that provides forecasts for labour costs by state by industry over the period 2006/07 to 2015/16. The LCM allows an independent assessment of labour cost conditions for the Mining, Electricity, Gas & Water Supply and Construction industries (and indeed all the 17 ANZSIC broad industries) in each state and territory.

The LCM forecasts are fully consistent with Econtech's Murphy Model 2 (MM2) modelling outputs, including the existing national wage forecast and the state and industry employment forecasts. MM2 is Australia's leading national, industry and state forecasting model, updated quarterly. The MM2 state forecasts cover gross state product, CPI, investment, consumption and demand, whilst the industry forecasts include production, investment, employment and exports and imports for the 17 ANZSIC industry divisions. More details on MM2 are available in Attachment A.

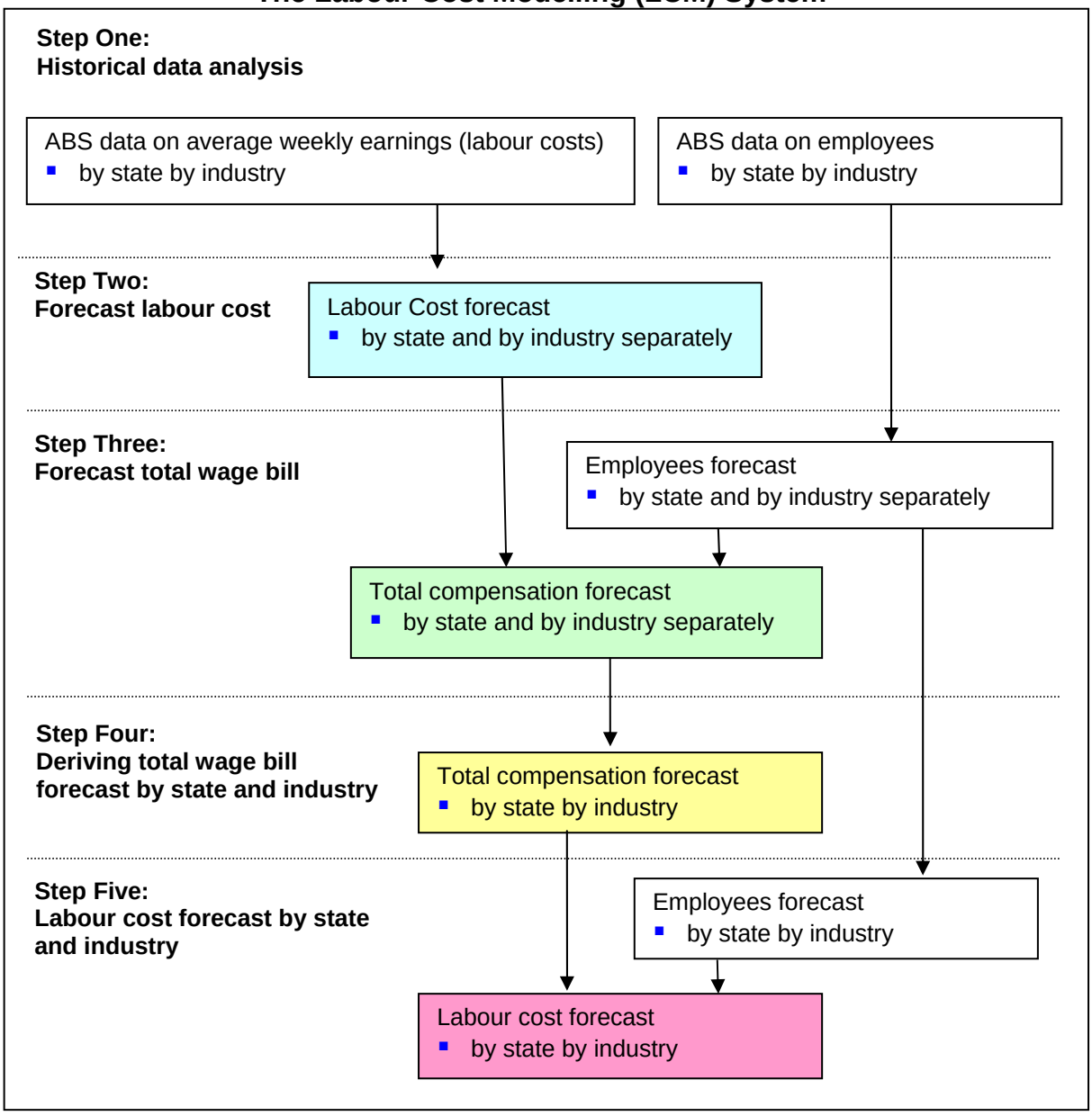
Overall labour market forecasts in MM2 are used as inputs into the LCM model. As MM2 is a macro-CGE model, the labour market forecasts that are used in the LCM are grounded in sound economic theory. For instance, as labour market conditions tighten, the MM2 will predict an increase in wages. Further, over the long term, the Australian economy will converge to a natural rate of unemployment. As such, total employment figures will depend on total labour supply.

The labour market forecasts that are fed into the LCM include labour demand, state and industry employment numbers and wages. The MM2 is a consistent model where the state and industry figures are consistent with the national figures. This feature flows on to the LCM. As such, one key feature of the LCM model is that it overcomes the major deficiency of many existing forecasts of wages in Australia which do not match at the state and industry level.

The general structure of the LCM is illustrated in Figure 4.1 on the following page. This section is organised as follows.

- Section 4.1 sets out the data used for the LCM.
- Section 4.2 describes the regression models used to forecast labour costs separately by state and by industry.
- Section 4.3 describes the methodology applied to forecast labour cost by state by industry.

Figure 4.1
The Labour Cost Modelling (LCM) System



4.1 Historical Data Analysis

The first step involves collecting the appropriate data sources to forecast labour cost. At both the industry and state levels, there are a number of labour cost indicators available. As discussed in Section 2, these measures include average weekly earnings, mean weekly earnings, compensation of employees and labour price index.

Econtech analysed all data sources at the detailed state by industry level, and established that the average weekly earnings data was the most appropriate for this analysis. The unpublished state by industry detail was obtained from the special request section of the ABS. See Section 2 for more details.

In addition to the compensation of employee's data, it is also necessary to obtain the historical data on total employees by state by industry. This data is available directly from the ABS[13].

4.2 Forecasting Labour Costs by State and by Industry Separately

Step Two in the modelling involves forecasting labour costs by state and by industry separately. This is done by using historical state and industry wage data in combination with Econtech's existing MM2 forecast of the national wage. These two data sources are used to forecast consistent wage relativities for each state and territory, and for each of the 17 ANZIC broad industries, separately, using robust econometric analysis. The key driver of these forecasts is the tightness of the labour market in each state and in each industry.

The tightness in the labour market is indicated by the developments in labour demand and labour supply in each industry and in each state. These developments stem from Econtech's outlook for each state and industry. Notably, the labour demand by industry, and labour demand and labour supply by state are published in Econtech's *Australian, State and Industry Outlook (ANSIO)* publication.

4.3 Forecasting Employees by State and by Industry Separately

The sub-section above described how labour costs are forecast by state and by industry separately. The next step is to also forecast employees by state and by industry separately.

As mentioned above, Econtech's MM2 provides forecasts of total employment by state and by industry separately. Total employment, by definition, includes both employees and self-employed persons. Therefore, to estimate compensation per employee it is necessary to convert the total employment figures produced by MM2 into total employee figures. This conversion is based on an economic analysis of the historical employee share of employment in each industry and in each state.

4.4 Forecasting Labour Cost by State by Industry

Step 2 (discussed in sub-section 4.2) described how labour costs are forecast by state and by industry separately. The final step is to forecast labour costs by state by industry. This step is explained below.

By combining the labour cost forecasts in Step 2 with the employee forecasts, forecasts of total compensation of employee can be calculated for each state and industry, separately[14] (Step 3).

Next, a widely accepted estimation technique known as Residual Allocation System (RAS)[15] is applied to the forecast of the total compensation for each separate state and each separate industry. This technique allows for the estimation of total compensation by state for each industry. Importantly, this technique ensures that the compensation figures by state by industry are fully consistent with the national numbers (Step 4).

---

[13] ABS Cat No. 6291.0.55.003 - Labour Force, Australia, Detailed, Quarterly

[14] The total wages bill is simply the product of employees and wages.

[15] This technique is also used by the ABS – for example in producing their input-output tables.

The same approach is then used to forecast the number of employees by state by industry. The RAS technique converts the forecasts of employees by industry and employees by state (based on the MM2 employment forecasts) into forecasts of employees by industry by state.

Finally, the forecasts of total compensation by state by industry are divided by the forecasts of employees by state by industry. The results give compensation per employee by state by industry. This is the measure of labour costs used in this analysis.

It is, again, important to note that the Econtech LCM approach generates a nationally consistent forecast. As the whole economy (state and industry) is forecast as a system, the LCM produces forecasts of labour costs by state by industry for all states and industries. This has the important advantage of demonstrating that the industry forecasts are consistent with a plausible view of the labour cost outlook for each state economy and the national economy.

5. Macroeconomic, State and Industry Overview

Section 4 described the modelling approach used in this analysis to forecast labour cost growth over the period 2007-2016. As discussed in the previous section, this approach ensures that the state and industry forecasts are consistent with the national forecast.

This section presents the resulting forecasts of labour costs growth by state by industry. Section 5.1 sets out the current macroeconomic outlook in Australia, as presented in Econtech's *Australian, State and Industry Outlook (ANSIO)* publication. Section 5.2 provides Econtech's forecast of labour cost growth for each state and for each industry. This is followed by Section 6, which presents the detailed labour cost growth forecasts, with particular focus on the Mining, Construction and Utility sectors in Victoria.

5.1 Macroeconomic Outlook

As mentioned in previous section, the labour cost forecasts in this report are consistent with Econtech's national outlook. Thus, to start, this sub-section provides a brief discussion on the outlook of the Australia economy. Detailed national forecasts are available in Attachment B.

Overview

In 2005/06, GDP expanded by 2.9 per cent, slightly up from the 2.7 per cent increase in the preceding year (see Table 5.1). The key driver of growth was business investment, which recorded double digit growth in 2005/06. However, the pace of growth was restricted due to the rise in capital imports. At the same time, weak consumer spending and falling residential construction activity also put a drag on overall GDP growth.

Going forward, GDP growth is forecast to remain unchanged at 3.0 per cent in 2006/07. There are opposite factors to growth prospects. On one hand, household spending will receive a modest boost from the scheduled tax cuts and lower fuel prices. Business investment is also expected to continue its strong growth, albeit at a slower pace. Government investment is also expected to be solid.

After a few years of weak growth, exports are forecast to rebound in 2006/07. This largely occurs on the back of increased production in the mining sector, following the huge amount of capacity expanding investment in recent years. Meanwhile, imports are expected to continue to grow as demand for investment and consumption goods remain strong.

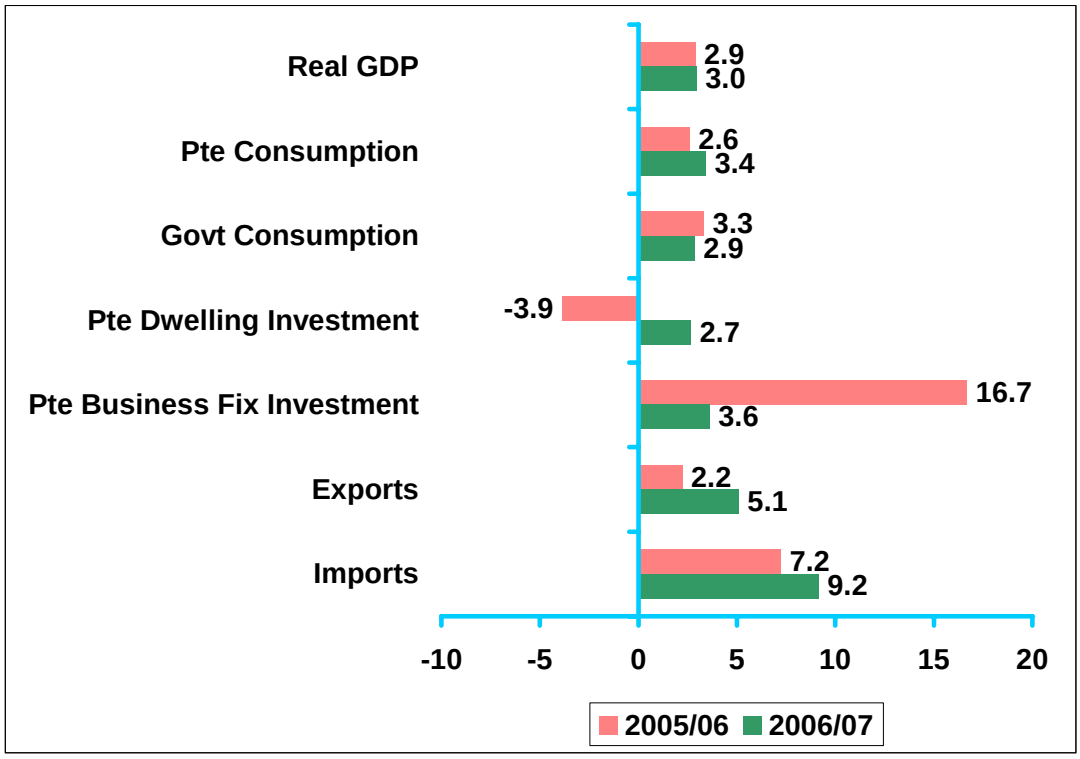
Residential investment is expected to experience modest growth in 2006/07 after declining in the last two years. This occurs in an environment of rising rental yields and low vacancy rates in most areas.

Table 5.1
Key Macroeconomic Variables (%)

	Real GDP growth	Unemployment rate	Employment growth	CPI inflation	Wage growth
history					
1995-96	4.1	8.1	2.9	4.2	5.2
1996-97	3.9	8.3	0.8	1.3	4.8
1997-98	4.5	8.0	1.2	0.0	2.7
1998-99	5.2	7.4	1.9	1.3	3.5
1999-00	4.0	6.5	2.2	2.4	3.6
2000-01	1.9	6.5	2.0	6.0	3.9
2001-02	3.8	6.7	1.4	2.9	4.0
2002-03	3.2	6.2	2.5	3.1	2.3
2003-04	4.1	5.8	1.6	2.4	4.0
2004-05	2.7	5.3	2.9	2.4	4.0
2005-06	2.9	5.1	2.5	3.2	4.6
forecasts					
2006-07	3.0	4.6	2.6	2.8	4.3
2007-08	3.5	4.4	2.1	2.3	4.9
2008-09	2.7	4.3	2.0	2.9	4.9
2009-10	3.1	4.3	1.4	3.0	5.3
2010-11	3.6	4.5	1.0	2.5	5.2
2011-12	3.6	4.6	1.0	2.2	5.1
2012-13	3.0	4.7	0.7	2.3	5.0
2013-14	2.5	5.0	0.3	2.3	4.5
2014-15	2.3	5.3	0.1	2.0	3.5
2015-16	2.4	5.5	0.2	2.2	3.5

Source: MM2

Chart 5.1
Growth in Key Macro Indicators (percentage change)



Source: MM2

Population

The forecasts in this part of the report are based on our demographic model. The demographic model provides the capacity to examine the effect on economic growth of different scenarios for fertility and overseas and interstate migration. In the baseline forecasts, the fertility rate is assumed to decline slightly from 1.7 to 1.6 over the next few years.

Migration, at the national and state levels, is also modelled in the MM2. Over the forecast period, the net migration from overseas is expected to be steady. At the same time, the MM2 also breaks down the share of migrants into the different states. In addition, the MM2 also allows for inter-state migration. The net migration figures will impact on population levels. This, in turn, affects the labour supply – at the national and state levels.

At the industry level, there is no data on migrants for the ANZIC industry codes. This is because, while it is possible to identify the occupation of a migrant, it is difficult to identify the specific industry that the migrant will end up working for. For example, an electrical engineer could work in the manufacturing industry, the mining industry, the electricity industry or even in an engineer consulting company which would be classified as business services industry. As such, it is very difficult to model/forecast net migration by sectors.

One key consequence of the demographic trends being experienced in Australia and in most developed economies is that labour force growth is expected to slow.

In the past, rising female participation rates have meant that the total labour force has risen faster than the population of working age. However, as female participation rates approach male rates, and ageing of the population becomes more significant, the pendulum is swinging. This will soon end the long era of a rising labour force participation rate. The participation rate, currently around 65 per cent, is expected to enter a new era of steady decline towards the end of this decade.

Offsetting to some extent the initial impact of Australia's demographic destiny is the expectation that labour productivity growth will rebound gradually in the second half of this decade. The potential sources of this productivity growth are the ongoing effects of labour market deregulation, recent strong business investment in new equipment and also the anticipated shedding of marginal workers in some boom industry sectors where rapid employment growth is depressing measured productivity.

Thus, lower labour force growth and higher productivity growth are expected to have broadly offsetting effects on the sustainable rate of economic growth, which remains generally unchanged at about 3 per cent over the medium term. Economic growth has been maintained at above that rate through falling unemployment. However, in the medium term we are forecasting that this will not continue. Rather, the unemployment rate may have now stabilised, meaning that economic growth will eventually settle at a sustainable 3 per cent.

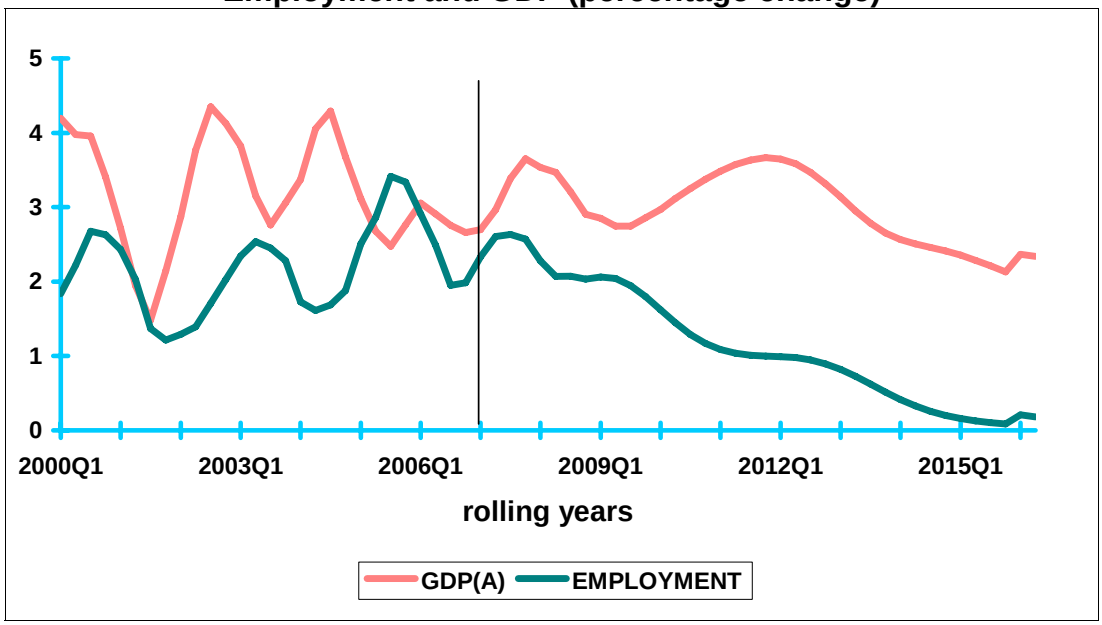
Labour Market

As discussed above, the labour force participation rate has been steadily increasing, and stood at 65 per cent in May 2007. This is largely attributed to more favourable labour market conditions which are attracting entrants to the labour force. However, as noted

earlier, with an ageing population the labour force participation rate is nearing a crest and is expected to start a steady decline by the end of this decade.

Employment growth tends to follow growth in output with a lag. Moderate GDP growth in 2005/06 and 2006/07 is expected to lower employment growth to 2.5 per cent and 2.6 per cent in 2006/07 and 2007/08, respectively (Chart 5.2).

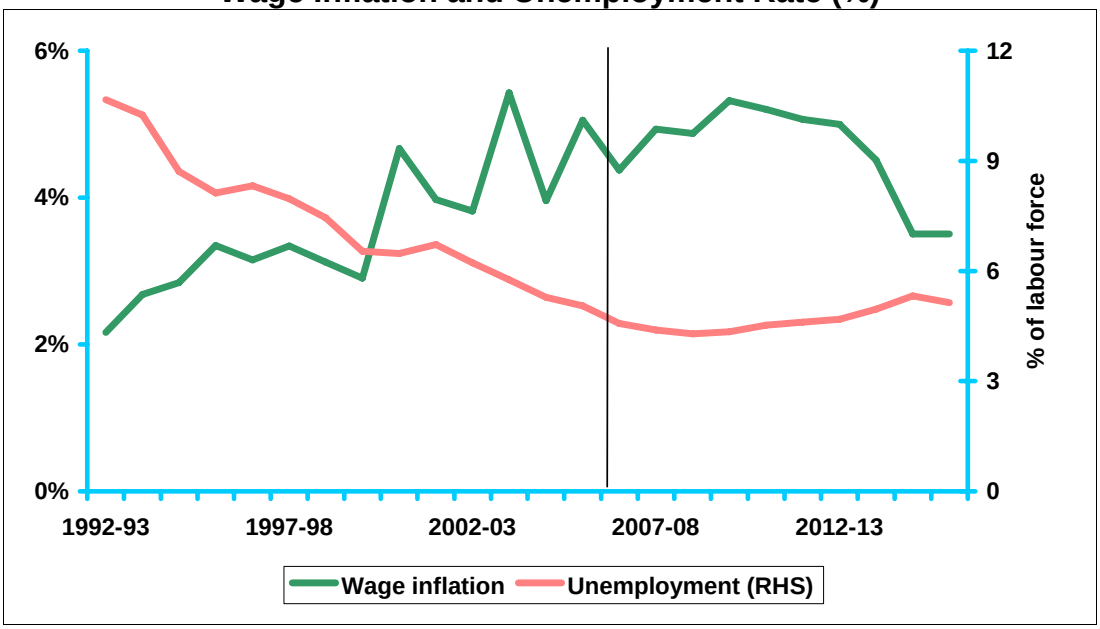
Chart 5.2
Employment and GDP (percentage change)



Source: MM2

Nonetheless, employment growth is currently above trend, and thus the unemployment rate is expected to come in at around 4.6 per cent in 2006/07 (a thirty year low) and remain below 5 per cent in the next few years (Chart 5.3). The tight labour market, as indicated by the low unemployment rate of below 5 per cent, is expected to put upward pressure on wages. As such wage growth is expected to stay around 5 per cent over the next few years, before moderating toward the end of the forecast period. National wages growth is expected to come in at an annual average of 4.6 per cent over the period 2006-07 to 2015-16.

Chart 5.3
Wage Inflation and Unemployment Rate (%)



Source: MM2

Chart 5.4 shows the relationship between growth in real wages and productivity. Increases in productivity growth are expected to lead to higher real wage growth. As shown in Chart 5.4, the two series are highly correlated. Prior to 2002-03, productivity growth outstripped real wages growth. This implies that the labour share of GDP was declining, while the profit share of GDP was increasing.

With low unemployment, wages have increased in the last couple of years. This implies that the labour share of GDP has increased since 2002-03. This trend is expected to continue, until the end of the forecast period.

Chart 5.4
Real Wage Growth and Productivity Growth (%)

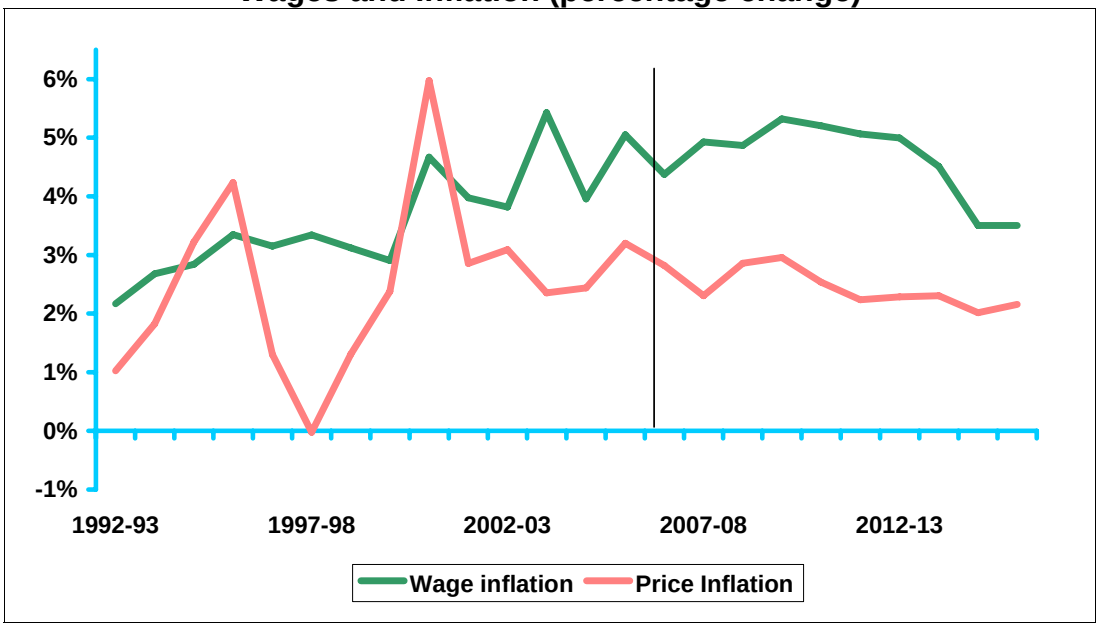
Source: MM2

Inflation

Inflation rose above 3 per cent in 2005/06, but is forecast to moderate to 2.8 per cent this year. This is partly due to the flow on effects of lower oil prices to the rest of the economy. The strengthening of the AUD also curbs imported inflation. For example, the fall in oil prices since October 2006 led to a fall in pump prices, which in turn led to fall in transport inflation. Transport inflation fell from 6 per cent in 2005/06, to 3 per cent in March 2007.

The strong outlook in wages is expected to exert some upward inflationary pressures. However, the AUD is expected to stay above 80 US cents, reducing inflationary pressures in the short term. Strong productivity growth, supported by high business investment, is expected to moderate inflation in the medium term. As such, on balance, we expect inflation to maintain its normal path of 2-3 per cent per annum, consistent with the Reserve Bank's target.

Chart 5.5
Wages and Inflation (percentage change)



Source: MM2

5.2 Sectoral Outlook

This sub-section provides Econtech's outlook for the Mining, Construction and Utility sectors.

Mining

The output of the Mining sector mainly consists of the extraction of minerals, exploration for minerals and the provision of services to mining and mineral exploration. Essentially, the commodities produce by this sector involve the minimum amount of processing to produce a marketable product. Some examples of these commodities are coal, crude oil and iron ore.

2005/06 saw a fall in mining output of 2.8 per cent on the back of a turbulent cyclone season in North-Western Australia, coupled with longer than expected lead times on most mining investments. (See Table 5.2)

Table 5.2
Mining Output and Employment (percentage change)

	Mining - output	Mining - employment
2005-06	-2.0	22.0
2006-07	10.6	6.8
2007-08	8.7	2.9
2008-09	6.8	3.1
2009-10	7.4	3.8
2010-11	7.5	4.2
2011-12	6.2	3.8
2012-13	4.1	2.9
2013-14	2.4	1.9
2014-15	1.0	0.9
2015-16	1.7	1.4

Source: MM2

On the other hand, 2006/07 has seen mining production surge, as the industry is finally beginning to realise the benefits of a period of record investment. The mining industry is expected to experience output growth of 10.5 per cent in 2006/07, in line with a massive increase in production capacity. Strong output growth is likely to continue over the forecast period, as demand from China is showing no signs of slowing, with the Chinese economy recording its fourth consecutive year of double digit growth.

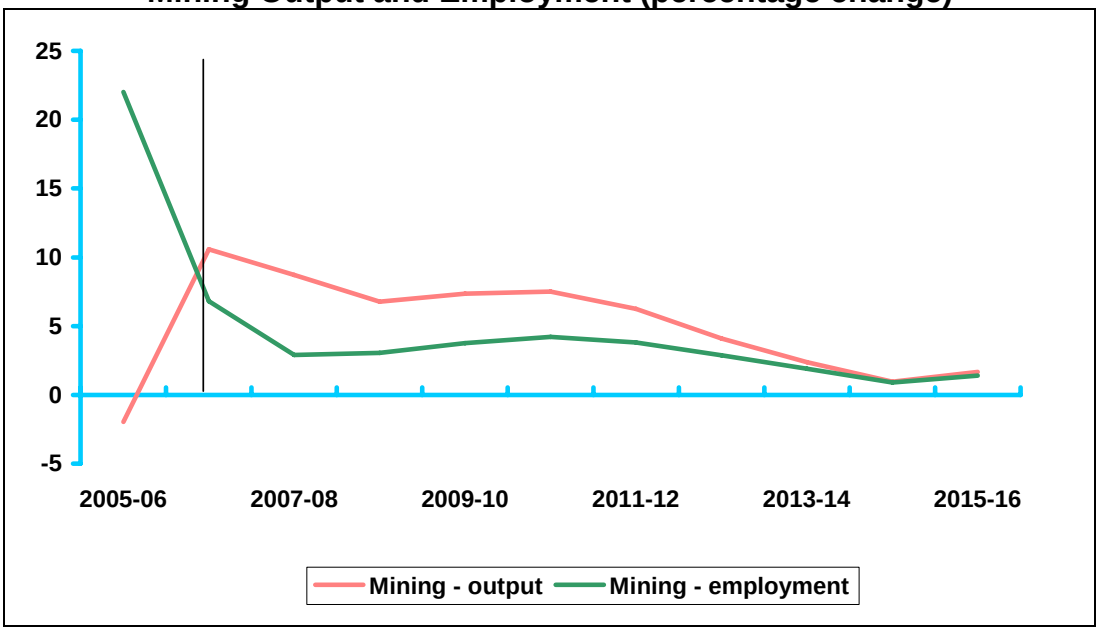
Unsurprisingly, mining exports are expected to grow strongly over the forecast period, with an average growth rate of 11.3 per cent over the three years beginning 2007/08. Again, this reflects the currently high levels of demand in world markets, which is being driven by growth in developing countries.

Investment growth over the next few years is likely to moderate, as the global production of minerals begins to catch up with demand, and commodity prices soften. Investment is forecast to be 8 per cent in 2006/07, before contracting slightly over the forecast period. Despite a likely fall in investment growth, overall investment levels are expected to remain high by historical standards, following phenomenal growth in the three years leading up to 2006/07.

Employment levels are also expected to remain relatively high by historical standards, and employment growth will remain strong as firm's ramp up production in response to continued export demand (see Chart 5.6). This is quite different to Access Economics view.

Under the ABS ANZSIC classification, preparation of mine site, demolition or excavation and mine sites construction are all classified as construction activities. Therefore, it is likely that in the production phase, employment in the construction sector will fall, while employment in the mining sector will remain strong. As such, Mining employment growth in 2006/07 is forecast at 6.8 per cent, and is expected to remain above 3 per cent per annum till 2012. After which employment is likely to moderate to below 2 per cent by 2015.

Chart 5.6
Mining Output and Employment (percentage change)



Source: MM2

Construction

The output of the Construction sector consists of dwellings, other buildings such as offices and retail, engineering construction such as roads and mines, and construction trade services such as site preparation and building completion services. The Construction industry sells 90 per cent of its output as investments to other industries. Therefore the level of investment in the overall economy heavily influences construction activity.

After making a slight recovery in 2005/06, dwelling investment fell in early 2006/07 as the number of building approvals declined. This can be attributed to a number of factors that include recent interest rate rises and changes to superannuation tax rules that have made property investment less attractive.

On the other hand, extremely low rental vacancy rates have put upward pressure on rental yields, which increased by 4.4 per cent between March 2005 and March 2006. This is expected to provide some stimulus for a recovery in dwelling construction. Rising household incomes have also led to increased demand for home renovations, which is expected to support increased dwelling construction over the medium term.

The recent strong performance of the wider construction industry has been driven by high levels of engineering and non-residential construction. In particular, investment in mining production expansion[16], as well as heavy investment in infrastructure by State and Federal governments under Auslink, led to growth in output of 7.0 per cent in 2006/07. Looking forward, levels of activity in engineering construction are likely to moderate over the next few years, in a lagged response to the mineral resources price cycle. Nonetheless, a number of scheduled infrastructure projects will ensure that spending remains high by historical

[16] Preparation of mine site, demolition or excavation and mine sites construction are classified as construction activities.

standards. As such, output for the industry is forecast to grow at a solid 4.7 per cent in 2007/08 (see Table 5.3).

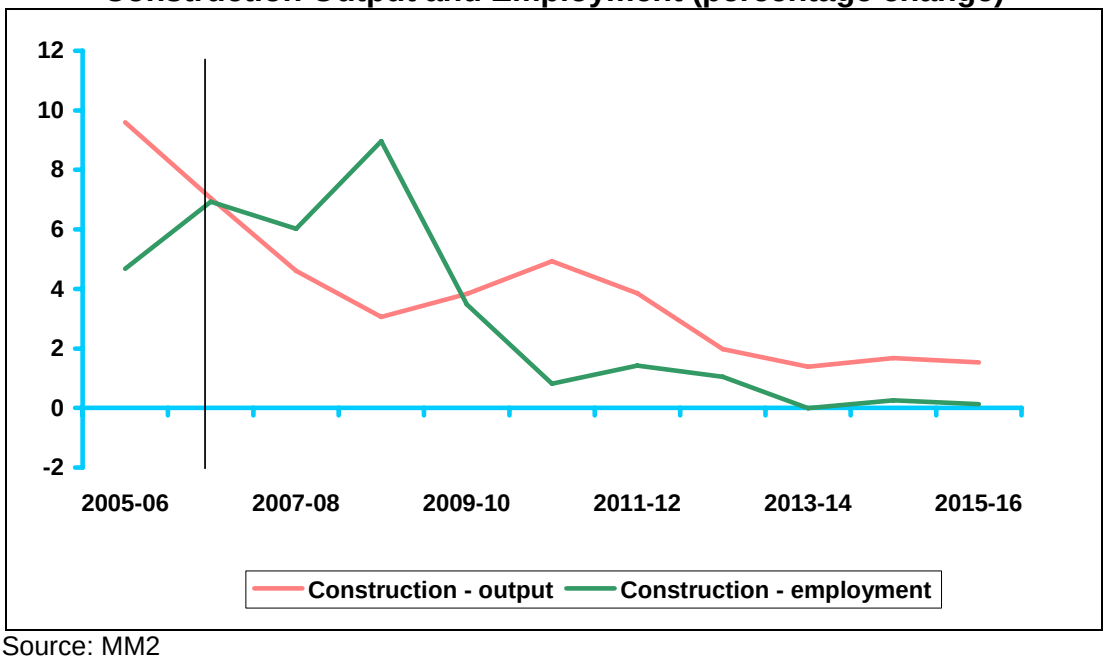
Table 5.3
Construction Output and Employment (percentage change)

	Construction - output	Construction - employment
2005-06	9.6	4.7
2006-07	7.0	6.9
2007-08	4.6	6.0
2008-09	3.1	9.0
2009-10	3.8	3.5
2010-11	4.9	0.8
2011-12	3.9	1.4
2012-13	2.0	1.0
2013-14	1.4	0.0
2014-15	1.7	0.3
2015-16	1.5	0.1

Source: MM2

Employment growth is expected to be supported by continued output growth in this sector, and is forecast to grow at an average rate of 7.3 per cent over the next three years to 2008-09, before levelling off in the long run (see Chart 5.7). Over the period 2009-10 to 2015-16, average annual employment growth in the Construction sector is forecast to come in at 1.1 per cent, which is higher than the national annual average rate of 0.7 per cent.

Chart 5.7
Construction Output and Employment (percentage change)



Source: MM2

Electricity, Gas & Water Supply

The output of the Electricity, Gas & Water Supply (EGW) sector consists of the generation, transmission or distribution of electricity, the manufacture of town gas from coal or

petroleum, and the distribution of town gas, natural gas or liquefied petroleum gas through a main reticulation system. With regards to water supply, the output (or services) includes water storage, purification or supply of water and the operation of sewerage etc.

Prior to 1990, the Australian utilities sector had been dominated by government owned monopolies, under a heavily regulated system that segregated electricity and gas supply by State. Electricity had generally been a State or Territory provided service with limited interaction between the state grids. The natural gas industry was also partly government owned, and consisted of a small number of networks connecting basins to major cities. Inter-state trade in natural gas was often limited by statute, there were very few connections between state networks and competition was constrained by the fact that the majority of the networks were natural monopolies[17].

The early 1990's saw the beginning of a period of dramatic change in the energy sector. A number of government enquiries had identified the need for the deregulation of specific industries. The Hilmer enquiry, in particular, cited the benefits that could be gained by making the energy industry more competitive. Consequently, state governments set about making extensive structural changes to both the gas and electricity markets, with the aim of creating a competitive national electricity market between the eastern states and removing all barriers to the inter-state trade of natural gas[18].

Significant changes in the electricity industry included separating the vertically integrated electricity businesses into individual generation, transmission, distribution and retailing businesses. This allowed generators and retailers in the Eastern States to compete with each other through interconnected power grids, whilst the transmission and distribution monopolies could be regulated to prevent monopoly pricing. In the Victorian context, this process involved breaking the former State Electricity Commission of Victoria into five separate distribution and retail companies that could compete against each other in the National Electricity Market (NEM)[19].

In 1998 the NEM began operating as a wholesale electricity market between QLD, New South Wales, Victoria, the ACT and South Australia (Tasmania joined in 2006)[20]. The NEM allows all of the interconnected state generators to pool their output in a national grid, so distributors and retailers can buy it on the spot market and resell it to consumers in a competitive market. In this way, generators compete with each other as they bid to supply electricity to the NEM, whilst retailers compete against each other in consumer markets.

A number of similar reforms were also made to the gas industry. These included the removal of all legislative and regulatory barriers to inter-state trade, the separation of transmission and distribution units from the state owned gas businesses, and the corporatisation of state owned gas businesses. Further legislative reforms included the creation of the National Third Party Access Code for Natural Gas and the establishment of independent state and territory regulatory bodies. Victoria in particular took significant steps to facilitate the interconnection of the Gippsland Basin and the NSW pipeline system so as to

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[17] Council of Australian Governments, 2002, *Towards a Truly National and Efficient Energy Market*, Independent Review of Energy Market Directions

[18] Australian Energy Regulator, 2006, *2006-08 AER Strategic Plan*

[19] Australian Competition and Consumer Commission, March 2000, *Infrastructure Industries: Energy*

[20] National Electricity Market Management Company Ltd, June 2005, *An introduction to Australia's National Electricity Market*

allow for the sale of Victorian gas in NSW[21]. As a result of the reforms, all of the eastern gas basins have now been linked through a series of interconnected pipelines.

The water industry in Victoria has also undergone a period of change over the past 15 years, although to a lesser extent than the energy sector. Water services remain state owned across Australia, but have recently seen a period of rapid consolidation. In Victoria the number of water boards and trusts providing water supply has fallen from 130 to just 20 since 1991[22].

In the 1990s, EGW had an average growth rate that was among the lowest of all Australian industries. This was due to the impact of increased water and energy conservation on demand. These water and energy conservation efforts have led to a fall in demand, as Australians start to be more aware of their water and energy consumption. The fall in demand consequently led to a slower growth rate for this sector.

At the same time, reforms within this industry (as mentioned above) meant that substantial productivity gains were achieved through corporatisation, outsourcing and privatisation. As a result, labour productivity rose almost continuously from the mid-1980s to 2000.

The cost of electricity has risen sharply over the last year, and price increases are set to continue over the mid term. Price hikes have been driven primarily by water restrictions; as coal powered generators rely heavily on water for cooling purposes. Drought condition have also put pressure on hydro electric generators, with Snowy Hydro recently announcing that its water level was down to 8 percent of active capacity. Nonetheless, demand for electricity has been driven by strong economic growth, and it is likely that output will not be adversely affected in 2007/08.

The demand for gas has also benefited from favourable economic conditions, with activity in the mining sector driving strong output growth in 2006/07. With continued expansion to production capacity, particularly in Queensland, output is expected to grow steadily in 2007/08. As such, output in the Electricity, Gas and Water industry is forecast to grow by 5.0 per cent in 2007/08, with strong growth continuing over the forecast period (see Table 5.4).

Table 5.4
Utility Output and Employment (percentage change)

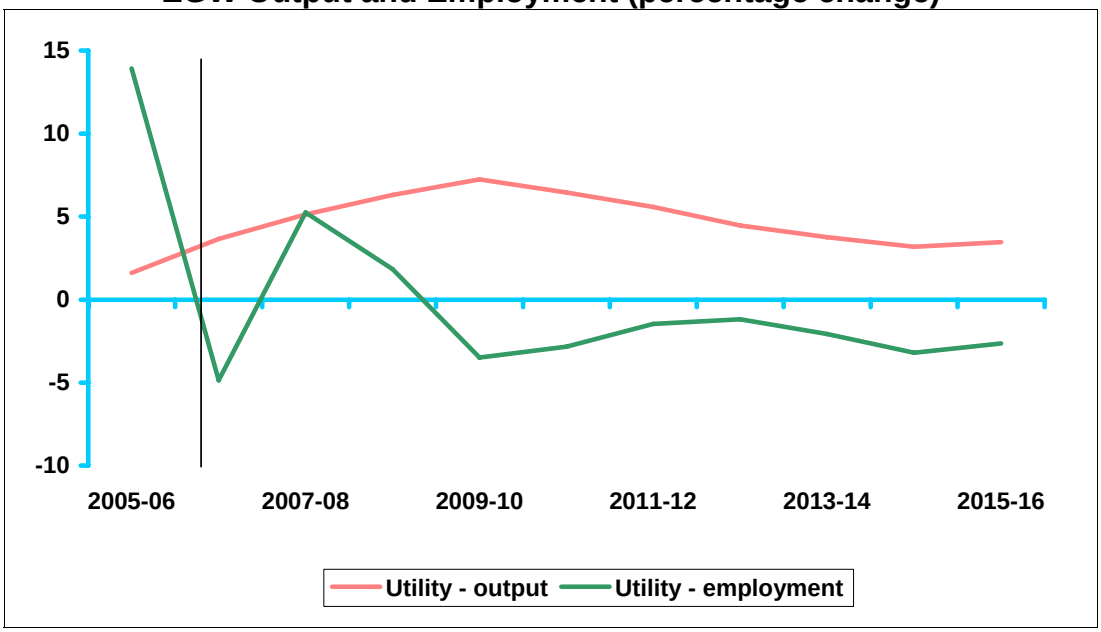
	Utility - output	Utility - employment
2005-06	1.6	13.9
2006-07	3.6	-4.9
2007-08	5.1	5.3
2008-09	6.3	1.8
2009-10	7.2	-3.5
2010-11	6.4	-2.8
2011-12	5.6	-1.5
2012-13	4.5	-1.2
2013-14	3.8	-2.1
2014-15	3.2	-3.2
2015-16	3.5	-2.6

Source: MM2

[21] Australian Competition and Consumer Commission, 2000, *Infrastructure Industries: Energy*
[22] Victorian Government, April 2007, *Victoria's Infrastructure: Status and Prospects*, Final Report to the Council of Australian Governments

The last six months have seen a flurry of activity in this industry in terms of mergers and acquisitions. Recent examples include the acquisition of QLD energy retailers by Origin Energy and AGL Energy, as well as the acquisition and internal restructuring of WA giant, Alinta, by Babcock and Brown. It is likely that the industry will see future productivity gains over the next few years. This is expected to lead to falls in employment in 2006/07, although employment growth will be buoyed by expansions in production throughout 2007/08 and 2008/09 before contracting again over the long run (see Chart 5.8).

Chart 5.8
EGW Output and Employment (percentage change)



Source: MM2

5.3 Outlook for Victoria

This subsection outlines the outlook for Victoria. Detailed forecast for Victoria are presented in Attachment C.

Short-term outlook

In 2005/06, Victorian GSP increased by 2.6 per cent. A decline in net exports, coupled with a fall in dwelling investment, detracted from growth. However this was partly offset by strong business and infrastructure investment.

On the whole, the Victorian GSP growth rate is forecast to come in at 2.1 per cent in 2006/07, unchanged from 2005/06. The main drag on spending in Victoria is the slowdown in non-dwelling investment. Growth in business machinery and equipment investment is also forecast to decline sharply but remain solid, following a surge in the preceding year.

Table 5.5
Key Variables for Victoria (%)

	Gross State Product Growth	Unemployment rate	Employment growth	CPI inflation	Wage growth
2005-06	2.6	5.3	1.9	3.1	7.2
2006-07	2.1	4.5	2.4	2.5	7.1
2007-08	3.3	4.4	1.9	2.4	7.1
2008-09	2.3	4.5	1.5	2.7	6.1
2009-10	2.4	4.8	1.0	2.7	6.2
2010-11	2.7	5.1	0.7	2.3	5.9
2011-12	3.0	5.2	0.7	2.0	5.8
2012-13	2.7	5.3	0.6	2.1	5.6
2013-14	2.4	5.4	0.3	2.1	4.8
2014-15	2.2	5.5	0.2	1.8	3.7
2015-16	2.3	5.4	0.2	1.9	4.2

Source: MM2
Notes: (a) All variables are shown as % change unless otherwise specified.
(b) The unemployment rate are shown as per cent

Meanwhile, dwelling investment is expected to rebound somewhat from its previous downward trend, in line with a broader recovery in the housing market. Victorian exports are expected to recover slightly in 2006/07. At the same time, imports growth will slow in line with weaker domestic demand. Therefore, net exports figures are expected to improve, and have a less negative impact on growth compared to the preceding year.

Victorian employment grew by 1.9 per cent in 2005/06. Looking ahead in 2006/07, we expect employment to continue to expand by another 2.4 per cent. Therefore, the unemployment rate is likely to slide to 4.5 per cent in 2006/07.

Chart 5.9
Victoria GSP and Employment (percentage change)

Source: MM2

Longer term outlook

Annual growth in domestic demand in Victoria is expected to average around 2.8 per cent for the period 2006-2009.

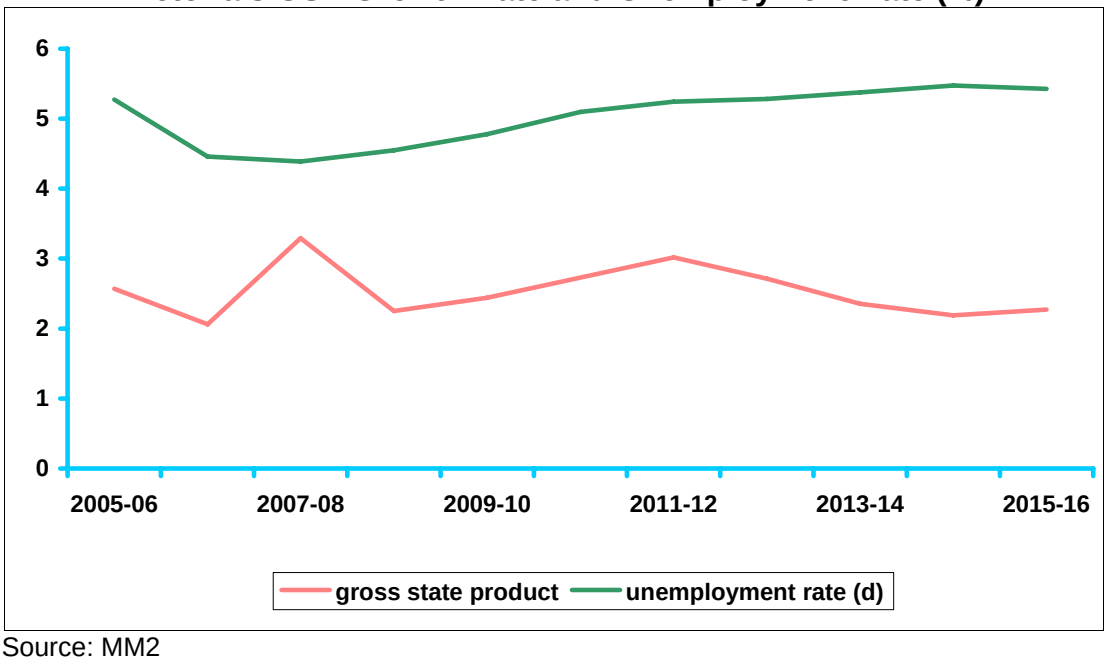
Activity will be largely supported by growth in business investment, particularly in machinery and equipment investment. At the same time, household consumption is expected to expand steadily. A recovery in dwelling investment over the medium term is also expected.

Growth in domestic demand will flow through to higher demand for imports. Despite improvement in exports performance, we expect imports to continue to outstrip exports by a fair margin (in level terms and in growth terms in 2007/08). On balance, we are forecasting GSP growth of 3.3 per cent in 2007/08.

Over the three years to 2008/09, we forecast Victoria's GSP to grow steadily on average by 2.5 per cent per annum. With Victoria's below average population growth, we anticipate GSP per capita to grow at 1.9 per cent per annum, below the national average of 2.1 per cent per annum.

Over the longer term, employment growth is expected to increase, albeit at a slower rate compared to the national level. As such Victoria's unemployment rate will be slightly higher than the national average over the long term.

Chart 5.10
Victoria's GSP Growth Rate and Unemployment Rate (%)



Source: MM2

5.4 Electricity Industry in Victoria

Victoria's energy industry currently consists of businesses at all levels of production, including generation, transmission, distribution and retail businesses. Electricity generation

is dominated by a number of coal fired generators in the Latrobe Valley. The majority of electricity transmission assets are owned by SP Ausnet, whilst distribution assets are owned by four major companies; Cheung Kong Infrastructure, SP Ausnet, Alinta and Diversified Utility and Energy Trust. The major Victorian gas pipelines are owned by a handful of companies that include GasNet, International Power, Origin Energy, CLP Energy and Alinta. The gas distribution network is divided between Envestra, Multinet and SP Ausnet. There are over 10 combined service gas and electricity retailers currently operating in Victoria, the largest of which are AGL, TRUenergy and Origin energy[23].

The Victorian water industry, on the other hand, is entirely state owned and managed through twenty separate water authorities. Within the Melbourne Metropolitan area a single authority (Melbourne Water) provides wholesale water to three retail businesses, whilst 16 other authorities provide a range of distribution, retail and sewerage services to regional Victoria[24].

Wage Movements

Generally speaking, wages growth in an industry is determined by a combination of factors that include inflationary pressures, productivity changes and the forces of supply and demand in the labour market.

These forces act in the following way to influence wage movements:

- High inflation puts upward pressure on wages as employees factor the rising costs of living in to wage demands.
- Increases in worker productivity mean that workers become more valuable to a firm, which allows them to demand higher wages. Decreases in worker productivity have the opposite effect.
- Changes in the supply and demand for labour shift the relative power of employers and employees in negotiating wages i.e. if demand is greater than supply, employers will have to pay more to attract the workers that they need.

The electricity, gas and water industry has exhibited above average wage growth over the last three years when compared to wage growth across the economy as a whole (see Table 5.6). Over the period 1986-1996, average wage growth in the overall electricity, gas and water industry was 5.4 per cent, compared to average wage growth of all industries of 4.5 per cent. A similar trend is also observed over the period 1996-2006, at both the national level and in Victoria. On average, wage growth in the electricity, gas and water industry is around 1 percentage point higher than the average wage growth of all industries.

Table 5.6
Average Nominal Wage Growth (%)

	Overall Australia	Overall Victoria	Electricity, Gas and Water - Overall	Electricity, Gas and Water - Victoria
1986-1996	4.5	4.4	5.4	5.6
1996-2006	3.9	3.8	5.4	4.4

Source: ABS and LCM

[23] Ibid
[24] Ibid

Although inflation has become a worrying issue over the last 18 months, it is more apt to view wages and earnings growth as a driver of accelerating inflation (in this particular circumstance) rather than the other way around i.e. increasing wages have led to higher consumption, bidding up prices. In the Victorian context it is also important to note that state inflation came in well below the national average in 2005/06, suggesting any effect that inflation is having on wages would be weaker in Victoria[25]. Likewise, productivity movements in the electricity gas and water industry have not been conducive to wage increases in recent times. Indeed, productivity growth has been negative in this industry since 2000/01[26], whilst wage growth has been relatively strong, which would suggest that recent wage movements must be the result of discrepancies between labour demand and labour supply.

Over the last decade the Australian economy has experienced strong economic growth that has seen the unemployment rate fall to as low as 4.3 per cent in May 2007[27]. This has resulted in an extremely tight labour market, putting pressure on the available supply of skilled labour and a skills shortage currently exists in most professional occupations and trades. The effect of such a tightening in the labour market has been to put upward pressure on wages in some sectors, as businesses are being forced to offer higher wages to attract skilled workers. The utilities sector in particular has been hit hard by the skills shortage, given the nature of demand for its output as well as the fact that it is forced to compete for workers with both the construction and mining industries.

On the demand side, Victorian demand for electricity and gas has grown only modestly, as the average labour intensity of its economy has been gradually declining[28]. Nonetheless, the boom in the energy intensive mining and construction industries has supported strong demand for energy across the Australian economy. Even though the demand for Victorian energy was not strongly effected by the mining boom (Victoria is isolated from Western Australia and did not export electricity to Queensland in 2005/06[29]), the overall effect across the Australian economy was to increase the demand for electrical and gas related trades, putting upwards pressure on wages.

Another distinguishing feature of this industry is that electricity, gas and water are considered essential services for business and consumers. As such, their supply must be reliable and activities within the industry are less responsive to increases in input costs. In other words, maintenance and supply activities in the electricity, gas and water industry cannot be delayed or cancelled when input prices such as wages increase in the short run. This means that businesses in this industry have a greater imperative to attract and maintain skilled workers and are more likely to absorb wage increases in order to maintain labour supply.

On the supply side of the labour market, the utilities sector has obviously suffered from the scarcity of skilled labour that is currently afflicting most of Australia. Studies of the Victorian labour market have shown that there is a general shortage in most trades and a

[25] Econtech, May 2007, *Australian National State and Industry Outlook*
[26] Access Economics, 12 April 2007, *Labour Cost Indices for the Energy Sector*
[27] Australian Bureau of Statistics, June 2007, *Catalogue Number 6202.0*
[28] Victorian Government, April 2007, *Victoria's Infrastructure: Status and Prospects*, Final Report to the Council of Australian Governments
[29] Australian Bureau of Agricultural and Resource Economics, 2007, *Energy in Australia 2006*

number of key professions, which is in line with the rest of Australia[30]. Relevant skill shortage areas for the utilities sector include engineers, electrical engineers, gas fitters and electricians. Surveys of the electricity, gas and water industry in regional Victoria have also shown that the industry is feeling the effects of the skills shortage, with employers reporting difficulties in retaining staff at a much higher rate than the state average (31 per cent compared to 19 per cent)[31]. This has obviously had an inflationary effect on wages as a large number of employers have been forced to offer higher wages in an effort to retain staff. Indeed, the same survey revealed that 48 per cent of employers that were surveyed had offered higher wages and better working conditions in order to retain staff compared with a state average of 44 per cent. These figures do go some of the way to explaining why wages growth in utilities has been greater than the national average.

One of the main reasons that the electricity, gas and water industry has had such difficulty in retaining skilled staff has to do with demand booms in related industries. The electricity, gas and water industry employs a large proportion of electricians, electrical engineers and engineers; categories that are also employed extensively by the construction industry and the mining industry. As such, the current mining and construction boom that has been taking place over the last few years has caused competition between the industries in these particular skill areas. Consequently, wages growth in all three of these industries has recently been well above average as the jump in demand for skilled labour has exacerbated the effect of the underlying supply shortage.

[30] Department of Employment and Workplace Relations, July 2006, *Skills in Demand Lists: States and Territories 2006*

[31] Victorian Government, October 2006, *Regional Skills Shortage Survey: Victoria: Report*

6. Detailed Labour Cost Forecasts

This section highlights the key labour cost forecasts from the LCM which are relevant to the report. Further detailed results are presented in Attachment D.

The analysis in this section uses compound average growth rates when presenting the results. This is in comparison to the simple average growth rates that are provided in the previous studies. Compound growth rates measure the rate of change (per annum) in a value between two points in time. It differs from a simple average, by only focusing on the beginning value and the ending value. Compound averaging provides a more precise and informative estimate of the average annual growth over time, compared to a simple average of yearly growth rates.

This is best illustrated with an example. For instance in Table 6.1, with the same wage data, using the compound average method will arrive at 10 per cent, whereas the simple average method will arrive at an overestimated 15 per cent.

Table 6.1
Simple Illustration - Wages

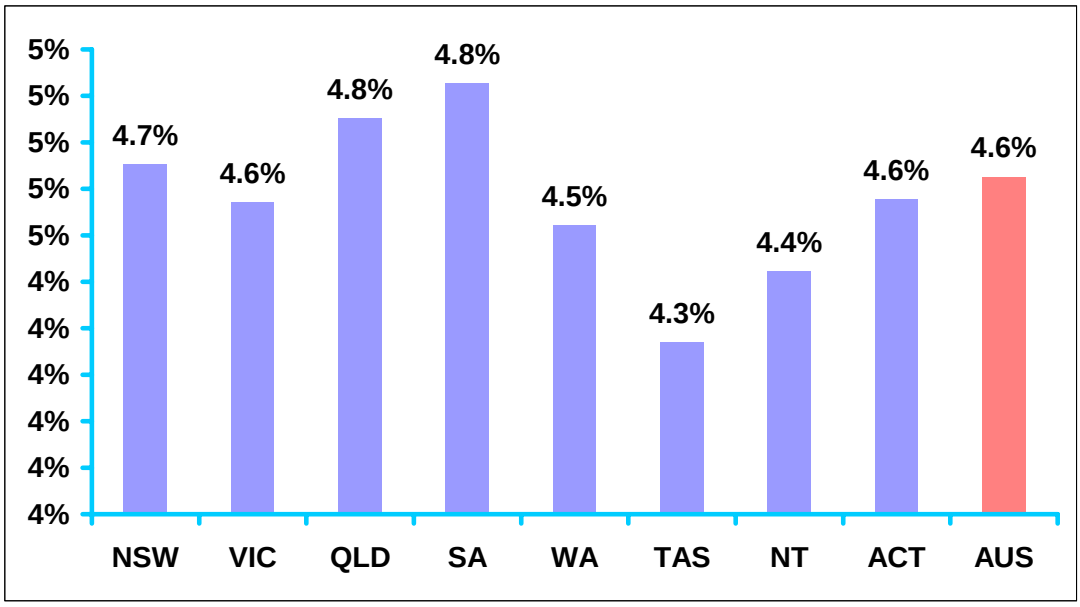
	Level	Growth
Year 0	1000	
Year 1	800	-20%
Year 2	1200	50%
	Compound Average	Simple Average
	10%	15%

The first two parts of this section present the resulting wage growth estimates from the LCM. Section 6.1 provides the wage growth forecasts separately by state and by a selection of industries. Section 6.2 provides the wage growth forecasts at the detailed state by industry level, focussing on the Utility sector in Victoria. Finally, Section 6.3 explains the main drivers behind the forecast growth rates.

6.1 Labour Cost Forecasts by State and by Industry

Chart 6.1 shows the compound labour cost growth rates for each state over the period 2005-06 to 2015-16. The chart shows that NSW, Queensland and South Australia are expected to achieve the highest average annual growth in labour costs over the next ten years. Tasmania and Northern Territory average annual wage growth is expected to be more modest at around 4.3-4.4 per cent. The other States and Territories are expected to achieve close to the national average annual labour cost growth rate of 4.6 per cent over the ten years to 2015-16.

Chart 6.1
National Compound Labour Cost Growth Rates by State
(2005-06 to 2015-16)



Source: LCM

Table 6.2 shows the annual labour cost growth rates for the Mining, Electricity, Gas & Water, and Construction sectors over the period 2005/06 to 2015/16.

Table 6.2
Labour Cost Growth Rates, selected industries, 2005/06– 2015/16 (%)

	Mining	Electricity, Gas & Water	Construction	All industries
2005-2006	2.5%	3.5%	4.6%	5.1%
2006-2007	5.7%	4.3%	7.5%	4.4%
2007-2008	2.8%	5.2%	3.8%	4.9%
2008-2009	3.3%	5.7%	4.0%	4.9%
2009-2010	3.7%	7.6%	4.8%	5.3%
2010-2011	3.5%	7.0%	4.9%	5.2%
2011-2012	3.6%	6.3%	4.9%	5.1%
2012-2013	4.0%	6.0%	4.9%	5.0%
2013-2014	3.8%	5.6%	4.4%	4.5%
2014-2015	3.2%	5.0%	3.4%	3.5%
2015-2016	2.7%	4.8%	3.5%	3.5%

Source: LCM

Tables 6.3(a) and 6.3(b) show the average compound growth rates for nominal and real wages in selected industries in Australia, as well as the corresponding inflation figures. As discussed in the previous section, average wage growth for the utility sector has been consistently about one percentage point higher than the all-industry average (in both nominal and real terms) over the period 1986-2006.

Table 6.3 (a)
Average Nominal Wage Growth & Inflation in Australia (%)

	Mining	Electricity, Gas & Water	Construction	All industries	CPI Inflation
1986-1996	6.1	5.4	5.2	4.6	4.9
1996-2006	4.2	5.4	3.5	4.2	2.5
2008-2014	3.6	6.3	4.7	5.2	2.5
2006-2016	3.6	5.7	4.6	4.7	2.4

Source: LCM

Table 6.3 (b)
Average Real Wage Growth in Australia (%)

	Mining	Electricity, Gas & Water	Construction	All industries
1986-1996	1.1	0.5	0.3	-0.3
1996-2006	1.7	2.9	1.0	1.7
2008-2014	1.1	3.7	2.1	2.6
2006-2016	1.1	3.2	2.1	2.2

Source: LCM

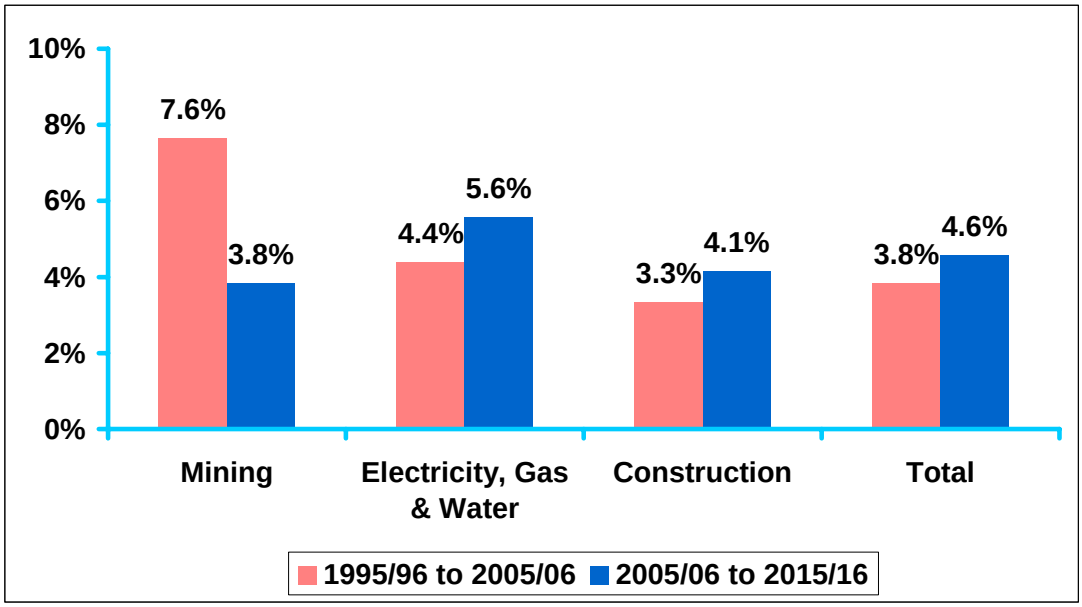
Following this trend, the model also predicts a higher wage growth for the utility sector compared to all-industry average over the next 10 years. Specifically, over the period 2006-2016, overall nominal wages are expected to grow by 4.7 per cent per year. Accounting for an inflation rate of 2.4 per cent per annum, overall real wages are forecast to grow by an annual average of 2.2 per cent. In comparison, average annual nominal wages growth for the utility sector over the period 2006-2016 is 5.7 per cent. This translates to an average annual real wage growth for the utility sector of 3.2 per cent over the same period. These figures again highlight the one percentage point difference between wage growth for the utility sector and the economy as a whole. The main reasons this trend is expected to continue are discussed in Section 6.3.

6.2 Labour Cost Forecasts of Selected Industries in Victoria

Chart 6.2 shows the compound labour cost growth rates for the Mining, Electricity, Gas & Water, and Construction sectors in Victoria over the historical period 1995/96 to 2005/06 and the forecast period 2005/06 to 2015/16. The average annual labour cost growth rates for these industries are presented in Table 6.2.

The chart shows that the compound growth rate for the Electricity, Gas & Water industry has been historically higher than for both the Construction industry and Victoria as a whole. This trend is expected to continue over the forecast period, with industry wage growth estimated at an average annual rate of 5.6 per cent over the ten years to 2015/16. In comparison, after experiencing strong labour cost growth over the last ten years, growth in wages in the Mining industry is expected to return to more modest levels over the next ten years, as the mining boom eases.

Chart 6.2
Ten-Year Compound Labour Cost Growth Rates in Victoria



Source: LCM

It can be seen in Table 6.4 that the estimated year-to-year labour cost growth rates are more volatile. This partly reflects cyclical factors that affect the forecasts.

Table 6.4
Labour Cost Growth Rates in Victoria, 1995/96 to 2015/16 (%)

	Mining	Electricity, Gas & Water	Construction	Overall Victoria
1995-1996	14.9%	3.9%	4.4%	3.7%
1996-1997	18.7%	3.4%	3.5%	1.7%
1997-1998	23.8%	9.0%	11.1%	4.8%
1998-1999	2.5%	0.2%	-5.7%	1.4%
1999-2000	-8.8%	11.8%	-6.4%	1.6%
2000-2001	-1.7%	6.6%	3.6%	4.6%
2001-2002	-6.4%	7.5%	2.7%	4.9%
2002-2003	31.4%	1.0%	15.9%	7.7%
2003-2004	15.9%	-2.0%	4.1%	4.6%
2004-2005	2.8%	2.8%	-0.7%	2.7%
2005-2006	5.2%	4.1%	7.2%	4.4%
2006-2007	5.7%	1.8%	2.1%	2.9%
2007-2008	4.3%	5.9%	4.6%	5.5%
2008-2009	3.9%	6.0%	4.3%	5.1%
2009-2010	3.8%	7.6%	4.9%	5.4%
2010-2011	3.5%	7.0%	4.9%	5.2%
2011-2012	3.6%	6.2%	4.8%	5.1%
2012-2013	3.9%	5.9%	4.8%	5.0%
2013-2014	3.8%	5.6%	4.4%	4.5%
2014-2015	3.2%	5.0%	3.4%	3.5%
2015-2016	2.7%	4.7%	3.4%	3.5%

Source: LCM

Tables 6.5(a) and 6.5(b) show the average compound growth rates for nominal and real wages in selected industries in Victoria, as well as the corresponding inflation figures. Similar to the national level, average wage growth for the utility sector in Victoria is about one percentage point higher than all-industry average in Victoria (in both nominal and real term) over the period 1986-2006.

Table 6.5(a)
Average Nominal Wage Growth & Inflation in Victoria (%)

	Mining	Electricity, Gas & Water	Construction	Overall Victoria	CPI Inflation
1986-1996	2.9	5.6	5.7	4.4	4.9
1996-2006	7.6	4.4	3.3	3.8	2.5
2008-2014	3.8	6.4	4.7	5.0	2.5
2006-2016	3.8	5.6	4.1	4.6	2.4

Table 6.5(b)
Average Real Wage Growth in Victoria (%)

	Mining	Electricity, Gas & Water	Construction	Overall Victoria
1986-1996	-1.9	0.7	0.7	-0.4
1996-2006	5.0	1.8	0.8	1.3
2008-2014	1.2	3.7	2.1	2.5
2006-2016	1.4	3.0	1.7	2.1

The forecast wage growth for the utility sector in Victoria is also expected to be higher compared to the all-industry average in Victoria over the next 10 years. This trend is similar to that at the national level. This partly reflects the point that the wage forecasts at the detailed state level are consistent with overall national figures.

Over the period 2006-2016, overall nominal wages in Victoria are expected to grow by 4.6 per cent per year. Accounting for an inflation rate of 2.4 per cent per annum, overall real wages are forecast to grow by an annual average rate of 2.1 per cent. In comparison, average annual nominal wages growth for the utility sector in Victoria over the period 2006-2016 is forecast at 5.6 per cent. The forecast average annual real wage growth for the utility sector is 3.0 per cent over the same period.

Over the regulatory period of 2008-2014, overall nominal wages in Victoria are expected to grow by 5.0 per cent per year. Accounting for an inflation rate of 2.5 per cent per annum, overall real wages are forecast to grow by an annual average of 2.5 per cent. In comparison, average annual nominal wages growth for the utility sector in Victoria over the period 2006-2016 is estimated at 6.4 per cent. The average annual real wage growth for the utility sector over the same period is 3.7 per cent.

6.3 Factors Driving the Labour Cost Forecasts in the Utilities Sector

The historically higher wage growth in the utilities sector has largely resulted from the recent restructuring in the electricity, gas and water industry. The drive for increased productivity in the industry is expected to have led to a fall in lower-skilled workers, as the industry continued to become more capital intensive. As the lower-skilled workers were displaced, strong growth was achieved in the average wages in the industry.

Higher wage growth in the utilities sector, at the national and state levels, is expected to continue due to a number of different factors. In particular, as mentioned in the earlier section, the utilities sector is experiencing the scarcity of skilled labour that is currently affecting most of Australia.

The electricity, gas and water industry employs a large proportion of electricians, electrical engineers and engineers. As such, it faces competition from industries such as the construction industry and the mining industry for the same type of skilled workers. With the mining and construction boom expected to last for another couple of years, this will continue to boost wages in these industries. In turn, wages for the utility sector will need to also increase so the industry can continue to attract skilled workers.

To address the current skill shortages in these industries, a number of measures have been introduced to actively increase the supply of engineers. For instance the Australian Group of Technical Universities has started a program to encourage students to study engineering[32]. This program is expected to provide an extra 3,300 engineers over the next four years. However the shortage in engineers ranges from new graduates to experienced senior managers. As such, while the new program could provide additional engineers, it will take some years before these new engineering graduates are experienced enough to also fill the more senior level shortages. This means that the wage pressures for experienced engineers are unlikely to ease in the near future.

Additionally, skilled migration has also been used to help ease the supply gap for engineers. According to Engineering Australia, the number of immigration applications by engineers is on the rise[33]. However, despite this increase in skilled migrants, it is still insufficient to meet the rising demand.

One reason that the skilled migration is not meeting demand may be the difficulty some migrants experience in gaining skilled employment. While migrant engineers sponsored by Australian employers have relatively easy entry into the Australian labour market, many migrants who enter under the independent permanent migration stream may find it difficult to gain employment in the Australian labour market as an engineer[34]. According to Engineers Australia, there are several reasons for these difficulties. These include:

- scepticism by employers about the strength and value of the person's qualification;
- lack of Australian work experience and unfamiliarity with Australian standards and regulations and understanding the work culture; and
- ability of the prospective employee to present relevant/local experience.

[32] ABC News online, *Uni scheme to ease engineer shortage*, 8 June 2007.
[33] Engineers Australia, *Engineering Skilled Migration*, March 2006.
[34] ibid

7. Comparison of Labour Cost Forecasts with Previous Studies

This section compares Econtech's labour cost growth forecasts with results from previous studies. In particular, this section focuses on reports by BIS Shrapnel and Access Economics.

Given that Econtech's forecasts at the detailed level are driven by the national forecast, the first step is to compare the differences at the macroeconomic level. Specifically, the key variables that are of interest in this report are:

- CPI inflation forecast;
- Productivity forecast;
- Overall wage forecast; and
- Business cycles, if any.

Table 7.1 shows the forecasts of growth rates of overall CPI, wages and productivity over the period 2006-07 to 2015-16 by Econtech, Access Economics and BIS Shrapnel.

Table 7.1
Comparison of Growth Forecast at National Level (%)

	CPI forecast		Wages			Productivity	
	Econtech	BIS	Econtech	BIS	Access Economics	Econtech	BIS
2005-06	3.2	3.2	4.6	4.8	n.a.		0.6
2006-07	2.8	3.1	4.3	4.1	4.1	0.4	0.8
2007-08	2.3	3.0	4.9	5.8	4.6	1.4	1.5
2008-09	2.9	2.9	4.9	4.9	4.4	0.7	2.5
2009-10	3.0	2.3	5.3	4.4	4.0	1.6	2.5
2010-11	2.5	2.9	5.2	5.3	4.3	2.5	0.9
2011-12	2.2	3.2	5.1	5.6	5.0	2.6	0.8
2012-13	2.3	3.2	5.0	5.4	5.2	2.2	0.9
2013-14	2.3	n.a	4.5	4.8	4.7	2.2	2.3
2014-15	2.0	n.a	3.5	4.4	4.6	2.2	1.5
2015-16	2.3	n.a	3.5	5.4	4.6	2.3	2.2
2008-2014	2.5	2.9*	5.0	5.1	4.6	2.0	1.6
2006-2016	2.5	n.a	4.6	5.0	4.5	1.8	1.6

Source: Econtech, Access Economics and BIS Shrapnel
Note: 2008-2014 indicates the compound growth rate between 2007/08 and 2013/14. Similarly, 2006-2016 indicates the compound growth rate between 2005/06 and 2015/16.
*5 years average between 2007/08 to 2012/13

For ease of comparison, it would be better to compare the average growth rate of the nation-wide variables of Econtech, Access Economics and BIS Shrapnel. Thus, Table 7.2 summarises the growth rates in each study.

Table 7.2
Average Annual Growth Forecast at National Level (%)

	Econtech	BIS	Access Economics
CPI forecast			
2008-2014	2.5	2.9*	n.a.
2006-2016	2.5	n.a.	n.a.
Nominal Wage			
2008-2014	5.0	5.1	4.6
2006-2016	4.6	5.0	4.5
Real Wage			
2008-2014	2.4	2.2	2.6
2006-2016	2.1	n.a	2.2
Productivity			
2008-2014	2.0	1.6	n.a.
2006-2016	1.8	1.6	n.a.

Source: Econtech, Access Economics and BIS Shrapnel
Note: 2008-2014 indicates the compound growth rate between 2007/08 and 2013/14. Similarly, 2006-2016 indicates the compound growth rate between 2005/06 and 2015/16.
*5 years average between 2007/08 to 2012/13

Compared to Econtech, BIS has a similar nominal wages growth forecast over 2008-2014 and a higher wages growth forecast over 2006-2016. Over the period 2008-2014, both Econtech and BIS expect wages to increase by 5.1 and 5.0 per cent per annum, respectively. In contrast, Access Economics forecasts nominal wage growth at a lower rate of 4.6 per cent per annum over the same period.

Over the longer period 2005/06 to 2015/16, BIS has a higher nominal wage growth forecast than Econtech. BIS forecasts an average annual growth rate of 5 per cent, whilst Econtech's forecasts show nominal wages increasing by 4.6 per cent per annum. Access Economics' forecast of nominal wages over the same period is 4.5 per cent per annum, which is in line with Econtech's forecasts.

The three main drivers that influence wage growth are inflation, productivity growth and the tightness of the labour market. The Access Economics report does not provide details of these drivers, thus it is difficult to understand the differences in the wages forecasts by Access Economics and Econtech. The following points summarise the outlook for the drivers by Econtech and BIS.

- Both Econtech and BIS expect higher inflation in the future. While Econtech forecasts some inflationary pressure over the period 2008-11, inflation is expected to ease in the outer years, consistent with the RBA target zone of 2-3 per cent inflation. BIS, on the other hand, expects inflation to remain high throughout the forecast period, at 2.9 per cent per annum.
- Over the forecast period 2008-13, Econtech expects overall national productivity to increase by 1.9 per cent per year. In comparison, BIS expects lower annual productivity growth of 1.5 per cent.

- Both Econtech and BIS expect wages growth to be stronger than would be expected based on CPI inflation and productivity growth alone. This is consistent with the tightness of the labour market.

Table 7.3 shows the difference in the Econtech and BIS forecasts of labour cost growth for the Electricity, Gas & Water Industry. In comparison to BIS, Econtech expects higher growth in labour costs over the period 2008 to 2013. Econtech's forecast is consistent with the historic pattern of wages growth in the utility sector exceeding the average for all industries, both in Victoria and at the national level.

Table 7.3
Nominal Wage Growth Forecast for the Utility Sector – Australia

	Econtech	BIS	Access Economics
2005-06	3.5	1.5	na
2006-07	4.3	4.4	5.6
2007-08	5.2	6.2	5.7
2008-09	5.7	5.4	5.1
2009-10	7.6	5.1	3.6
2010-11	7.0	6.1	3.9
2011-12	6.3	5.9	4.4
2012-13	6.0	5.8	4.5
2013-14	5.6	5.0	4.3
2014-15	5.0	5.4	3.6
2015-16	4.8	6.1	3.9
2008-2014	6.3	5.5	4.3
2006-2016	5.7	5.5	4.5

Source: Econtech, Access Economics and BIS Shrapnel
Note: 2008-2014 indicates the compound growth rate between 2007/08 and 2013/14. Similarly, 2006-2016 indicates the compound growth rate between 2005/06 and 2015/16.

Table 7.4(a) provides a summary of nominal and real wage growth in the Australian Utility sector, while Table 7.4 (b) provides a summary of the nominal and real wage growth in the Victorian Utility sector.

Table 7.4 (a)
Average Annual Wage Growth Forecast for the Utility Sector – Australia

	Econtech	BIS	Access Economics
Nominal Wage			
2008-2014	6.3%	5.5%	4.3%
2006-2016	5.7%	5.5%	4.5%
Real Wage			
2008-2014	3.7%	2.7%	2.3%
2006-2016	3.2%	n.a.	2.1%

Source: Econtech, Access Economics and BIS Shrapnel

Table 7.4 (b)
Average Annual Wage Growth Forecast for the Utility Sector – Victoria

	Econtech	BIS	Access Economics
Nominal Wage			
2008-2014	6.4%	n.a.	4.2%
2006-2016	5.6%	n.a.	4.4%
Real Wage			
2008-2014	3.7%	n.a.	2.3%
2006-2016	3.0%	n.a.	2.0%

Source: Econtech, Access Economics and BIS Shrapnel

Econtech and BIS expect a higher wage growth profile for the Utility sector compared to the respective national wages growth (in both nominal and real terms). Over the period 2006-2016, Econtech forecast nominal wage for all industries and the utility sector to increase by an annual average of 4.6 per cent and 5.7 per cent, respectively. Over the same period, BIS forecast nominal wage for all industries and the utility sector to increase by an annual average of 5.0 per cent and 5.5 per cent, respectively.

Both these Econtech and BIS forecasts are in line with historical trends, where the utility sector appears to have a wage premium. At the same time, the forecasts are also consistent with the assumption that labour market for the utility sector is expected to remain tight in general, and also in comparison to the overall labour market (in view of the lack of experienced engineers). In contrast, Access Economics appear to have a lower wage growth profile for the utility sector, compared to their national wage profile.

For the Victorian Utility sector, Econtech forecast nominal wages to grow by an annual average of 5.6 per cent, and real wages to grow by an annual average of 3.0 per cent over 2006-2016. This profile is consistent with the overall utility sector forecast.

Access Economics expects wages in the Victoria utility sector to increase by 4.4 per cent per annum in nominal terms, or 2.0 per cent per annum in real terms. This forecast is again lower than their wages outlook for the whole industry. In other word, Access Economics expects wages in the utility sector to grow more slowly than the rest of the economy.

While BIS produces wage forecasts for the overall utility sector, it stops short of providing the forecast of wages in the Victorian utility sector. Given that the AER is assessing the labour cost for VenCorp and SP Ausnet, the wage profile of the Victorian utility sector would be more relevant than the overall utility sector.

Nonetheless, on the whole, while BIS does not provide a wage forecast for the Victorian utility sector, its national and overall utility wage profiles are fairly consistent with Econtech.

Attachment A – Murphy Model 2 (MM2)

Econtech's forecasting tool, Murphy Model 2 (MM2), is Australia's leading national, industry and state forecasting model. It has a highly respected forecasting track record and is used by Federal and State Governments, industry associations, financial institutions and major companies. Subscriptions to forecasting reports and Windows-based forecasting software are available.

Development

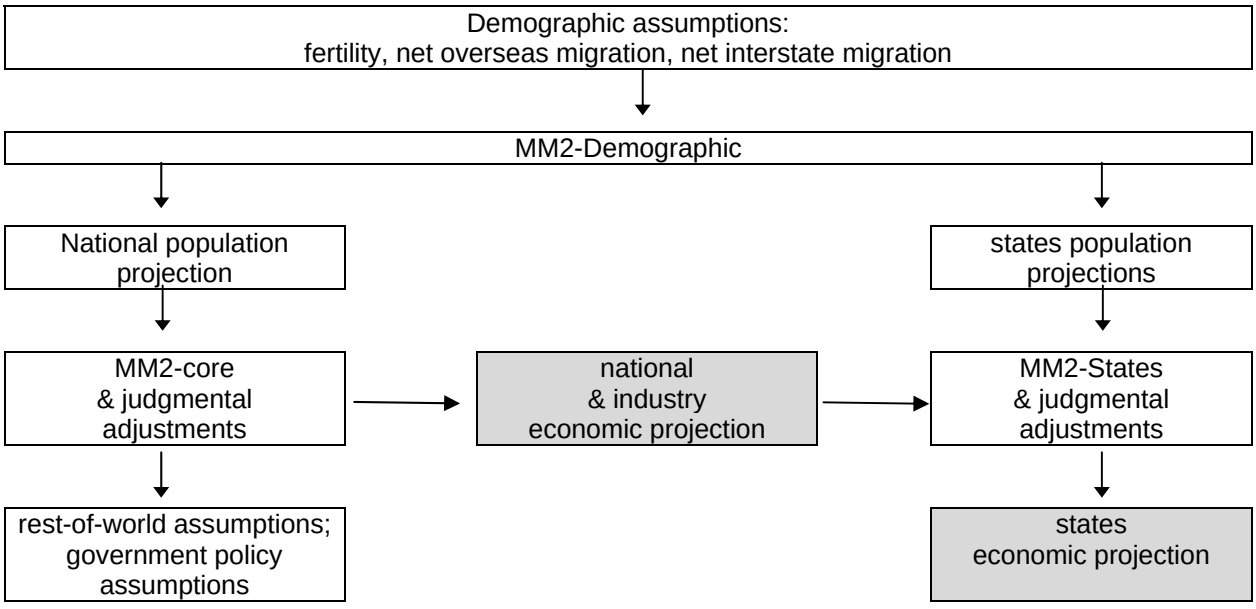
The original Murphy Model was developed by Chris Murphy, after ten years of experience in macroeconometric modelling at the Australian Treasury, Economic Planning Advisory Council, and the Australian National University. In 1988, Chris published the first version of the Murphy Model in Australian Economic Papers, and it was soon recognised as Australia's leading national or macro model.

In 1994, the first major redevelopment of the model was undertaken to distinguish 12 industry sectors. This marked the introduction of the Murphy Model 2 (MM2), a fully integrated macro and industry model.

In 1995, under contract to two state treasuries, the MM2-States was developed as an extension to MM2. The MM2-States allocates a number of MM2's key outputs across the eight Australian States and Territories.

In the same year, the current version of MM2-Demographic was developed under contract to the Australian Bureau of Immigration Research. Using assumptions for fertility, mortality, overseas and interstate migration, it generates consistent state and national population scenarios.

In 1996, the MM2 was further developed to expand the sectoral detail from 12 sectors to the 18 sectors corresponding to the Australian and New Zealand Standard Industrial Classification (ANZSIC) industry divisions. The linkages between the three models are illustrated below.



Features

MM2 is a state-of-the-art, fully-integrated macro-industry model with the following features:

- produces quarter-by-quarter nine-year-ahead forecasts;
- forward-looking financial sector for realism;
- Keynesian short-run for forecasting; and
- neoclassical long-run for policy analysis.

Documentation

Powell, A.A. and Murphy, C.W. (1997), *Inside a Modern Macroeconometric Model - A Guide to the Murphy Model, Springer*, Berlin, 2nd ed., 455pp.

MM2 Forecasting Services

The MM2 suite of models is used every quarter to produce comprehensive and up-to-date economic forecasts at the national, industry and state levels.

The national, industry and state forecasts are available in a group of forecasting reports. By also subscribing to the MM2 forecasting software service, clients can easily vary any of Econtech's assumptions to produce their own forecasts and alternative scenarios.

Consulting

As well as forecasting services, MM2 has also been used in several consulting projects as follows.

- "Economic Effects of the Recent Tourism-Related Events on the Tourism Sector and the Economy", prepared for the Department of Industry, Tourism and Resources (2001)
- "The Economic Impact of 2000/01 Migration Program Changes", prepared for the Department of Immigration and Multicultural Affairs (2001).
- "Economic Modelling of The Cost of Presenteeism In Australia", prepared for Medibank Private (2007).
- "Victorian Water Industry Construction Price Indexes", prepared for City West Water, South East Water, Yarra Valley Water and Melbourne Water for submission to the Essential Services Commission (2007).

Attachment B – Detailed National Forecasts

DESCRIPTION	UNITS	2005-06 history	2006-07 forecast	2007-08 forecast	2008-09 forecast	2009-10 forecast	2010-11 forecast	2011-12 forecast	2012-13 forecast	2013-14 forecast	2014-15 forecast	2015-16 forecast
PRIVATE CONSUMPTION	%change	2.6	3.4	3.7	3.2	2.0	1.9	2.6	2.9	2.6	2.4	2.5
GOV'T CONSUMPTION	%change	3.3	2.9	2.3	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.4
PRIVATE DWELLING INVESTMENT	%change	-3.9	2.7	0.1	-0.2	3.3	6.2	4.2	0.8	0.3	1.5	0.9
PRIVATE NON-DWELLING CONSTRUCTION INVESTMENT	%change	23.4	7.4	4.4	4.7	3.7	3.7	3.7	2.9	2.0	1.5	1.7
PRIVATE EQUIPMENT INVESTMENT	%change	13.1	1.4	6.3	4.7	3.7	3.7	3.7	2.9	2.0	1.5	1.7
PUBLIC ENTERPRISE FIXED INVESTMENT	%change	18.6	6.5	7.2	5.3	4.7	4.9	4.8	4.3	3.9	3.5	3.7
GENERAL GOV'T INVESTMENT	%change	-0.4	14.0	9.6	3.2	0.3	0.6	2.3	2.5	2.5	2.5	2.5
INCREASE IN STOCKS - NON-FARM	%ch. in GDP	-0.4	0.1	0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INCREASE IN STOCKS - FARM & PUBLIC AUTHORITY	%ch. in GDP	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GROSS NATIONAL EXPENDITURE	%change	4.0	3.6	4.0	2.8	2.4	2.7	2.9	2.7	2.3	2.2	2.3
EXPORTS - TOTAL	%change	2.2	5.1	7.8	9.1	8.1	7.3	6.4	5.4	4.3	3.2	3.7
IMPORTS - TOTAL	%change	7.2	9.2	11.6	8.5	4.6	3.4	3.6	3.8	3.2	2.7	2.9
GROSS DOMESTIC PRODUCT (EXPENDITURE BASED)	%change	3.0	2.7	3.0	2.6	3.0	3.5	3.6	3.0	2.5	2.3	2.4
STATISTICAL DISCREPANCY (E)	%ch. in GDP	-0.1	0.3	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0
GROSS DOMESTIC PRODUCT (AVERAGE)	%change	2.9	3.0	3.5	2.7	3.1	3.6	3.6	3.0	2.5	2.3	2.4
GROSS DOMESTIC PRODUCT DEFLATOR	%change	4.8	3.9	2.7	2.6	2.4	2.5	2.5	2.5	2.5	2.3	2.4
NOMINAL GROSS DOMESTIC PRODUCT (INCOME BASED)	%change	7.9	6.9	6.3	5.5	5.6	6.1	6.2	5.6	5.1	4.7	4.9
PRIVATE BUS. FIXED INVESTMENT	%change	16.7	3.6	5.5	4.7	3.7	3.7	3.7	2.9	2.0	1.5	1.7
DOMESTIC FINAL DEMAND	%change	4.4	3.5	3.7	3.1	2.4	2.6	2.9	2.7	2.4	2.2	2.3
PUBLIC FINAL DEMAND	%change	4.0	4.3	3.5	2.6	2.2	2.4	2.6	2.6	2.6	2.5	2.6
PRIVATE CONSUMPTION DEFLATOR	%change	2.4	2.3	2.4	2.8	3.0	2.6	2.3	2.3	2.3	2.1	2.2
CONSUMER PRICE INDEX	%change	3.2	2.8	2.3	2.9	3.0	2.5	2.2	2.3	2.3	2.0	2.2
AVERAGE EARNINGS (NAT. AC. BASIS)	%change	4.6	4.3	4.9	4.9	5.3	5.2	5.1	5.0	4.5	3.5	4.0
EMPLOYMENT	%change	2.5	2.6	2.1	2.0	1.4	1.0	1.0	0.7	0.3	0.1	0.2
PARTICIPATION RATE	per cent	64.5	64.9	65.3	65.7	66.0	66.0	66.0	65.9	65.6	65.3	65.2
UNEMPLOYMENT RATE	per cent	5.05	4.57	4.39	4.29	4.35	4.53	4.60	4.69	4.96	5.32	5.5
UNEMPLOYMENT	pers. '000	536	495	485	483	497	524	538	552	587	633	665
UNEMPLOYMENT BENEFIT RECIPIENTS	pers. '000	621	597	593	593	609	637	653	668	704	751	783
90-DAY BILL RATE (BEG. OF PERIOD)	%p.a.	5.66	5.96	6.50	6.53	6.11	5.66	5.43	5.29	5.06	4.74	4.5
10-YEAR BOND RATE (BEG. OF PERIOD)	%p.a.	5.11	5.78	5.91	5.60	5.34	5.18	5.08	5.00	4.95	4.96	4.9
TWI EXCHANGE RATE (BEG. OF PERIOD)	May '70=100	64.5	62.2	67.2	66.0	64.9	63.9	63.0	62.1	61.3	60.7	59.9
US DOLLAR EXCHANGE RATE (BEG. OF PERIOD)	USc/$A	76.4	74.3	82.7	81.6	80.4	79.7	79.2	78.8	78.6	78.5	78.2
JAPANESE YEN EXCHANGE RATE (BEG. OF PERIOD)	Yen/$A	84.1	85.1	98.5	93.2	88.6	84.9	81.9	79.1	76.5	74.2	71.6
GERMAN MARK EXCHANGE RATE (BEG. OF PERIOD)	DM/$A	1.24	1.14	1.19	1.16	1.14	1.13	1.11	1.10	1.10	1.09	1.08
UK POUND EXCHANGE RATE (BEG. OF PERIOD)	UKPD/$A	0.422	0.405	0.417	0.414	0.412	0.410	0.409	0.409	0.410	0.412	0.412

DESCRIPTION	UNITS	2005-06 history	2006-07 forecast	2007-08 forecast	2008-09 forecast	2009-10 forecast	2010-11 forecast	2011-12 forecast	2012-13 forecast	2013-14 forecast	2014-15 forecast	2015-16 forecast
GOV'T CONSUMPTION	% of gdp	18.2	18.2	18.0	17.8	17.6	17.5	17.4	17.4	17.4	17.5	17.4
GENERAL GOV'T FIXED INVESTMENT	% of gdp	2.12	2.29	2.40	2.39	2.32	2.25	2.24	2.24	2.25	2.27	2.26
PUBLIC ENTERPRISE INVESTMENT	% of gdp	1.82	2.05	2.11	2.02	2.05	2.09	2.12	2.16	2.20	2.24	2.28

Attachment C – Detailed Victoria Forecasts

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
household consumption	2.1	2.7	3.2	2.9	1.7	1.6	2.4	2.7	2.4	2.2	2.3
gov't consumption	3.4	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2
private dwelling investment	-6.6	2.4	0.1	-0.2	3.3	5.8	4.3	0.7	-0.2	1.5	0.7
priv. other building investment	13.1	3.0	-1.6	3.1	3.2	3.4	3.4	2.7	1.7	1.2	1.5
priv. mach. & equipment investment	13.1	4.4	6.4	5.1	4.1	4.3	4.1	3.2	2.3	1.8	2.1
public fixed capital formation	-1.8	8.3	3.8	3.3	1.6	1.4	2.3	2.1	1.6	1.6	1.6
state final demand	3.2	2.5	3.2	2.8	2.2	2.4	2.7	2.5	2.1	2.0	2.1
overseas exports	1.2	4.3	4.5	8.0	7.1	6.4	5.8	5.0	4.3	3.5	3.9
overseas imports	6.3	2.6	7.4	7.3	3.6	2.5	2.9	3.3	2.8	2.4	2.6
net interstate trade (b)	-0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1
gross state product	2.6	2.1	3.3	2.3	2.4	2.7	3.0	2.7	2.4	2.2	2.3
taxes less subsidies on prod'n/imports	4.4	10.3	3.3	4.4	5.7	5.8	5.9	5.6	5.0	4.5	4.7
compensation of employees	7.2	7.1	7.1	6.1	6.2	5.9	5.8	5.6	4.8	3.7	4.2
gross operating surplus (c)	3.3	1.9	6.1	3.6	2.4	3.4	4.3	4.0	4.2	5.0	4.6
nominal gross state product	5.2	5.1	6.2	4.8	4.5	4.8	5.2	5.0	4.6	4.3	4.4
gross state product deflator	1.0	2.9	2.8	2.4	2.1	2.3	2.3	2.2	2.1	1.8	1.9
consumer price index	3.1	2.5	2.4	2.7	2.7	2.3	2.0	2.1	2.1	1.8	1.9
working age pop. (labour force measure)	1.3	1.3	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8
participation rate (d)	64.4	64.5	65.0	65.5	65.7	65.8	65.8	65.6	65.4	65.1	65.2
employment level	1.9	2.4	1.9	1.5	1.0	0.7	0.7	0.6	0.3	0.2	0.2
unemployment rate (d)	5.3	4.5	4.4	4.5	4.8	5.1	5.2	5.3	5.4	5.5	5.4

Source: MM2

(a) all variables are shown as % change unless otherwise specified
(b) net interstate trade is shown as its contribution to the % change in GSP
(c) gross operating surplus includes gross mixed income
(d) the unemployment rate and the participation rate are shown as per cent

Attachment D – Forecasts of Nominal Wage Growth by Industry

	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Mining	2.5%	5.7%	2.8%	3.3%	3.7%	3.5%	3.6%	4.0%	3.8%	3.2%	2.7%
Manufacturing	3.8%	4.3%	6.3%	6.2%	6.1%	5.4%	5.0%	4.9%	4.5%	3.5%	3.4%
Electricity, Gas & Water	3.5%	4.3%	5.2%	5.7%	7.6%	7.0%	6.3%	6.0%	5.6%	5.0%	4.8%
Construction	4.6%	7.5%	3.8%	4.0%	4.8%	4.9%	4.9%	4.9%	4.4%	3.4%	3.5%
Wholesale Trade	4.4%	3.2%	5.7%	5.4%	5.6%	5.3%	5.1%	5.0%	4.5%	3.5%	3.5%
Retail Trade	6.2%	2.9%	3.9%	6.4%	6.2%	4.8%	4.1%	4.2%	4.1%	3.2%	3.1%
Accomm'n, Cafes & Restaurants	5.0%	14.7%	0.9%	3.0%	6.2%	6.9%	6.3%	6.0%	5.5%	4.6%	4.8%
Transport & Storage	3.4%	2.4%	5.7%	5.3%	5.6%	5.3%	5.1%	5.0%	4.5%	3.5%	3.5%
Communication Services	1.6%	4.5%	8.9%	8.2%	8.1%	7.5%	6.9%	6.5%	5.8%	4.6%	5.0%
Finance & Insurance	6.1%	2.0%	6.2%	7.1%	6.9%	6.3%	5.8%	5.5%	4.8%	3.7%	3.9%
Property & Business Services	7.2%	3.3%	5.3%	5.1%	5.5%	5.3%	5.1%	5.0%	4.5%	3.5%	3.5%
Gov't Admin & Defence	3.8%	3.1%	5.9%	5.5%	5.8%	5.6%	5.4%	5.2%	4.6%	3.6%	3.6%
Education	4.8%	2.6%	5.0%	4.9%	5.4%	5.2%	5.1%	5.0%	4.6%	3.6%	3.5%
Health & Community Services	1.9%	4.0%	4.5%	4.6%	5.1%	5.0%	4.8%	4.8%	4.4%	3.4%	3.3%
Culture & Recreation Services	-1.0%	-7.1%	8.3%	5.4%	5.8%	5.4%	5.3%	5.4%	5.1%	4.0%	3.8%
Personal & Other Services	8.9%	11.5%	3.1%	3.7%	4.6%	4.8%	4.8%	4.9%	4.5%	3.5%	3.5%
Total AUS	5.1%	4.4%	4.9%	4.9%	5.3%	5.2%	5.1%	5.0%	4.5%	3.5%	3.5%

Source: Econtech

Attachment E – The Labour Cost Model (LCM)

Section four provides an overall perspective on the LCM model. This attachment to the report describes in more detail the modelling principles behind the LCM and the data sources used in the modelling.

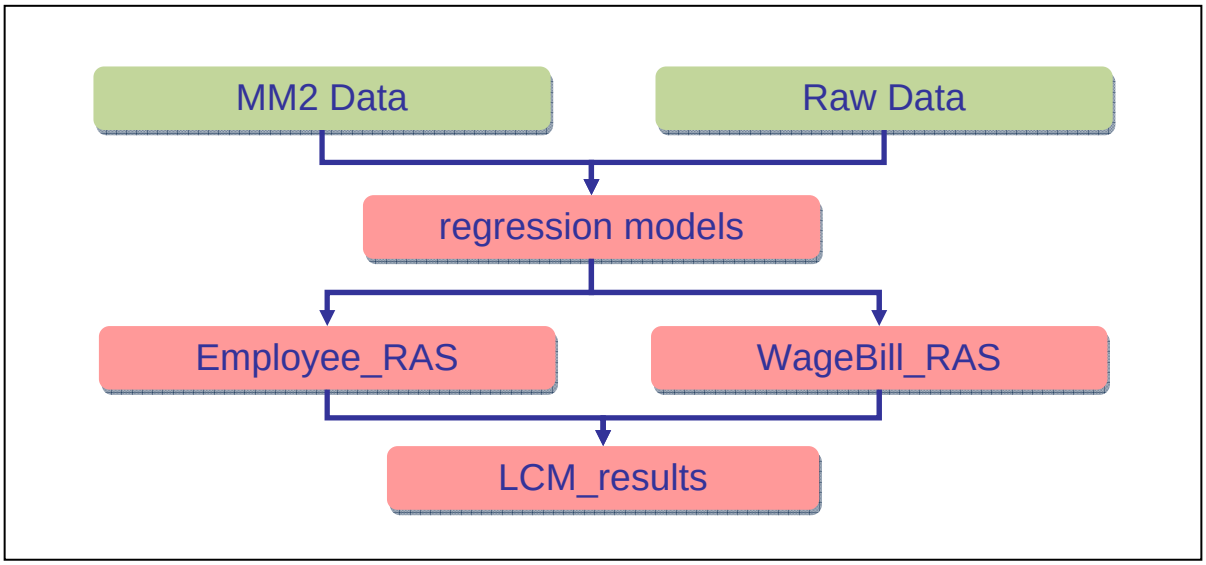
There are four main steps in constructing a model such as the LCM. These steps are outlined below and then discussed in more detail in the following sections.

- The first step is to collect historical data on labour costs in the Australian economy.
- The second step is to forecast, at both the state and industry level, three labour cost and related variables: wages, employees and compensation of employees.
- The third step is to convert the employee and compensation forecasts into detailed state by industry forecasts.
- The fourth, and final step, is use the detailed employee and compensation forecasts to produce detailed forecasts of compensation per employee.

LCM model

The Labour Costs Model (LCM) is made up of four excel workbooks: *regression models.xls*, *Employee_RAS.xls*, *WageBill_RAS.xls* and *LCM_results.xls* (as shown in Figure E.1).

Figure E.1
Structure of the Labour Costs Model



The role of each workbook is as follows:

- *regression models.xls* – read in raw ABS data and MM2 data (Step 1); separately forecasts at the state and industry level, three labour cost and related variables: wages, employees and compensation of employees (Step 2).
- *employee_RAS.xls* – converts the employee forecasts by state and by industry into detailed state by industry forecasts using the Residual Allocation System (RAS) (Step 3).
- *WageBill_RAS.xls* – converts the compensation forecasts by state and by industry into detailed state by industry forecasts in the RAS (Step 3).
- *LCM_results.xls* – uses the detailed compensation and employee forecasts to produce detailed forecasts of compensation per employee by state by industry (Step 4).

Data Sources

The first step involves collecting the appropriate data sources to forecast labour costs. The following data is used in the LCM.

- Average Weekly Earnings by State by Industry - Australian Bureau of Statistics, unpublished data from the *Average Weekly Earnings, Australia* publication (Catalogue no. 6302), February 2007.
- Employees by State by Industry - Australian Bureau of Statistics, *Labour Force, Australia, Detailed, Quarterly* (Catalogue no. 6291.0.55.003), February 2007, Data Cubes E06_nov84 and E06_aug94.
- Employed Persons by State by Industry - Australian Bureau of Statistics, *Labour Force, Australia, Detailed, Quarterly* (Catalogue no. 6291.0.55.003), February 2007, Table 5.
- Forecasts of Employment by State and by Industry - Econtech, *Australian National, State and Industry Outlook*, July 2007.
- Forecasts of Wages - Econtech, *Australian National, State and Industry Outlook*, July 2007.

Data Conversion

First, average weekly earnings and employee figures are combined to obtain total compensation of employees. These data are read into *regression models.xls*. Specifically, the <comp_hist>, <emp_hist> and <wages_hist> worksheets contain the historical compensation, employee and wages data respectively. <MM2> worksheet contains the forecast of national wages and employment by state and by industry from the MM2.

Second, the employment forecasts from the MM2 are converted to employee figures. This conversion is a technical issue because labour cost relates to employees, which would exclude the self-employed.

The conversion from employment to employee figures is done by forecasting the share of employees in total employment. A logistic equation is used to estimate the share of employees in employment for each industry (or state). The logistic equation ensures that the forecast of shares of employees are between 0 per cent and 100 per cent. The logistic equation takes the form of

$$\ln\left(\frac{e_i}{1-e_i}\right)_t = \alpha_0 + \alpha_1 \ln\left(\frac{e_i}{1-e_i}\right)_{t-1} + \alpha_3 timetrend + \varepsilon \qquad (1)$$

where e_i = the ratio of employee to total employment for industry *i* (or State *i*)

The forecasts of the share of employees in employment for each industry (or state) are shown in the <employees-employment> worksheet.

Subsequently, number of employees is derived by multiplying the estimated shares above with the total employment forecasts from the MM2. The employee forecasts are found in <employees> worksheet.

Forecasts Labour Cost by State and by Industry Separately

There are a few technical issues in directly modelling labour costs at the very detailed by state by industry level.

- First, the wage data by state by industry exhibits large volatility (most likely due to small sample sizes). In comparison, labour cost figures by state and by industry separately appear to be more stable.
- Second, modelling labour costs by state by industry would involve estimating 136 series in total, that is, 17 industries in eight states/territories. This is a time consuming process.
- Third, and most importantly, separately estimating 136 labour cost series would potentially lead to inconsistencies in the estimates. As mentioned previously, it is important to ensure the total state and industry figures separately sum to the national figures.

To overcome these technical issues, Econtech has forecast labour costs by state and by industry separately. This is done by using historical state and industry wage data in combination with Econtech's existing MM2 forecast of the national wage. These two data sources are used to forecast consistent wage relativities for each state and territory, and for each of the 17 ANZIC broad industries, separately, using robust econometric analysis. The key driver of these forecasts is the tightness of the labour market in each state and in each industry.

The tightness in the labour market is indicated by the developments in labour demand and labour supply in each industry and in each state. These developments stem from Econtech's outlook for each state and industry. Notably, the labour demand by industry, and labour demand and labour supply by state are published in Econtech's *Australian, State and Industry Outlook (ANSIO)* publication.

Specifically, Econtech forecast the wage relativities between each industry and state. Wage relativity for industry *i* (or state *i*) is calculated as the difference between industry *i* (or state *i*) share of total compensation and industry *i* (or state *i*) share of total employees.

$$Wage\_relativity_i = \left(\frac{compensation_i}{total\_compensation}\right) - \left(\frac{employee_i}{total\_employee}\right) \quad (2)$$

The wage relativities measure how wages in each industry (or state) compared with the national wages. For instance, a positive wage relativity shows that wages in that particular industry (or state) is higher than the national wage, and vice verse. The feature of the wages relativities is that the sum of wage relativity of all industry (or state) will be zero.

Next, regression equations are used to forecast industry and state wage relativities.

$$Wagerelativity_{i,t} = \beta_0 + \beta_1 timetrend + \alpha_1 Wagerelativity_{i,t-1} + \alpha_2 e_{i,t} + \alpha_3 e_{i,t-1} + \varepsilon \quad (3)$$

where e_i = industry *i* (or state *i*) share of total employees

Equation (3) is contains two key elements of the LCM. First, wage relativities between industries are affected by industry employment demand as measured by an industry's share of national employment. An increase in the demand for labour in industry *i* would lead to an increase this industry share of employees. Consequently, wages relativity for this industry would increase as well.

Second, both industry and state wage relativities are modelled in a flexible dynamic framework that also allows for trend-related effects. Wage relativities in this period are expected to depend on the wage relativity in the previous period. At the same time, the wage relativities equation contains a time trend variable.

The regression equations for the industry and state wage relativities are in the <compensation-employees> worksheet. It is important to note that the wage relativity equations are the key equations in the LCM model.

Forecasts Compensation by State and by Industry Separately

After deriving the forecast of industry and state wage relativities, the next step is to forecast compensation for each industry and state. This is done by first calculating the forecast of industry *i* (or state *i*) share of compensation, which is the sum of the wage relativity of industry *i* (or state *i*) and its share of total employees.

Essentially, rearranging Equation (2), we have the following equation

$$\left(\frac{compensation_i}{total\_compensation}\right) = Wage\_relativity_i + \left(\frac{employee_i}{total\_employee}\right) \qquad (2a)$$

Forecast of total compensation is the product of the forecast of national wage and the forecast of total employees.

Therefore compensation for each industry (or state) is obtained by applying the industry (or state) share of total compensation to total compensation. Total compensation of each industry and state are contained in the <compensation> worksheet.

Forecasting Labour Cost by State by Industry

The final step is to convert the forecasts of state wage relativities and industry wage relativities to forecasts of wage relativities by state by industry. A procedure known as the Residual Allocation System (RAS) is used.

The RAS procedure is applied separately to forecasts of total compensation and employees to obtain the forecast by state by industry. The forecasts of total compensation and employees are found in *WageBill_RAS.xls* and *employee_RAS.xls* respectively.

Average wages are then calculated by dividing compensation by the number of employees. This calculation is done in *LCM_results.xls*. This approach has the advantage that the final forecasts of wages by state by industry are fully consistent with the national wage forecasts supplied from MM2 in the first step.