Wage Costs Consultant Report

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Executive Summary

Periodically the Commonwealth Grants Commission (the Commission) undertakes a review of its approach to calculating a wage cost factor for each state. As part of its review the Commission has engaged an independent consultant to advise on the methodology used to estimate state/territory differences in wage relativities (information used in the determination of each state/territories wage cost factor). This document is the product of the consultant's review. The recommendations arising from the review are listed below.

Recommendations

1. Introduction

The Commonwealth Grants Commission (the Commission) has a particular interest in understanding the character of the public sector regional wage structure; that is, state/territory differences in relative wages of comparable public sector employees. Each year the Commission makes recommendations for the distribution of revenue from the goods and services tax (GST) to enable the delivery of comparable levels of public services within the states/territories. The Commission recognises that the wages of comparable public sector employees may vary by geographic location (state/territory), in part because of different labour market conditions and different competitive pressures (i.e., factors beyond the control of the states / territories).

The task of the Commission is to estimate the financial impact to states/territories of these differing labour market pressures and, therefore, labour costs. When completing this task the Commission operates under the following principles:

a) 'What states do' – assess needs based on the average policy of all states.
b) Policy neutrality – state policy choices should not be able to affect their assessed needs.
c) Practicality – methods should be simple, reliable and fit for purpose.
d) Contemporaneity – assessments should reflect current circumstances.

The Commission's methodology, to date, relies on using state/territory wage relativities in the private sector as a proxy for the different labour market pressures experienced by the public sector within the states and territories.

In determining GST distributions the Commission typically estimates a wage regression that incorporates a series of state/territory dummies to capture the wage differentials due to regional characteristics. (The terms regional and geographic wage structure are used interchangeably in this paper to refer to the wage structure among the states and territories). Equation (1) below provides an example of such an approach. In the Commission's work the **X** vector includes an extensive set of controls (300+), including age, sex, marital status, migrant status, employment status, tenure and detailed industry and occupation controls. Information from the estimated state/territory coefficients are then used to calculate a 'wage cost factor' for each state. The latter is defined as "the percentage difference from the national average wage level that is driven by geographic cost pressures".[1]

[1] For further information on the approach that has been taken see: Commonwealth Grants Commission (2023) *2015 Methodology Review: Wage Costs Consultation Paper*, June. Australian Government, Canberra.

$$ln(W_i) = \alpha_0 + \beta_1 NSW_i + \beta_2 VIC_i + \beta_3 QLD_i + \beta_4 SA_i + \beta_5 WA_i + \beta_6 TAS_i + \beta_7 ACT_i + \beta_8 \boldsymbol{X}_i + \varepsilon_i \quad (1)$$

Periodically the Commission undertakes an assessment of its approach to estimating geographic differences in wages and its determination of the monetary amounts of GST to be distributed. The last review was undertaken in 2020. Since then, there have been marked changes in the labour market. In its *2025 Methodology Review: wage costs consultation paper* (released June 2023) the Commission identified a series of issues that the states/territories may wish to consider in their 2023 November submissions to the Commission on state/territory wage costs. States/territories, for example, are asked to consider whether the conceptual basis for the wage costs assessment remains sound.

As part of its review the Commission has also engaged an independent consultant to advise on the methodology, including the choice of dataset, the use of the private sector as a proxy for the public sector and the specification of the econometric model (equation (1)). The remainder of this report constitutes the "Consultant's report". The document is organised as follows. Section 2 summarises the key features of the current estimation approach and describes the dataset used. Section 3 sets out the issues to consider. Section 4 provides a response to those issues and a series of recommendations. (These recommendations are also reproduced in the Executive Summary).

2. Regional wage differentials – current estimation approach and outcomes

2.1 Dataset: Characteristics of Employment Survey (COES)

The Commission's present estimation approach uses data from the ABS Characteristics of Employment Survey (COES). The COES is a supplement to the monthly Labour Force Survey (LFS). It excludes members of the permanent defence forces and persons not residing in a private dwelling (e.g., persons in prisons, retirement homes) and persons living in very remote areas. Data is generally collected in early August of each year and data are gathered from people aged 15 years and older in sampled households. Respondents in employment are asked a series of questions concerning their wages and hours of work. For example:

- In [your/name's] [main] job, [with employer/business (LFS)] how much was [your/name's] last total pay, before tax, salary sacrifice or anything else was taken out? Include wages and salaries received from the Jobkeeper Payment.
- In total how many hours of work, [including paid leave and overtime] did that last [Time period reported] pay cover?

Each year the survey instrument collects information on education and qualification, demographic characteristics (such as marital status and children), whether the respondent is on a fixed-term contract or independent contractor. In the even years (only) the survey also collects information on whether the respondent is employed on a casual basis, is a trade union member and/or works for a labour hire company and on the odd years the survey collects information on overtime work and working from home arrangements.

2.2 Specification of the wage equation – current approach

Within economics the dominant framework for the study of wages is Gary Becker's human capital model. The central premise of the model is that human capital investments render individuals more productive and thus able to command higher wages (e.g., earnings rise with human capital investments). Human capital may be acquired formally (e.g., at school and in other institutions such as universities) and informally such as on-the-job learning (experience). Empirically, earning profiles have been shown to be concave in nature (increasing at a decreasing rate). Theory and evidence also show that earnings profiles differ amongst individuals. Those investing in human capital on average have higher and steeper earning profiles. Jacob Mincer[2] is credited with formalizing the relationship

[2] Mincer, J. (1974), *Schooling, Experience and Earnings*, National Bureau of Economic Research, New York.

between human capital and wages. The relationship (commonly referred to as a Mincerian wage equation) is given by equation (2) as follows:

$$ln(W_i) = \alpha_0 + \beta_1 yos_i + \beta_2 exp_i + \beta_3 exp_i^2 + \varepsilon_i \quad (2)$$

where "ln" denotes the natural logarithm; "W" is a measure of wages; "yos" is a measure of years of schooling, "exp" is a measure of labour market experience, "ε" is an error term; "∝" is a constant. The equation suggests that variations or differences in wages across individuals predominantly arise because of differences in their human capital. In 1974 there were few data sets that contained information on actual work experience. Mincer, therefore, proposed a 'potential' measure of labour market experience ("exp"), constructed as "age minus years of schooling minus age when schooling commenced". While this potential experience measure is (or was) thought to be a good representation of the actual labour market experience of males, it was (and is) recognized that it is a poor approximation of female labour market experience given their significant career breaks and periods out of the labour market.

The 'Mincerian wage equation' is frequently augmented or adapted in empirical studies. For example, a common adaptation is to use dummy variables capturing the highest qualification level attained rather than a continuous measure of years of schooling. The augmentations are typically driven by the research question(s) at hand. Augmentations can, however, come at a price. One cost is the possibility of endogenous regressors and biased coefficient estimates. A variable is considered exogenous where its measure or value is determined outside the model. For example, one's birthplace is given and not chosen by the individual (meaning it is an exogenous characteristic). Union membership, however, is typically a choice variable (unless it is a closed shop). That is, individuals decide whether to take out union membership. In this way union membership may be considered an endogenous variable. Another augmentation cost is degrees of freedom ('v' or 'df') and, therefore, inference testing. The degree of freedom is typically calculated as the sample size minus the number of restrictions (i.e., controls or variables employed).

Other common augmentations to the Mincer wage equation include controls for sex (if the wage equation is pooled across men and women), marital status, dependent children, migrant status and geographic controls (e.g., urban residence and state/territory dummies). The geographic controls capture factors such as compensatory wage premiums (e.g., the additional monies that individuals may require to compensate for cost-of-living costs in particular regions) as well as wage pressures linked to local labour markets (e.g., skill shortages).

Augmentations may also see the inclusion of controls for industry of employment, workplace size, sector of employment and occupation. The nature of the research question should guide the set of variables to be included. For example, if the focus is on estimating the return to education then the wage equation should not include controls for occupation. In Mincer's view the inclusion of occupation with education will downwardly bias the returns to education since occupation is a grouped version of the dependent variable and is driven by education. Some studies seek to minimise this problem by controlling for occupation at a high level of aggregation (e.g., white collar; blue collar) or 'female-dominated', 'male-dominated'.

Table 1 (column (1)) sets out the variables (dependent and control) included in the Commission's 2020 wage estimations. Column (2) of Table 1 details the variables that the Commission is proposing to use in future work. In each case there are more than 300 control variables in the Commission's current and proposed regression.

Table 1: The Commission's current and planned specification of the wage equation

	(1)	**(2)**
	R2020 model	**Proposed model**
Dependent variable	Log of weekly wages (main job)	Log of hourly wages (main job)
Variables of interest	State of usual residence (NSW, VIC, QLD, WA, SA, TAS, ACT (with the base or reference group being NT)	State of usual residence
Other control variables		
Hours	Log of usual hours	Usual hours
	Log of usual hours<16	Paid hours
	Log of usual hours>59	Usual hours^2
		Paid hours^2
		Usual hours*Paid hours
Education	Education (7 categories)	Education (7 categories)
Age / experience	Imputed work experience (defined as 'age minus 15')	Imputed work experience (defined as 'age minus 15')
	Imputed work experience^2	Imputed work experience^2
Education*Age interaction		Education*(age minus 15)
		Education*(age minus15)^2
Tenure	Tenure (5 categories)	Tenure (continuous)
Permanent status	Leave entitlement (dummy)	Leave entitlement (dummy)
Migrant status	Migrant status (7 categories)	Migrant status (7 categories)
Marital status	Marital status	Marital status
Dependent children	Dependent child (dummy)	Dependent child (dummy)
Occupation	Occupation (~120 categories)	Occupation (~120 categories)
Industry	Industry (~260 categories)	Industry (~260 categories)
Sex	Male	Male
Sex interaction	Male*(every other control)	Male*every other control)

Source: 2025 Methodology Review: Wage Costs Consultation Paper, Table C2.

As previously noted, a key assumption of the Commission is that the geographic (state/territory) wage relativities across a sample of private sector employees is an appropriate proxy or guide for "non-policy driven differences across states in public sector wages".[3] That is, it is assumed that "… geographic effects will have the same impact on public sector wages as on private sector wages".

Table 2 summarises the coefficients associated with the state/territory controls from the Commission's estimation of a wage equation across a pooled sample (5 years of survey data covering 2018-2022) of private sector employees (N= 82,214 observations). Estimates from two alternative model specifications are provided for comparison purposes.[4] The regional wage relativities are also shown graphically in Figure 1 below. It is worth noting that both specifications generate qualitatively similar results. For example, a Z test (comparing the coefficient estimates of NSW between models (1) and (2)) suggests that there is no significant difference in the size of these coefficients once standard errors are taken into account).[5]

What the estimates do show is that private sector workers in Victoria (VIC), Queensland (QLD), South Australia (SA) and Tasmania (TAS) earn significantly less than the national average, while those in Western Australia (WA) and the Australian Capital Territories (ACT) earn significantly more.

[3] 2025 Methodology Review, paragraph 7, page 5.

[4] Table 2 is sourced from the 2025 Methodology Review paper. In that paper the Commission actually provides estimates from eight different specifications (see Table C1 in the 2025 Methodology Review paper).

[5] The approach used to compare the coefficients from the two different models (compute the Z test) is as follows:

$$Z = \frac{\beta_1 - \beta_2}{\sqrt{(se\beta_1)^2 + (se\beta_2)^2}}$$

See Clobb, C.C., Petkova, E. and Haritou, A. (1995), 'Statistical Methods for Comparing Regression Coefficients Between Models', *American Journal of Sociology*, 100(5), 1261-1293.

Table 2: Conditional (mean) wage relativities by region, private sector, Australia, 2018-2022.

	(1) 2020 model (Y= Log of weekly wages)		(2) Proposed model (Y= Log of hourly wages)	
	Coefficient	Standard Error	Coefficient	Standard Error
NSW	0.0027	0.0045	0.0079***	0.0037
VIC	-0.0135***	0.0046	-0.0026	0.0038
QLD	-0.0159***	0.0049	-0.0226***	0.0041
WA	0.0377***	0.0059	0.0304***	0.0048
SA	-0.0471***	0.0068	-0.0441***	0.0056
TAS	-0.0660***	0.0115	-0.0547***	0.0094
ACT	0.0691***	0.0132	0.0640***	0.0108

Notes:

1. The regression specification is detailed at Table 1 above.
2. Wage relativities are with respect to the national average wage level.
3. Coefficient estimates and standard errors provided to the consultant by the Commission.
4. *** indicates significance at the 1% level.
5. Source: Commission calculations, 2025 Methodology Review: Wage Costs Consultation Paper, Table C1.

Figure 1: Conditional (mean) wage relativities by region, private sector, Australia, 2018-2022.

Notes:

1. The percent wage differential is computed as: [exp(coef)-1]*100.
2. Source: Table 2 above.

3. Issues to consider

Since 2020 there have been various changes in the labour market that may necessitate a change in the Commission's specification (and, therefore, a consideration of the proposed specification in column (2)) of Table 1). Issues identified in the 2025 Methodology Review paper include: an increase in the share of employees working from home (many teleworking); low unemployment and labour shortages, particularly in areas such as health and education; an increase in the demand for skilled workers; falling real wages (as a result of rising inflation).

In its 2025 Methodology Review paper the Commission (at paragraph 32) identified four issues for consideration:

(a) Whether, and to what extent, labour market changes challenge the conceptual basis for the wage cost assessment.
(b) Whether the accuracy of the assessment can be improved and volatility reduced.
(c) Whether changes to data used in the assessment would make it more resilient to shocks.
(d) Whether to continue to discount the wage costs assessment.

The states/territories also raised various issues. Broadly these include:

(a) Conceptual considerations – e.g., are private sector wages a good proxy for local labour market effects felt by public sector employees? To what extent might state wage policy influence private sector wages?
(b) Estimation considerations – e.g., is the COES the most suitable dataset for the research problem at hand? What are the alternatives? Is the regression over-specified? Are there other variables that should be considered that are not in the model.

4. Response to issues raised

4.1 Conceptual considerations – using the private sector to proxy the public sector

The Commission is of the view (2025 Methodology Review paper, paragraphs 33-35) that although the labour market has changed "… the underlying conceptual basis of the wage costs assessment remains sound". The key question is whether the geographic wage relativities in the private sector should be used to proxy geographic wage relativities in the public sector.

If the geographical wage structure in the private sector is not used to proxy the geographical wage structure in the public sector then the alternative is to generate a direct measure of the geographical wage structure in the public sector from a sample of public sector employees. The risk of this approach, however, is that the observed geographical wage structure may not be policy neutral.

Additionally, states/territories choosing to pay higher wages for comparable public sector employees (e.g., teachers) may, through their wage policy decisions, be able to attract better quality employees and deliver better quality services. Distributing GST revenue on the basis of actual geographic differences in public sector wages may, therefore, see high paying states/territories attract a greater share of GST revenue thus enabling them to continue to attract better quality employees and deliver better quality services.

Using the private sector geographical wage structure as a proxy for the public sector, however, is also not without issues. For example, if state/territory governments are wage leaders (i.e., set wages) and the local private sector follows, then private sector wage levels could be contaminated by state policy choices. If either or both sectors follow external influences (e.g., local amenities, cost of living or local labour shortages), or the private sector is the wage leader and the public sector a wage follower, this would suggest that using private sector wages to proxy public sector labour cost pressures is valid. If public and private sector labour markets are separate and do not experience any common drivers, then the underlying assumption is invalid.

One way to explore whether the private sector geographic wage structure is reflective of the public sector geographic wage structure is to simply compare the geographic wage structures from both sectors. Table 3 summarises the results from such an approach using COES data[6]. The coefficients are summarised in Figure 2 and show the percentage wage relativity. The estimates in Table 3 and the

[6] The consultant is grateful to the Commission for undertaking these regressions and providing the estimates as reported.

graphics in Figure 2 lead to the conclusion that the pattern of geographic wage relativities are not completely consistent across the public and private sectors. For example, while for six out of seven states the directions are consistent, the magnitudes vary for some of them.

Private sector employees in Western Australia, for example, have higher wages than their NSW counterparts (as given by the significant and positive coefficient on the "WA" dummy variable). WA public sector employees, on the other hand, earn significantly less than their NSW public sector counterparts. The differences in magnitudes and (for WA) direction could be due to the policy choices of the states (e.g., public sector wage freeze or caps) and/or due to labour market segmentation effects (e.g., a higher share of women in the public sector). The latter may mean that the public / private labour markets are separate in WA. In other words, using the private sector to proxy the public sector may not be equally valid for all states, although this may reflect a policy choice in some states, or may be a short-term effect.

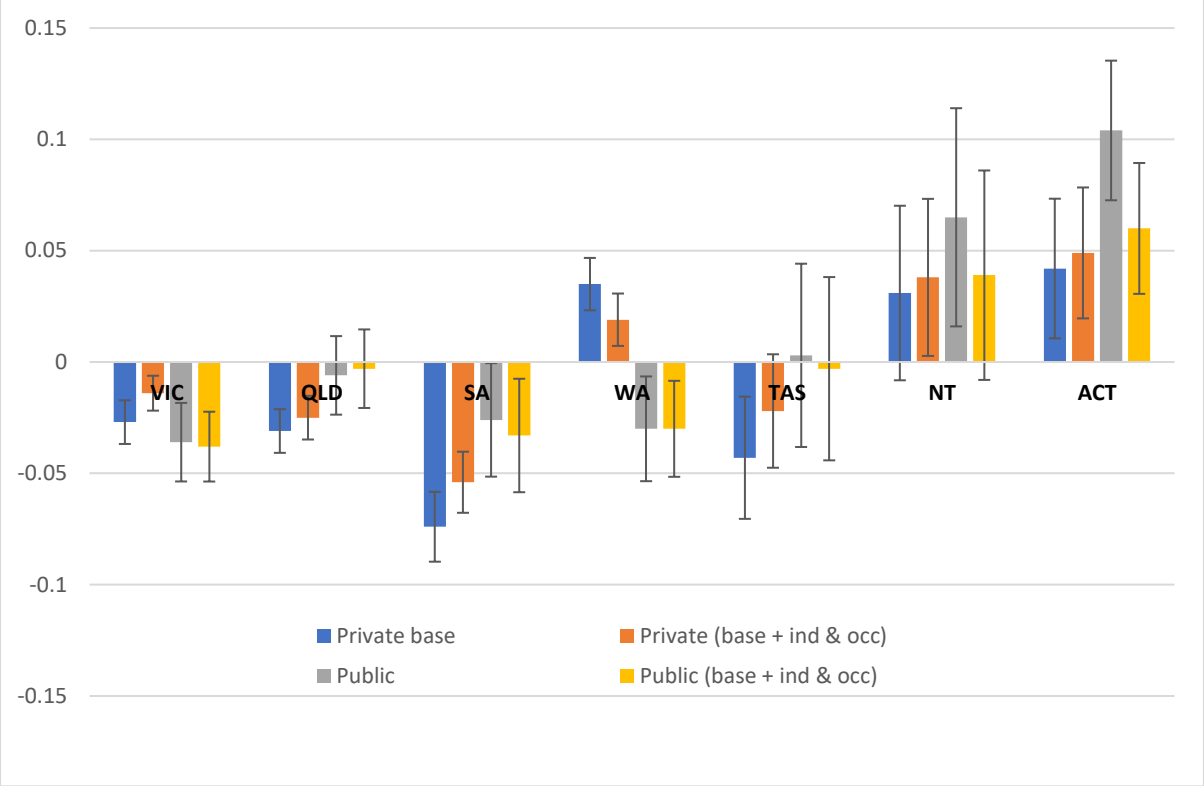
Table 3: State/Territory geographic wage structures by sector, 2016-2021.

	Private Sector Employees		**Public Sector Employees**	
	(1)	(2)	(3)	(4)
	BASE	BASE + 1 digit industry and 1 digit occ	BASE	BASE + 1 digit industry and 1 digit occ
VIC	-0.027***	-0.014***	-0.036***	-0.038***
	(0.005)	(0.004)	(0.009)	(0.008)
QLD	-0.031***	-0.025***	-0.006	-0.003
	(0.005)	(0.005)	(0.009)	(0.009)
SA	-0.074***	-0.054***	-0.026*	-0.033**
	(0.008)	(0.007)	(0.013)	(0.013)
WA	0.035***	0.019**	-0.030*	-0.030**
	(0.006)	(0.006)	(0.012)	(0.011)
TAS	-0.043**	-0.022	0.003	-0.003
	(0.014)	(0.013)	(0.021)	(0.021)
NT	0.031	0.038*	0.065**	0.039
	(0.020)	(0.018)	(0.025)	(0.024)
ACT	0.042**	0.049***	0.104***	0.060***
	(0.016)	(0.015)	(0.016)	(0.015)
Num.Obs.	66,419	66,419	18,274	18,274
R^2	0.170	0.287	0.167	0.235

Notes:

1. The dependent variable is the natural logarithm of the hourly wage in the main job.
2. "Base" refers to a wage specification that controls for state/territory (the base case is NSW) as well as urban, sex, education, potential experience and its square, marital status, dependent child and year dummies. Table 1 (column 2) provides a description of these additional variables.
3. The extended regression includes controls for industry and occupation at the 1 digit level. The estimates are weighted to reflect population values and the standard errors (in parentheses) are clustered on the individual. Significance given by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
4. Source: Commission estimates generated using the COES, 2018-2022.

Figure 2: Geographic wage relativities of public and private sectors, Australia.



Source: Table 3.

Another way to explore this issue (of using the private sector as a proxy for the public sector) is to consider the geographic wage relativities separately by sector and sex. A large share (around two-thirds) of public sector employees are female. This primarily arises because the states have responsibility for health and education and these two sectors are highly feminised. The Australian labour market is also highly segregated along gender lines.

Table 4 shows the estimates disaggregated by sex and sector. Focusing in on Victoria, columns (1) to (4) for males suggest that males in the private sector in Victoria earn significantly less than their counterparts in NSW. There is, however, no significant differences in the wages of male public sector employees in Victoria and NSW.

Columns (5) to (8) for VIC show that female employees in both the public and private sectors are paid significantly less than their NSW counterparts. The estimates also show that:

- Female private and public sector employees in SA earn significantly less than their NSW counterparts.

- In QLD female private sector employees earn less than female private sector employees in NSW while female public sector employees have comparable earnings to their NSW counterparts.
- In WA there is no significant differences in the wages paid to WA and NSW private sector female employees. Female public sector employees in WA, however, earn significantly less than their NSW counterparts.

These differences may reflect data limitations. They may also reflect the effects of state policies. In other words, it is not possible with these data to explain whether differences are due to differences in the public and private labour markets.

Table 4: State/territory geographic wage structures by sector and sex, 2016-2021.

	MALE				FEMALE			
	PRIVATE SECTOR		PUBLIC SECTOR		PRIVATE SECTOR		PUBLIC SECTOR	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Base	Augmented	Base	Augmented	Base	Augmented	Base	Augmented
VIC	-0.020**	-0.007	-0.001	-0.019	-0.034***	-0.023***	-0.058***	-0.047***
	(0.007)	(0.006)	(0.015)	(0.014)	(0.007)	(0.006)	(0.011)	(0.010)
QLD	-0.020**	-0.018**	0.010	0.001	-0.045***	-0.033***	-0.018	-0.006
	(0.007)	(0.007)	(0.015)	(0.015)	(0.007)	(0.007)	(0.011)	(0.011)
SA	-0.080***	-0.060***	-0.012	-0.028	-0.067***	-0.046***	-0.036*	-0.035*
	(0.011)	(0.010)	(0.023)	(0.022)	(0.011)	(0.010)	(0.016)	(0.016)
WA	0.068***	0.035***	-0.007	-0.025	-0.008	0.001	-0.045**	-0.031*
	(0.009)	(0.009)	(0.020)	(0.020)	(0.009)	(0.009)	(0.014)	(0.014)
TAS	-0.066**	-0.046*	0.041	0.019	-0.021	0.004	-0.019	-0.013
	(0.020)	(0.019)	(0.037)	(0.035)	(0.020)	(0.018)	(0.026)	(0.025)
NT	0.044	0.051*	0.097*	0.063	0.010	0.021	0.046	0.022
	(0.027)	(0.025)	(0.042)	(0.040)	(0.029)	(0.027)	(0.031)	(0.030)
ACT	0.053*	0.058**	0.126***	0.073**	0.029	0.037	0.088***	0.054**
	(0.023)	(0.021)	(0.025)	(0.024)	(0.022)	(0.021)	(0.021)	(0.020)

Notes: For information on the variables in the 'base' and 'augmented' specification see notes to Table 3. The 'augmented' consists of the base plus 1 digit industry and occupation variables.

To further unpack these differing female estimates by sector a Blinder-Oaxaca decomposition is undertaken[7]. This decomposition sheds light on the source of a wage differential between two groups. For convenience the focus is confined to NSW and VIC. The decomposition allows us to ask how much

[7] The Blinder-Oaxaca decomposition is a statistical approach proposed by A. Blinder (Blinder, A. (1973), 'Wage Discrimination: Reduced Form and Structural Estimates', *Journal of Human Resources*, 84, 436-455) and R. Oaxaca (Oaxaca, R. (1973), 'Male-Female Wage Differentials in Urban Labor Markets', *International Economic Review*, 14, 693-709).

of the differences in the mean wages of females public servants in NSW and VIC may be explained by differences in the characteristics (e.g., age, qualifications, etc.) of the two groups.[8]

The Blinder-Oaxaca decomposition requires first estimating a wage equation for each group. The results associated with this are reported in Table 5. Table 6 shows the estimates following the application of the Blinder-Oaxaca decomposition. The estimates in Table 6 show that there is a 5% raw wage gap (female public servants in Victoria are, on average, paid 5% less than female public servants in NSW).

The decomposition exercise shows that of this 5% wage gap, none of it derives from differences in the characteristics of female public servants in NSW and female VIC public servants. This means all the difference is generated by differences in the coefficients, i.e., by differences in the way NSW and VIC remunerate their female public servants. The detailed estimates (not reported) show that the differences in the main arise from differences in the way workers of different occupations, industry sectors and levels of education are treated in these two states.

[8] The Blinder-Oaxaca decomposition requires first fitting two regressions using OLS (e.g., equations (i) and (ii) and then subtracting and re-arranging the terms to give equation (iii). The first component on the right-hand-side of equation (iii) shows the gap that can be explained by differences in the characteristics of the two groups. The second and third components (together) show the difference that is due to differences in the coefficients (driven by differences in the way each group rewards specific characteristics).

$$ln(W_{NSW}) = \alpha_{NSW} + \boldsymbol{\beta}_{NSW}\boldsymbol{X}_{NSW} + \varepsilon_{NSW} \quad \text{(i)}$$

$$ln(W_{VIC}) = \alpha_{VIC} + \boldsymbol{\beta}_{VIC}\boldsymbol{X}_{VIC} + \varepsilon_{VIC} \quad \text{(ii)}$$

After subtraction and rearranging:

$$ln(gap) = \overline{ln(W_{NSW})} - \overline{ln(W_{VIC})}$$

$$= (\overline{\boldsymbol{X}}_{NSW} - \overline{\boldsymbol{X}}_{VIC})\widehat{\boldsymbol{\beta}}_{NSW} + \overline{\boldsymbol{X}}_{VIC}(\widehat{\boldsymbol{\beta}}_{NSW} - \widehat{\boldsymbol{\beta}}_{VIC}) + (\hat{\alpha}_{NSW} - \hat{\alpha}_{VIC}) \quad \text{(ii)}$$

Table 5: Wage regressions, female, public sector, NSW and VIC.

	(1)	(2)	(3)	(4)
	NSW	s.e.	VIC	s.e.
English-speaking background	0.039	0.023	0.044	0.025
Highest qualification (relative to high-school)				
Certificate	0.052	0.036	-0.034	0.042
Diploma	0.095	0.035	0.068	0.037
Degree	0.183	0.030	0.145	0.032
Post-graduate	0.267	0.035	0.221	0.037
Age controls (reference group < 30 years)				
30-34 years	0.089	0.035	0.094	0.034
35-39 years	0.152	0.036	0.152	0.037
40-44 years	0.162	0.038	0.141	0.039
45-49 years	0.154	0.036	0.170	0.037
50-54 years	0.161	0.036	0.182	0.038
55-59 years	0.138	0.036	0.225	0.037
60-64 years	0.147	0.040	0.207	0.041
Marital status - partnered	0.007	0.020	-0.024	0.021
Has dependent student	-0.046	0.033	0.040	0.035
Has dependent child	0.010	0.023	0.007	0.024
Resides in an urban area	0.076	0.019	0.037	0.024
Industry controls				
Public administration and safefy	0.021	0.037	0.063	0.038
Education and training	-0.051	0.036	-0.076	0.038
Health care and social assistance	-0.099	0.037	-0.016	0.039
Occupation controls				
Manager	0.459	0.04	0.479	0.042
Professional	0.292	0.03	0.314	0.028
Clerical or administrative worker	0.082	0.03	0.077	0.031
Time controls				
2019	0.091	0.028	0.048	0.03
2020	0.095	0.028	0.14	0.03
2021	0.176	0.029	0.172	0.03
2022	0.166	0.029	0.198	0.03
Observations	2,290		1,950	
R^2	0.218		0.232	

Source: COES, 2018-22.

Table 6: Blinder-Oaxaca decomposition of female, public sector wages, NSW and VIC.

	Description	Mean Value
(1)	Natural logarithm of mean wages of female public sector workers – NSW	3.862
(2)	Natural logarithm of mean wages of female public sector workers – VIC	3.812
(3)	Difference (raw gap) [row (1) – row (2)]	0.050
(4)	Explained coefficient	0.004
(5)	Unexplained coefficient	0.046
(6)	Share of gap explained (due to differences in characteristics) [(row (4)/row (3)*100)]	8%
(7)	Share of gap unexplained (due to coefficients) [(row (5)/row (3)*100)]	92%

Notes:

1. The decomposition is based on information provided in Table 5 and the mean values of each of these variables (not reported).
2. The decomposition was undertaken for the consultant by the Commission using the COES data covering the period 2018-22.

To restate the point, there are no clear differences in the characteristics (e.g., age, occupation, etc.) between the female public sector labour forces in the two states, only differences in the way they are remunerated. It is very likely that the differences in the treatment of public sector workers in NSW and VIC arises from differences in state wage policies, either driven by unencumbered policy choice, or by similar responses to different underlying wage pressures. More detailed analysis is required to confidently support such an assessment. Additionally, if the different coefficient estimates are the product of differences in state wage policies it is likely the case that the different treatment of public sector workers within each state has a historical element to it as well.

4.1.1 Response - should state differences in the private sector be used as a proxy for market pressures felt by the public sector?

Should the state/territory wage structure in the private sector be used to proxy for market pressures felt by the public sector in the states and, therefore, public sector wage costs?

The approach, as noted, has strengths and weaknesses. The strength is that, at an aggregate level, private sector wages are likely not driven by public sector wages. This means that the observed wage relativities are likely 'policy-neutral'.

The weakness of the approach, however, is that there are significant differences in the character and composition of private and public sector labour markets – particularly by sex. Public sector employment is concentrated in three main industry sectors – Public administration, health and education. Together these sectors account for around 90% of public sector employees. In the private sector these same three industries account for around 21% of all employment.[9] The public sector is also highly feminised (around 65% of public sector workers are female) whereas the majority of workers in the private sector are male.

Analysis reported above shows that there are some differences between the regional wage structure in the private sector and the regional wage structure in the public sector –pointing to differences in wage costs by sector. There is, however, no easy way of estimating 'policy-neutral' public sector wage costs given the interplay between the public and private sectors. Alternatives, such as using public sector or private sector health and education industries may better reflect the particular labour market segments of interest, but would significantly reflect the policy decisions of each State.

Notwithstanding the issues discussed above, the Commission's approach is reasonable. Wages are different between the states in both public and private sectors, and the directions of these differences rarely conflict. Given the challenges of finding a policy neutral measure of state wage costs, and the strengths and weaknesses of alternative approaches, the following two recommendations are offered:

Recommendation 1: The Commission continue to use the regional wage structure in the private sector as a proxy for labour market pressures in the state/territory public sector.

Recommendation 2: Given the different sex composition of the public and private sectors, the Commission give consideration to using the FEMALE private sector regional wage structure as a proxy for labour market pressures in the state/territory public sector.

4.2 Choice of dataset

The Commission's present approach uses data from the ABS Characteristics of Employment Survey (COES). There are other datasets that the Commission could consider employing to uncover the geographical wage structure. These include the ABS Census data and the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Each dataset has its strengths and limitations.

The Census data (latest available is 2021), for example, is large and representative but is only available on a five year basis and does not have information on wages (just total income).

[9] These shares are based on estimates from COES for a sample of employees aged 25-54.

HILDA on the other hand, is annual, longitudinal and, after weighting, is nationally representative. HILDA has several strengths over the COES. For example, it contains information on actual labour market experience, thus overcoming the need to generate a measure of potential experience. It also lends itself to panel estimation techniques with the advantage that a panel approach picks up selection and unobservable information. The HILDA sample, however, is too small to provide robust estimates at the territory level (especially for the NT). The COES provides a larger sample, and more robust estimates, for all states and territories.

Given the favourable characteristics of the COES (large sample size, frequency of the survey and the ability to estimate a wage equation with hourly wages as the dependent variable) the recommendation is that the Commission continue to use the COES for its modelling.

Recommendation 3: The Commission remain with the COES for estimation purposes.

4.3 Estimation considerations

Various estimation considerations have been raised. For example, is the regression over-specified? Are there other variables that should be considered that are not in the model. Should the specification include hours of work? Should the approach use a pooled cross-section?

4.3.1 Hourly or weekly wages as the dependent variable

In the empirical literature weekly wages generally constitute the dependent variable where there is no information on hours worked in the dataset. The limitation of this approach, however, is that the sample is often restricted to workers employed full-time. COES has information on hours worked and the capacity to use the hourly wage as the dependent variable.

Recommendation 4: The Commission use hourly wages as the dependent variable.

4.3.2 Inclusion of controls for hours worked in the wage equation

Table 1 (column 2) sets out the Commissions proposed set of controls for a wage equation with hourly wages as the dependent variable (with Y constructed as: usual weekly wage / paid hours worked). The Commission proposes using five hour-control variables in its modelling: usual hours, paid hours, usual

hours squared, paid hours squared and an interaction term capturing usual hours paid multiplied by paid hours.

In a standard wage equation with hourly wages as the dependent variable hours would not normally be included as an independent variable because of endogenous considerations. (Does the hourly wage drive hours worked; or does hours worked drive hourly wage). If, however, there are reasons to believe that hours worked is exogenous (the firm imposes desired hours and the individual has no choice) and that the treatment of workers differs across the hours distribution (e.g., part-time workers or workers on short-hour arrangements receive less hourly wages, perhaps because of different award and agreement coverage and/or different working conditions) then there may be an argument for controlling for hours on the right-hand-side (RHS). The nature of these controls should reflect the Commission's assumption or a-priori expectations about how hours worked affect wages.

For example, if the Commission is concerned that the dependent variable (based on a measure of usual hours) is not reflective of paid hours (has measurement error) then the option could be to either check (via a robustness test) the estimates with the dependent variable first constructed using usual hours and then constructed using paid hours. Another alternative could be to include a dummy variable set equal to 1 if paid hours are equal to usual hours and 0 otherwise. A more conventional approach would be to exclude sample members who are outliers – e.g., those who report working less than 5 hours per week in their main job and those working 60 or more hours per week in their main job.[10]

Returning to the question of hour controls on the RHS, in the 2025 Methodology document the Commission is proposing the inclusion of usual hours and paid hours squared and an interaction of "usual hours x paid hours". The Commission should both reduce the complexity of its use of hours and better explain the choice of functional form (e.g., what is the presumed relationship between hours and wages and why?).

Given the Commission's stated principles (see the Introductory section) of practicality ("methods should be simple") a simpler approach to capture differences in the relationship between hours and wages over the distribution would be to include dummy variables. For example, the Commission may consider including a variable labelled "Part-time" set equal to 1 if the respondent works less than 35 hours per week and 0 otherwise; and a variable labelled "Long-hour" set equal to 1 if the respondent works > 40 hours per week and 0 otherwise. The reference group could be those working 35-39 hours

[10] For an example of this approach see: Breunig, R., Hasan, S. and Salehin, M. (2023), 'The Immigrant Wage Gap and Assimilation in Australia: Does Unobserved Heterogeneity Matter?', *Economic Record*, 89(287): 490-507.

per week (full-time). An alternative way to proceed is to generate a distribution of hours worked for sample members. The expectation is that much of the sample will fall around 40 hours or in the full-time bin. The distribution may assist in determining what bins to use if the decision is to employ a dummy variable approach to capture differences in the hours-wage relationship.

The Commission should consider the effect that hourly wage rates have on hours worked as well as the effect of hours worked on hourly wage rates in determining this aspect of its model.

Recommendation 5: The Commission deals with potential measurement error in hourly wages by excluding sample members who report working less than 5 hours per week in their main job and those working 60 or more hours per week in their main job.

Recommendation 6: If the Commission has strong a-priori reason to believe that the hours-wage relationship differs across the distribution the recommendation is to adopt a simpler specification using a dummy variable approach with controls for part-time hours and long-hours.

4.3.3 Potential experience and age variables

The key parameters of interest are the coefficients on the state and territory dummy variables. Standard wage equations commonly control for qualifications, labour market experience, marital status, dependent children, migrant status and urban location. Ideally experience captures actual time in the labour market (actual experience), however, this is not possible with the COES. In instances where information on actual experience is not available researchers typically generate a potential measure, commonly calculated as 'age minus age when completed highest qualification' (or age-years of schooling-5) (the assumption being that they were 5 years of age when the commenced school). In the absence of information on the age when the respondent completed their highest qualification it is not uncommon to invoke an assumption of time-taken (years of schooling) to complete a particular qualification. For example, those with a postgraduate degree could be assigned 19 years of education and Bachelor degree holders assigned 15.5 years of education.[11]

In light of the above the Commission may wish to re-consider how it derives its measure of potential experience. It would appear that the Commission presently measures potential experience as "age-15". This adds unnecessary complexity as all the approach does is discount age by 15 years for everyone.

[11] An example of this approach may be found in: Chiswick, B.R., Le, A.T. and Miller, P.W. (2006), *How Immigrants Fare Across the Earnings Distribution: International Analyses.* IZA Discussion Paper No. 2405. (See appendix A for a description of their variables).

Rather than employing a potential measure of experience the Commission may wish to consider including a series of age-related dummy variables. Given state differences in the age composition of its population this approach would likely be a more suitable than one using a derived measure of experience. It would also be more appropriate given the large share of females in the public sector and the fact that a potential experience measure is a poor proxy for female experience. Finally, an age-related dummy variable approach would also be simpler.

The Commission has proposed replacing the derived work experience variable with variables interacting age with level of education. The Commission should ask itself "What value does this approach add to the regression and to the estimation of the key variables of interest – the state and territory dummy variables?" Age-education interactions might be used if the Commission wishes to model how the education-wage relationship changes with age, but this isn't the purpose of the regression. Is there an improvement in the regression's fit when the age variable is interacted with the education? Is the model fit worth the increased complexity that comes with these interactions? More importantly, do the parameters on the state/territories dummies change with age-education interactions? The expectation is that they will not be different.

Recommendation 7: The Commission should use a series of age dummy variables to capture labour market experience rather than a measure of potential experience.

Recommendation 8: The Commission does not include age-education (interactions) in its model.

4.3.4 Tenure

In its 2020 model the Commission controlled for tenure via five dummy variables. Going forward they propose to model tenure as a continuous variable. Such an approach is endorsed.

Recommendation 9: The Commission include tenure as a continuous variable.

4.3.5 Number of controls

The Commission's approach to specifying the regression is to estimate a detailed and complex regression with more than 300 variables. This includes numerous interactions (e.g., all variables are interacted with a male dummy variable) and industry and occupation controls at the three and four digit level. Their view is that a detailed specification captures the regional (geographic) wage structure more accurately.

The Commission is aware of the problems that arise from overfitting a regression. This includes multicollinearity and degrees of freedom (df) considerations. The latter matters for inference testing.

A widely used test for multicollinearity is the variance inflation factor (VIF). The Commission's reporting of this test suggests that the variables of interest (the state and territory dummies) do not have high VIFs. This suggests that their performance as control variables is not impaired by an overly specified model.

The Commission has, however, indicated that one of its principles is 'practicality' (methods are simple, reliable and fit for purpose). This begs the question whether a simpler specification would work just as well.

Given the focus is on the geographical wage structure one way to proceed could be to estimate a base specification and then incrementally add-in sets of controls. In the process the Commission could check to see if the additional controls affect the coefficients on the state / territory dummies in any significant way.

For example, Table 4 reports the geographic wage structure for states and territories disaggregated by sex and sector. Two specifications are estimates for each group. A Z test of the coefficient difference between the base model and the augmented model (the base model plus 1 digit industry and occupation controls) reveals that, for all cases considered, there is only one instance where there is a significant difference in the coefficients when comparing the results from the base and augmented model. This case relates to male private sector workers in WA. Column 1 shows that when the model is just a base specification, male private sector workers in WA earn around 6.8% more than their NSW counterparts. When the model is augmented with industry and occupation this premium reduces to around 3.5%.

Recommendation 10: The Commission seek to estimate a parsimonious model (fewer predictor variables).

4.3.6 Volatility of estimates

The Commission wishes to reduce the volatility of its estimates while allowing for relative wage levels to change over time.

To achieve the above they propose using all available data (starting from 2016-17) to estimate relative wage costs in each assessment year. These estimates would be generated by indexing and weighting

the estimates from each contributing year. This approach sounds relatively complex, although statistically sound.

An alternative approach may be to pool the data across all the available years. Such an approach, would generate an average geographical wage relativity over the whole period. A limitation is that it would not be updated annually. A variant of the latter is to pool the data for, say, three years and thus estimate the average 'three-year-annual' (moving) geographical wage relativity.

Recommendation 11: To reduce the volatility of the geographic wage relativities the Commission consider alternative approaches such as pooling data over a moving three-year period when estimating the geographic wage structure.

4.3.7 A national labour market?

Are we moving to a national labour market? In some occupations, possibly yes. Commonwealth public servants, for example, maybe found working in teams but residing in differing states and meeting up virtually via software such as Microsoft Teams.

States are also increasingly competing for labour in areas such as nursing and teaching.[12] Various 'attraction' packages are being offered, including one-off cost of living payments and promises to pay outstanding HECS debts.

What is not clear from available empirical work is the extent to which increased competition (over recent years) between states is resulting in comparable salaries. For example, if Tasmania is recruiting from New South Wales are they required to offer comparable salaries or can they compete on the basis of lower salaries but life-style choices?

Estimates from the COES (see Table 4 above) suggest that over the period 2018-22 there was no significant difference in wages of public sector workers (male and female) in NSW and Tasmania (ceteris paribus). Given the moderately large standard errors on this estimate, one cannot rule out the possibility that Tasmania, may, indeed, be offering comparable salaries to attract labour.

This pattern, however, is not consistent across all states and territories (as noted). Female public servants in WA, for example, are paid significantly less than their counterparts in NSW, as are those in Victoria and South Australia. The fact that a similar pattern amongst male public servants (holding all

[12] For example, see Western Australia's 'belong' campaign to recruit health professionals from overseas and interstate (https://belong.health.wa.gov.au)

else constant) is not statistically significant, however, means that these differentials may be reflective of state wage policy decisions rather than cost of living pressures.

An important question for state governments (in setting state wage policy) (and for the Commission in determining grants) is the responsiveness of labour to increases in wages. States / territories are presently experiencing acute shortages in particular labour markets such as nursing and teaching. Empirical research elsewhere shows that, for nursing, there are large positive wage elasticity effects for older nurses.[13] In other words, raising wages will attract labour into the sector. State / territory governments should, therefore, consider significantly raising the wages in these occupations as part of its attraction and retention policies. Put differently, it is recognised that states/territories cannot set wages in isolation and must respond to labour market conditions to recruit and retain staff.

[13] Hanel, B., Kalb, G. and Scott, A. (2012). Nurses' Labour Supply Elasticities: The importance of accounting for extensive margins. Melbourne Institute Working Paper No. 9/12.