

INPUT COSTS

- 1 This working paper describes the assessment of the effect on State expenses of differences in the price States face for labour, office accommodation and electricity that are due to circumstances outside a State's control — the price differences are unavoidable. These differences are assessed as input cost disability factors. They capture differences in the cost per unit of inputs, and are additional to differences in the demand per person for services. Input cost factors are intended to influence a State's share of the pool — a State facing, say, unavoidably higher costs of labour would incur higher expenses in providing an average level of service and would receive a higher share of the pool.
- 2 Differences in the price of inputs that arise because of State policy choices are avoidable and are not intended to influence a State's share of the pool.
- 3 More detailed and comprehensive discussion on the development of the assessment method is in Volume 7 of the 2004 Review Working Papers and the Commission's various discussion papers¹. Only a summary of the concepts and methods are presented here.

GENERAL

- 4 Labour, office accommodation and electricity are inputs to virtually all State services. Input cost disability factors were applied to 29 expense categories, including Depreciation, but not to categories assessed by equal per capita or actual per capita methods.
- 5 Input cost factors for labour, accommodation, and electricity were assessed separately. The factors for labour were of most importance to the distribution of the pool.
- 6 Detailed discussion of each factor follows.

¹ Discussion Papers *CGC 2002/20 Input Costs*, *CGC 2003/04 Input Costs* and *CGC 2003/11 Wages Input Costs — Technical Update*.

WAGES AND SALARIES

Why do wages and salaries differ

- 7 Wages and salaries are a large component of the costs of government services. The wages and salaries input cost factor (called the wages factor) is applied to between 20 and 100 per cent of average costs in 29 expense categories. Thus, even small interstate differences in wage levels can have substantial effects on the distribution of the pool.
- 8 The task in assessing the wages factor was to measure the extent to which the level of compensation paid to similar employees (defined as employees with similar labour productivity characteristics) differed according to their location (the ‘location’ effect).
- 9 Actual observed wages in the States did not allow the measurement of cost differences because they reflected the differences in productivity characteristics or working conditions of individuals or groups in the State, as well as the differences in wage rates. None of the standard data series on aggregate State wages compiled by the ABS and others compared wages paid to similar employees.
- 10 Hence, the Commission analysed wages data for individual employees in the private sector to separate the ‘location’ effects from labour productivity factors², based on a widely used standard econometric model. By accounting for the productivity effects, location effects could be indirectly estimated³.
- 11 The use of the **private** sector as the benchmark for analysing **public** sector wages is the usual approach in economic literature. This is because the wage cost base in each State is defined by the larger private sector — it typically accounts for 75 to 80 per cent of employment — and the opportunities for cross-location trading. For the Commission, it has the added advantage that it is less contaminated by State policies than public sector data.
- 12 The analysis found that after removing the effects of productivity differences there were differences across States in wages. Those ‘location’ effects arose because the conventional cost-of-living for individuals differed by location based on:
- the cost of a representative basket of consumption goods and services;
 - cost of housing (reflecting an economic cost of housing services rather than cash outlays); and
 - the ‘intangible’ and subjective value placed on location specific amenity (characteristics such as congestion, climate, isolation, big city/small city and proximity to friends/relatives).
- 13 These differences between locations in conventional cost-of-living measures arise because:
- there are restrictions on trade in goods and services;

² Here, the term ‘productivity’ also includes measurable terms and conditions of employment that impact on wages, for example, part-time or full-time.

³ The detailed conceptual discussion is in Volume 7 of the CGC Working Papers for the 2004 Review, at www.cgc.gov.au.

- **all** goods and services cannot be freely traded across locations. For example, personal services such as taxi services, hairdressing salons and repair services. Housing is a major non-tradeable service because employees generally locate themselves close to their job. Because housing competes with alternative economic uses of land, housing costs could be higher if land were relatively scarce; and
 - there are frictional costs (for example, freight costs).
- 14 In summary, differential location effects arise because of differences in the nature and extent of non-tradeable services and ‘intangibles’. These differences exist, even in an otherwise competitive national labour market⁴, because potential employees respond to wage signals in deciding whether there is any benefit in relocating, that is, whether the differences in wages exceeds differences in the broader cost-of-living.
- 15 The Commission’s analysis also indicated broad conformity in the location effects for wage rates paid in the public and private sectors, including occupations concentrated in the public sector.

The 2004 Review approach

- 16 The assessment was done using an econometric model that reflected the conceptual issues outlined above and data from the ABS’s 1997 and 2001 Surveys of Education and Training (SET). The Confidentialised Unit Record File (CURF) data covered people who had a wage or salary job in the 12 months prior to the survey. The data included details by sector of wage levels, hours worked, location, occupation, industry, education and other characteristics of sampled individuals.
- 17 The model sought to explain interstate differences in wage levels in terms of differences in:
- characteristics of employees that are usually associated with productivity (such as type and level of education, experience, occupation and industry); and
 - location specific effects, such as cost of living, especially housing costs.
- 18 In other words, the model estimates the interstate differences in wages paid to comparable employees and attributes them to differences in location specific effects.
- 19 Essentially, the model regressed, separately for the 1997 and 2001 data, the logarithm of earnings (w_t ($t = 1997, 2001$)) on measurable labour market influences (X_x) in the datasets and the State of employment as a location dummy (**DS**).

⁴ It is not levels of wages, but degrees of trading in goods and services and/or movement of labour across locations, that defines whether the private sector labour market is national and competitive. This, together with other factors, determines levels of wages in different locations. In a competitive market, real wages — other labour productivity characteristics being equal — would be equal, but nominal wages would differ to accommodate cost-of-living differences.

$$\begin{aligned}
& \ln(w_t) \\
= & X_{ijt} B_{it} + \varepsilon_t \quad \dots\dots\dots(A) \\
= & I_t \quad (\mathbf{I}: \text{Fixed Intercept}) \\
& + \sum_i DS_{it} * I_{it} \quad (\mathbf{DS}_i \text{ represents dummy variables for each State } i; \\
& \quad \mathbf{I}_i \text{ represents the location effect for each state}) \\
& + \sum_x X_{xt} \beta_{xt} \quad (\mathbf{X}_x: \text{ represents a set of measures of individuals' labour} \\
& \quad \text{market characteristics such as type and level of education} \\
& \quad \text{(EDU), field of education (FEDU), experience (EXP) and} \\
& \quad \text{square of experience (EXPSQ), employment history, etc.;} \\
& \quad \mathbf{\beta}_x \text{ represents returns to such characteristics}) \\
& + \varepsilon_t \quad (\text{stochastic error})
\end{aligned}$$

20 The regression results indicated that, after excluding differences in employee skills, occupations, industry and other productive characteristics, there was consistent evidence of ‘location effects’ across the States in both the private and the public sectors. That is, the values of I_{it} for the States were generally different from each other.

21 The Commission subjected the location effects derived from the regression model to substantial reality testing. Specifically, it:

- compared the results of its model with results from other studies of interstate wage differentials;
- examined widely used ABS data on wages (especially average weekly earnings and the wage cost index) for evidence of divergent trends in wage patterns across States;
- compared estimates of interstate differences in private and public sector wages based on average weekly earnings data and the raw SET data at both the aggregate level and by occupation; and
- examined the main causes of the location effect — especially the changes in house prices over time in the State capital cities.

22 That testing indicated the model results were robust. However, the Commission considered some adjustments to the model results were required to allow for special features of the labour markets in some smaller States, which were not captured in the model.

- The location effect for Tasmania appeared understated because of the low migration of labour into Tasmania’s private sector and because the pattern of economic activity was broadly comparable to regional areas of other States. As a matter of judgment, the Commission set the Tasmanian location effect at the level of the second lowest State (Queensland).
- The location effect for the ACT underestimated the effect of the Commonwealth sector on wage levels. Using judgment, the Commission set the ACT location effect at the average of the calculated effects for the ACT and New South Wales.

- The raw wages data from SET were consistently higher than those from average weekly earnings, especially in 2001. To deal with this and the inevitable uncertainty of model results, the Commission discounted the estimated location effects for 2001 by 15 per cent.

The 2007 Update

23 In the 2007 Update, the Commission updated the estimated location effects by applying new 2005 SET data to the econometric model used in the 2004 Review. In doing so, the Commission considered the need for State specific adjustments to the modelled location effects for Tasmania, the ACT and Western Australia.

- **Tasmania.** The Commission decided that an adjustment was still required but adjusting Tasmania upwards to the level of the second lowest State (Queensland) as was done in the 2004 Review would overstate the adjustment because the two economies were growing at different rates. It decided to set Tasmania's 2005 adjusted location effect at the same level as its 2001 adjusted location effect of - 0.048.
- **The ACT.** Between the 2001 and 2005 surveys, the estimated location effect for New South Wales declined and that for the ACT rose such that there was little difference between them in 2005. The process used to adjust the ACT in the 2004 Review resulted in an immaterial adjustment. The Commission decided not to adjust the ACT's 2005 estimated location effect.
- **Western Australia.** Contextual information indicated that the economic climate has changed in Western Australia. The Commission noted that the wages data of the SET survey related to May to August of 2005 and it possibly would not have adequately captured the changed economic condition over 2005-06 in that State. However, insufficient data were available on which to base any adjustment.

The Commission decided to reconsider the location effects in the 2008 Update when Employee Earnings, Benefits and Trade Union Membership (EEBTUM) 2006 survey and other data became available.

24 The Commission also considered the reasons for applying a general 15 per cent discount to the estimated location effects in the 2004 Review still existed. It decided to discount the estimated 2005 SET location effects (as adjusted for the State specific factors noted above) by 15 per cent.

Developments in the 2008 Update

25 In the 2008 Update, the Commission modelled the location effects using data for private sector employment from EEBTUM 2004 and 2006. The ABS conducts the EEBTUM survey in August each year as a supplement to its Labour Force Survey. The Confidentialised Unit Record File (CURF) data, released in alternate years, covered all persons who had a wage or salary job. The data included details by sector of wage levels, hours worked, location, occupation, industry, and other characteristics for sampled individuals. Unlike the SET data, they did not include educational variables such as level and field of educational attainment.

26 The analysis used the same basic econometric model as the one applied to the SET data, except that educational variables could not be included.

27 Table 1 summarises the modelled location effects based on EEBTUM data for 2004 and 2006.

Table 1 Modelled location effects, EEBTUM survey, 2004 and 2006

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
EEBTUM 2004									
Location effects	0.032	-0.003	-0.029	-0.021	-0.033	-0.043	0.03	0.071	0.000
Standard error	0.004	0.005	0.006	0.009	0.01	0.021	0.025	0.034	0.000
t-value	7.691	-0.53	-4.888	-2.272	-3.264	-2.06	1.195	2.096	0.000
Level of Significance	0.000	0.591	0.000	0.023	0.001	0.039	0.232	2.096	0.000
EEBTUM 2006									
Location effects	0.025	-0.009	-0.011	0.002	-0.044	-0.08	0.045	0.031	0.000
Standard error	0.004	0.005	0.006	0.008	0.010	0.020	0.024	0.032	0.000
t-value	6.240	-1.770	-1.970	0.220	-4.330	-4.080	1.870	0.960	0.000
Level of Significance	0.000	0.077	0.049	0.826	0.000	0.000	0.061	0.338	0.000
Change in location effects	-0.007	-0.006	0.018	0.023	-0.011	-0.038	0.015	-0.04	0.000
Average change per year	-0.004	-0.003	0.009	0.012	-0.006	-0.019	0.008	-0.020	0.000

28 Overall, movements in published wages and wage indices of States provided good support for the direction, though not necessarily the magnitude, of the changes in location effects estimated from the EEBTUM data. Changes to house prices provided somewhat limited support. The contextual information offered strong support for an increased location effect for Western Australia and a reduced effect for New South Wales.

29 A staff discussion paper (New Issues for the 2008 Update — Wages, Staff Discussion paper CGC2007/34-S⁵) was sent to States in September 2007 seeking comments on the use of location effects estimated from EEBTUM data as the basis for adjustments to the 2005-06 location effects derived from SET 2005 data. State comments were specifically sought on the following issues.

- Should the 2005-06 location effects be retained or should an EEBTUM based adjustment to location effects be made for the 2008 Update? (The paper indicated the Commission Staff preference was to make an adjustment based on the difference in the location effects estimated from the 2004 and 2006 EEBTUM surveys.)
- Should State specific adjustments be made to the 2005-06 location effects?

⁵ Staff Discussion Paper 2007/34-S (New Issues for the 2008 Update – Wages) is reproduced as Appendix A to this paper. Its Attachment A listed summary statistics for the sample data of the EEBTUM 2006 survey. Attachment B provided the regression results while Attachment C presented contextual information. The results corresponding to the sample from 2004 EEBTUM data are presented in Appendix B.

- Should the State specific adjustments made to the 2005-06 location effects estimated in the 2007 Update using the SET data continue to be applied?
- Should Tasmania's location effect be set at Queensland's level for the 2008 Update, as it was prior to the 2007 Update.

State views

- 30 **EEBTUM based adjustment to location effects.** Queensland, Western Australia and the ACT supported making a more contemporaneous wages input cost assessment for 2006-07 because there had been significant movements in wage levels since 2005. Western Australia and the ACT accepted an assessment for 2006-07 could be made by adjusting the 2005-06 location effects derived from the SET data using the EEBTUM data. Queensland suggested the Commission should consider using EEBTUM as the sole data source. It said that, based on its own research, SET 2001 data were anomalous and, therefore, not fit for purpose. It recommended replacing the SET2001 data with the average from SET1997 and SET2005 data.
- 31 The other States supported retaining the 2005-06 assessment of location effects. In general, they did so because of concerns about the implications of using data from two sources and concerns about the reliability of the EEBTUM data.
- 32 **State-specific adjustment to location effects — Tasmania.** Tasmania said the SET data did not provide a realistic result for it and urged the Commission to continue to exercise judgement in setting its location effect. It asked the Commission to maintain consistency with its 2004 Review approach and set its location effect equal to that of the State with the next lowest location effect (Queensland).
- 33 The ACT said it would support a continuation of the Tasmanian discount if the conditions that gave rise to the need for an adjustment still applied. However, it supported breaking the nexus between it and Queensland's modelled location effect. If Tasmania's location effect was linked to the State with the second lowest location effect, then EEBTUM 2006 results indicated that would be South Australia not Queensland.
- 34 The other States did not comment on this issue.
- 35 **State-specific adjustment to location effects for the ACT.** Queensland did not support an adjustment to the ACT's location effect because it believed any impact of the Commonwealth government wages was reflected in the ACT private sector wages.
- 36 The ACT suggested its location effect should be set at its modelled location effect plus half the difference between its location effect and that of the second highest State, the Northern Territory. It did not state why its wages should be linked to those of the Northern Territory.
- 37 The other States had no comments on the adjustment to the ACT's location effect.
- 38 **Discount for data uncertainties in EEBTUM surveys.** Queensland supported a discount to wage differentials to offset any inherent data and estimation errors. It urged the Commission to

take a conservative approach because the distribution impacts of the wages assessments were large. It proposed a 50 per cent discount to the modelled location effects.

- 39 Western Australia did not support discounting the location effects for data uncertainty. While the ACT said discounting would not be needed if EEBTUM data were used because those data were better correlated with average weekly earnings than the SET data.
- 40 **General adjustment for SET data uncertainty.** No State commented on the general 15 per cent adjustment for data uncertainty.

Commission decisions

- 41 Commission noted the State concerns about splicing the EEBTUM and the SET data together. However, it considered:
- it was necessary to take account of the evidence that there had been significant movements of wage levels in some States since the SET 2005 data were collected;
 - the proposed statistical approach to making an adjustment was acceptable; and
 - the ABS confirmed that the EEBTUM 2004 and 2006 data were fit for the purpose of making adjustments to the location effects derived from the SET 2005 data.
- 42 The Commission decided to base the wage input costs for the 2008 Update on those derived in the 2007 Update for 2005-06 from SET 2005 data, with adjustments for the circumstances in 2006-07. It based the adjustments on the changes in location effects drawn from the 2004 and 2006 EEBTUM data. Those data suggested relative wage levels rose in Queensland, Western Australia and the ACT and declined in other States. However, only the Queensland and Western Australian movements were statistically significant⁶.
- 43 The Commission therefore adjusted the 2005-06 modelled location effects for Queensland and Western Australia by the annualised change between the estimated location effects from EEBTUM 2004 and 2006 data, discounted by 50 per cent for data uncertainties. The 2006-07 location effects for the other States were those for 2005-06.
- 44 Table 2 shows the 2006-07 modelled location effects, following the Commission's decision.

⁶ Wald Test – a robust test based on definition of multinormal distribution and one that relies on asymptotic normality of parameter estimates – was applied. (See Buse, A. “The Likelihood Ratio, Wald and Lagrange Multiplier Tests: An expository Note”, American Statistician, Vol 36, 1982, pp. 153-57

Table 2 Modelled location effects for 2001, 2005 and 2006

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
2001 SET									
Location effects	0.050	-0.005	-0.048	-0.021	-0.046	-0.079	0.019	0.043	0.000
2005 SET									
Location effects	0.037	-0.004	-0.035	-0.020	-0.024	-0.069	0.031	0.032	0.000
2006-07									
2005-06 modelled effects	0.037	-0.004	-0.035	-0.020	-0.024	-0.069	0.031	0.032	0.000
Adjustment	0.000	0.000	0.004	0.006	0.000	0.000	0.000	0.000	0.000
2006-07 location effect	0.037	-0.004	-0.031	-0.014	-0.024	-0.069	0.031	0.032	0.000

45 The Commission also decided to retain the adjustments made in the 2007 Update:

- it continued to set the 2006-07 Tasmanian location effect at the same level as its 2001 adjusted location effect. It considered aligning Tasmania with Queensland as was done in the 2004 Review was no longer appropriate because the EEBTUM data indicated the location effects of Tasmania and Queensland have diverged markedly. Queensland's economy has been growing and its relative mean weekly earnings have been increasing since 2004, whereas they have declined in Tasmania. The rate of increase in the labour price index for Queensland to 2006-07 was second highest next to Western Australia;
- not to adjust the 2005 modelled location effect for the ACT because an adjustment based on the approach adopted in the 2004 Review (equating the ACT's location effect to the average of that in New South Wales and the ACT) would not be material when applied to the 2005 SET data; and
- to discount the modelled location effects of all States by 15 per cent for SET data uncertainty because the 2005 SET data continued to be the basis of the 2006-07 assessment and uncertainties with those data remained.

2008 Update factors

46 The final factors, shown in Table 3, were calculated using similar steps as in the 2004 Review.

- The raw location effects (A) for 2001 and 2005 were adjusted to reflect the Commission's decision on Tasmania.
- The raw location effects for 2006-07 were derived from the 2005 raw location effects adjusted for the Commission's decision on Queensland and Western Australia, and rescaled (adjusted location effects (B)).
- The adjusted location effects (B) for 2001, 2005 and 2006 were discounted by 15 per cent (discounted location effects: 2001 (C), 2005 (D) and 2006 (E)).

- For 2001-02 to 2005-06, the discounted location effects (F) were calculated using a straight line interpolation, or time weighting (TW), of the discounted location effects for 2001 (C) and 2005 (D).
- The adjusted location effects for 2006-07 were discounted by 15 per cent.
- The raw factors (F) were calculated by taking the exponential of the calculated discounted location effects (E).
- The final factors (G) were calculated by rescaling the raw factors by mean resident population (MRP) to force the Australian average factor to equal one.

Table 3 Factors based on location effects, private sector, 2001, 2005 and 2006

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
Location effects, Original (A) from Table 2									
2001	0.050	-0.005	-0.048	-0.021	-0.046	-0.079	0.019	0.043	0.000
2005	0.037	-0.004	-0.035	-0.020	-0.024	-0.069	0.031	0.032	0.000
2006	0.037	-0.004	-0.031	-0.015	-0.024	-0.069	0.031	0.032	0.001
Location effects, Adjusted For Tasmania and the ACT, and Rescaled (B)									
2001	0.049	-0.006	-0.049	-0.022	-0.047	-0.049	0.033	0.042	0.000
2005	0.037	-0.004	-0.035	-0.021	-0.024	-0.048	0.030	0.031	0.000
2006	0.036	-0.005	-0.032	-0.016	-0.026	-0.049	0.029	0.030	0.000
Location effects, adjusted for Tasmania, and discounted									
2001 (C)	0.042	-0.005	-0.041	-0.019	-0.040	-0.041	0.028	0.036	0.000
2005 (D)	0.031	-0.003	-0.030	-0.018	-0.021	-0.041	0.026	0.027	0.000
2006 (E)	0.030	-0.005	-0.027	-0.014	-0.022	-0.042	0.025	0.025	0.000
Calculated Location effect For Six Years using Time Weights (TW): (F = C*(1 - TW) + TW*D) for 2001-02 to 2005-06 and TW*E for 2006-07									
2001-02 (TW = 0.00)	0.042	-0.005	-0.041	-0.019	-0.040	-0.041	0.028	0.036	0.000
2002-03 (TW = 0.25)	0.039	-0.005	-0.039	-0.018	-0.035	-0.041	0.028	0.033	0.000
2003-04 (TW = 0.50)	0.037	-0.004	-0.036	-0.018	-0.030	-0.041	0.027	0.031	0.000
2004-05 (TW = 0.75)	0.034	-0.004	-0.033	-0.018	-0.025	-0.041	0.026	0.029	0.000
2005-06 (TW = 1.00)	0.031	-0.003	-0.030	-0.018	-0.021	-0.041	0.026	0.027	0.000
2006-07 (TW = 1.00)	0.030	-0.005	-0.027	-0.014	-0.022	-0.042	0.025	0.025	0.000
Calculated Raw Factors (G =EXP (F))									
2001-2002	1.04263	0.99488	0.95953	0.98146	0.96117	0.95953	1.02872	1.03621	1.00057
2002-2003	1.03995	0.99531	0.96222	0.98171	0.96572	0.95967	1.02806	1.03387	1.00047
2003-2004	1.03727	0.99574	0.96492	0.98196	0.97030	0.95981	1.02740	1.03154	1.00038
2004-2005	1.03460	0.99616	0.96763	0.98222	0.97490	0.95995	1.02675	1.02921	1.00032
2005-2006	1.03193	0.99659	0.97034	0.98247	0.97952	0.96009	1.02609	1.02689	1.00031
2006-2007	1.03075	0.99545	0.97288	0.98612	0.97840	0.95899	1.02492	1.02571	1.00029
Final factors (H)									
2001-2002	1.04204	0.99431	0.95898	0.98090	0.96062	0.95898	1.02813	1.03562	1.00000
2002-2003	1.03945	0.99484	0.96177	0.98124	0.96527	0.95921	1.02757	1.03338	1.00000
2003-2004	1.03687	0.99536	0.96455	0.98159	0.96993	0.95944	1.02701	1.03115	1.00000
2004-2005	1.03426	0.99584	0.96732	0.98190	0.97458	0.95964	1.02642	1.02888	1.00000
2005-2006	1.03161	0.99628	0.97004	0.98216	0.97921	0.95979	1.02577	1.02656	1.00000
2006-2007	1.03046	0.99517	0.97261	0.98584	0.97812	0.95872	1.02463	1.02542	1.00000

Estimating wage components of assessed expenses

- 47 The wage cost disabilities shown in Table 3 were applied to the wages proportion of expenses in each category to derive the wage cost factor. The formula used was:

$$\text{Weighted wage costs factor} = \text{wage proportion} * (\text{wage cost factor} - 1) + 1.$$

- 48 For each category, the wages proportion of expenses (including grants and subsidies used by the recipients to pay wages and salaries) was estimated using information from the adjusted budget, departmental annual reports and other documents.
- 49 The Commission assumed that wages were 80 per cent of the minimum fixed costs of head office in every category. Table 4 shows the wage proportions applied to the remainder of each category.

Table 4 Wage cost as proportion of total expenses

Expense category	Wage proportion
	(%)
Pre-school education	70
Government primary education	70
Non-government primary education	Not applicable
Government secondary education	70
Non-government primary education	Not applicable
Vocational education and training	70
Inpatient services	62.5
Non-inpatient and community health services	60
Population and preventive health	60
Family and child services	70
Aged and disabled services	70
Homeless and general welfare	70
Housing	20
Services to Indigenous communities	70
Police	80
Administration of justice	60
Corrective services	70
Public safety	80
Culture and recreation	70
National parks and wildlife services	50
Electricity and gas	80
Water, sanitation and protection of the environment	80
Non-urban passenger transport	80
Roads	60
Urban transit	100
Primary industry	60
Mining, fuel and energy	60
Tourism	60
Manufacturing & other industry	60
General public services	80
Depreciation	35

ACCOMMODATION

50 The accommodation cost factor recognises differences in the cost of office accommodation, either through renting, leasing or purchasing. The assessment was based on commercial rental data

provided by the Australian Valuation Office (AVO), with an adjustment for the ACT because it has no ‘outside capital city’ locations.

Calculation of the accommodation factor

51 The factor used data provided by the AVO on net average commercial rents (expressed in \$/m², dollars per square metre), for various types of office locations in the central business districts and fringe (both primary and secondary) areas of State capital cities and outside capital cities. The factors are updated annually using the latest rental data from the AVO.

52 Table 5 shows the net average rent for 2006-07 by types of office location and the standard weight for each location, the latter reflecting the average proportion of accommodation occupied by State governments in each type of location.

Table 5 Net average commercial rents for CBDs and areas outside capital cities, 2006–07

Area	Std prop ^(a)	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
	%	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²
Prime CBD	15	520	320	550	500	250	245	380	260	443
Secondary CBD	15	340	250	400	350	200	180	300	180	314
Prime fringe CBD	18	345	290	395	400	220	170	320	210	331
Secondary fringe CBD	27 (52)	270	220	310	325	200	110	260	130	260
Outside capital city^(b)	25 (0)	196	170	353	200	140	200	0	210	214

(a) Standard proportions of commercial areas occupied by State governments.

(b) Except for Canberra, referring to the population weighted average of net average commercial rentals in the selected locations outside capital cities in the States. The selected locations were:
 New South Wales: Broken Hill and Wagga Wagga;
 Victoria: Bendigo and Mildura;
 Queensland: Cairns and Mount Isa;
 Western Australia: Kalgoorlie-Boulder;
 South Australia: Whyalla;
 Tasmania: Launceston; and
 Northern Territory: Alice Spring.

Source: Australian Valuation Office.

53 The factors were calculated as follows:

- Calculate the weighted net average commercial rents for each location by multiplying the net average commercial rents by the standard weight for that location in Table 5. Table 6 shows the weighted average rents for 2006-07.

Table 6 Weighted average rents, 2006–07

Area	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²	\$/m ²
Prime CBD	78.0	48.0	82.5	75.0	37.5	36.8	57.0	39.0	66.4
Secondary CBD	51.0	37.5	60.0	52.5	30.0	27.0	45.0	27.0	47.1
Prime fringe CBD	62.1	52.2	71.1	72.0	39.6	30.6	57.6	37.8	59.7
Secondary fringe CBD	72.9	59.4	83.7	87.8	54.0	29.7	70.2	35.1	70.3
Outside capital city	49.0	42.5	88.3	50.0	35.0	50.0	0.0	52.5	53.5
Sum of weighted average	313.0	239.6	385.6	337.3	196.1	174.1	229.8	191.4	296.9

- Scale up the ACT results because it has no ‘outside capital city’ locations. The ACT’s secondary fringe CBD rate was scaled up by the standard proportion of ‘outside capital city’ accommodation.
- Calculate the ratio by dividing the States weighted average rents divided by weighted average national rent.
- These ratios were rescaled by mean resident population to calculate the accommodation cost factors.

54 Table 7 shows the resulting accommodation cost factors for the 2008 Update.

Table 7 Accommodation factors, 2008 Update

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
2002-2003	1.16777	1.05272	0.84222	0.78930	0.85900	0.70355	1.08107	0.79119	1.00000
2003-2004	1.17262	1.05508	0.85084	0.77456	0.84295	0.70200	1.06088	0.78221	1.00000
2004-2005	1.15925	1.01039	0.95276	0.78491	0.79430	0.66377	1.02763	0.82769	1.00000
2005-2006	1.18687	0.91343	0.96176	0.93563	0.74430	0.72368	1.04839	0.88495	1.00000
2006-2007	1.05042	0.80409	1.29390	1.13181	0.65811	0.58411	0.98934	0.64234	1.00000

Estimating the accommodation component of standard expenses

55 The cost factors in T were applied to the average share of accommodation costs in total expenses (2 per cent) to derive the accommodation cost factors for each category. The formula used was:

$\text{Weighted accommodation cost factor} = \text{accommodation proportion}^*$ $(\text{accommodation cost factor} - 1) + 1.$

ELECTRICITY

- 56 The electricity input costs factors take account of the effects of unavoidable interstate differences in the cost of electricity on the relative costs of providing services.
- 57 The electricity factors were calculated using data on electricity generated by each plant type in each State published annually by the Energy Supply Association of Australia Limited (ESAA).
- 58 However, for the 2005 Update, the electricity factors were calculated using published generation data by types of plant for the years 1998-99 to 2002-03. The data for 2002-03 were also used for 2003-04. On that basis, in each update, data for the pre-final year are brought in, but the same data are used for the final year as well. In this update, the data were updated for 2005-06. The same data are used for 2006-07.
- 59 For each State, electricity generated by each plant type was weighted by the average cost of generation for that plant type (the weights for each type of plant are not updated between reviews) and aggregated to derive a weighted generation cost.
- 60 As in the 2007 Update, the following adjustments were made to the raw factors.
- For New South Wales, Victoria, Queensland and the ACT the final adjusted costs were set equal to the average of the generation costs in New South Wales, Victoria and Queensland.
 - For Western Australia, the final adjusted cost was set equal to the estimated generation cost in the State plus 10 per cent of the standard cost of capital (which was estimated to be equal to 50 per cent of the standard generation cost) to allow for the greater reserve capacity required in the State.
 - For South Australia, the final adjusted cost was set equal to the average of its generation cost and the average generation cost of the three large interconnected States (New South Wales, Victoria and Queensland).
 - For Tasmania and the Northern Territory, no adjustments were made.
- 61 Table 8 sets out the raw and final factors calculated following the above approach for 2006-07. The detailed calculations are in Appendix C.

Table 8 Electricity factors based on generation costs in \$/mwh, 2006-07

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aus
	\$/mwh	\$/mwh	\$/mwh	\$/mwh	\$/mwh	\$/mwh	\$/mwh	\$/mwh	\$/mwh
Weighted cost	33.69	33.50	34.41	37.50	37.02	20.63	33.69	65.65	34.41
Final modified weighted cost ^(a)	33.87	33.87	33.87	39.22	35.44	20.63	33.87	65.65	34.51
Raw factors	0.98140	0.98140	0.98140	1.13649	1.02709	0.59773	0.98140	1.90238	1.00000
Final factors	0.98073	0.98073	0.98073	1.13571	1.02639	0.59732	0.98073	1.90108	1.00000

(a) See paragraph 90 for conversion from weighted cost to final modified weighted cost.
mwh - million kilowatt hours.

- 62 Table 9 shows electricity cost factors for the 2008 Update.

Table 9 Electricity cost factors, 2008 Update

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
2002-2003	0.97105	0.97105	0.97105	1.21900	1.03952	0.57213	0.97105	1.85791
2003-2004	0.97243	0.97243	0.97243	1.23133	1.02454	0.62135	0.97243	1.62569
2004-2005	0.98239	0.98239	0.98239	1.11553	1.02673	0.60702	0.98239	1.98182
2005-2006	0.98093	0.98093	0.98093	1.13594	1.02660	0.59744	0.98093	1.90147
2006-2007	0.98073	0.98073	0.98073	1.13571	1.02639	0.59732	0.98073	1.90108
Average	0.97750	0.97750	0.97750	1.16750	1.02876	0.59905	0.97750	1.85359

63 The factors for the three bigger States — which served as the benchmark for the ‘national market’ — were generally similar in magnitude. The factor for South Australia was over one, because of its less than full integration with the national market for topographical and historical reasons.

64 Western Australia and the Northern Territory had factors substantially greater than one mainly because they were not part of the national market. This meant they incurred greater costs because they needed to maintain a greater reserve capacity (to respond to sudden increases in demand) than other States who could draw upon reserves in the national grid.

Estimating electricity component of standard expenses

65 The weighted electricity cost factor for each category was calculated by applying the estimated share of electricity costs in total expenses (0.5 per cent) to the calculated electricity cost factor. The formula used was:

$$\text{Weighted electricity cost factor} = \text{electricity proportion} * (\text{electricity cost factor} - 1) + 1.$$

RESULTS FOR THE 2008 UPDATE

Wages input costs

66 Table 10 compares the wages input costs factors calculated for the five years of the 2008 Update as described earlier with those assessed for the 2007 Update.

Table 10 Wages input costs factors for 2007 Update and 2008 Update

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
2007 Update								
2001-2002	1.04202	0.99430	0.95897	0.98088	0.96061	0.95897	1.02812	1.03561
2002-2003	1.03941	0.99480	0.96173	0.98120	0.96523	0.95918	1.02753	1.03334
2003-2004	1.03681	0.99530	0.96450	0.98153	0.96987	0.95939	1.02695	1.03108
2004-2005	1.03419	0.99577	0.96724	0.98182	0.97451	0.95957	1.02634	1.02880
2005-2006	1.03152	0.99620	0.96996	0.98208	0.97913	0.95971	1.02568	1.02648
Average	1.03679	0.99527	0.96448	0.98150	0.96987	0.95936	1.02692	1.03106
2008 Update								
2002-2003	1.03945	0.99484	0.96177	0.98124	0.96527	0.95921	1.02757	1.03338
2003-2004	1.03687	0.99536	0.96455	0.98159	0.96993	0.95944	1.02701	1.03115
2004-2005	1.03426	0.99584	0.96732	0.98190	0.97458	0.95964	1.02642	1.02888
2005-2006	1.03161	0.99628	0.97004	0.98216	0.97921	0.95979	1.02577	1.02656
2006-2007	1.03046	0.99517	0.97261	0.98584	0.97812	0.95872	1.02463	1.02542
Average	1.03453	0.99550	0.96726	0.98255	0.97342	0.95936	1.02628	1.02908

Accommodation input costs

67 Table 11 compares the accommodation input costs factors calculated for the five years of the 2008 Update with those for the 2007 Update.

Table 11 Accommodation costs factors, comparison of factors, 2007 Update and 2008 Update

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
2007 Update								
2001-2002	1.17883	1.06579	0.82972	0.76466	0.82876	0.68932	1.07058	0.79313
2002-2003	1.17941	1.06632	0.83013	0.76504	0.82917	0.68966	1.07110	0.79352
2003-2004	1.17230	1.05479	0.85060	0.77435	0.84272	0.70180	1.06058	0.78199
2004-2005	1.15820	1.01043	0.95280	0.78494	0.79433	0.66380	1.02767	0.82773
2005-2006	1.18568	0.91327	0.96159	0.93547	0.74417	0.72355	1.04820	0.88479
Average	1.17489	1.02212	0.88497	0.80489	0.80783	0.69363	1.05563	0.81623
2008 Update								
2002-2003	1.16777	1.05272	0.84222	0.78930	0.85900	0.70355	1.08107	0.79119
2003-2004	1.17262	1.05508	0.85084	0.77456	0.84295	0.70200	1.06088	0.78221
2004-2005	1.15925	1.01039	0.95276	0.78491	0.79430	0.66377	1.02763	0.82769
2005-2006	1.18687	0.91343	0.96176	0.93563	0.74430	0.72368	1.04839	0.88495
2006-2007	1.05042	0.80409	1.29390	1.13181	0.65811	0.58411	0.98934	0.64234
Average	1.14739	0.96714	0.98030	0.88324	0.77973	0.67542	1.04146	0.78568

68 Over the five years to 2006-07, Queensland and Western Australia showed above average increases to rental cost for office premises. New South Wales rentals increased only marginally in 2006-07 and fell relative to the fast growing States.

Electricity input costs

69 Table 12 compares the electricity input costs factors calculated for the five years of the 2008 Update with those for the 2007 Update.

Table 12 Electricity input cost factors, comparison of factors, 2007 Update and 2008 Update

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
2007 Update								
2001-2002	0.97429	0.97429	0.97429	1.16200	1.04429	0.53055	0.97429	2.21742
2002-2003	0.97111	0.97111	0.97111	1.21907	1.03958	0.57216	0.97111	1.85801
2003-2004	0.97249	0.97249	0.97249	1.23142	1.02460	0.62140	0.97249	1.62580
2004-2005	0.98251	0.98251	0.98251	1.11568	1.02686	0.60710	0.98251	1.98207
2005-2006	0.98236	0.98236	0.98236	1.11550	1.02671	0.60700	0.98236	1.98177
Average	0.97655	0.97655	0.97655	1.16873	1.03241	0.58764	0.97655	1.93301
2008 Update								
2002-2003	0.97105	0.97105	0.97105	1.21900	1.03952	0.57213	0.97105	1.85791
2003-2004	0.97243	0.97243	0.97243	1.23133	1.02454	0.62135	0.97243	1.62569
2004-2005	0.98239	0.98239	0.98239	1.11553	1.02673	0.60702	0.98239	1.98182
2005-2006	0.98093	0.98093	0.98093	1.13594	1.02660	0.59744	0.98093	1.90147
2006-2007	0.98073	0.98073	0.98073	1.13571	1.02639	0.59732	0.98073	1.90108
Average	0.97750	0.97750	0.97750	1.16750	1.02876	0.59905	0.97750	1.85359

70 The changes to the factors since the 2007 Update were due to changes in the assessment data and the mean resident population. The changes were small because of the stable patterns of electricity generation by plant type over time. The fall in the factor for the Northern Territory until 2003-04 was due, to less reliance on the most expensive form of electricity, the diesel engine. This had accounted for only 4.6% in 2003-04. Since then, it has risen, but to a lower level than pre-2003 level. In 2005-06 it rose to 9.2%.

SUMMARY OF THE INPUT COST FACTORS

71 The overall input costs factors, combining the wages, accommodation and electricity cost sub-components, were calculated by:

- weighting the extent of the cost advantage/disadvantage for each component by the proportion of costs for that component; and
- summing and adding 1, to turn the weighted cost advantages/disadvantages into a cost factor relative to the Australian average of 1.

72 This is shown in the following formula.

$$\begin{aligned} \text{Input costs factor} &= \text{wage proportion} * (\text{wage cost factor} - 1) \\ &+ \text{accommodation proportion} * (\text{accommodation cost factor} - 1) \\ &+ \text{electricity proportion} * (\text{electricity factor} - 1) \\ &+ 1 \end{aligned}$$

where **wage proportion = range from 0.2 to 0.8 (see Table);**
accommodation proportion = 0.02; and
electricity proportion = 0.005.

Note: For input costs applied to the ‘fixed cost’ component, wage proportion = 0.8.

73 Table 13 shows the fixed cost input costs factors for all expenses categories to which they apply.

Table 13 Input cost factors applied to the fixed costs component, 2006-07

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
Input Costs factor	1.02528	0.99212	0.98387	0.99199	0.97579	0.95664	1.01939	1.01769	1.00000

74 Table 14 shows, for each expense category, the input costs factors applied to all components other than the fixed cost component.

CHANGES IN GST REVENUE DISTRIBUTION: 2008 UPDATE COMPARED WITH 2007 UPDATE

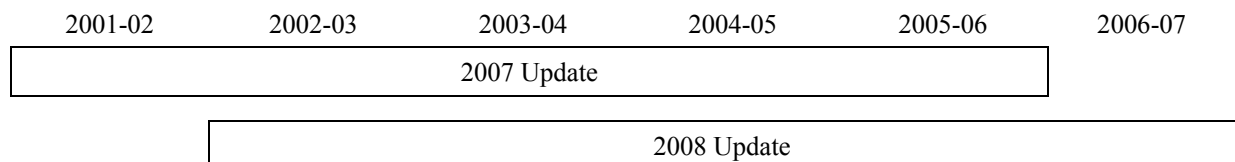
What has changed?

75 The main changes the Commission examines are:

- revisions to the financial and assessment data that were used in the 2007 Update; and
- advancing the reference period one year — a new year comes into the reference period and the oldest year drops out.

76 Figure 1 shows the reference periods for the two inquiries.

Figure 1 Advancing the reference period, 2008 Update



77 The effect of revisions is estimated by replacing 2007 Update data with 2008 Update data for the years 2002-03 to 2005-06. The effect of advancing the reference period one year is estimated by comparing the data of the year entering the reference period (2006-07) with the data of the year dropping out (2001-02). In both cases, the Commission considers the impact of replacing financial data separately from the effect of replacing assessment data.

Table 14 Input cost factors by category, 2006-07

Expense category	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
Pre-school education	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Government primary education	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Government secondary education	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Vocational education and training	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Inpatient services	1.01995	0.99297	0.98866	0.99446	0.97962	0.96387	1.01508	1.01324	1.00000
Non-inpatient and community health services	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
Population and preventive health	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
Family and child services	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Aged and disabled services	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Homeless and general welfare	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Housing	1.00700	0.99502	1.00030	1.00048	0.98892	0.98141	1.00462	1.00244	1.00000
Services to Indigenous communities	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Police	1.02528	0.99212	0.98387	0.99199	0.97579	0.95664	1.01939	1.01769	1.00000
Administration of justice	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
Corrective services	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
Public safety	1.02528	0.99212	0.98387	0.99199	0.97579	0.95664	1.01939	1.01769	1.00000
Culture and recreation	1.02223	0.99260	0.98661	0.99340	0.97798	0.96077	1.01693	1.01515	1.00000
National parks and wildlife services	1.01614	0.99357	0.99208	0.99623	0.98235	0.96903	1.01200	1.01006	1.00000
Electricity and gas	1.02528	0.99212	0.98387	0.99199	0.97579	0.95664	1.01939	1.01769	1.00000
Water sanitation and protection of the environment	1.02528	0.99212	0.98387	0.99199	0.97579	0.95664	1.01939	1.01769	1.00000
Non-urban passenger transport	1.02528	0.99212	0.98387	0.99199	0.97579	0.95664	1.01939	1.01769	1.00000
Roads	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
Urban transit	1.03046	0.99517	0.97261	0.98584	0.97812	0.95872	1.02463	1.02542	1.00000
Primary industry	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
Mining, fuel and energy	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
Tourism	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
Manufacturing & other industry	1.01919	0.99309	0.98935	0.99482	0.98016	0.96490	1.01447	1.01260	1.00000
General public services	1.02528	0.99212	0.98387	0.99199	0.97579	0.95664	1.01939	1.01769	1.00000
Depreciation	1.01064	0.99831	0.99043	0.99505	0.99236	0.98558	1.00860	1.00888	1.00000

Wages input costs

78 Table 15 shows the redistribution of the pool due to wages cost factors in the 2007 Update and the 2008 Update.

Table 15 Wages cost factor contributions and changes to the distribution of the pool^(a), 2007 Update and 2008 Update

Contribution	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total redist'd
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
2007 Update	868.9	-68.0	-507.4	-135.2	-161.3	-76.9	33.3	46.7	948.9
2008 Update	805.3	-66.7	-470.2	-128.7	-141.1	-76.1	32.6	44.9	882.8
Effect of updating	-63.6	1.3	37.3	6.5	20.2	0.8	-0.7	-1.8	66.1

(a) The distributions were calculated by applying the 2007 Update and 2008 Update relativities to State populations as at 31 December 2007 and the 2007–08 GST and Health Care Grants (HCGs) pool of \$50.994 billion (about 7 per cent larger than the 2006-07 pool), and by removing the influence of wages.

79 The redistributions were consistent with the direction of changes to the factors (see Table 10). Although the changes to the factors appear small, they have large redistributive effects because wages factors apply to a large number of expenses categories and to the bulk of expenses in each category (see Table 4).

Electricity and accommodation input costs (only changes since the 2007 Update)

80 Table 16 shows changes to redistribution of the pool since the 2007 Update due to the accommodation and electricity cost factors.

Table 16 Electricity and accommodation input costs, changes to the distribution of the pool since 2007 Update

Contribution	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Total redist'd
2007 Update	105.4	9.4	-44.2	-29.3	-25.5	-20.2	1.9	2.6	119.2
2008 Update	92.4	-17.2	-8.2	-14.6	-32.1	-22.3	1.5	0.5	94.4
Effect of updating	-20.4	-27.2	39.1	16.7	-4.8	-0.7	-0.6	-2.2	55.9

(a) The distributions were calculated by applying the 2007 Update and 2008 Update relativities to State populations as at 30 December 2007 and the 2007–08 GST and Health Care Grants (HCGs) pool of \$50.994 billion, and by removing the influence of electricity and accommodation.

81 The changes to the GST revenue distribution, since the 2007 Update, due to electricity and accommodation cost factors were notable. The effects were relatively high for the big States.

82 Queensland and Western Australia showed above average increases to rental cost for office premises from 2005-06 to 2006-07 mirroring the rental growth in the prime CBD areas (Brisbane: 62 per cent; Perth: 51 per cent).

83 Rental rate in New South Wales was stagnant and Victoria recorded modest growth. South Australia also recorded a modest rise in rental rate in absolute term. But, they decreased relative

to the average. Rent in the CBD and fringe of the Northern Territory showed a dramatic drop in 2006-07. Rental rates also dropped in Tasmania, while the ACT had a 9 per cent increase.

- 84 Hence there was redistribution of the pool away from these States to Queensland and Western Australia.
- 85 The changes to redistribution from electricity costs were generally small because of the stable patterns of electricity generation by plant type over time. Over the four years to 2005-06, the decrease in the disability factors for the Northern Territory and Western Australia was due, to a lesser reliance on the most expensive form of electricity, the diesel engine⁷. This was so although its use increased between 2003-2004 and 2004-2005 in the Northern Territory.

This chapter was prepared by the Revenue section of the Commonwealth Grants Commission. If you have any questions about its content please contact Lintong Feng on (02) 6229 8889 or Lintong.Feng@cgc.gov.au

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⁷ See Appendix C for a cost comparison of electricity from the various sources.

APPENDIX A

**NEW ISSUES FOR THE 2008 UPDATE —
WAGES**

STAFF DISCUSSION PAPER CGC 2007/34-S

SEPTEMBER 2007

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INTRODUCTION

- 86 Interstate differences in wage rates, henceforth ‘location effects’, can have a major effect on the relative costs of providing services. Wages input cost factors reflect the effects of unavoidable interstate differences in the cost of labour (wages) on the relative cost of providing services.
- 87 In the 2004 Review, the Commission estimated the differences across States in wages input costs using an econometric model which operated on data from the ABS’ Survey of Education and Training (SET) for 1997 and 2001⁸.
- 88 The location effects for 2005 were re-estimated when the SET data relating to May to August of 2005 were made available by the ABS in 2006. Table 1 summarises the raw location effects as estimated from the analysis of SET data⁹.

Table 1 Modelled raw location effects using SET data for 1997, 2001 and 2005

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
1997	0.015	0.010	-0.027	-0.016	-0.015	-0.056	0.040	0.094	0.000
2001	0.050	-0.005	-0.048	-0.021	-0.046	-0.079	0.019	0.043	0.000
2005	0.037	-0.004	-0.035	-0.020	-0.024	-0.069	0.031	0.032	0.000

Adjustments

- 89 The Commission adjusted the modelled locations effects for:
- State specific influences; and
 - data uncertainties.
- 90 In the 2004 Review, the Commission adjusted the 2001 modelled effects for Tasmania and the ACT. It thought low mobility of labour meant the modelled effect for Tasmania might understate the wage levels required to attract staff needed to provide State services. It thought the Australian Government influence meant the modelled effect for the ACT might understate the wage levels required to attract staff needed to provide State services. In the 2007 Update, smaller adjustments were made for the 2005 modelled effect for Tasmania.
- 91 In the 2004 Review and 2007 Update, the Commission discounted the modelled location effects of all States by 15 per cent in recognition of data uncertainties.
- 92 Linear interpolation was applied to location effects for the intervening years between 2001 and 2005. Table 2 summarises the adjusted location effects from 2001-02 to 2005-06 for the 2007 Update. It reflects the combined impact of adjustments to the raw location effects for State specific adjustments, discounting, interpolations and rescaling.

⁸ See CGC Working Papers 2007, Volume 4, Input Costs.

⁹ See Agenda paper 2006/73, Wages input cost factors for the 2007 and future updates.

Table 2 Location effects, adjusted, rescaled and discounted, private sector

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
Calculated location effect (all years)									
2001-02	0.042	-0.005	-0.041	-0.019	-0.040	-0.041	0.028	0.036	0.000
2002-03	0.039	-0.005	-0.039	-0.018	-0.035	-0.041	0.028	0.033	0.000
2003-04	0.037	-0.004	-0.036	-0.018	-0.030	-0.041	0.027	0.031	0.000
2004-05	0.034	-0.004	-0.033	-0.018	-0.025	-0.041	0.026	0.029	0.000
2005-06	0.031	-0.003	-0.030	-0.018	-0.021	-0.041	0.026	0.026	0.000

- 93 In the 2007 Update, the Commission considered whether a State specific adjustment should be made to the modelled location effect for Western Australia because a number of related contextual indicators showed marked increases in that State in 2005-06 after the SET data were collected. The Commission did not make an adjustment because it could not isolate influences on wage rates specific to Western Australia arising from changes in the skills of people being employed and the growth of the mining and construction industries in that State.
- 94 However, the Commission committed to reconsidering the location effects for the 2008 Update using an alternative ABS dataset, Employee Earnings, Benefits and Trade Union Membership (EEBTUM) for August 2006 and, if appropriate, update the location effects using information from that analysis.
- 95 The EEBTUM data for August 2006 are now available. This paper:
- presents location effects for August 2004 and August 2006 using the EEBTUM data and the same model (to the extent practicable) as was used in the 2004 Review;
 - presents a range of related contextual information; and
 - considers whether adjustments to the States' location effects are necessary, and could be appropriately made using additional information from the analyses of EEBTUM data.
- 96 State views are sought on how best to take the matter of wages input cost factor forward for the 2008 Update, especially with respect to the use of EEBTUM data for its determination.
- 97 Commission staff would prefer to use an annual estimate of changes in the location effect based on the EEBTUM data, and use that to adjust the SET based results.

ANALYSIS OF EEBTUM DATA

- 98 The ABS conducts the EEBTUM survey in August each year¹⁰. The detailed data necessary for the Commission's purpose are however available only biannually. The survey provides information on weekly earnings for a sample of individual respondents, together with their labour market and socio-demographic characteristics. During the 2007 Update, Commission

¹⁰ This is done as a supplement to the monthly ABS Labour Force Survey.

staff presented estimates of location effects using the EEBTUM 2004 data as contextual information¹¹. This paper re-estimates the location effects using both EEBTUM 2004 and EEBTUM 2006 data.

- 99 The econometric model is presented in Attachment A. Detailed results of the regression analysis of EEBTUM 2006 data are presented in Attachment B.
- 100 Table 3 summarises estimated raw location effects from the analysis of EEBTUM data for 2004 and 2006.

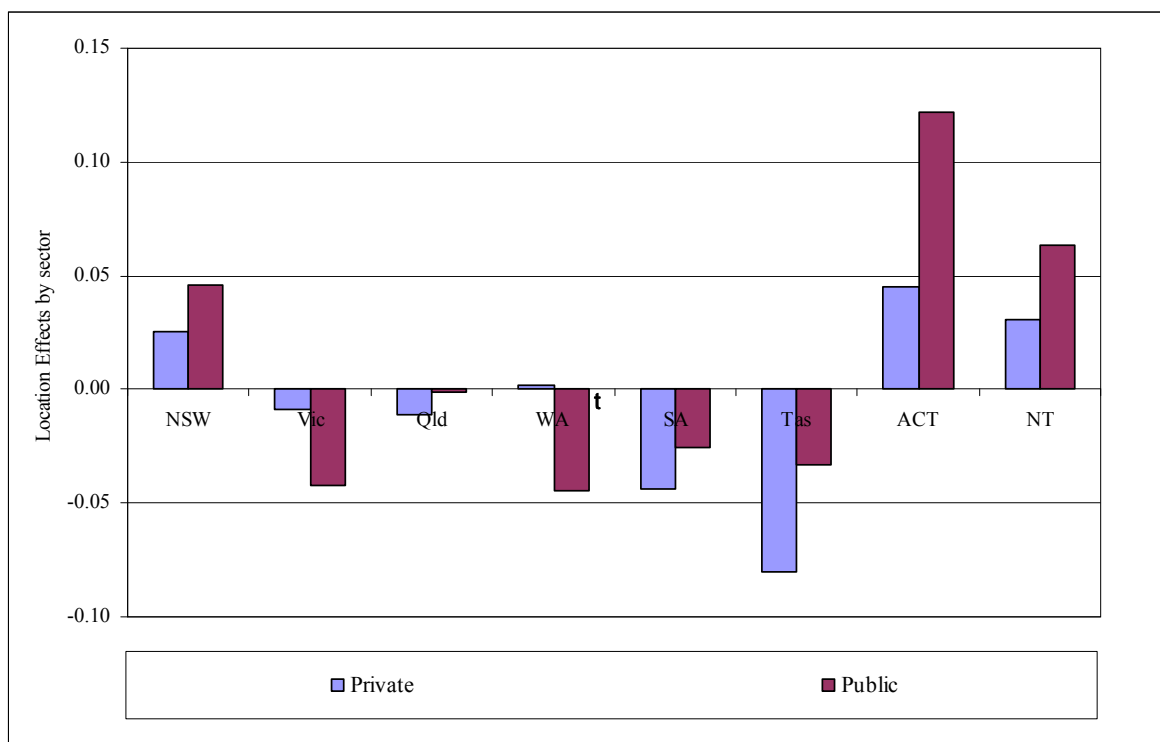
Table 3 Modelled location effects based on EEBTUM data, 2004 and 2006

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
EEBTUM 2004									
Location effects	0.032	-0.003	-0.029	-0.021	-0.033	-0.043	0.030	0.071	0.000
Standard error	0.004	0.005	0.006	0.009	0.010	0.021	0.025	0.034	0.000
t-value	7.691	-0.53	-4.888	-2.272	-3.264	-2.06	1.195	2.096	0.000
Level of Significance	0.000	0.591	0.000	0.023	0.001	0.039	0.232	0.036	0.000
EEBTUM 2006									
Location effects	0.025	-0.009	-0.011	0.002	-0.044	-0.080	0.045	0.031	0.000
Standard error	0.004	0.005	0.006	0.008	0.010	0.020	0.024	0.032	0.000
t-value	6.24	-1.77	-1.97	0.22	-4.33	-4.08	1.87	0.96	0.000
Level of Significance	0.000	0.077	0.049	0.826	0.000	0.000	0.061	0.338	0.000
Change in location effects									
2004 to 2006 (points)	-0.007	-0.006	0.018	0.023	-0.011	-0.038	0.015	-0.040	0.000
Average change per year									
(points)	-0.003	-0.003	0.009	0.011	-0.006	-0.019	0.007	-0.020	0.000

- 101 The location effects estimated for the States from the EEBTUM are generally consistent with those from the SET data (see Table 1). Estimated location effects of New South Wales, the ACT and the Northern Territory are above average for both data, while those of the other States except Western Australia are below average. The location effect for Western Australia, as measured, has changed since 2004 from being below average to slightly above average.
- 102 Moreover, for both SET and EEBTUM data, location effects of New South Wales and the Northern Territory show decreases in recent years, while as might be expected those of Queensland and Western Australia have increased. However, the reasons for the large decrease in the location effects of Tasmania and Northern Territory are less clear cut.
- 103 Figure 1 compares the estimated raw location effects from the analysis of 2006 EEBTUM data for the public and the private sectors.

¹¹ Commission staff re-estimated the location effects based on EEBTUM 2004 data to maintain consistency with the method for the EEBTUM 2006 data.

Figure 1 EEBTUM data, modelled location effects by sector, 2006



- 104 The analysis shows that despite government policy differences, there are many similarities in the location effects for the two sectors — similar results were obtained for the EEBTUM 2004 data and the SET data for past years. The large difference between the two sectors for the ACT is because the public sector data include the Commonwealth public service employees.
- 105 However, the uses to which the estimated location effects from the EEBTUM data can be put should be judged against the nature of the data and hence reliability of the estimates.
- 106 The EEBTUM data have a number of known shortcomings for the Commission’s purpose. For example, the data do not include the respondents’ education status, which is one of the key determinants of wages. Second, some variables such as experience, hours of work, tenure and ‘dependent’ children cannot be as precisely defined as for the SET data. Third, unlike for the SET data, the survey did not use face-to-face interviews¹². Together, they would have impacted on the fitness for purpose of the data.

¹² It adopted computer assisted interviewing (CAI), where interviewers record responses directly onto an electronic questionnaire. Information was collected largely via telephone interviews by trained interviewers, who asked members of each household or a responsible adult answering on behalf of other household members the EEBTUM questions. The use of proxies (‘any responsible adult’), have added respondent burden and recall issues impacting on data quality.

USE OF EEBTUM RESULTS

- 107 Because of those shortcomings, caution is necessary in interpreting and using the modelled location effects based on the EEBTUM data, and comparing the results directly with the SET based results. Commission staff think that contextual information should play a strong supporting role in judging and using the results from the EEBTUM data.
- 108 At the outset, Commission staff note that the EEBTUM and SET data cannot be directly interlaced because they are based on different scope and survey methods.
- 109 Nevertheless, Commission staff consider that the results from EEBTUM data can be used to adjust the location effects for 2006-07. This can be done by:
- using the SET 2005 location effects as the main measure for 2005-06; and
 - adjusting (with or without discounts) changes in the modelled location effects based on the EEBTUM data for 2004 and 2006 as indicators of annual change over 2005-06 and 2006-07 (see Table).
- 110 Commission staff would prefer to use the results this way because the sampling and survey processes were similar for the two EEBTUM surveys and the contextual information provides reasonable support for the measured changes.
- 111 However, because EEBTUM data do not include education variables, Commission staff have assumed that the average levels of education remained unchanged in all the States over the two years. This assumption means we can use EEBTUM data to estimate the change in location effects between 2004 and 2006.

CONTEXTUAL INFORMATION

- 112 This section provides contextual information that forms the basis for reality checking of the movements between the estimated location effects in recent years covering 2005-06 and 2006-07. The information relates to observed wage levels and house prices in the States. This information is provided in Attachment C.
- 113 However, there may be different time-lags before inter-linked markets, such as the labour market and housing market of the States, respond to changes in economic conditions. This is particularly important in view of the very short time horizon being considered.
- 114 Overall, movements in published wages and wage indices of States provide good support for the direction, though not necessarily the magnitude, of changes in location effects using the EEBTUM data. Changes to house prices provide somewhat limited support.
- 115 In particular, the contextual information lends strong support for increased location effect for Western Australia and a reduced effect for New South Wales. However, the support is limited for the significant changes in location effect for Queensland and mixed for Tasmania.

116 Contextual information does not pose much concern for the pattern of changes in location effects of Victoria, South Australia or the ACT. The contextual information for the Northern Territory should be viewed in the context of its long term convergence to the average.

QUESTIONS FOR THE STATES

117 Commission staff would like the States to comment on whether the Commission should estimate States' 2006-07 location effects by:

- using SET only data, not making any use of EEBTUM data, and setting the location effects for 2006-07 equal to those for 2005-06 ; or
- using changes to EEBTUM data, with or without discounts, to adjust the 2005 location effect based on SET data.

118 No matter which approach is adopted, the Commission will separately consider the question of whether adjustments are required for State specific influences (as has been the case for Tasmania and the ACT) and data uncertainties. Commission staff note that, in a recent submission, Tasmania sought to have the Commission consider adjusting its location effect to the level of Queensland, and give other States an opportunity to comment on the issue¹³.

119 Commission staff would like State comment on whether State specific adjustments should continue to be applied in 2006-07.

¹³ Tasmania's letter to the Commonwealth Grants Commission, August 2007.

ATTACHMENT A: GENERIC MODEL AND SUMMARY DATA

THE GENERIC MODEL

- 1 A summary specification of the model follows. Essentially, the model regressed the logarithm of earnings (w_t) in the private sector on measurable labour market influences (X_k) and the State of employment as a location dummy (DS).

$$\ln(w_t)$$

$$= A_t$$

$$+ \sum_i DS_{it} * I_i$$

$$+ \sum_k \beta_k x_{tk} + \varepsilon_t$$

A is fixed intercept;

DS_i represents dummy variables for State i ; I_i represents the 'location effects' for state i ($i= 1, 2, \dots, 8$);

x_k ($k=1, \dots, n$) represents a set of measures of individuals' labour market characteristics such as age, sex, type and level of education, field of education, experience, full-time or part-time status, duration of unemployment etc; the vector of parameters, β_k , represents returns to such characteristics; and

ε_t is stochastic error.

- 2 Essentially, the model interprets 'location effects' for each State as the proportion of wage over or below the wage of an average employee. The average employee is one whose measurable productivity characteristics are the average of all employees in the sample, and who is thus identical for all States.

Table A-1 Number of samples by State^(a)

	NSW	VIC	Qld	WA	SA	Tas	ACT	NT	Total
Private									
Number	5049	4666	4341	3185	2369	1154	893	348	22005
%	22.9	21.2	19.7	14.5	10.8	5.2	4.1	1.6	100.0

- (a) Include those who had a job, and worked more than five hours and earned more \$2 per week. Outliers are also excluded.

Table A-2 Mean Earnings by Occupation and State, private sector samples

	NSW	VIC	QLD	WA	SA	Tas	ACT	NT	Aus
	\$	\$	\$	\$	\$	\$	\$	\$	\$
Earnings									
Managers	1422.7	1312.2	1129.2	1203.4	1060.4	1144.9	1116.8	1080.8	1282.4
Professionals	1236.4	1256.1	1156.2	1295.3	1148.7	1017.4	1236.3	971.6	1224.4
Technicians and Trades Workers	851.7	878.0	895.1	990.4	814.2	733.8	859.4	974.4	880.1
Community and Personal Service Workers	514.3	488.7	493.8	504.3	501.7	489.7	526.0	667.5	503.5
Clerical and Administrative Workers	770.5	701.3	700.1	684.0	683.9	619.4	703.3	733.3	721.2
Sales Workers	552.0	501.6	557.4	576.2	466.2	452.3	467.4	545.0	533.5
Machinery Operators And Drivers	905.0	830.0	912.9	1057.3	847.1	841.4	944.3	1043.8	902.5
Labourers	547.4	571.1	631.6	585.3	553.5	460.4	568.7	689.5	576.2
Total	877.0	856.8	802.2	874.7	767.4	692.7	833.7	843.5	844.3
Relative Earnings									
Managers	1.10940	1.02327	0.88058	0.93840	0.82693	0.89281	0.87088	0.84280	1.00000
Professionals	1.00982	1.02595	0.94431	1.05794	0.93824	0.83097	1.00975	0.79356	1.00000
Technicians and Trades Workers	0.96776	0.99761	1.01697	1.12531	0.92508	0.83373	0.97649	1.10713	1.00000
Community and Personal Service Workers	1.02147	0.97074	0.98069	1.00154	0.99644	0.97254	1.04465	1.32571	1.00000
Clerical and Administrative Workers	1.06836	0.97237	0.97080	0.94839	0.94830	0.85889	0.97522	1.01675	1.00000
Sales Workers	1.03455	0.94003	1.04474	1.07991	0.87387	0.84771	0.87594	1.02140	1.00000
Machinery Operators And Drivers	1.00284	0.91972	1.01158	1.17161	0.93860	0.93237	1.04632	1.15659	1.00000
Labourers	0.95003	0.99104	1.09602	1.01580	0.96052	0.79904	0.98690	1.19664	1.00000
Total	1.03874	1.01481	0.95012	1.03603	0.90892	0.82046	0.98744	0.99908	1.00000

Table A -3 Sample proportion by variables, private sector final samples

Variable/period	Proportion of sample (%)
State of residence	
NSW	22.9
Vic	21.2
Qld	19.7
WA	14.5
SA	10.8
Tas	5.2
ACT	4.1
NT	1.6
Sector	
Private	79.1
Public	20.9
Sex	
Female	44.5
Marital status	
Married	60.6
Whether had any young children	
Respondents with dependents	34.2
Migrant status ^(a)	
Born in Australia	74.9
Born in English-speaking countries, lived in Australia more than 21 years	5.6
Born in English-speaking countries, lived in Australia more between 11-21 years	2.3
Born in English-speaking countries, lived in Australia less than 11 years	3.1
Born in other countries, lived in Australia more than 21 years	5.8
Born in other countries lived in Australia between 11-21 years	3.7
Born in other countries, lived in Australia less than 11 years	4.5

**Table A-3 Sample proportion by variable persons, private sector final samples
(continued)**

Variable/period	Proportion of sample (%)
Occupation^(c)	
Managers	11.4
Professionals	15.5
Technicians and Trades Workers	15.6
Community and Personal Service Workers	8.3
Clerical and Administrative Workers	15.5
Sales Workers	12.8
Machinery Operators And Drivers	7.8
Labourers	13
Industry^(d)	
Agriculture, forestry & fishing	2.1
Mining	2
Manufacturing	13.3
Electricity, gas, water and waste Services	1
Construction	8.1
Wholesale trade	5.2
Retail trade	14.7
Accommodation and food services	8.2
Transport, Postal and Warehousing	4.9
Information Media and Telecommunications	2.4
Finance & insurance services	4.6
Rental, Hiring and Real Estate Services	2.2
Professional, Scientific and Technical Services	8
Administrative and Support Services	3.8
Public Administration and Safety	1.3
Education and training	3
Health care and social assistance	9.5
Arts and Recreation Services	1.5
Other services	4.3
Trade union membership	
Had trade union membership	15.7

**Table A-3 Sample proportion by variable persons, private sector final samples
(continued)**

Variable/period	Proportion of sample (%)
Size of firm (number of employees)	
Less than 20	42.9
20-99	25.8
100 and over	28
Number unknown	3.3
Whether permanent or casual	
Permanent with main period employer	77.3
Tenure with main employer	
under 6 months	14.1
6-8 months	4.9
8-10 months	3.8
10-12 months	3.1
12+ months	74.1

Notes: Main English speaking countries (Canada, Republic of Ireland, New Zealand, South Africa, United Kingdom, United States of America).

Occupation was coded to Australian and New Zealand Standard Classification of Occupations (ANZSCO) 51 sub-major group categories.

Industry was classified to the Australian and New Zealand Standard Industrial Classification (ANZSIC 2006) 66 sub-division categories.

Source: 2006 EEBTUM CURF data.

ATTACHMENT B: REGRESSION RESULTS

Table B-1 Regression Results, private sector, EEBTUM 2006

Variables	Coefficients	Level of Significance
Constant	3. 336	0. 000
NSWMTASA	0. 025	0. 000
VICMTASA	-0. 009	0. 077
QLDMTASA	-0. 011	0. 049
SAMTASA	-0. 044	0. 000
WAMTASA	0. 002	0. 826
NTMTASA	0. 031	0. 338
ACTMTASA	0. 045	0. 061
OCC11	0. 417	0. 000
OCC12	-0. 221	0. 000
OCC13	0. 328	0. 000
OCC10	0. 182	0. 017
OCC21	0. 149	0. 003
OCC22	0. 273	0. 000
OCC23	0. 292	0. 000
OCC24	0. 215	0. 000
OCC25	0. 485	0. 000
OCC26	0. 376	0. 000
OCC27	0. 248	0. 000
OCC20	0. 332	0. 056
OCC31	0. 135	0. 000
OCC32	0. 040	0. 047
OCC33	-0. 081	0. 002
OCC34	0. 009	0. 712
OCC35	-0. 080	0. 009
OCC36	-0. 158	0. 000
OCC39	-0. 044	0. 140
OCC30	0. 119	0. 306
OCC41	0. 078	0. 268
OCC42	-0. 070	0. 215
OCC43	0. 007	0. 846
OCC44	-0. 093	0. 060
OCC45	-0. 019	0. 704
OCC51	0. 282	0. 000

Table B-1 Regression Results, private sector, EEBTUM 2006 (continued)

Variables	Coefficients	Level of Significance
OCC52	0.043	0.683
OCC53	0.015	0.805
OCC54	-0.086	0.092
OCC55	-0.014	0.699
OCC56	-0.121	0.013
OCC59	-0.030	0.330
OCC50	-0.173	0.744
OCC61	0.128	0.000
OCC62	-0.059	0.007
OCC63	-0.078	0.035
OCC71	-0.054	0.043
OCC72	-0.094	0.001
OCC73	-0.134	0.000
OCC74	-0.132	0.000
OCC70	-0.290	0.119
OCC81	-0.221	0.000
OCC82	0.003	0.910
OCC83	-0.199	0.000
OCC84	-0.208	0.000
OCC85	-0.226	0.000
OCC80	0.007	0.965
MARRIED	0.077	0.000
CHILD	0.003	0.730
PERM	0.040	0.002
LHRWORK1	0.709	0.000
LHRWO15	-0.124	0.000
LHRWO16	-0.028	0.000
MIG1	0.094	0.000
MIG2	0.136	0.000
MIG3	0.204	0.000
MIG4	0.207	0.000
MIG5	0.037	0.110
MIG6	-0.023	0.351
FIRM1	-0.054	0.009
FIRM2	0.054	0.010
FIRM3	0.142	0.000

Table B-1 Regression Results, private sector, EEBTUM 2006 (continued)

Variables	Coefficients	Level of Significance
INDU1	0.055	0.144
INDU2	0.403	0.000
INDU3	0.057	0.006
INDU4	0.205	0.000
INDU5	0.158	0.000
INDU6	0.031	0.197
INDU7	-0.025	0.271
INDU8	-0.054	0.060
INDU9	0.116	0.000
INDU10	0.124	0.000
INDU11	0.206	0.000
INDU12	0.090	0.008
INDU13	0.164	0.000
INDU14	0.124	0.000
INDU15	0.132	0.003
INDU16	-0.015	0.730
INDU17	-0.094	0.003
INDU18	0.020	0.595
YESUNION	0.053	0.000
TMPE1	0.008	0.509
TMPE2	-0.016	0.390
TMPE3	-0.063	0.003
TMPE4	0.010	0.658
WEXP	0.042	0.000
WEXPSQ	-0.001	0.000
FEMALE	-0.176	0.035
OCC11F	0.172	0.013
OCC12F	0.542	0.000
OCC13F	0.146	0.000
OCC10F	0.316	0.071
OCC21F	0.107	0.189
OCC22F	0.034	0.296
OCC23F	-0.003	0.940
OCC24F	0.138	0.040
OCC31F	-0.033	0.489
OCC32F	-0.137	0.426

Table B-1 Regression Results, private sector, EEBTUM 2006 (continued)

Variables	Coefficients	Level of Significance
OCC33F	-0.043	0.844
OCC34F	0.295	0.125
OCC35F	0.135	0.008
OCC36F	0.069	0.334
OCC39F	-0.022	0.652
OCC41F	0.091	0.263
OCC42F	0.037	0.534
OCC43F	0.035	0.458
OCC44F	0.181	0.072
OCC45F	0.110	0.078
OCC51F	-0.102	0.032
OCC52F	0.013	0.908
OCC53F	-0.030	0.651
OCC54F	0.089	0.108
OCC55F	0.080	0.058
OCC56F	-0.058	0.412
OCC59F	0.069	0.119
OCC61F	0.030	0.516
OCC62F	-0.060	0.043
OCC63F	-0.043	0.351
OCC60F	0.639	0.069
OCC71F	-0.128	0.028
OCC72F	-0.132	0.316
OCC73F	0.369	0.000
OCC74F	0.102	0.174
OCC81F	0.047	0.298
OCC82F	0.134	0.383
OCC83F	0.035	0.384
OCC84F	0.183	0.013
OCC85F	0.094	0.057
MARRIEDF	-0.055	0.000
CHILDF	-0.068	0.000
PERMF	0.044	0.014
LHRWOR1F	0.025	0.178
LHRWO15F	0.056	0.000
LHRWO16F	-0.118	0.000
MIG1F	-0.013	0.627

Table B-1 Regression Results, private sector, EEBTUM 2006 (continued)

Variables	Coefficients	Level of Significance
MIG2F	-0.051	0.171
MIG3F	-0.004	0.932
MIG4F	-0.135	0.001
MIG5F	0.030	0.397
MIG6F	0.086	0.024
FIRM1F	0.068	0.034
FIRM2F	-0.004	0.914
FIRM3F	-0.032	0.329
INDU1F	-0.046	0.508
INDU2F	-0.039	0.618
INDU3F	0.049	0.178
INDU4F	-0.015	0.852
INDU5F	-0.038	0.401
INDU6F	0.038	0.362
INDU7F	0.068	0.066
INDU8F	0.037	0.370
INDU9F	-0.053	0.239
INDU10F	-0.010	0.836
INDU11F	-0.033	0.436
INDU12F	0.033	0.527
INDU13F	0.028	0.466
INDU14F	-0.053	0.225
INDU15F	-0.075	0.281
INDU16F	0.071	0.218
INDU17F	0.085	0.041
INDU18F	-0.009	0.870
TMPE1F	-0.053	0.003
TMPE2F	-0.015	0.591
TMPE3F	0.025	0.406
TMPE4F	-0.022	0.498
WEXPF	-0.003	0.101
WEXPSQF	0.000	0.891
UNIONF	-0.080	0.000

Note: The Adjusted R squared is 0.723; but it must be noted that the estimated results are based on weighted regression.

Figure B-1 Plot of residual, 2005

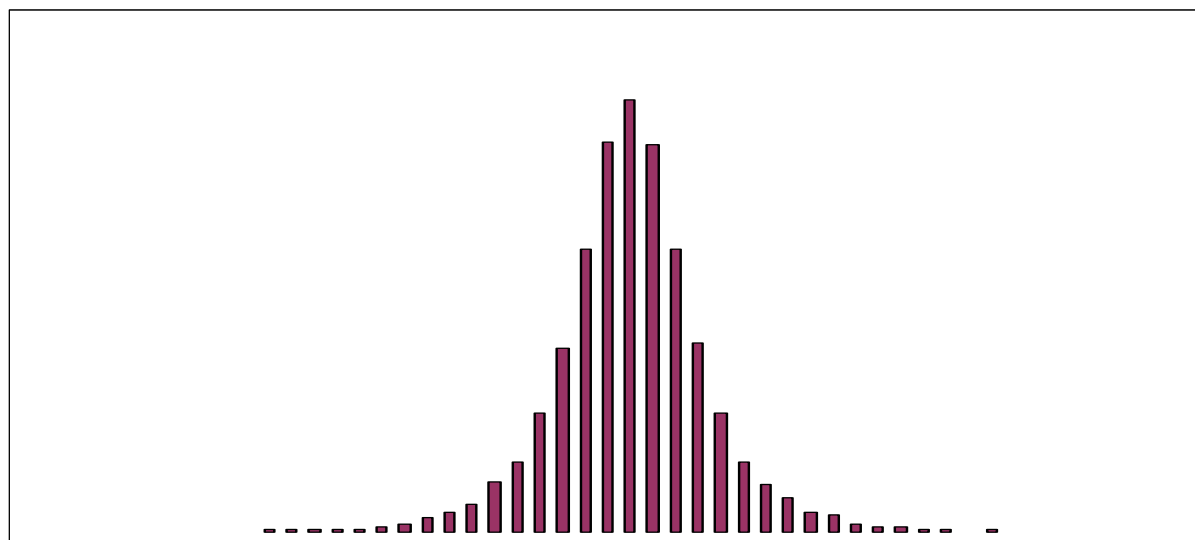


Table B-2 Number of outliers by State, occupation and industry, 2006

Occupation	State	Manufacturing	Retail Trade	Information Media and Telecommunications	Financial and Insurance Services	Rental, Hiring and Real Estate Services	Health Care and Social Assistance	Grand Total
Hospitality, Retail and Service Managers	Qld					1		1
Personal Assistants and Secretaries	WA				2			2
Specialist Manager; Hospitality, Retail and Service Manager; Factory Process Worker; and Other labourer.	NT	1	1	1			1	4
Grand Total		1	1	1	2	1	1	7

Table B–3 Description of variables and variable abbreviations

Variable	Abbreviation
State of residence	
New South Wales	NSW
Victoria	VIC
Queensland	QLD
South Australia	SA
Western Australia	WA
*Tasmania	
ACT	ACT
Northern Territory	NT
Migrant status	
Born in Australia	MIG1
Born in English-speaking countries, lived in Australia more than 21 years	MIG2
Born in English-speaking countries, lived in Australia more between 11-21 years	MIG3
Born in English-speaking countries, lived in Australia less than 11 years	MIG4
Born in other countries, lived in Australia more than 21 years	MIG5
Born in other countries lived in Australia between 11-21 years	MIG6
*Born in other countries, lived in Australia less than 11 years	
Detailed Occupation	
Managers nfd	OCC10
Chief Executives, General Managers and Legislators	OCC11
Farmers and Farm Managers	OCC12
Specialist Managers	OCC13
Hospitality, Retail and Service Managers	OCC14
Professionals nfd	OCC20
Arts and Media Professionals	OCC21
Business, Human Resource and Marketing Professionals	OCC22
Design, Engineering, Science and Transport Professionals	OCC23
Education Professionals	OCC24
Health Professionals	OCC25
ICT Professionals	OCC26
Legal, Social and Welfare Professionals	OCC27
Technicians and Trades Workers nfd	OCC30
Engineering, ICT and Science Technicians	OCC31
Automotive and Engineering Trades Workers	OCC32
Construction Trades Workers	OCC33

Table B-3 Description of variables and variable abbreviations (continued)

Variable	Abbreviation
Electrotechnology and Telecommunications Trades Workers	OCC34
Food Trades Workers	OCC35
Skilled Animal and Horticultural Workers	OCC36
Other Technicians and Trades Workers	OCC39
Community and Personal Service Workers nfd	OCC40
Health and Welfare Support Workers	OCC41
Carers and Aides	OCC42
Hospitality Workers	OCC43
Protective Service Workers	OCC44
Sports and Personal Service Workers	OCC45
Clerical and Administrative Workers nfd	OCC45
Office Managers and Program Administrators	OCC50
Personal Assistants and Secretaries	OCC52
General Clerical Workers	OCC53
Inquiry Clerks and Receptionists	OCC54
Numerical Clerks	OCC55
Clerical and Office Support Workers	OCC56
Other Clerical and Administrative Workers	OCC59
Sales Workers nfd	OCC60
Sales Representatives and Agents	OCC61
Sales Assistants and Salespersons	OCC62
Sales Support Workers	OCC63
Machinery Operators and Drivers nfd	OCC70
Machine and Stationary Plant Operators	OCC71
Mobile Plant Operators	OCC72
Road and Rail Drivers	OCC73
Store persons	OCC74
Labourers nfd	OCC80
Cleaners and Laundry Workers	OCC81
Construction and Mining Labourers	OCC82
Factory Process Workers	OCC83
Farm, Forestry and Garden Workers	OCC84
Food Preparation Assistants	OCC85
Other Labourers	OCC89
* Inadequately described	

Table B-3 Description of variables and variable abbreviations (continued)

Variable	Abbreviation
Hours paid for per week	
Greater than 15 hours and less than 60 hours	HRWOR1
1-15 hours	HRWO15
60+ hours	HRWO16
Estimated Work Experience (years)	
Experience	WEXP
Experience square	WEXPSQ
Trade Union membership	
Had Trade Union Membership	YESUNION
* Did not have Trade Union Membership	
Marital status	
Married	MARRIED
*Not married	
Whether had any young children	
With children under 15 years old	CHILD
*Without children under 15 year old	
Whether permanent or casual	
Permanent with main period employer	PERM
*Casual with main period employer	
Duration of employment in the main job	
Under 6 months	TMPE1
6-8 months	TMPE2
8-10 months	TMPE3
10-12 months	TMPE4
*12 + months	
Size of firm (number of employees)	
Less than 20	FIRM1
20-99	FIRM2
100 and over	FIRM3
* Number unknown	

Table B–3 Description of variables and variable abbreviations (continued)

Variable	Abbreviation
Industry	
Agriculture, forestry & fishing	INDU1
Mining	INDU2
Manufacturing	INDU3
Electricity, gas, water and waste Services	INDU4
Construction	INDU5
Wholesale trade	INDU6
Retail trade	INDU7
Accommodation and food services	INDU8
Transport, Postal and Warehousing	INDU9
Information Media and Telecommunications	INDU10
Finance & insurance services	INDU11
Rental, Hiring and Real Estate Services	INDU12
Professional, Scientific and Technical Services	INDU13
Administrative and Support Services	INDU14
Public Administration and Safety	INDU15
Education and training	INDU16
Health care and social assistance	INDU17
Arts and Recreation Services	INDU18
*Other services	

- (a) A variable beginning with 'L' in the estimated model means the natural logarithm of that variable. For females, the suffix, 'F', was used.
- (b) * denotes reference category (omitted dummies) in the model.

ATTACHMENT C: CONTEXTUAL INFORMATION

Wages data

- 1 Commission staff looked for indicative evidence on how changes in average wages data from standard ABS publications compared with the modelled location effects. The fact that the readily available wages data series are not directly comparable with the modelled results because of compositional differences should be borne in mind.
- 2 Table C-1 shows by sector wages in dollars and relative to the Australian figures. Two specific caveats apply to these figures:
 - the public sector figures for the ACT include the Commonwealth sector; and
 - comparisons over time and across States do not control for any compositional changes.
- 3 The direction of changes in private sector wages in all States except South Australia and Tasmania are consistent with changes in the modelled location effects. However, the consistency is less marked for Queensland.
- 4 The other notable point is the relatively uniform changes in wages in the public sector.

Mean weekly earnings in all jobs

- 5 Table C-2 summarises earnings from the publication — Employee Earnings, Benefits and Trade Union Membership (EEBTUM), Australia, August 2006¹⁴. Like the average weekly earnings, earnings from this survey are raw figures and are not corrected for composition effects.
- 6 The changes in mean weekly earnings, over the two years from 2004 to 2006 considered together, generally confirm the changes in location effects for all States except for Victoria.
- 7 In general, the direction and magnitude of changes in relative mean weekly earnings provide support for the changes in location effects.

Labour price index

- 8 Table C-3 shows, by State, the labour price index for the private sector. This index is corrected for changes in the composition of the labour force over time within each State, but not for differences in composition across States.
- 9 Directions of changes in the labour price index (LPI) are consistent with those in location effects except for Tasmania and the ACT. They provide support for the above average increases in location effects for Queensland and Western Australia.

¹⁴ ABS Catalogue number 6310.0 Employee Earnings, Benefits and Trade Union Membership, Australia, August 2006.

10 In summary, the wages indicators, in particular the LPI, confirm better the direction of changes in location effects, for most States.

Table C-1 Full-time adult ordinary time earnings, original, by sector, 2004-05 to 2006-07

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
Ordinary time earnings (\$ per week)									
(a) private sector									
2004-05	1004.1	964.1	879.6	992.0	867.0	827.3	978.5	948.8	956.6
2005-06	1057.5	993.5	921.6	1058.9	916.6	861.3	1105.0	987.6	1002.6
2006-07	1079.8	1022.0	957.2	1154.1	951.3	897.2	1179.6	988.6	1038.2
Annual change (%)									
to 2005-06	5.3	3.0	4.8	6.7	5.7	4.1	12.9	4.1	4.8
to 2006-07	2.1	2.9	3.9	9.0	3.8	4.2	6.8	0.1	3.6
(b) public sector									
2004-05	1082.6	1111.7	1046.0	1024.5	1056.8	1019.9	1210.1	1066.9	1078.9
2005-06	1163.8	1156.1	1090.6	1062.7	1106.9	1067.3	1282.5	1114.0	1136.2
2006-07	1214.1	1181.8	1136.8	1093.9	1149.8	1118.9	1334.6	1136.5	1178.3
Annual change (%)									
to 2005-06	7.5	4.0	4.3	3.7	4.7	4.6	6.0	4.4	5.3
to 2006-07	4.3	2.2	4.2	2.9	3.9	4.8	4.1	2.0	3.7
Relative wages									
(a) private sector									
2004-05	1.04966	1.00789	0.91958	1.03701	0.90633	0.86488	1.02292	0.99187	1.00000
2005-06	1.05476	0.99097	0.91921	1.05621	0.91422	0.85913	1.10214	0.98509	1.00000
2006-07	1.04005	0.98442	0.92195	1.11169	0.91629	0.86421	1.13625	0.95220	1.00000
Annual change (%)									
to 2005-06	0.005	-0.017	0.000	0.019	0.008	-0.006	0.079	-0.007	0.000
to 2006-07	-0.015	-0.007	0.003	0.055	0.002	0.005	0.034	-0.033	0.000
(b) public sector									
2004-05	1.00341	1.03033	0.96944	0.94958	0.97949	0.94529	1.12158	0.98881	1.00000
2005-06	1.02434	1.01758	0.95986	0.93535	0.97428	0.93942	1.12879	0.98046	1.00000
2006-07	1.03043	1.00303	0.96482	0.92839	0.97585	0.94963	1.13270	0.96457	1.00000
Annual change (%)									
to 2005-06	0.021	-0.013	-0.010	-0.014	-0.005	-0.006	0.007	-0.008	0.000
to 2006-07	0.006	-0.015	0.005	-0.007	0.002	0.010	0.004	-0.016	0.000

Source: Average Weekly Earnings, 6302. 0, May 2007, ABS. Financial year relate to August to May.

Table C-2 Relative mean weekly earnings in all jobs, by State, August, 2004 to 2006

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aus
Mean weekly wages (\$)									
August 2004	816	758	724	747	700	668	878	843	766
August 2005	838	806	767	821	763	697	912	858	807
August 2006	898	863	820	872	784	739	1012	928	862
Annual change (%)									
to August 2005	2.7	6.3	5.9	9.9	9.0	4.3	3.9	1.8	5.4
to August 2006	7.2	7.1	6.9	6.2	2.8	6.0	11.0	8.2	6.8
Relative wages									
August 2004	1.0653	0.9896	0.9452	0.9752	0.9138	0.8721	1.1462	1.1005	1.0000
August 2005	1.0384	0.9988	0.9504	1.0173	0.9455	0.8637	1.1301	1.0632	1.0000
August 2006	1.0418	1.0012	0.9513	1.0116	0.9095	0.8573	1.1740	1.0766	1.0000
Annual change (%)									
to August 2005	-2.5	0.9	0.6	4.3	3.5	-1.0	-1.4	-3.4	0.0
to August 2006	0.3	0.2	0.1	-0.6	-3.8	-0.7	3.9	1.3	0.0

Table C-3 Labour Price Index by State, total hourly rates of pay excluding bonuses, private sector, 2004-05 to 2006-07

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aus
2004-05	103.4	103.8	103.7	104.3	103.3	103.8	103.4	103.8	103.7
2005-06	107.2	107.9	108.4	109.2	106.9	107.9	107.3	107.9	107.8
2006-07	111.1	111.6	113.2	114.3	110.9	112.3	111.4	112.0	111.9
Annual change									
to 2005-06	3.7	3.9	4.5	4.7	3.5	4.0	3.8	3.9	4.0
to 2006-07	3.6	3.5	4.5	4.7	3.8	4.1	3.8	3.8	3.8

Source: Labour Price Index, June 2007. 2003-04 = 100 for all States.

House prices data

House Price Index

- 11 Differences in cost of living are a major determinant of differences in wages of comparable employees between States. Cost of housing is a key component of cost of living, and differences between regions in cost of housing can materially affect the relative cost of living in a short time (say, five years). Changes in prices of many other goods and services tend to follow a national pattern given interstate and international trading affect all States more evenly.
- 12 In that light, staff examined to what extent changes in house prices accord with changes in the modelled location effects in recent years.

- 13 Commission staff examined the ABS price index for established homes¹⁵ in the capital cities (see Table C-4). This series conceptually tracks changes in the price of the same (notional) representative house in each city and is less prone to compositional effects than some other data series.
- 14 In general, the house prices over the last two years increased in all capital cities except Sydney. The below average increase for Sydney, Melbourne and Adelaide are consistent with their reduced location effects. The direction of change is also consistent for Perth and Canberra. For Perth, in particular, the increase in prices of established homes was high, consistent with the rising relative wages and the increase in Western Australia's estimated location effect.
- 15 For Darwin, the increase in recent house prices did not translate into higher location effects, implying that potential effects are more than offset by other changes such as those reducing isolation. This is consistent with the recent trends as seen in the results from the analysis of SET data (see **Error! Reference source not found.**).
- 16 However, for Brisbane and Hobart, changes in recent house prices did not correspond to the direction or degree of changes in location effects.

Median house prices in capital cities

- 17 Table C-5 shows changes in the median house prices of established homes in the capital cities. It also shows rises in house prices in all capital cities — relative to Sydney.
- 18 This series is not based on the same representative house in each city, and is affected by compositional effects. However, it shows that, over 2005-06 and 2006-07, house prices in Perth and Darwin increased markedly.
- 19 These changes are somewhat, but not fully, consistent with the changes in modelled location effects. For example, for Brisbane in particular, the change in median house price is not commensurate with the degree of change in its location effects. However, there is a strong regional aspect to the growth in Queensland outside of Brisbane which might explain the difference.
- 20 In summary, Commission staff conclude that changes to house prices in the capital cities between 2004 and 2006, together with a long term decline in relative wages in the Northern Territory, provides reasonable support for changes in the modelled location effects from the analysis of EEBTUM data for 2004 and 2006. Brisbane is the exception.

¹⁵ Published in ABS 6416.0 June Quarter 2007.

Table C-4 Price index of established homes (2003-04 = 100)^(a)

	Syd	Mel	Bri	Per	Ade	Hob	Can	Dar	All capitals
2004-05	96.1	101.9	104.2	114.4	106.5	111.8	99.9	115.9	101.2
2005-06	93.3	106.4	108.2	145.7	111.2	119.7	103.5	138.8	105.1
2006-07	95.3	116.6	119.3	194.0	119.9	131.7	112.9	159.3	115.3
Annual change	%	%	%	%	%	%	%	%	%
to 2005-06	-3.0	4.5	3.8	27.4	4.5	7.1	3.6	19.8	3.8
to 2006-07	2.2	9.5	10.2	33.2	7.8	10.0	9.1	14.8	9.7

(a) The ABS' new house price series started only in Mar 2002. Each index represents the average for four quarters, Sep to June.

Table C-5 Median house prices in capital cities, 2004-05 to 2006-07

Year	Syd	Mel	Bri	Per	Ade	Hob	Can	Dar
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2004-05	532.0	341.4	310.0	277.0	270.8	263.0	352.1	268.7
2005-06	520.5	363.9	321.5	353.1	279.8	275.6	368.3	328.3
2006-07	522.6	391.8	345.2	450.1	298.3	296.0	405.3	385.0
Annual changes	%	%	%	%	%	%	%	%
to 2005-06	-2.2	6.6	3.7	27.5	3.3	4.8	4.6	22.2
to 2006-07	0.4	7.7	7.4	27.5	6.6	7.4	10.0	17.3
Prices relative to Sydney								
2004-05	100.0	64.2	58.3	52.1	50.9	49.4	66.2	50.5
2005-06	100.0	69.9	61.8	67.8	53.8	53.0	70.8	63.1
2006-07	100.0	75.0	66.1	86.1	57.1	56.6	77.5	73.7
Annual Changes	%	%	%	%	%	%	%	%
to 2005-06	0.0	9.0	6.0	30.3	5.6	7.1	6.9	24.9
to 2006-07	0.0	7.2	6.9	26.9	6.2	7.0	9.6	16.8

Source: Real Estate Institute of Australia. Median prices were averaged over September to June quarters.

APPENDIX B

EEBTUM 2004 DATA AND REGRESSION MODEL RESULTS

SUMMARY EEBTUM 2004 DATA

Table 1 **Number of samples by State^(a)**

	NSW	VIC	Qld	WA	SA	Tas	ACT	NT	Total
Private Number	4394	4430	3541	2542	2295	1054	730	285	19271
%	22.8	23.0	18.4	13.2	11.9	5.5	3.8	1.5	100.0

(a) Include those who had a job, and worked more than five hours and earned more \$2 per week. Outliers are also excluded.

Table 2 Mean Earnings by Occupation and State, private sector samples

	NSW	VIC	QLD	WA	SA	Tas	ACT	NT	Aus
	\$	\$	\$	\$	\$	\$	\$	\$	\$
Earnings									
Managers & administrators	1403.6	1263.9	1092.0	1231.0	1179.9	943.5	1288.0	1094.4	1276.8
Professionals	1189.5	1050.1	973.3	1082.7	926.4	1006.8	1063.1	870.5	1078.6
Associate Professionals	950.7	887.8	827.0	863.8	775.7	769.0	927.4	973.5	884.9
Tradesperson & related	788.6	765.9	792.6	842.1	728.9	630.6	719.3	896.7	781.6
Advanced clerical service workers	709.4	752.0	608.6	689.4	597.7	489.3	631.3	638.9	687.2
Intermediate clerical & service workers	551.7	568.5	574.9	552.0	530.0	530.1	548.5	649.6	559.5
Intermediate production & transport	761.4	729.3	718.3	820.5	702.5	652.0	672.5	878.2	742.0
Elementary clerical, sales & service	390.1	367.1	375.2	369.8	378.6	350.5	410.5	611.9	379.7
Labourers & related workers	512.7	561.7	541.5	474.3	521.8	469.7	329.9	474.9	525.7
Total	801.5	761.4	699.8	742.2	677.0	632.9	727.9	768.9	751.2
Relative Earnings									
Managers & administrators	1.09938	0.98996	0.85527	0.96419	0.92412	0.73899	1.00879	0.85714	1.00000
Professionals	1.10277	0.97356	0.90235	1.00377	0.85886	0.93339	0.98560	0.80702	1.00000
Associate Professionals	1.07443	1.00336	0.93457	0.97623	0.87666	0.86904	1.04813	1.10020	1.00000
Tradesperson & related	1.00900	0.97992	1.01408	1.07747	0.93258	0.80682	0.92038	1.14736	1.00000
Advanced clerical service workers	1.03233	1.09434	0.88566	1.00330	0.86977	0.71210	0.91878	0.92973	1.00000
Intermediate clerical & service workers	0.98607	1.01621	1.02759	0.98670	0.94729	0.94745	0.98044	1.16114	1.00000
Intermediate production & transport	1.02624	0.98296	0.96808	1.10582	0.94675	0.87875	0.90640	1.18355	1.00000
Elementary clerical, sales & service	1.02741	0.96674	0.98827	0.97383	0.99712	0.92311	1.08112	1.61149	1.00000
Labourers & related workers	0.97526	1.06847	1.03005	0.90214	0.99252	0.89333	0.62754	0.90335	1.00000
Total	1.06703	1.01364	0.93157	0.98798	0.90119	0.84255	0.96903	1.02361	1.00000

Table 3 Sample proportion by variables, private sector final samples

Variable/period	Proportion of sample (%)
State of residence	
NSW	22.8
Vic	23.0
Qld	18.4
WA	13.2
SA	11.9
Tas	5.5
ACT	3.8
NT	1.5
Sector	
Private	79.2
Public	20.8
Sex	
Female	44.5
Marital status	
Married	60.6
Whether had any young children	
Respondents with dependents	31.7
Migrant status ^(b)	
Born in Australia	76.1
Born in English-speaking countries, lived in Australia more than 21 years	6.3
Born in English-speaking countries, lived in Australia more between 11-21 years	2.2
Born in English-speaking countries, lived in Australia less than 11 years	2.2
Born in other countries, lived in Australia more than 21 years	6.0
Born in other countries lived in Australia between 11-21 years	4.1
Born in other countries, lived in Australia less than 11 years	3.0

Table 3 Sample proportion by variable persons, private sector final samples (continued)

Variable/period	Proportion of sample (%)
Occupation^(c)	
Managers & administrators	6.5
Professionals	14.8
Associate Professionals	11.3
Tradesperson & related	12.8
Advanced clerical service workers	3.4
Intermediate clerical & service workers	18.3
Intermediate production & transport	10.4
Elementary clerical, sales & service	12.2
Labourers & related workers	10.3
Industry^(d)	
Agriculture, forestry & fishing	2.5
Mining	1.6
Manufacturing	15.4
Electricity, gas & water supply	0.6
Construction	7.3
Wholesale trade	5.7
Retail trade	18.2
Accommodation, cafes & restaurants	6.3
Transport & storage	4.9
Communication services	1.3
Finance & insurance	4.4
Property & business services	12.8
Government administration & defence	0.6
Education	3.6
Health & community services	9.5
Cultural & recreational services	2.2
Personal & other services	3.1
Trade union membership	
Had trade union membership	18.0

Table 3 **Sample proportion by variable persons, private sector final samples (continued)**

Variable/period	Proportion of sample (%)
Size of firm (number of employees)	
Less than 20	42.1
20-99	27.2
100 and over	27.3
Number unknown	3.4
Whether permanent or casual	
Permanent with main period employer	75.8
Tenure with main employer	
under 6 months	14.2
6-8 months	4.4
8-10 months	3.7
10-12 months	2.9
12+ months	74.8

Notes: (b) Main English speaking countries (Canada, Republic of Ireland, New Zealand, South Africa, United Kingdom, United States of America).

(c) Occupation was coded to Australian Standard Classification of Occupations (ASCO) 2nd edition.

(d) Industry was classified to the Australian and New Zealand Standard Industrial Classification (ANZSIC) 1993.

Source: 2004 EEBTUM CURF data.

REGRESSION RESULTS, EEBTUM 2004 DATA

Table 4 **Regression Results, private sector, EEBTUM 2004**

Variables	Coefficients	Level of significance
Constant	3.098	0.000
nswmtasa	0.032	0.000
vicmtasa	-0.003	0.591
qldmtasa	-0.029	0.000
samtasa	-0.033	0.001
wamtasa	-0.021	0.023
ntmtasa	0.071	0.036
actmtasa	0.030	0.232
occ11	0.351	0.000
occ12	0.401	0.000
occ13	-0.106	0.062
occ10	0.467	0.000
occ21	0.407	0.000
occ22	0.416	0.000
occ23	0.866	0.000
occ24	0.372	0.000
occ25	0.325	0.000
occ20	0.217	0.474
occ31	0.176	0.000
occ32	0.254	0.000
occ33	0.169	0.000
occ34	0.305	0.000
occ39	0.220	0.000
occ41	0.097	0.000
occ42	0.117	0.000
occ43	0.104	0.000

Variables	Coefficients	Level of significance
occ44	0.099	0.001
occ45	-0.017	0.652
occ46	0.011	0.785
occ49	0.113	0.000
occ40	0.226	0.040
occ51	0.006	0.958
occ59	0.093	0.058
occ61	0.044	0.108
occ62	0.106	0.001
occ63	0.067	0.038
occ71	0.030	0.280
occ72	0.078	0.041
occ73	-0.025	0.356
occ79	0.002	0.947
occ70	-0.005	0.974
occ81	-0.044	0.525
occ83	-0.142	0.000
occ91	-0.172	0.000
occ92	-0.079	0.005
occ99	-0.051	0.045
occ90	-0.129	0.212
married	0.083	0.000
child	-0.013	0.203
perm	0.115	0.000
lhrwork	0.716	0.000
mig1	0.092	0.000
mig2	0.149	0.000
mig3	0.123	0.000
mig4	0.214	0.000
mig5	0.061	0.022
mig6	0.000	0.989

Variables	Coefficients	Level of significance
firm1	-0.099	0.000
firm2	0.001	0.959
firm3	0.098	0.000
indu1	0.044	0.240
indu2	0.377	0.000
indu3	0.094	0.001
indu4	0.221	0.000
indu5	0.145	0.000
indu6	0.087	0.003
indu7	-0.036	0.197
indu8	0.004	0.910
indu9	0.142	0.000
indu10	0.163	0.000
indu11	0.270	0.000
indu12	0.154	0.000
indu13	0.137	0.017
indu14	-0.032	0.489
indu15	-0.228	0.000
indu16	0.051	0.167
yesunion	0.052	0.000
tmpe1	0.025	0.038
tmpe2	0.005	0.790
tmpe3	-0.012	0.573
tmpe4	0.001	0.968
wexp	0.042	0.000
wexpsq	-0.001	0.000
OCC11F	-0.438	0.000
OCC12F	-0.319	0.000
OCC13F	-0.467	0.002
OCC10F	-0.268	0.119
OCC21F	-0.446	0.000

Variables	Coefficients	Level of significance
OCC22F	-0.450	0.000
OCC23F	-0.807	0.000
OCC24F	-0.326	0.001
OCC25F	-0.430	0.000
OCC20F	-0.025	0.943
OCC31F	-0.391	0.000
OCC32F	-0.431	0.000
OCC33F	-0.426	0.000
OCC34F	-0.568	0.000
OCC39F	-0.497	0.000
OCC30F	-0.192	0.589
OCC41F	-0.316	0.050
OCC42F	-0.304	0.187
OCC43F	-0.223	0.495
OCC44F	-0.433	0.308
OCC45F	-0.435	0.000
OCC46F	-0.531	0.001
OCC49F	-0.567	0.000
OCC40F	-0.707	0.008
OCC51F	-0.248	0.077
OCC59F	-0.320	0.000
OCC61F	-0.379	0.000
OCC62F	-0.371	0.000
OCC63F	-0.448	0.000
OCC71F	-0.335	0.007
OCC72F	-0.552	0.000
OCC73F	-0.417	0.000
OCC79F	-0.415	0.000
OCC70F	-0.416	0.103
OCC81F	-0.312	0.005
OCC82F	-0.415	0.000

Variables	Coefficients	Level of significance
OCC83F	-0.371	0.000
OCC91F	-0.331	0.000
OCC92F	-0.352	0.000
OCC99F	-0.389	0.000
OCC90F	-0.379	0.370
MARRIEDF	-0.030	0.055
CHILDF	-0.030	0.066
PERMF	-0.053	0.003
LHOURF	0.146	0.000
MIG1F	-0.015	0.641
MIG2F	-0.077	0.055
MIG3F	-0.027	0.594
MIG4F	-0.085	0.087
MIG5F	-0.031	0.434
MIG6F	0.045	0.281
FIRM1F	0.091	0.006
FIRM2F	0.050	0.141
FIRM3F	0.005	0.894
INDU1F	-0.038	0.533
INDU2F	-0.116	0.156
INDU3F	-0.072	0.074
INDU4F	0.049	0.655
INDU5F	-0.060	0.225
INDU6F	-0.092	0.040
INDU7F	-0.041	0.303
INDU8F	-0.006	0.889
INDU9F	-0.069	0.138
INDU10F	-0.085	0.206
INDU11F	-0.151	0.001
INDU12F	-0.074	0.063
INDU13F	-0.076	0.399

Variables	Coefficients	Level of significance
INDU14F	-0.006	0.915
INDU15F	0.224	0.000
INDU16F	-0.069	0.191
TMPE1F	-0.065	0.000
TMPE2F	-0.034	0.238
TMPE3F	-0.006	0.851
TMPE4F	-0.003	0.933
WEXPF	-0.011	0.000
WEXPSQF	0.000	0.000
YESUNIONF	-0.052	0.002
YESUNIONF	-0.062	0.001

Dependent Variable: lnwage

Weighted Least Squares Regression - Weighted by Persons weight derived in PAA

APPENDIX C

CALCULATION OF ELECTRICITY COST FACTORS FOR 2005-06

- 1 The electricity factors are calculated using the Electricity Generation by plant type and State available from the published data of Energy Supply Association of Australia Limited (ESAA). Table 1 shows the amount of electricity generated by each State by type or generating plant in 2005-06 (the same holds for 2006-07).

Table 1 Electricity generation (gwh) by plant type, 2005-06

	NSW	Vic	Qld	WA ^(a)	SA	Tas	ACT ^(b)	NT
Hydro ^(c)	349	464	473			9 688		5 167
Steam	66 523	51 359	54 177	7 036	10 627	608		
Internal combustion				2			126	
Gas turbine		143	140	502	1 849		572	
Combined cycle	1 016		4 682	2 785	1 216		667	
Wind					59	244		
Total generation	67 889	51 966	59 471	10 326	13 750	10 540	1 366	5 167

(a) Figures represent only generation from Western Power Corporation for the South West Interconnected System now Verve Energy).

(b) Assigned New South Wales' figures at a latter stage.

(c) Excludes output from pump store plant.

Source: Energy Supply Association of Australia Limited, *Electricity Gas Australia, 2007* Table 2.5, Principal electricity generation, million kilowatt-hour (gwh) by plant type, 2005-06, pp 16 and 17.

- 2 The electricity factor calculation was as follows:
- Calculate the proportion of electricity generated by each State by type of generating plant, using the Electricity Generation by plant type available from the data published by ESAA. Table 2 shows the proportion of electricity generated by each State by type of generating plant, using the data from Table 1.

Table 2 Percentage of generation by plant type, 2005-06

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Hydro	0.5	0.9	0.8	0.0	0.0	91.9	0.5	0.0
Steam	98.0	98.8	91.1	77.3	68.1	5.8	98.0	0.0
Internal combustion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2
Gas turbine	0.0	0.3	0.2	13.4	4.9	0.0	0.0	41.9
Combined cycle	1.5	0.0	7.9	8.8	27.0	0.0	1.5	48.9
Wind	0.0	0.0	0.0	0.4	0.0	2.3	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

- Calculate the average long run cost of generation by plant type. It was calculated as the smoothed cost of generation over the life of the plant. The cost components included in the estimate were capital, fuel, operating and maintenance costs.

3 Table 3 shows the average long run cost of generation by plant type.

Table 3 Levelised long run cost of generation

	Levelised average cost (\$/mwh)
Other Hydro	17.9
Black coal	33.6
Gas – baseload	39.2
Gas – peaking	60.0
Snowy	26.7
Snowy as gas	115.0
Wind	95.0

Source: Cap Gemini Ernst & Young, *Assessing the long run marginal costs of generation in New South Wales*. Report for IPART, September 2000.

4 Calculate the estimated national average generation costs. The costs were calculated as follows.

- The cost of hydro electricity was set equal to the ‘other hydro’ cost in Table 3.
- The cost of steam based electricity was set equal to the ‘black coal’ cost in Table 3.
- The gas turbine cost was the average of ‘gas–baseload’ and ‘gas–peaking’ costs in Table 3.
- The Internal combustion cost was the set equal to ‘gas turbine’ cost (in Table 4) multiplied by 5. (The factor of 5 was based on the Northern Territory 2004 Review main submission: *Concessions and Other Payments*, Chapter 20, p 270, that said the cost per unit of energy produced using diesel was about five times that of gas.)
- The Combined cycle cost was the ‘black coal’ cost multiplied by 1.34. The factor of 1.34 was based on a study: BurnVair Partner, *Review of Supply Chain Costs in the National*

Electricity Market, Report for the National Electricity Code Administrator Limited, December, 2001, that said the average generation cash cost of combined cycle was about 1.3 times that of conventional steam coal production.

5 Tabl 4 shows the estimated national average generation costs.

Table 4 Estimated Australian average generation costs by type (\$/mwh)

	Estimated average unit costs (\$/mwh)
Hydro	17.94
Steam	33.60
Internal combustion	248.00
Gas turbine	49.60
Combined cycle	44.99

6 Table 5 sets out the calculations of the weighted cost, adjusted weighted cost, raw factors and final factors.

7 The weighted unit cost was calculated by weighting the unit generation costs in Table 4 by the proportion (%) of electricity generated by plant type in Table 2. The weighted costs were adjusted as follows.

- For New South Wales, Victoria, Queensland and the ACT, the final adjusted costs were set equal to the average of the generation costs in New South Wales, Victoria and Queensland.
- For Western Australia the final adjusted cost was set equal to the estimated generation cost in the State plus 10 per cent of the standard cost of capital, estimated to be equal to 50 per cent of the standard generation cost, to allow for the greater reserve capacity required in the State.
- For South Australia the final adjusted cost was set equal to the average of its generation cost and the average generation cost for the three large interconnected States (New South Wales, Victoria and Queensland).
- For Tasmania and the Northern Territory, no adjustments were made.

8 The raw factors, for each State, were calculated by dividing each State's adjusted cost by the average Australian cost. The final factor for each State was calculated by rescaling to the Mean Resident Population.

Table 5 Calculation of final modified weight cost, raw and final factors, 2005-06

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aus
Weighted cost	33.69	33.50	34.41	37.50	37.02	20.63	33.69	65.65	34.41
Adjusted cost	33.87	33.87	33.87	39.22	35.44	20.63	33.87	65.65	34.51
Raw factors	0.98140	0.98140	0.98140	1.13649	1.02709	0.59773	0.98140	1.90238	1.00000
Final factors	0.98073	0.98073	0.98073	1.13571	1.02639	0.59732	0.98073	1.90108	1.00000