



# PC productivity insights

## Productivity growth and wages – a forensic look

### **Appendices**

- A Making the right data choices
- B Methodological details
- C Mining and agriculture effect on the aggregate results
- D Wage decoupling and other economic indicators
- E Estimates of long-run decoupling from 1959-60

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Further information on the Productivity Commission can be obtained from the Commission's website ([www.pc.gov.au](http://www.pc.gov.au)).

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# Appendix A – Making the right data choices

## A.1 The Commission’s preferred measure of wage decoupling

While there is general agreement – or rather, common practice – on how to measure labour productivity for estimating wage decoupling, there are significant variations in how to measure wages and the choice of time period for the analysis (appendix A.2).

Measuring real wages requires a combination of a measure of total labour income, a measure of hours worked and a measure of inflation. The Commission’s preferred measure of all of these are detailed below as well as the choice of labour productivity measure.

### Labour income measure

The preferred measure of labour income is:

- the sum of *compensation of employees* – which includes wages and salaries (including bonuses and overtime) and employer social contributions (including superannuation contributions)  
*plus*
- the labour portion of *gross mixed income* (GMI, the income of unincorporated businesses) in the *Australian System of National Accounts* (Cat. no. 5204.0). GMI reflects both the income from the use of capital by business owners and their own hours of work (which do not receive an explicit wage) in the business. GMI needs to be apportioned between the income attributable to the hours worked by business owners and the return on their invested capital. The Commission’s preferred approach is to assume owner-managers receive the same wage rate as employees. The apportioning of GMI is discussed in further detail in *data issue 3* in appendix A.2.

The average (nominal) wage rate is calculated by dividing total labour income by the total hours worked (both owner-manager and employee) in the *Labour Account*, Cat. no. 6150.0.55.003.

Explanation as to why these data sources were chosen are in appendix A.2.

### Particular industries and aggregations of industries

For particular industries, or aggregations of industries (such as all industries excluding mining and agriculture), the ABS does not publish an equivalent national accounts’ employee wage rate at the industry level, so we have had to derive an estimate from several ABS sources. As for the whole economy, we assume that owner-managers and employees receive the same wage rate (for each industry). The detailed calculations are shown in appendix B.1.

Industry or sectoral labour income can be further calculated by multiplying this wage rate by the corresponding total hours worked (both employee and owner-manager) in the *Labour Account*, Cat. no. 6150.0.55.003.

## Hours worked measure

Hours worked are taken from the *Labour Account* (Cat. no. 6150.0.55.003.), which is the measure of labour input used by the national accounts. This measure can differ (especially at the industry level) from the hours worked reported in the *Labour Force Survey* (LFS, Cat. no. 6202.0.), reflecting that the latter is based only on information from households and does not take into account administrative data or business surveys that also provide information on hours. The *Labour Account* harmonises across these various sources of labour information.

Nominal wages are then the ratio of estimated nominal labour income (above) and hours worked.

## Inflation measure

Business's capacity to pay employees depends on the productivity of their employees and the prices they receive for goods and services, not on the prices that consumers must pay for their goods and services. While consumer price increases are generally highly correlated with producer prices (at the whole economy level, not the industry level), they can vary significantly given taxes, and global price shocks that affects one or other. Notably, the labour share of income is equivalent to the ratio of real producer wages to labour productivity, and not real consumer wages to labour productivity.

The implicit GDP deflator from the national accounts was used as the measure of economywide producer prices because it is the way labour productivity is deflated. Accordingly, any wage decoupling will be driven solely by changes in the labour share of income, not methodological differences between price indexes. The implicit gross value added (GVA) deflators were used for disaggregated analysis and reflect the prices of output and intermediate inputs supplied by other firms. (Failing to adjust for the price of intermediate inputs can make a significant difference at levels of aggregation less than the whole economy).

We also present results using the *Consumer Price Index* (CPI, Cat. no. 6401) because real consumer prices are sometimes used to measure decoupling. The CPI is the most comprehensive measure of consumer prices in preference to the alternative, *Selected Living Cost Indexes* (Cat. no. 6467), which relate to cost of living for particular groups of individuals (employees, pensioners etc).

The issue of which inflation measure to use is discussed in more detail in *Data issue 4* in appendix A.2.

## Productivity measure

Labour productivity is measured as GDP per hour worked for the whole economy and as GVA per hour worked for subsets of the economy. The value of GDP and the sum of industry GVA is nearly identical except for the inclusion in GDP of product taxes less subsidies.

## A.2 The Commission's preferred estimate of wages

There are many measures of wages (table 1) and several ways of converting these into measures that take account of price movements. Typically wages only relate to employees and exclude the implicit labour earnings of owner-managers of unincorporated enterprises. Most commonly, the CPI, which measures price increases of a fixed basket of goods and services ('inflation'), is used to assess how the buying power of any given dollar of wages changes from year to year. However, other prices can also be used, such as those that apply to 'essential' goods and services, like housing and energy. And from the perspective of businesses, the real cost to them of employees is linked to producer prices.

When adjusted for consumer prices, all measures of real wage growth over the last decade has been significantly below productivity growth, though over the long run, there is greater alignment. (That said, a couple of wage

measures have also shown growth on par or greater than labour productivity in the past five years even as others show continued decoupling, demonstrating the large amount of variation between the measures.)

**Table 1 – Real wage growth compared to labour productivity<sup>a</sup>**

**Average annual growth rates (%)**

	5 years	10 years	20 years	27 years
Average weekly earnings (full time workers)	0.47	0.43	1.29	1.31
Average weekly earnings (all workers)	0.52	0.30	1.12	1.01
Wage price index <sup>b</sup>	0.05	0.27	0.62	
Compensation of employees per hour	1.07	0.46	1.02	1.23
Non-farm compensation of employees per hour	0.99	0.40	0.98	1.22
Labour productivity	0.96	1.17	1.15	1.52

**a.** All wage measures were deflated using the Consumer Price Index. **b.** The wage price index does not extend back 27 years. The wage price index chosen was the index including bonuses for all sectors.

Source: Commission estimates based on (*Australian System of National Accounts, 2021-22*, Cat. no. 5204, tables 1 and 16; *Consumer Price Index, Australia*, Cat. no. 6401, table 1; *Wage price index, Australia, March 2023*, Cat. no. 6345.0., table 7a).

Even this wide set of results belie the difficulties of grasping the relationship between wages and productivity. In particular, there are five key data issues to resolve when measuring real wages:

1. the appropriate source of wages data
2. what should be included in wages
3. how should owner-manager income be split between labour and capital
4. the appropriate price deflator to deflate wages
5. the timeframe over which to assess de-coupling.

Choices about which of these are best should not be haphazard, but be based on whether a measure corresponds to the thing it is intended to measure ('validity') and the degree to which the measure is accurate (suffering from bias or significant random variation from its true value).

The Commissions preferred resolution to these data issues is set out below.

## Data issue 1: what data source to use?

The ABS is the best source of data on wages – with large sample surveys and high survey response rates that reduce non-sampling bias. Nonetheless, the ABS collects wage data through multiple surveys, which given their varying sampling frames, sample sizes, collection periods and coverage, give different answers. Overall, there are five different survey sources based on:

- Business survey sources:
  - The *Employee Earnings and Hours* (EEH) (Cat. no. 6306.0) survey focuses on wages per hour *paid for* (rather than hours actually worked) according to the employer. It covers cash earnings and salary sacrificing where an employee forgoes parts of wages and salaries in exchange for goods and services. It is conducted in May every two years (and was postponed from May 2020 to May 2021 due to the COVID pandemic) so it does not provide continuous estimates. It covers most enterprise types except

enterprises mainly engaged in agriculture, forestry and fishing , private households employing staff and permanent armed forces. As discussed further below, it does not cover working proprietors and partners of unincorporated businesses, self-employed people, or people paid by commission only.

- The *Average Weekly Earnings* (AWE) (Cat. no. 6302.0) survey is a bi-annual survey of business units in May and November each year of their average gross weekly earnings of employees. It covers current and regular payments in cash to employees for work done and has the same significant exclusions as the EEH above.
- The *Wage Price Index* (WPI) (Cat. no. 6345.0) is a quarterly survey of public and private sector employers with a survey design that controls for job type. The survey reference date is the last pay period ending on or before the third Friday of the middle month of the quarter. The WPI is akin to the CPI in that it is based on a fixed ‘basket’ of job types whose wages change over time. The WPI accordingly aims to capture wage growth after excluding the effects of compositional changes in labour markets (for example, promotions and people switching jobs).
- Household survey sources – the *Characteristics of Employment* (CoE) (Cat. no. 6333.0) supplement<sup>1</sup> to the main LFS (Cat. no. 6291.0.55.001) focuses on wages per hour *actually* worked (in contrast to hours paid for) according to the employee. Like the EEH, the CoE excludes defence force employees, but otherwise covers other workers and all industries. Data is collected in August each year.
- The *National Accounts/Labour Account* (Cat. no. 6150.0.55.003) draws on multiple datasets, including the EEH, the LFS and the Linked Employee-Employer Database and tax data. The main national accounts measure of wages is referred to as compensation of employees, while the hours worked measured is of hours actually worked. The hours measure includes both employees and owner-managers and tries to balance the inconsistencies between household and business surveys.

The definitional and methodological differences between these data sources can lead to significant variations in wage growth rates. While variations tend to be short-lived for most measures, the divergence between the WPI and other wage measures has risen over time, testimony to its failure to account for shifts in the type of work to higher paid jobs (figure 1). Higher productivity and associated wages in an economy are often associated with shifts of employees between low and high-paying jobs, which the WPI fails to measure. Accordingly, while useful for some purposes, the WPI is not a valid measure of the total returns to work, and so we have avoided using it to measure wage decoupling.<sup>2</sup>

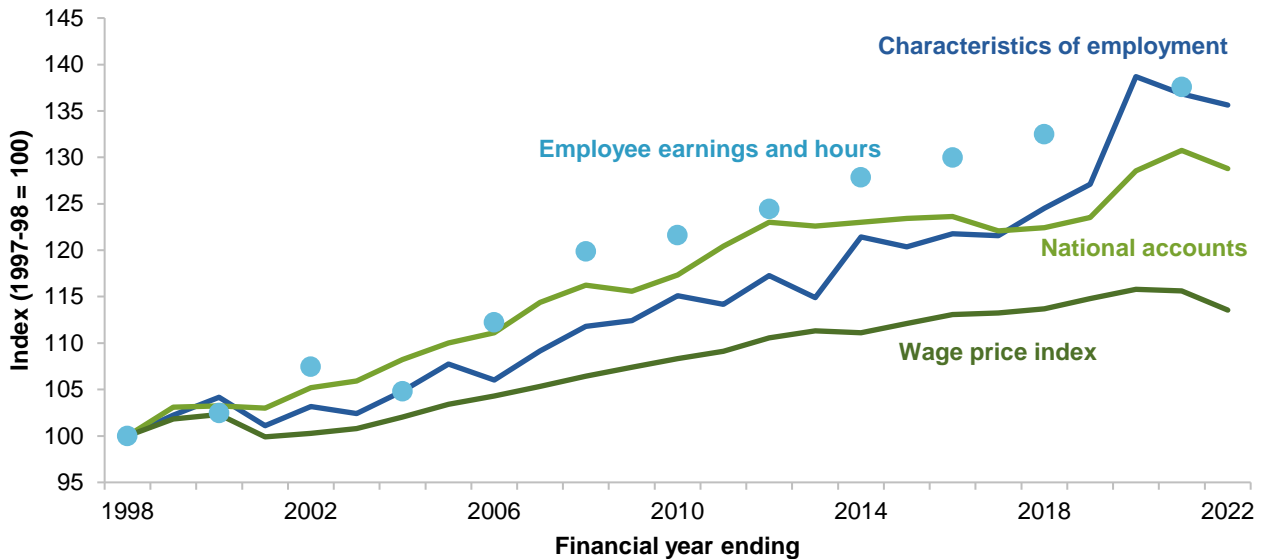
While the other measures of wages follow similar trends, the estimates of compensation of employees in the National Accounts/Labour Account is the best overall measure of returns to *employees*. It has greater coverage of employees and forms of payment, is produced annually, and triangulates from disparate data. It has one major deficiency for considering wage decoupling in that it does not include the implicit wages of working proprietors and the self-employed, an issue we cover further below.

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<sup>1</sup> Data from the CoE is now reported in a separate publication called Employee Earnings.

<sup>2</sup> The WPI has a number of other important uses. It is a good measure of the effect of wages on inflation because it excludes compositional changes. For example, there is no inflationary pressure if someone gets a higher wage because they move from a low to high skill job, so it is important to remove such compositional changes to assess the impacts of wage pressures.



**Figure 1 – Different data sources give different rates of wage growth<sup>a</sup>****Various measures of wage growth between 1997-98 and 2021-22**

a. National accounts measure is compensation of employees per hour, Characteristics of employment measure is mean wages (all employees), the Employee earnings and hours measure is non-managerial median total hourly wage. All series deflated by the consumer price index.

Source: ABS (*Australian system of national accounts, 2021-22*, Cat. no. 5204, table 16; *Consumer Price Index, Australia*, Cat. no. 6401, table 1; *Employee Earnings and Hours, Australia, various years*, Cat. no. 6306.0., data cube 4; *Employee earnings, August 2022*, Cat. no. 6337, table 1).



#### Data issue conclusion 1

##### What data sources that should be used to measure wages?

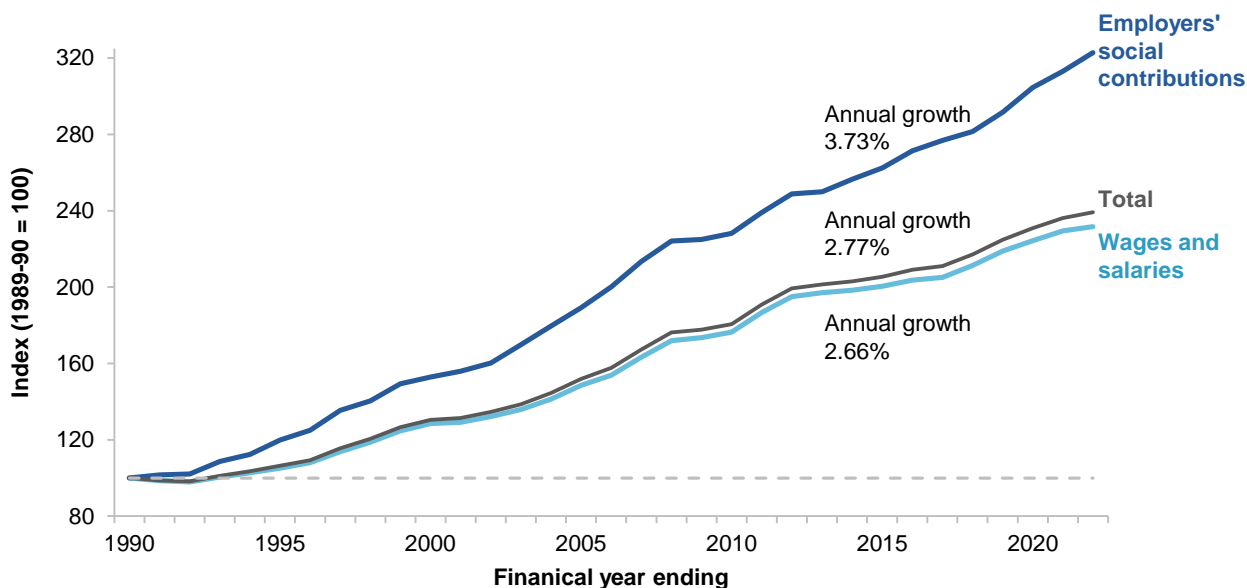
The National Accounts (and accompanying Labour Account) provide the best data source for employee wages for the purposes of measuring wage decoupling. Other data sources have less coverage of industries and types of payment and do not address the inconsistencies between business and household measures of hours worked.

## Data issue 2: what counts as wages?

In addition to their ordinary rate of pay, employees often receive other benefits, such as superannuation benefits, bonuses and paid overtime. Decisions about what benefits to include have effects on trends in wage growth rates because the share of labour earnings accounted for by ordinary cash earnings has changed over time. For example, employers' social contributions, mainly superannuation benefits, have grown at a much greater pace than wages and salaries (figure 2), with the consequence that overall compensation of employees has grown (somewhat) more rapidly than wages and salaries.

**Figure 2 – Non-wage employee benefits can be substantial<sup>a,b</sup>**

**Wages and salaries, employers’ social contributions and the total of the two between 1989-90 and 2021-22**



- a. The total of wages and salaries and employers’ social contributions is referred to as ‘compensation of employees’.
- b. All series are deflated by the consumer price index. All series are indexes of total compensation across all employees rather than hourly compensation.

Source: ABS (*Australian System of National Accounts, 2021-22, Cat. no. 5204, table 6*); *Consumer Price Index, Australia, Cat. no. 6401, table 1*).

On conceptual grounds, the returns to labour should include all benefits provided by employers to employees regardless of the form of the benefit. This is consistent with the measure of output in labour productivity. GDP includes every type of income accruing from production.<sup>3</sup>



**Data issue conclusion 2**  
**What employee benefits should be counted as wages?**

Measures of wages should include all forms of benefits provided by employers to employees, including fringe benefits, overtime pay and social contributions such as superannuation. The ABS national accounts measure of labour returns – ‘compensation of employees’ – includes all such benefits.

**Data issue 3: what to do about unincorporated business profits**

A substantial share of capital income accrues to the owner-managers of unincorporated enterprises (so-called ‘gross mixed income’), including the earnings of the self-employed (figure 3). Unincorporated businesses tend to be smaller than incorporated ones and often the owner of the business supplies much or

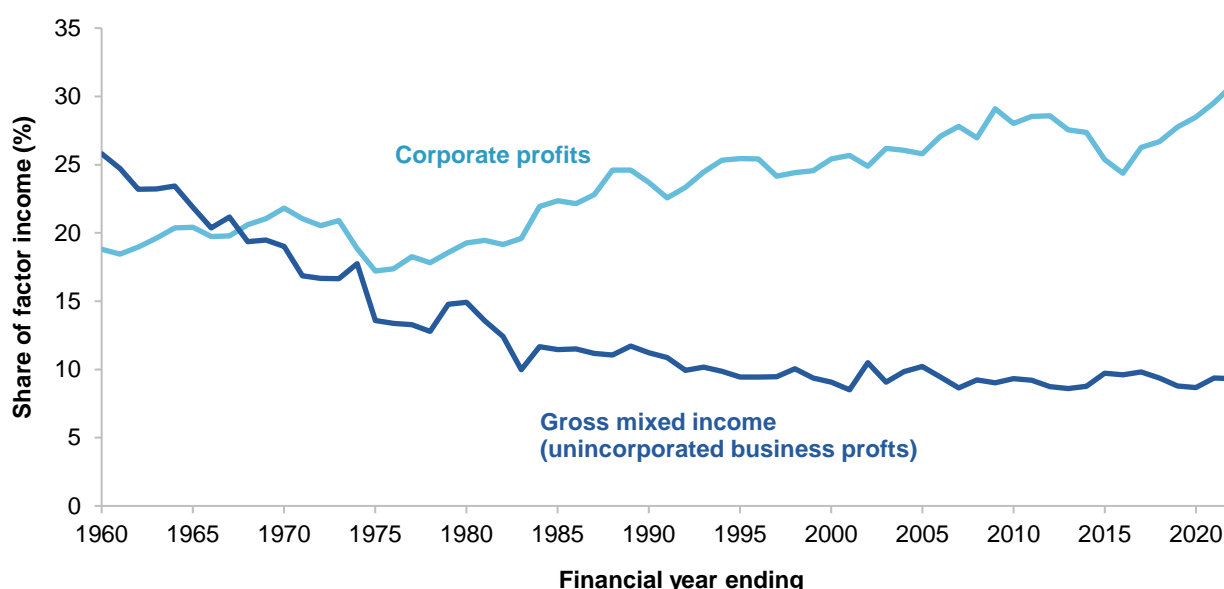
<sup>3</sup> GDP is measure of production but the income accruing from production (less direct taxes minus subsidies) should add to give the same amount. That is, GDP can be measured from three equivalent perspectives: adding up production (value added approach), adding up final expenditure (expenditure approach) or adding up the income accruing from production (income approach).

all of the labour for the business. For example, gig workers would typically be classified as self-employed with their earnings comprising part of GMI despite them having many shared characteristics with employees undertaking much the same tasks.

The ABS National Accounts derivation of labour productivity includes the hours worked by working proprietors. Accordingly, for a conceptually sound measure of wage decoupling, the wage equivalent of the time spent by such proprietors should be counted as part of economy-wide wages. That wage is unobserved but could be seen as either the amount the business owner would have to pay someone to perform their own tasks or the amount the manager could obtain if they were to get a job outside their own firm and earn a wage commensurate with their skills and abilities.

### Figure 3 – Aggregate business income is split between corporate profits and unincorporated business profits<sup>a</sup>

Shares of factor income going to corporate profits and gross mixed income (unincorporated business profits), 1959-60 to 2021-22



a. 'Profits' is 'gross operating surplus' for incorporated enterprises and gross mixed income for unincorporated businesses. Both roughly correspond to earnings before interest, taxes, depreciation and amortization.

Source: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204, table 6).

There are three methods used by statistical agencies (including the ABS) for splitting unincorporated business profits between labour and capital (ABS 2021, sec. 19.113-117):

1. *Assign owner-managers an implicit wage based on market wage rates* times their hours worked. Ideally, the wage chosen for an owner-manager would reflect their skill, experience and industry, but in practice, using the industry average wage for owner-managers is likely to be a reasonable proxy given the diversity of skills and occupations of owner-managers. The capital portion of GMI is the residual income after accounting for implicit wages.
2. *Assign owner-managers an implicit return on capital* – ideally, the return on capital would reflect the mix of assets and industry in which the asset is employed. The labour income of owner-managers is the residual income after accounting for the implicit return on capital.
3. *Take the average of the two above methods* – this is the approach taken by the Australian Bureau of Statistics (ABS) to split income between labour and capital for calculating multifactor productivity estimates.

Each of these approaches has practical limitations. The first approach often gives an estimate of labour income greater than actual GMI, which implies capital losses (appendix B.1). While it is feasible for capital losses to occur in one year and for returns to be volatile, it is less credible that, as occurs, the unincorporated sector makes capital losses over a number of successive years.

The second approach generates an owner-manager wage that is much more volatile than employee wages, and is even negative in some years, which is even less credible than variations in capital returns (appendix B.1).

The third approach – which is used by the ABS – prevents labour income of owner-managers from being greater than GMI. It still results in volatile wages, but less so than the second approach. However, the estimates of owner-manager wages produced by this method implies that owner-manager wages increased at about triple the rate of employee wages between 1994-95 and 2021-22<sup>4</sup>, which is not credible (figure 4).

**Figure 4 – The ABS decomposition of GMI implies rapid growth in wage rates for owner-managers<sup>a,b</sup>**

**Various wage measure for the market sector between 1994-95 and 2021-22**



**a.** The index of the wage rates for all employed people (‘All wages’) is calculated using the ratio of total labour compensation and total hours worked from the *Labour Account*. Total labour compensation (including both employees and owner-managers) is derived by multiplying the labour share of income for the 16 market sector industries in the *Industry Multifactor Productivity* publication by the total factor income in the *National Accounts*. Employee wage rates are the ratio of compensation of employees in the national accounts and hours worked per employee. Hours worked per employee is derived by using the ratio of hours worked performed by employees in the *Labour Force Survey* by the total hours worked (both owner-manager and employees) in the *Labour Account*. Implicit owner-manager hours are calculated by taking the ratio of owner-manager labour income to hours worked by owner-managers. The labour income of owner-managers is calculated by differencing the total labour compensation calculated for all workers and labour compensation for employees. Hours worked for owner-managers is calculated by differencing hours worked by all workers and hours worked by employees. **b.** All series are deflated by the consumer price index.

Source: Commission estimates using: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204.0., table 6; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003., industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001., table EQ05; *Consumer Price Index, Australia*, Cat. no. 6401.0., table 1).

<sup>4</sup> The total wage measure implied by the ABS splitting of GMI (inclusive of both owner-managers and employers) also grew about 0.4 percentage points more annually than employee wages over the same period, leading to substantially lower wage decoupling if the ABS method of splitting GMI is used to construct wages is used rather than the Commission’s preferred wage measure.

While all methods of splitting GMI between labour and capital have shortcomings, on balance, we assumed that owner-managers of unincorporated businesses earned a wage equal to the average employee. This decision reflected that:

- using the other two methods resulted in wage estimates that grow at faster and more volatile rates than for employees. This seems hard to justify if the outside option of working as an employee is available to an owner-manager
- there are several reasons why owner-manager labour income may exceed total GMI. In particular, it is possible that the incongruous results reflect errors in estimating GMI, especially as important components of GMI are derived by using estimated ratio of GMI and GOS (gross operating surplus) to apportion total GOS and GMI. Errors in such ratios make it plausible that overall capital income may be measured adequately, but with underestimation of GMI. Other assumptions by the ABS, such as those that correct for understatement of capital income, may also contribute to errors in measurement.



### Data issue conclusion 3

#### How much of unincorporated business income should we count as wages?

No method of splitting capital and labour is entirely adequate to split the profits of unincorporated businesses between labour and capital, with the three main methods all having drawbacks. The least problematic method is setting the owner-manager wage equal to the economy-average employee wage, which is consistent with their capacity to obtain a job as an employee.

This method produces – by construction – identical results to using compensation of employees per hour as the measure of wages.

## Data issue 4: what price deflator to use?

From the perspective of employees, the buying power of wages depend on the prices of the goods and services they buy. The dominant measure of prices faced by consumers is the CPI, though others include the implicit deflator for household final consumption expenditure and select cost of living indexes, of which the most relevant is the series for employees (Living Cost Index Employees).

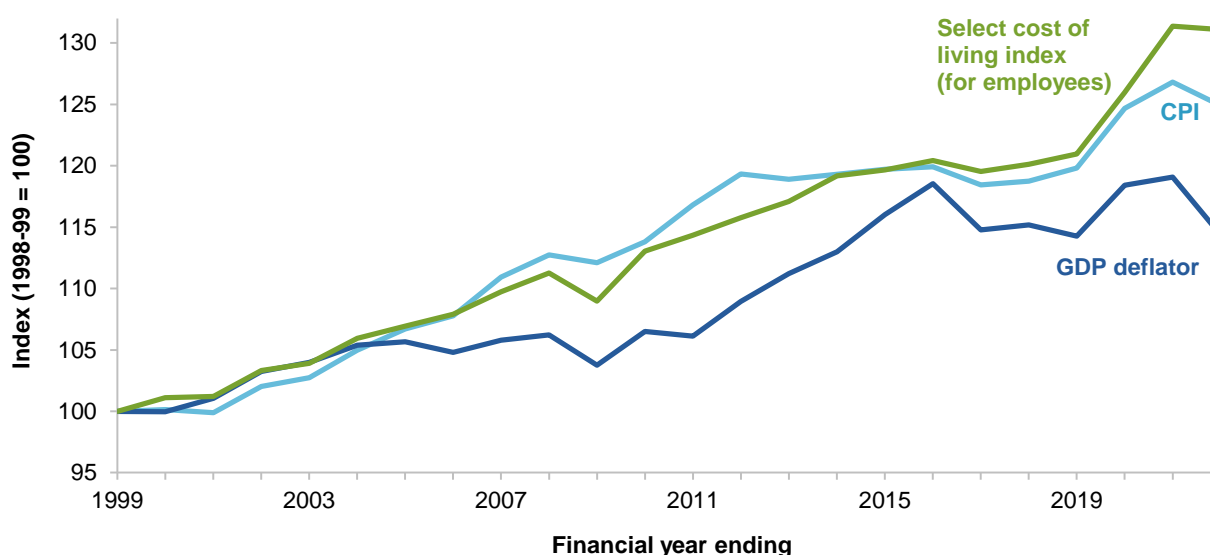
From the viewpoint of businesses, their capacity to pay wages depends on the prices they can obtain for their goods and services after adjusting for the cost of intermediate inputs (such as materials, energy and outside services). In this context, the CPI is an inappropriate measure of prices for estimating wage decoupling and using it would result in divergences between measured wages and labour productivity unrelated to the distribution of economic gains between labour and capital. The growth in real wages based on the CPI does not necessarily have a strong link to labour productivity because consumer price changes can reflect prices outside the control of domestic businesses – such as the price of imports, the impact of taxes (like excise, stamp duties and the goods and service tax), and subsidies (like childcare, Medicare and Pharmaceutical Benefit Scheme benefits). The CPI is also adjusted (in part) for quality improvements in goods that are largely imported, such as motor vehicles.

The relevant price adjustment for wages when considering decoupling is the implicit GDP deflator. Among the different measures of producer prices, the implicit GDP deflator is the only one that is comprehensive – covering all domestic production – and either incorporates both input and output prices or uses only the

prices of final products.<sup>5</sup> For example, the producer price index (PPI) for final domestic expenditure focuses on final goods but excludes exports, which have been a major driver of producer prices. Likewise, other PPI series, such as those for mining output, only focus on a particular industry and typically focus on only one of either inputs or outputs prices without incorporating the two together.

The choice of price deflator has large consequences for measured wage growth (figure 5). The disparities are most evident in the two periods 2011–2016 and 2016–2022, when real wages based on the GDP deflator grew by 2.2. and -0.6% per annum respectively, while for the CPI the respective growth rates were 0.5 and 0.7% per annum.

**Figure 5 – The choice of price deflator has a significant effect on measured real wage growth<sup>a</sup> 1998-99 to 2021-22**



a. The nominal wage rate underpinning these calculations is measured as compensation of employees per hour from table 16 of the *National Accounts*. Given the assumption that wage rates of owner-managers of unincorporated enterprises obtain the same wage rates as employees, this wage rate is also equal to the wage rate for all employed Australians (owner-managers and employees together).

Source: Commission estimates using: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204, table 6; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003, industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001, table EQ05; *Consumer Price Index, Australia*, Cat. no. 6401, table 1).

We still present results on the gap between labour productivity and real wages based on CPI to break down how much of this is due to true decoupling (the gap between productivity and real producer wages) and the relative price of consumption to production – what the ABS refers to as ‘labour’s terms of trade’ (ABS 2022e). When consumer prices are used to deflate wages, we term this **consumer wages** while when producer prices are used, we refer to this as **producer wages**.

<sup>5</sup> A significant proportion of a business’s sales will be to other businesses. So, if a price index reflected the prices of all goods and services provided by business without incorporating input costs or focusing only on final goods and services, then it would be double counting many products.



#### Data issue conclusion 4

##### What price deflator to use to convert nominal into real wages?

Producer prices are preferable to consumer prices for deflating wages when comparing them to labour productivity. Businesses cannot necessarily remunerate workers based on consumer prices, which they have only incomplete control over. Moreover, the labour share of income, which is frequently used to examine how much income flows to the employed, is based on producer prices (the labour share is equal to economywide producer wages divided by labour productivity).

### Data issue 5: choice of time period

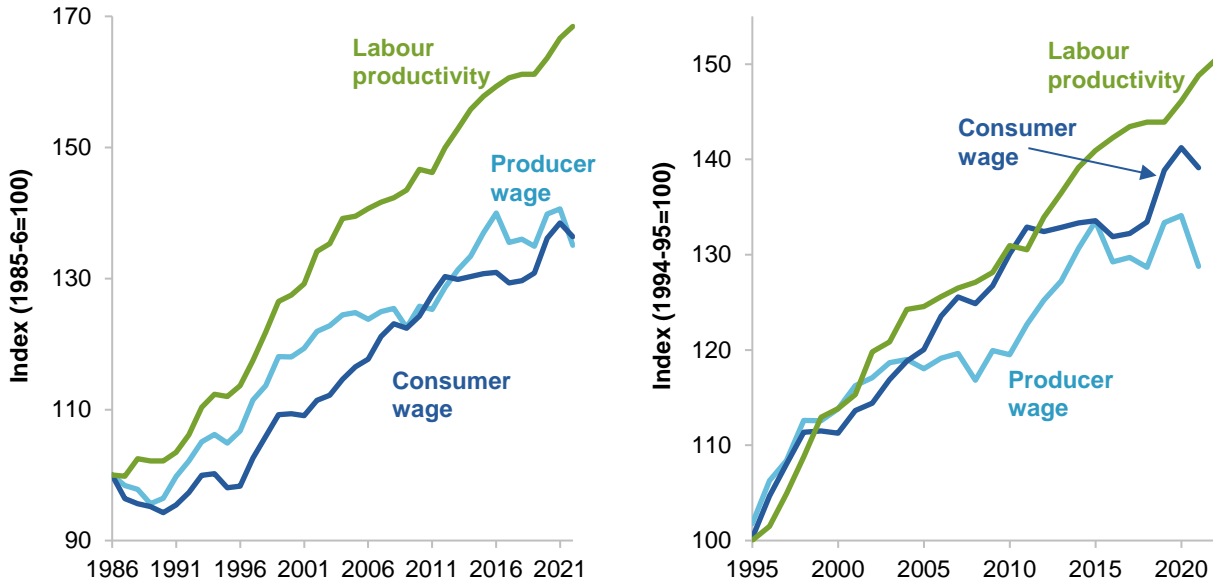
The degree of wage decoupling (or overhang) varies over time so that the choice of period can result in different conclusions about the significance of wage decoupling. An illustration of this is the different perspectives on decoupling when the commencement date is 1985-86 compared with 1994-95 (figure 6).

There are three approaches that better indicate the degree to which real wages follow labour productivity: the ratio between the two over time (figure 7), the differences in growth rates across business cycles (table 2) and the differences in results that arise from using different starting dates (figure 8). While there have been periods when aggregate real producer wages have risen at about the same rate as labour productivity (such as from 1994-95 to 1997-98 and 2009-10 to 2017-18), the long run outcome has been annual growth in labour productivity that exceeds real wage growth by about 0.5 %.<sup>6</sup>

For the purposes of considering the impact of industry composition on the aggregate results, we have used the data from 1994-95 to 2021-22 as this allows the use of consistent data at the industry level. The long-run patterns for that shorter period for decoupling of productivity from real producer wages are very similar to that for the longer period shown in table 2, suggesting few biases from that approach. However, it is also evident that estimating decoupling for short periods are likely to be unreliable (figure 8), and so should generally not be used.

<sup>6</sup> As noted above, producer wages are the preferred measure of real wages. It is notable that the relationship between the growth rates in labour productivity and real producer wages across the growth cycles are much more correlated with each other than the growth rates in labour productivity and real consumer wages (with correlation coefficients of 0.91 and 0.73 respectively).

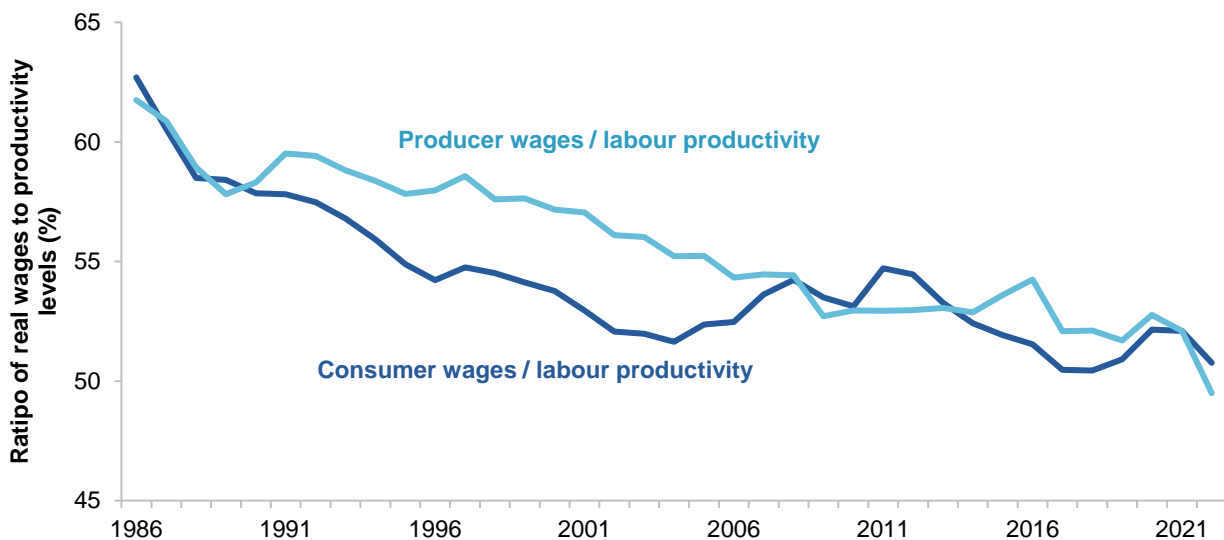
**Figure 6 – The gap between labour productivity and real wages depends on the chosen time period<sup>a,b</sup>**



a. Nominal wages constructed using methodology outlined in box 1. For simplicity, using compensation of employees per hour from table 16 of the *National Accounts* will yield – by construction – an identical result. Nominal wages are then deflated by either the consumer price index (consumer wages) or the implicit GDP deflator (producer wages). b. Annual average growth is the geometric growth from point to point (rather than an average of growth rates). Note that the ABS only has data on the split between employee and owner-manager hours worked back to 1985-86, so this is the earliest starting point due to the Commission’s chosen method of splitting GMI between capital and labour.

Source: Commission estimates using: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204.0., tables 1 and 6; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003., industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001., table EQ05; *Consumer Price Index, Australia*, Cat. no. 6401.0., table 1).

**Figure 7 – The ratio between real wages and labour productivity has been falling<sup>a</sup> 1985-86 to 2021-22**



a. The ratios are the values in dollars of real producer and consumer wages to the real dollar value of labour productivity.

Source: As in the previous figure.



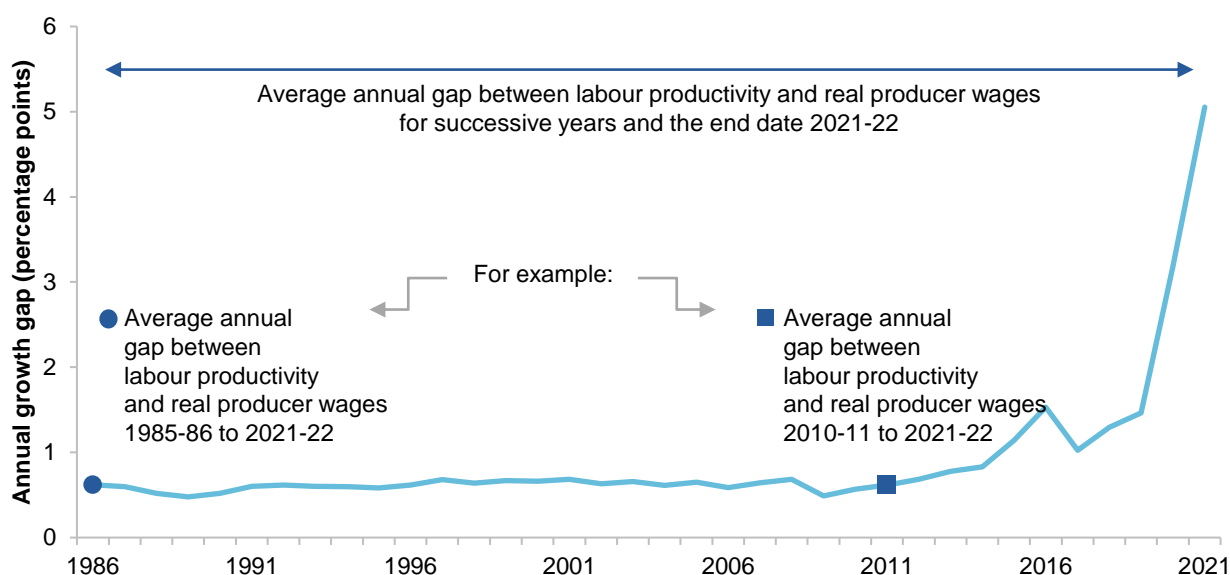
**Table 2 – Trends in aggregate real wages and labour productivity over growth cycles<sup>a</sup>**

	Annual growth in labour productivity (%)	Annual growth in real consumer wages (%)	Annual growth in real producer wages (%)	Decoupling (real consumer wage)	Decoupling (real producer wage)
1988-89 to 1994-95	1.9	1.0	2.1	0.9	-0.2
1994-95 to 1997-98	3.1	2.7	3.0	0.4	0.1
1997-98 to 2003-04	1.9	1.0	1.1	1.0	0.9
2003-04 to 2009-10	0.9	1.4	0.2	-0.5	0.7
2009-10 to 2017-18	1.2	0.5	1.0	0.7	0.2
2017-18 to 2021-22	1.1	1.3	-0.2	-0.2	1.3
1988-89 to 2021-22	1.5	1.1	1.1	0.4	0.5
1985-86 to 2021-22	1.5	0.9	0.8	0.6	0.6

a. Based on growth cycles used by the ABS (2022d) in its analysis of decoupling from 1994-95 and from Barnes (2011) for the preceding cycle.

Source: As above.

**Figure 8 – The degree of decoupling is stable for longer-run estimates<sup>a</sup>**  
**Successive years from 1985-86 to 2021-22**



a. For each year, the average annual growth rate in labour productivity and real producer wages are calculated between it and the end year of 2021-22, and then differenced to give the average annual decoupling rate over the relevant period. Accordingly, the first point in the chart is for 1985-86 to 2021-22 (the value shown in the bottom right-hand side of the table above), while the next observation is from 1986-87 to 2021-22 and so on. The chart shows that, it is only when the period becomes relatively short (after the period from 2010-11 to 2021-22) does the decoupling estimate deviate substantially from the long-run, which is therefore not characteristic of the long-run pattern.

Source: As above.



**Data issue conclusion 5**  
**Choice of timeframe of analysis**

The degree of decoupling depends on the period being used and consideration of business cycle effects. However, *so long as a date before 2010-11 is chosen as the starting point*, the degree of wage decoupling is little changed regardless of the choice of time frame. Any analysis after that date would likely be too vulnerable to a few outlying data points (such as the COVID-19 pandemic) so this was ruled out.

Given that starting analysis at any date before 2010-11 provides similar results, we selected 1994-95 as the starting date for examining decoupling as this is the earliest date from which rich industry level data is available for both labour productivity and wages.

## Appendix B – Methodological details

### B.1 Splitting gross mixed income (GMI) between labour and capital

The purpose of this documents to set out rigorously the methods used for estimating decoupling to avoid ambiguity.

#### Basic approach

GMI is split between labour and capital by assuming that the implicit wage rate received by owner-managers of unincorporated businesses is equal to the wage of employees for the same industry. That is, for each division industry:

$$W_T = W_E = W_O$$

where:  $W_T$  is the weighted average wage of owner-managers and employees,  $W_E$  is the employee wage, and  $W_O$  is the implicit wage of owner-managers of unincorporated enterprises.

The wage measure then becomes:

$$W_T = \frac{COE + W_O H_O^D}{H_T^A}$$

where:  $COE$  is compensation of employees from tables 6 and 46 of *Australian System of National Accounts*.,  $H_T^A$  is the industry hours worked measured from the *Labour Account* (totally both employees and owner-managers),  $H_O^D$  is the derived measure of owner-manager hours worked (details below).

Further:

$$W_E = \frac{COE}{H_E^D}$$

where:  $H_E^D$  is the derived measure of employee hours (details below).

And by construction:

$$H_T^A = H_E^D + H_O^D$$

Putting these together:

$$W_T = COE \times \left( \frac{1 + \frac{H_O^D}{H_E^D}}{H_T^A} \right)$$

This calculation is repeated for each industry.

#### Deriving employee and owner-manager hours

Hours worked by owner-managers of unincorporated enterprise and those of employees are not separately presented in the *Labour Account*. The shares were derived using a combination of the *Labour Force Survey* (LFS) and the *Labour Account* (these data sources needed to be combined because using unadjusted LFS estimates would lead to inconsistency with productivity statistics that use *Labour Account* measures of hours worked).

Employee and owner-manager hours are derived by:

$$H_E^D = \frac{H_E^S}{H_E^S + H_O^S} \times H_T^A$$

and

$$H_O^D = \frac{H_O^S}{H_E^S + H_O^S} \times H_T^A$$

Where:  $H_E^S$  is employee hours worked<sup>7</sup> in the LFS and  $H_O^S$  is the hours worked by owner-managers of unincorporated enterprises in the labour force survey. Note that employee hours incorporates both hours worked by employees and hours worked owner managers of incorporated enterprises while owner manager of unincorporated enterprise hours includes the hours of contributing family members (ABS 2022g).

Putting this together with the above wage equation:

$$W_T = COE \times \left( \frac{1 + \frac{H_O^S}{H_E^S}}{H_T^A} \right)$$

Accordingly, the preferred (nominal) wage measure (at the industry level) requires a combination of compensation of employees from the *Australian System of National Accounts*, total hours worked (both managers and employees) from the *Labour Account*, and LFS estimates of both owner-manager and employee hours worked.

At the whole economy level, this wage measure is the same as the ABS's measure of compensation of employees per hour measure in table 16 of the *Australian System of National Accounts*. However, at the industry level, this measure needs to be derived using the equation above.

The labour share of income can also be calculated using this wage measure and derived hours measure:

$$LIS = \frac{W_T \times H_T^A}{TFI}$$

where:  $LIS$  is the labour share of income for the whole economy,  $TFI$  is the total factor income for the whole economy.

## Limitations of the approach

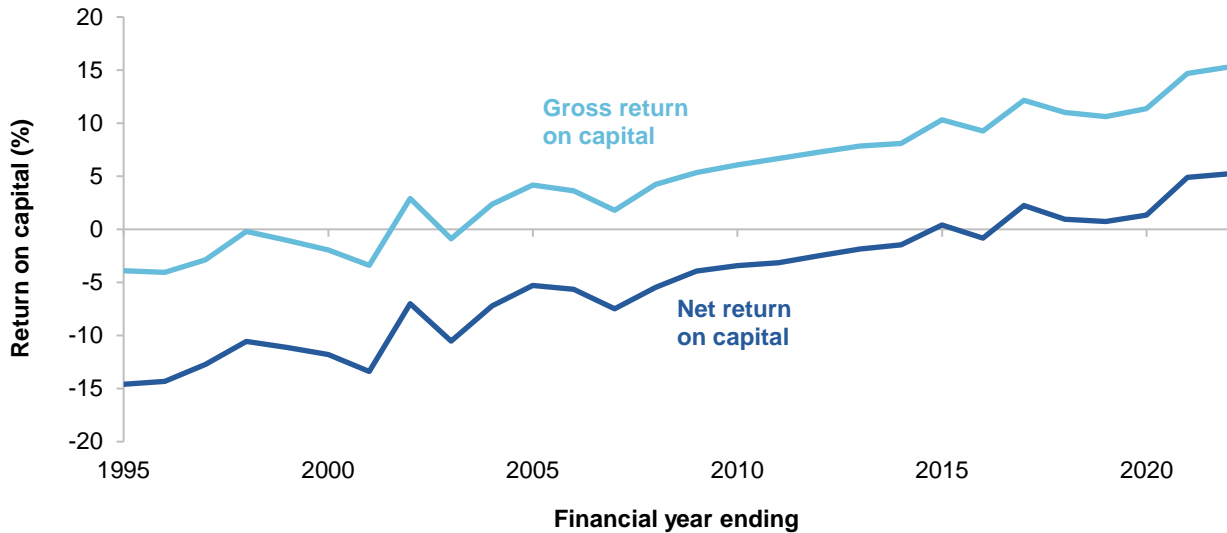
The Commission has used what it considered the least bad method for splitting the income of unincorporated businesses between labour and capital. As noted earlier, the main drawback of this approach is that the implicit capital income accruing to owner-managers of unincorporated businesses is negative in a number of financial years (and negative in even more years once depreciation is deducted as an expense – figure 9).

That said, this approach avoids the excessive and unrealistic growth of owner-manager wages implied by the ABS estimates (figure 10) and the volatile (and sometimes negative) owner-manager wage rate implied by using the return on net return on corporate capital as the benchmark for the net return on unincorporated capital.

<sup>7</sup> In the LFS, the hours worked by owner-managers of incorporated enterprises are added to the hours of employees, so all estimates of 'employee hours' presented in this report are the sum of employee and owner-manager of incorporated enterprises hours worked.

**Figure 9 – Assuming owner-manager wages equal employee wages, generates negative business profits<sup>a</sup>**

**Gross and net returns on capital, 1994-95 and 2021-22**

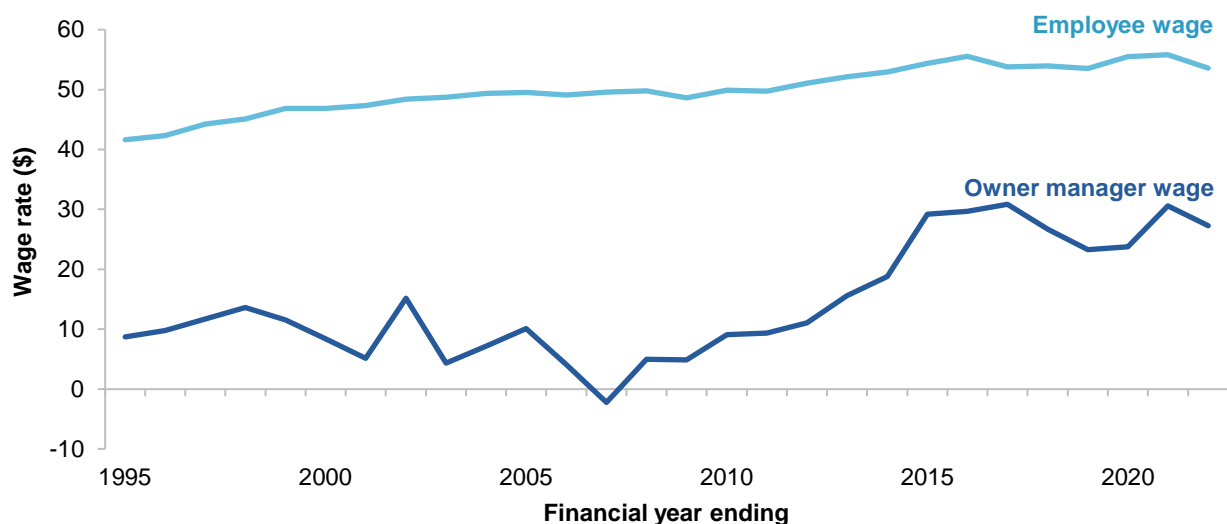


a. The gross return on capital is defined as the ratio of capital income for unincorporated businesses (calculated using the implicit wage method described above) to the net capital stock for unincorporated businesses. Net return on capital is defined as the ratio of capital income minus consumption of fixed capital to the net capital stock.

Source: Commission estimates using: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204, tables 6, 57 and 58; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003, industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001., table EQ05).

**Figure 10 – Wages of owner-managers are very low and volatile when they are assumed to receive the corporate return on capital<sup>a,b</sup>**

**Wage rates of employee and owner-managers, 1994-95 and 2021-22**



a. Owner-manager wages have been calculated assuming that unincorporated business receives the same net return on capital as the corporate sector. Net return on capital is defined as capital income (gross operating surplus for the corporate sector) less depreciation (consumption of fixed capital) then divided by the net capital stock (all values current price). Employee wages are compensation of employees per hour from table 16 of *Australian system of national accounts*. b. Both wage measures are deflated by the consumer price index.

Source: Commission estimates using: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204.0., tables 6, 57 and 58; *Consumer Price Index, Australia*, Cat. no. 6401.0., table 1; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003., industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001., table EQ05).

## B.2 Estimating aggregate labour productivity and the gross value added (GVA) deflator without mining

The ABS publish estimates of labour productivity for several industries and aggregations of industries, including:

- whole economy labour productivity – in table 1 of the *Australian system of national accounts*
- market sector labour productivity – in table 6 of the *Estimates of Industry Multifactor Productivity*
- industry level labour productivity for the 16 market sector industries – in table 6 of the *Estimates of Industry Multifactor Productivity*
- industry level labour productivity for the three non-market sector industries<sup>8</sup> – can be derived using table 46 of *Australian System of National Accounts* and the ‘industry summary table’ of the *Labour Account*.

A combination of the above publications can also be used to derive all of the associated implicit GDP/GVA deflators. For example, a combination of table 8 of the *Estimates of Industry Multifactor Productivity* and table 46 of *Australian System of National Accounts* can be used to derive the GVA deflator for the market sector, which can then be used to estimate producer wages for the entire market sector.

However, aggregations of labour productivity and GVA deflators for other combinations of industries are not readily available and not easily derivable from the above publications, requiring more complex methods.

Real GVA in the national accounts and productivity statistics, is a chain-linked Laspeyres index. That is, the proportional change in real GVA for any aggregation of industries is:

$$\frac{GVA_{t,ex}}{GVA_{t-1,ex}} = \frac{\sum_{i=1}^n P_{t-1,i} GVA_{t,i}}{\sum_{i=1}^n P_{t-1,i} GVA_{t-1,i}}$$

Where:  $GVA_{t,ex}$  is real GVA for the whole economy excluding mining and agriculture in year t,  $GVA_{t,i}$  is the real GVA for industry i at year t,  $P_{t,i}$  is the implicit price deflator for GVA in industry i at year t.

This formula can be simplified to:

$$\frac{GVA_{t,ex}}{GVA_{t-1,ex}} = \frac{\sum_{i=1}^n \frac{P_{t-1,i}}{P_{t,i}} \times GVA_{t,i,nom}}{\sum_{i=1}^n GVA_{t-1,i,nom}}$$

where:  $GVA_{t-1,i,nom}$  is nominal GVA in industry i in year t-1,  $P_{t,i}$  is the implicit price deflator for industry i in year t.

The implicit price deflators for GVA for each industry were by taking the ratio of nominal to real GVA for each industry in table 46 of the *Australian System of National Accounts*. The annual growth rates can then be chained together to get an annual index:

$$GVA_{t,ex,index} = \frac{GVA_{1,ex}}{GVA_{0,ex}} \times \frac{GVA_{2,ex}}{GVA_{1,ex}} \times \dots \times \frac{GVA_{t,ex}}{GVA_{t-1,ex}} \times 100$$

The index value will be 100 in the base year (year 0 above).

Finally, applying the index of real GVA to a benchmark year’s value of nominal GVA from the national accounts provides real estimates of GVA in dollars.

<sup>8</sup> There is a fourth non-market industry – *Ownership of dwellings* – which represents the explicit rents of landlords and implicit rents of owner-occupiers in national income. This industry is assumed to use no labour input and so has no labour productivity.

Using this formula, real GVA was estimated for all industries excluding mining and agriculture. This was divided by total hours worked in the labour account for all industries excluding mining and agriculture:

$$LP_{t,ex} = \frac{GVA_{t,ex}}{H_{t,ex}^A}$$

where:  $LP_{t,ex}$  is labour productivity for the whole economy excluding mining and agriculture,  $H_{t,ex}^A$  is the *Labour Account* measure of total hours worked (owner-manager plus employee) for all industries except mining,  $GVA_{t,ex}$  is the real level of GVA for all industries except mining and agriculture in year t.

A GVA implicit deflator for all industries excluding mining and agriculture (derived above) can also be constructed:

$$P_{t,ex} = \frac{GVA_{t,i,nom}}{GVA_{t,ex}}$$

where:  $P_{t,ex}$  is the implicit price deflator for aggregate GVA for all industries except mining and agriculture.

This price deflator can be used to derive producer wages for all industries other than mining and agriculture:

$$W_{t,ex,p} = \frac{W_{t,ex,nom}}{P_{t,ex}}$$

where:  $W_{t,ex,p}$  is the producer wage for all industries except mining and agriculture in year t and  $W_{t,ex,nom}$  is the nominal wage for all industries except mining and agriculture in year t.

Nominal wages are constructed using the methodology outlined in appendixes A and B.1.

### B.3 Decomposing the change in the labour share of income

The labour share of income has fallen across the whole economy and for several individual industries (table 3). However, the contribution of each industry to the overall reduction varies significantly. The contribution of each individual industry to the change in the economywide labour share of income is:

$$\Delta LIS_{All} = \sum \bar{s}_{TFI,i} \times \Delta LIS_i + \Delta s_{TFI,i} \times (\overline{LIS}_i - \overline{LIS}_{All})$$

where:  $s_{TFI,i}$  is the share of total factor income for each industry i,  $LIS_i$  is the labour share of income in industry i,  $LIS_{All}$  is the labour share of income for the whole economy. A bar above a variable indicates the average of variable in the two years, 1994-95 and 2021-22, while a  $\Delta$  indicates the change in the variable (arithmetic difference) between years 1994-95 and 2021-22. That is:

$$\Delta x = x_{2021-22} - x_{1994-95}$$

while:

$$\bar{x} = \frac{x_{2021-22} + x_{1994-95}}{2}$$

The decomposition relates to the change in the labour share of income between 1994-95 and 2021-22. The decomposition has two components. The first term in  $\Delta LIS_{All}$  is the 'within effect'. This is the overall effect of an industry on the labour share of income controlling for any impacts associated with changes in the industry's share of the economy. The second term is the 'between effect', which is the effect of the industry on the labour share of income stemming from changes in its share of the economy. For example, mining has a relatively low labour income share and has grown in significance in the economy, decreasing the economywide labour share even if the mining industry's labour share remained unchanged. As it happens, the labour share of mining has also declined, so that holding fixed its share of the economy, this has also contributed to a lower economywide labour share.

Both ‘within’ and ‘between’ effects made important contributions to the overall change in the labour share of income with the most important industries being mining and agriculture (table 4). Note there are differences in the total estimated change in the share of income due to rounding errors.

**Table 3 – Labour income shares have fallen more in mining and agriculture<sup>a,b</sup>**  
**Labour income share by industry division between 1994-95 and 2021-22**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	Total
1995	87	29	60	36	80	66	80	96	74	42	40	45	107	108	83	91	87	82	87	64
1996	69	29	64	38	80	63	79	97	74	43	41	44	109	107	83	90	87	96	85	64
1997	74	30	63	36	75	66	82	99	80	41	42	43	106	105	84	91	88	94	87	65
1998	72	29	61	31	75	69	82	96	75	39	43	45	109	104	84	91	89	80	87	64
1999	69	29	62	31	75	70	81	91	72	38	41	50	109	108	83	91	88	78	87	64
2000	67	23	61	33	72	73	84	92	74	40	41	45	106	109	83	90	87	73	88	63
2001	58	20	63	33	84	73	83	92	76	39	42	46	104	108	82	89	88	75	89	64
2002	45	21	62	33	79	70	80	93	72	38	42	43	104	107	83	88	88	74	87	62
2003	57	22	62	34	75	66	81	91	67	36	42	43	103	109	83	90	89	75	84	63
2004	52	25	57	32	71	63	79	88	66	35	41	51	101	108	84	91	88	72	81	62
2005	53	20	60	35	70	64	80	87	65	37	41	52	99	106	84	91	89	69	84	62
2006	50	18	60	36	72	64	80	80	68	39	40	53	97	103	84	91	89	74	86	61
2007	59	18	61	36	71	67	75	82	61	38	42	54	93	104	83	89	90	73	89	61
2008	55	19	61	37	75	69	76	82	62	38	41	51	92	103	83	89	90	71	91	61
2009	52	16	62	38	71	69	76	79	62	37	35	52	91	98	82	88	90	69	88	58
2010	47	20	62	38	70	68	75	76	63	35	35	48	84	101	83	89	89	70	84	59
2011	42	17	65	36	71	70	75	78	61	37	36	49	87	100	84	91	90	75	90	59
2012	38	21	66	34	69	69	73	76	62	39	35	42	86	103	84	90	89	67	87	58
2013	38	26	67	34	69	68	72	76	59	39	34	44	83	106	84	92	89	68	89	59
2014	39	23	67	35	68	68	73	80	60	40	34	43	86	109	83	92	90	70	89	59
2015	42	28	67	35	68	69	72	80	57	40	33	43	86	109	83	91	91	67	91	60
2016	40	30	67	35	69	69	73	81	58	42	33	42	88	107	84	92	92	69	94	61
2017	32	20	66	32	69	69	73	81	57	43	32	40	84	107	83	92	91	72	91	58
2018	34	18	65	31	67	68	73	80	58	45	33	42	85	109	83	93	91	70	93	58
2019	40	15	66	32	66	69	74	82	59	50	33	40	85	106	83	92	91	72	92	58
2020	41	16	64	35	64	64	69	81	59	45	34	41	82	101	83	91	90	67	89	57
2021	36	14	61	37	61	61	65	75	59	46	35	42	79	101	83	90	88	64	85	56
2022	24	11	60	39	65	66	70	79	61	43	36	44	83	106	82	89	90	76	103	55

a. The estimates of the labour share of income differ from those published by the ABS in the Industry Multifactor Productivity Statistics. The differences in methodology and results are discussed in appendix A.2. b. Industry codes are: Agriculture, forestry and fishing (A); Mining (B); Manufacturing (C); Electricity, gas, water and waste services (D); Construction (E); Wholesale trade (F); Retail trade (G); Accommodation and food services (H); Transport, postal and



warehousing (I); Information media and telecommunications (J); Financial and insurance services (K); Rental, hiring and real estate services (L); Professional, scientific and technical services (M); Administrative and support services (N); Public administration and safety (O); Education and training (P); Health care and social assistance (Q); Arts and recreation services (R); Other services (S).

Source: Commission estimates using: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204, table 46; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003, industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001, table EQ05).

**Table 4 – Effects of particular industries on the change in the labour share of income**  
**Within effects, between effects and the total effect**

	Within effect (p.p.)	Between effect (p.p.)	Total effect (p.p.)	% of total fall
Agriculture, forestry and fishing	-2.13	0.00	-2.13	22
Mining	-1.72	-3.98	-5.70	59
Manufacturing	-0.08	-0.06	-0.14	1
Electricity, gas, water and waste services	0.08	0.30	0.38	-4
Construction	-1.09	0.13	-0.96	10
Wholesale trade	0.02	-0.11	-0.09	1
Retail trade	-0.47	-0.19	-0.66	7
Accommodation and food services	-0.38	-0.20	-0.58	6
Transport, postal and warehousing	-0.61	-0.10	-0.71	7
Information media and telecommunications	0.02	0.27	0.29	-3
Financial and insurance services	-0.35	0.12	-0.23	2
Rental, hiring and real estate services	-0.02	-0.06	-0.08	1
Professional, scientific and technical services	-1.46	1.22	-0.24	2
Administrative and support services (N)	-0.06	0.64	0.58	-6
Public administration and safety	-0.01	-0.21	-0.22	2
Education and training	-0.07	-0.04	-0.10	1
Health care and social assistance	0.20	0.72	0.92	-10
Arts and recreation services	-0.05	-0.04	-0.10	1
Other services	0.30	-0.23	0.08	-1
Ownership of dwellings	0.00	0.07	0.07	-1
<b>Total</b>	<b>-7.87</b>	<b>-1.82</b>	<b>-9.69</b>	<b>100</b>

Source: Commission estimates using ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204.0., tables 6, 57 and 58; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003., industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001., table EQ05).

## Appendix C – Mining and agriculture affect on the aggregate results

The mining and agriculture are responsible for driving the aggregate wage decoupling seen across the economy. The lower degree of wage decoupling that occurs once mining and agriculture are removed from the aggregate figures reflects three factors (figure 11):

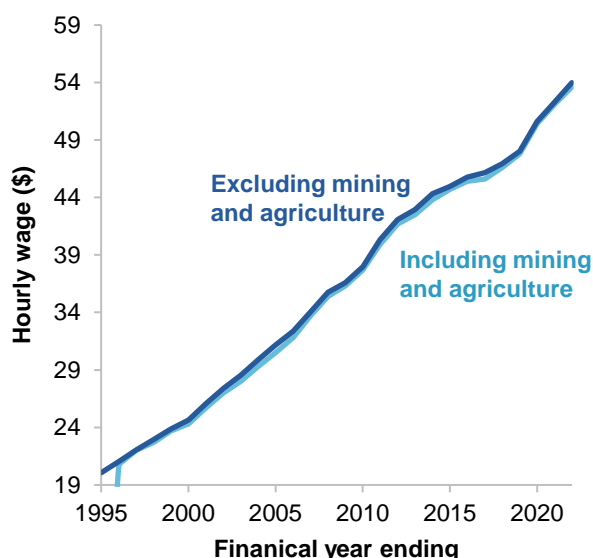
- nominal wage growth is marginally lower (0.01 percentage point annually between 1994-95 and 2021-22) – likely due to the small share of labour input used by mining and agriculture (about 5.6% of hours worked in the *Labour Account*)
- producer price growth is substantially slower (0.35 percentage points annually between 1994-95 and 2021-22) – this has the effect of increasing producer wage growth even as nominal wages are roughly unchanged. This slower price growth in producer prices for the economy outside of mining and agriculture reflects the high export prices of these primary industries in recent decades
- labour productivity growth is also slower (about 0.12 percentage points annually between 1994-95 and 2021-22). Even though mining itself has had slower than average productivity growth, its *level* of labour productivity is nearly nine times the average for the rest of the economy.<sup>9</sup> So as mining has expanded as a share of output this has had the effect of increasing measured aggregate labour productivity even as mining productivity growth itself has been weak.

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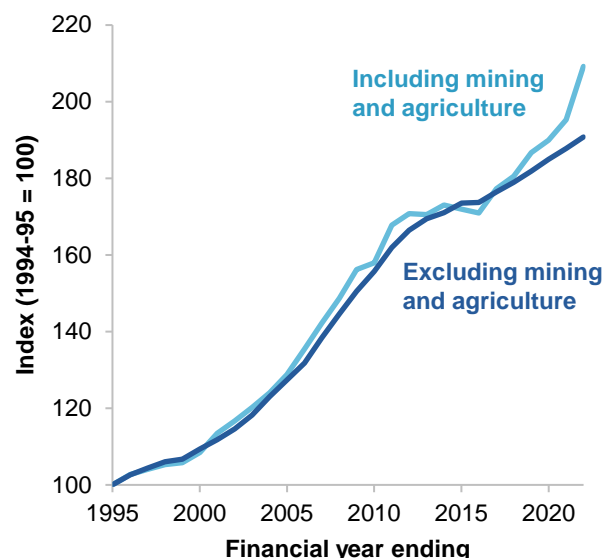
<sup>9</sup> Nominal gross value added (GVA) per hour worked in the mining industry in 2021-22 was \$777 while for the whole economy it was \$87 (ABS 2022a, 2023, table 46).

**Figure 11 – Factors driving the lower degree of wage decoupling when agriculture and mining are excluded<sup>a,b</sup>**

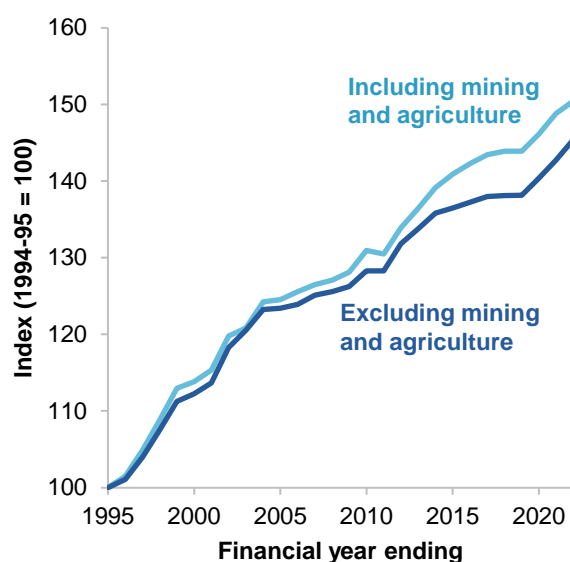
a. Nominal wage growth between 1994-95 and 2021-22



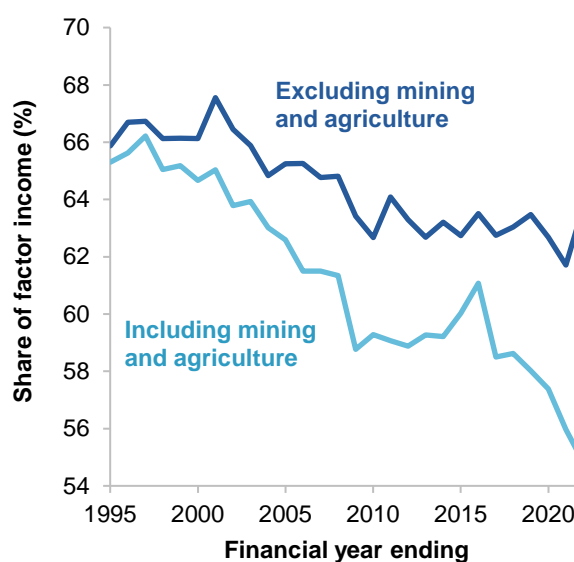
b. GDP and GVA deflators including and excluding mining and agriculture between 1994-95 and 2021-22



c. Labour productivity including and excluding agriculture and mining between 1994-95 and 2021-22



d. Labour income share including and excluding agriculture and mining between 1994-95 and 2021-22



a. When mining and agriculture are included, the relevant deflator is the GDP deflator for the whole economy while when they are excluded, the relevant deflator is the GVA deflator for all industries except mining and agriculture. b. Methodology outlined in appendixes A and B.1

Source: Commission estimates using: ABS (Australian System of National Accounts, 2021-22, Cat. no. 5204.0., table 6; Labour Account Australia, March 2023, Cat. no. 6150.0.55.003., industry summary tables; Labour Force, Australia, Detailed, April 2023, Cat. no. 6291.0.55.001., table EQ05; Consumer Price Index, Australia, Cat. no. 6401.0., table 1).

## Appendix D – Wage decoupling and other economic indicators

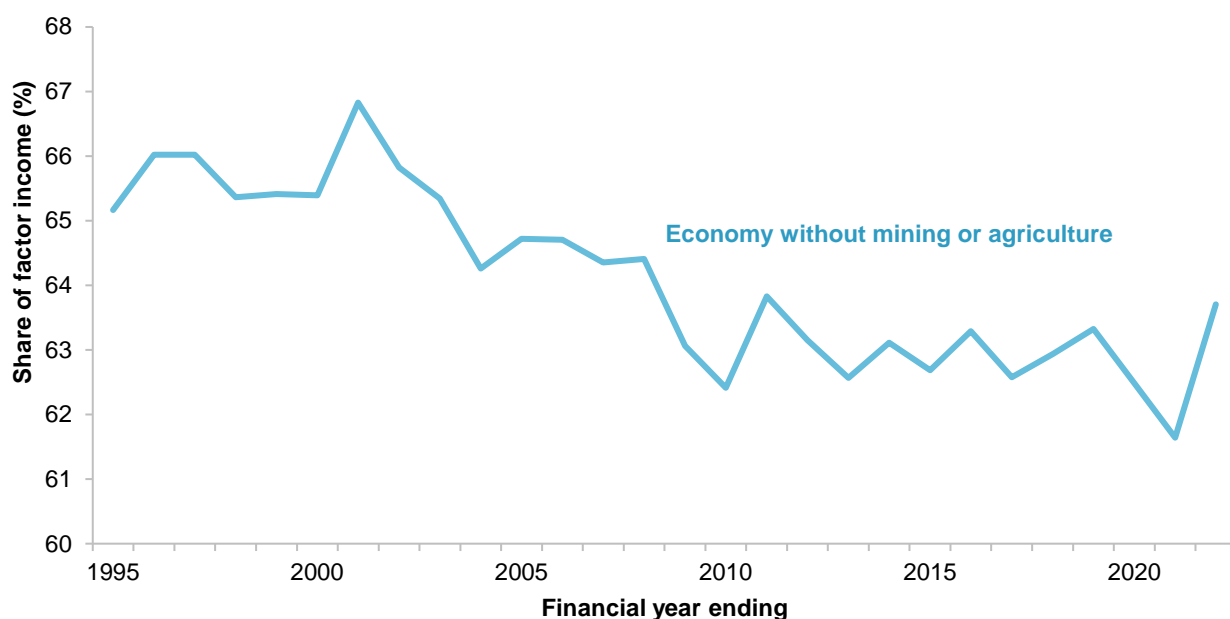
### D.1 Wage decoupling and the labour share of income

In the event of wage decoupling, we would expect to see a reduction in the labour share of income. This is because, as productivity increases, output and income increases. And if wages are not increasing, income must flow be flowing to other sources, and the labour share of income would decline.

Consistent with evidence of a small degree of wage decoupling (once mining and agriculture are accounted for) the labour share of income across the majority of the economy has declined slightly since 1995, from 65% to 64% (figure 12). And when employee compensation is directly compared to *corporate* profits, the two only diverged after 2015-16, which coincides with a large increase in mining export prices that increased the profitability of this industry. Indeed, when mining is excluded, corporate profits appear to have lagged compensation of employees (figure 13).

**Figure 12 – The labour share of income has fallen<sup>a</sup>**

**Various measures of the labour share of income between 1994-95 and 2021-22**

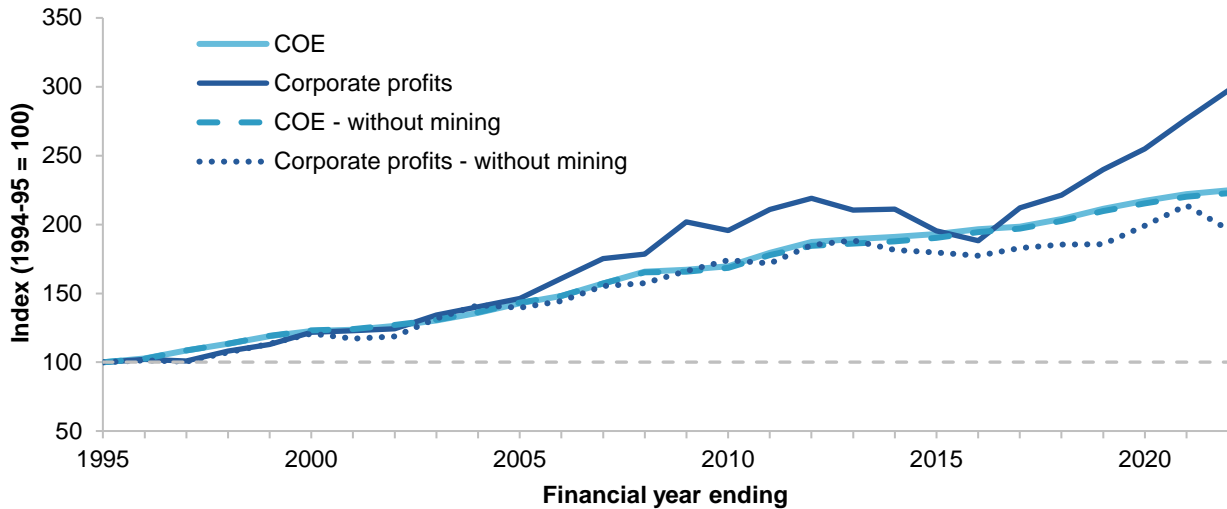


a. The Commission derived measures of labour income use the method of apportioning GMI between labour and capital outlined in appendix B.1.

Source: Commission estimates using ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204.0., tables 1 and 6; *Industry Multifactor Productivity Estimates*, Cat. no. 5260.0.55.002., tables 1-19 *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003., industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001., table EQ05).

**Figure 13 – Employee compensation has generally kept up with corporate profits when mining is excluded<sup>a,b</sup>**

**Compensation of employees and corporate profits (both with and without mining)**



**a.** Total compensation of employees (COE) excluding mining deducts the COE of employees for mining. Corporate profits is gross operating surplus (GOS). The value for GOS excluding mining was calculated as total corporate GOS minus the GOS + GMI for the mining sector from table 46 of the national accounts publication. The GMI component of GOS plus GMI for mining is less than 1% of the total based on ABS (2022b) so the lack of delineation between total profits (corporate plus non-corporate) and corporate profits for mining is inconsequential. **b.** All values are deflated by the consumer price index.

Source: ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204.0., tables 6 and 46; *Consumer Price Index, Australia*, Cat. no. 6401.0., table 1).

## D.2 Wage decoupling and the terms of trade

While the terms of trade boom (and in particular, volatility in the terms of trade) contributes to wage decoupling, the Commission does not consider this to be an eminent issue for policymakers. Commodity booms in primary industries are generally beneficial. When Australia's terms of trade rises – the ratio of export prices to import prices – overall real income per capita rises (figure 14). There is also some empirical evidence that real wages also increase with terms of trade shocks, with one study finding that for every 1% increase in the terms of trade, real wages rise by 0.15% – a large amount given the size of some shocks (Fisher and Kingston 2022).

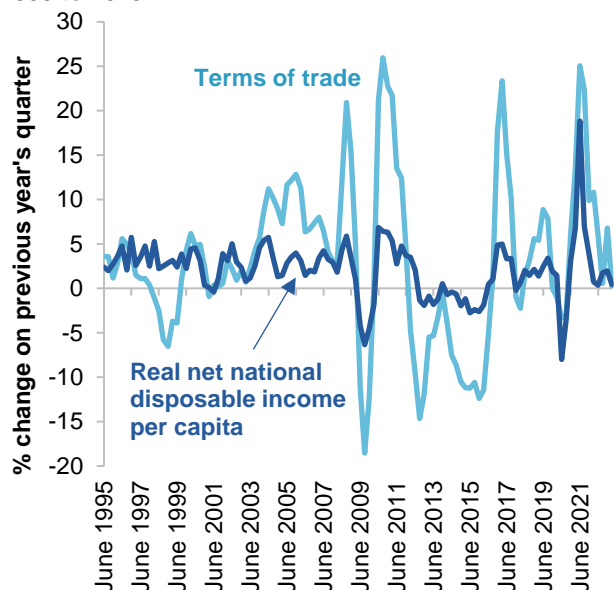
The higher returns to capital associated with higher commodity prices are also subject to tax (albeit recognising that there are debates about the design and level of the taxes used). Such tax revenue gives government the capacity to re-distribute capital income via the tax and transfer system and through the in-kind delivery of taxpayer-funded services (as noted below). In effect, governments have levers to change who gets the dividends of income growth in the economy, and in this context, it is better to have the income from a high productivity rate to underpin any such re-distribution than from a lower one. Consider the reverse situation Greece and Italy have real producer wages that have grown faster than labour productivity, but only because productivity has been so low in these economies (running at about 0.6 and 0.4% per annum over the period from 1994-95 to 2019-20) (figure 3, OECD 2023). This is not an enviable situation.

Moreover, employed people also benefit from capital income as they are often owners of the assets, particularly through the superannuation system. Some 14.8 million people were covered by superannuation

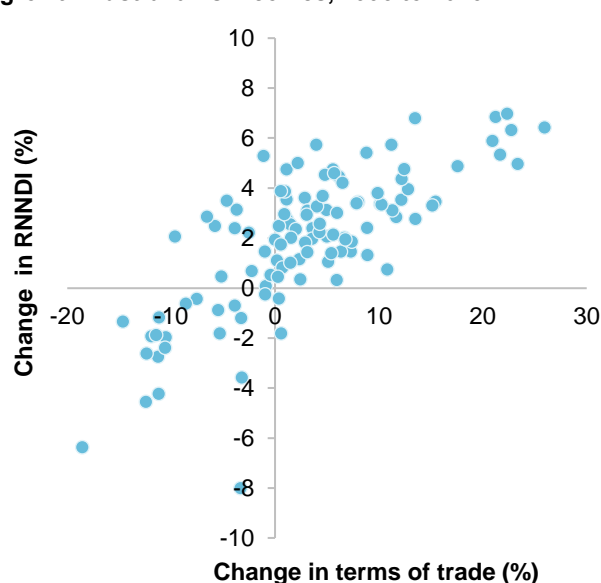
in 2019-20, with superannuation assets accounting for about 19% of all household assets (which has grown from 13.8% in 2009-10 (ABS 2022f, tables 2 and 12)). The higher rate of employer contributions and population ageing will increase this share further.

**Figure 14 – Higher commodity prices create higher incomes for Australians<sup>a</sup>**

The terms of trade and Australian’s incomes, 1995 to 2023



Relationship between the growth in terms of trade and growth Australian’s incomes, 1995 to 2023



a. The growth rates relate to the percentage difference between a given year’s quarter and the corresponding quarter of the previous year (for the period from June quarter 1995 to March quarter 2023).

Source: ABS (2023, Australian National Accounts: National Income, Expenditure and Product, Key National Accounts Aggregates, table 1, Cat. no. 5206.0).

### D.3 Wage decoupling and inequality

A major concern about wage decoupling is that it could increase income and wealth inequality. Notwithstanding that employees generally obtain some direct benefits from capital income (such as through their superannuation accounts), it is distributed less equally than labour income. Accordingly, an increase in the share of capital in national income – which is implied by wage decoupling – may, prime facie, increase the overall degree of income inequality. To what extent this has occurred in Australia is an empirical question, since governments can offset these distributional impacts through policy.

#### Overall income inequality has moved little

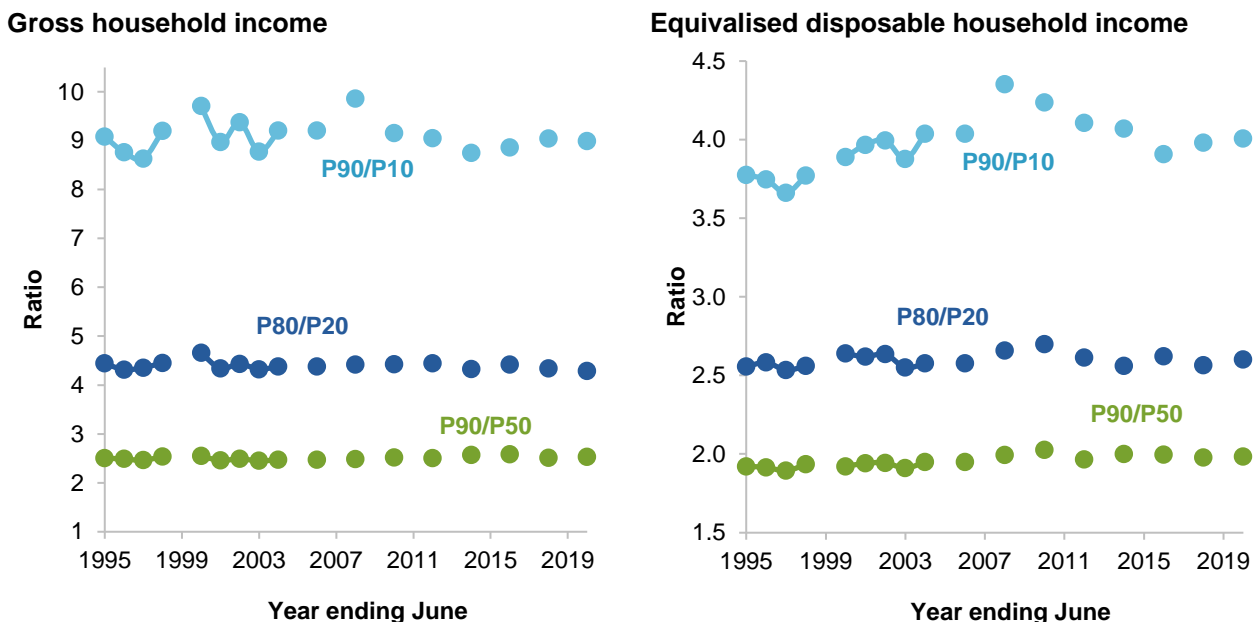
Income inequality is significantly reduced by transfers – as shown by the narrower margin between the income held by the top 10% of earners and the bottom 10% (the 90/10 ratio) after transfers (figure 15). Moreover, there have been relatively modest increases in income inequality as measured by the 90/10 ratio and no increase when measured by the 80/20 or 90/50 ratios (figure 15). Data from the Household, Income and Labour Dynamics in Australia (HILDA) survey from 2001 to 2020 also show that inequality has remained

largely stable over that period albeit with a modest fall over the past decade (Wilkins et al. 2022).<sup>10</sup> Nonetheless, another indicator of inequality, the share of total income accounted for the top 10% of income earners has increased significantly on a pre-tax, but much less on the post-tax basis (figure 16).<sup>11</sup>

In part, these patterns reflect the complex relationship between the distribution of income between labour and capital, and income inequality, even on a pre-tax basis. While capital income is more unequally distributed than labour income, capital income is also less strongly correlated with total income than labour income. While only a minority of people receive any significant capital income, many of these people do not have a high income overall. For example, a self-funded retiree may well have a lower-than-average income that is almost entirely capital funded. By contrast, a high earning professional in the higher end of the labour income distribution will tend to be in the upper end of the overall income distribution.

### Figure 15 – Income inequality has been generally stable<sup>a,b</sup>

Ratios of percentiles of gross household income (LHS) and equivalised disposable household income (RHS)



**a.** Gross household income is the sum of the income from all sources before income tax and the Medicare levy have been deducted. Income generally refers to the sum of income households receive from: employee income (wages and salaries, salary sacrificed income, non-cash benefits, bonuses and termination payment), government pensions and allowances, private transfers (for example, superannuation, workers' compensation, income from annuities, child support, and financial support received from family members not living in the same household). This measure excludes capital gains on financial assets and some other benefits. **b.** Equivalised disposable household income is post-tax income (gross income minus taxes) scaled by the size of the household. Larger households generally have lower per person living expenses than smaller households which this scaling adjustment corrects for.

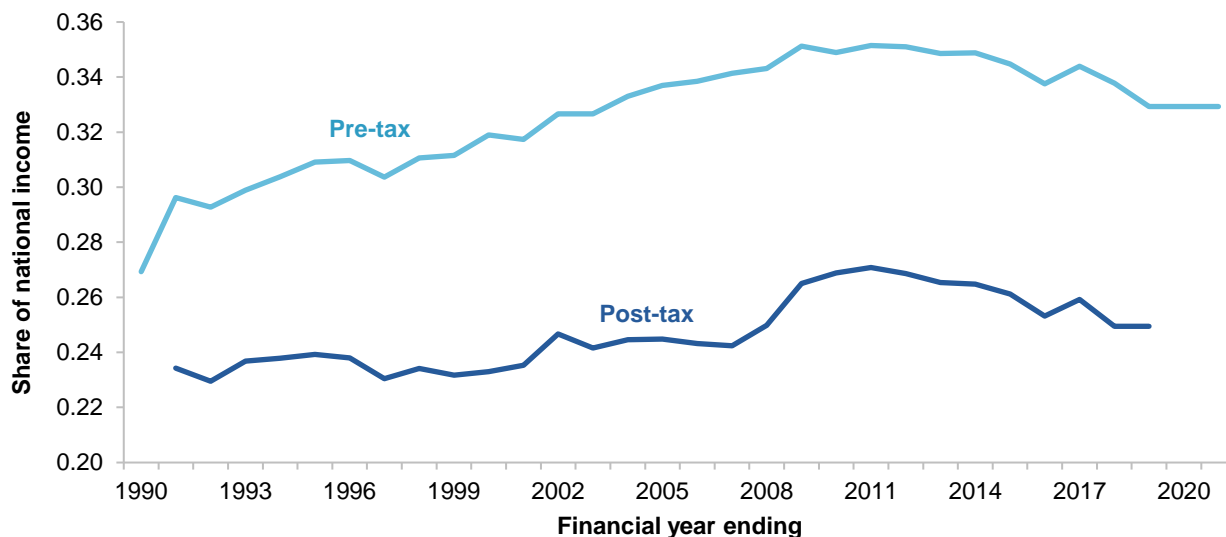
Source: ABS (2022f).

<sup>10</sup> Some of the difference between the HES/SIH (figure 15), which showed a small increase in post-tax and transfer income inequality, and HILDA, which showed no increase in post-tax and transfer income inequality, may be due in part to changes to the methodology in HES/SIH which tended to increase the measured incomes of higher income households (Wilkins 2014).

<sup>11</sup> These data are from different sources (survey data in the first instance and administrative data in the second).

**Figure 16 – The share of the top 10% of pre- and post-tax income has increased<sup>a</sup>**

**Pre- and post-tax share of the top 10% of income earners between 1989-90 and 2020-21**



a. These figures relate to individuals not households.

Source: Fisher-Post, Hérault and Wilkins (2022) presented by World Inequality Lab (2023).

## Wage inequality trends

Decoupling is not a significant source of reduced income for most employed Australians given its isolation to a few industries. A more prominent factor underpinning wage stagnation for many Australian wage earners are variations in wage rates over time *between* different employees, which, depending on the period, the employee type and the data source, has also increased wage inequality.

The longest available time series of data on wage inequality – the *Employee hours and earnings survey* – shows that over the last 45 years, full-time adult non-managerial employees with (pre-tax) wages in higher percentiles experienced more rapid wage growth (figures 17, 18, 19 and 20), though the gap between them has varied depending on the period.<sup>12</sup> There was, for example, little change in the dispersion of wages by percentile over the last decade and this even fell from 2016 to 2021 (a period in which economywide decoupling actually increased).

Data from a different ABS survey relating to hourly earnings of all employees – the *Characteristics of employment* supplement to the *Labour Force Survey* (LFS) – shows significantly higher *levels* of wage inequality for hourly wage rates. This is not surprising as the hourly series will include many people working in part-time, lower-paid jobs, such as cafe workers. What is less explicable are the different trends in recent years, with wage inequality increasing from 2018 to 2021 for hourly wage rates, while falling for full-time weekly pay rates. (The pattern for earlier years tell a more consistent story between the two series.)

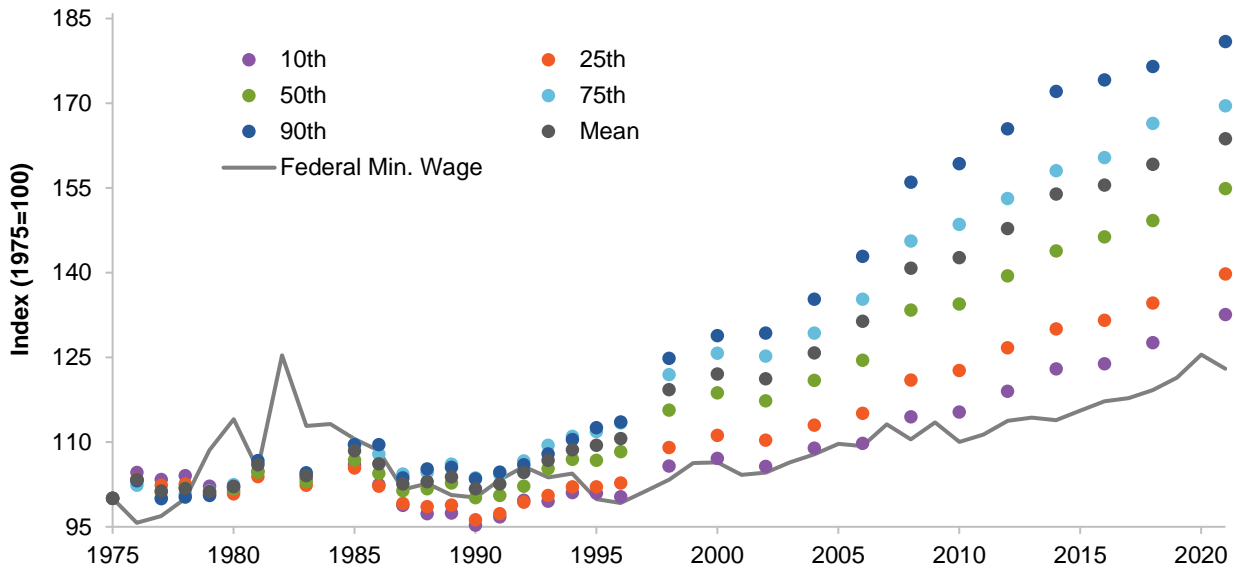
The hourly data also show large variations in wage inequality by occupation, industry and (to a lesser extent) skill levels, which suggests that structural changes in the economy favouring specific types of employees is the decisive determinant of changes in real wages affecting different workers (ABS 2022c). Wage decoupling

<sup>12</sup> It should be emphasised that this is not longitudinal data. Many people in lower percentiles when young (for example, those employed in unskilled jobs before they engage in further education) shift to higher percentiles as they age. Nonetheless, the data suggests that the returns to those factors that particularly improve earnings (such as sought-after occupations) have risen over time.



is an important phenomenon, but one that, given its narrow incidence, appears likely to play a peripheral role in wage trends and dispersion.

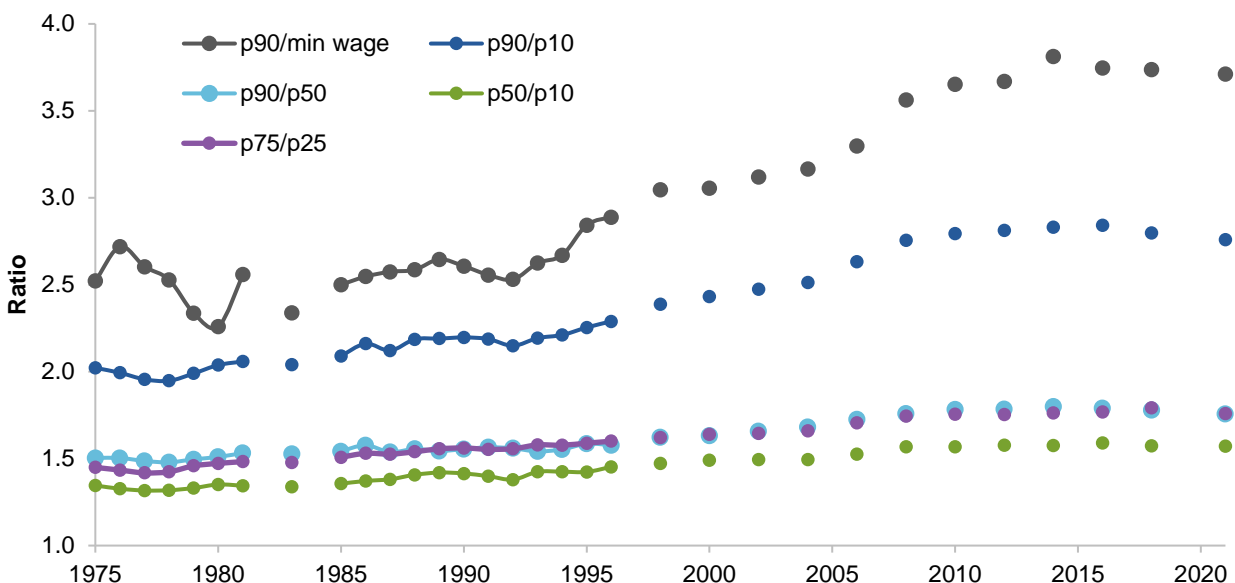
**Figure 17 – Long-run real wage growth has been higher for higher-paid employees<sup>a</sup>**  
**Full-time adult non-managerial employees, 1975–2021 (1975=100)**



a. Based on average real weekly gross earnings of full-time adult non-managerial employees by earnings percentile. This will be a good proxy for *hourly* earnings for full-time workers (because full-time hours have been relatively stable). The data does not take account of movements in hourly earnings of part-time employees as long time series for these employees are not available. Nominal wages were deflated by the consumer price index for the June quarter of any year. Data is missing for some years.

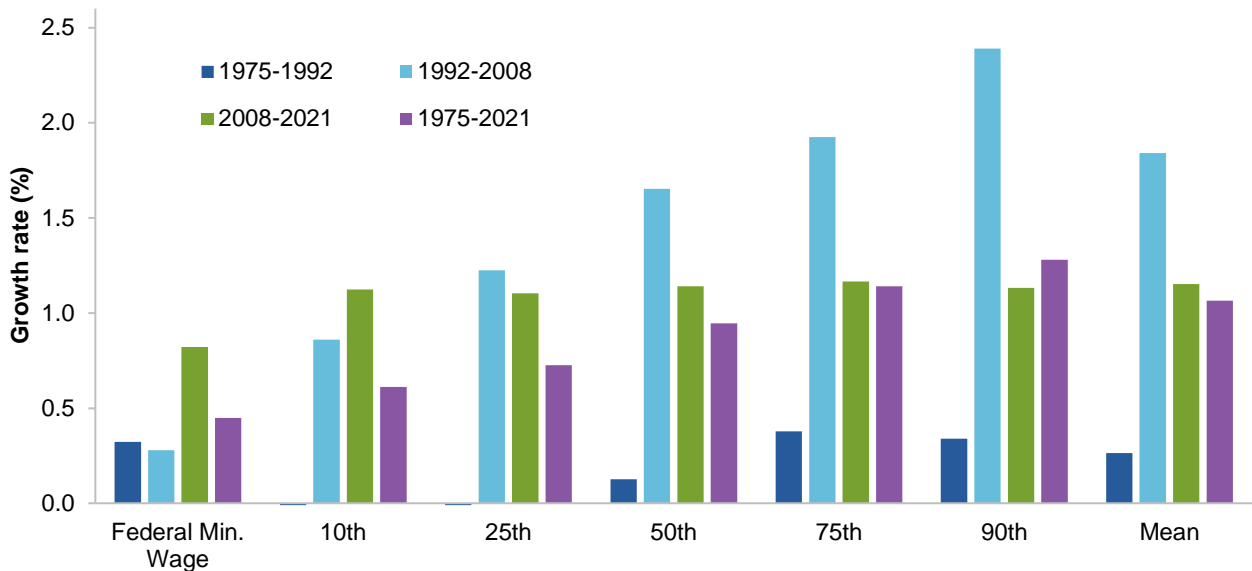
Source: Based on Leigh (2013), updated using ABS (*Employee Earnings and Hours, Australia, May*, cat. no. 6306.0, 2013, 2015, 2017, 2019, 2022 editions); ABS (2023, *Consumer Price Index, Australia*, table 8, cat. no. 6401.0) and data on the national minimum wage from the Fair Work Commission.

**Figure 18 – Long-run relative wages of full-time adult non-managerial employees<sup>a</sup>**  
**1975–2021**



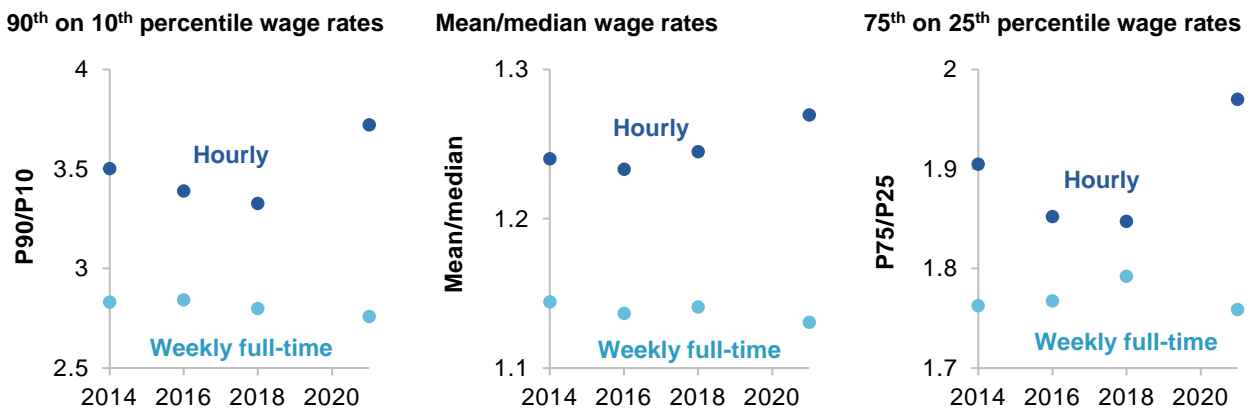
a. Notes and sources are as above.

**Figure 19 – Growth rates in real non-managerial full-time adult wages have varied significantly across different periods and across different parts of the wage distribution<sup>a</sup> 1975–2021**



a. Notes and sources are as above.

**Figure 20 – Hourly rates of pay show greater and, recently, growing wage inequality<sup>a</sup> Wage inequality measures 2014–2021**



a. The ABS produces several series on the wage distribution. One – as shown in the previous figures – relates to weekly wages of full-time non-managerial employees and is based on data provided by employers. This data is available for the years 2014, 2016, 2018 and 2021 only (and for August). The other, which is included above, relates to (median) hourly wages of employees in their main job and is collected from employees. While the latter series has data for all years from 2014 to 2022, only those that are also available for full-time rates are shown for easier comparison (for May). The higher *levels* of inequality among hourly wages is likely to reflect the greater share of people working in part-time, lower-paid jobs, such as cafes. However, it is not clear why the *trends* vary.

Source: ABS (Employee Earnings and Hours, Australia, May (various years), Cat. no. 6306; Employee Earnings, August (various years), Cat. no. 6337).

## An illustration of the complex relationship between the capital income share and overall income inequality

Overall pre-tax income inequality stems from the inequality of the two main market sources of income: capital and labour. And of the two, capital income generally has a higher Gini coefficient – a broad measure of the overall inequality of an income distribution – than does labour income. On face value, this appears to imply that income inequality would increase if capital obtains a higher share of income. However, in practice, this is not true. While most top wage earners are in the upper end of the overall income distribution, many of those in the upper end of the capital income distribution are in the middle of the overall income distribution. Put differently, capital income is less correlated with overall income than labour income (see below). In part, this stems from the use of capital income to smooth consumption over a lifecycle. A person will save and have low capital income when their labour income (and overall income) is highest and then draw on a higher capital income at retirement when their overall income is lower.

Another way to think of this issue is that while overall income and capital income are highly correlated over an individual's lifecycle, the cross-sectional correlation is much weaker due having a mix of individuals at different points in that lifecycle.

### Quantifying the role of capital and labour in driving overall income inequality

The Gini coefficient of overall income inequality can be decomposed into the contributions from labour, capital and the shifting share of these two sources in national income Van Kerm (2010, p. 3):

$$Gini_{All} = Gini_{Cap} \times corr_{Cap-All} \times Share_{Cap} + Gini_{Lab} \times corr_{Lab-All} \times (1 - Share_{Cap})$$

where:  $Gini_{All}$  is the Gini coefficient for all income (labour plus capital),  $Gini_{Cap}$  is the Gini coefficient for capital income,  $Gini_{Lab}$  is the Gini coefficient for labour income,  $Share_{Cap}$  is the income share of capital income,  $corr_{Cap-All}$  is the 'Gini correlation' between capital income and total income (capital and labour), and  $corr_{Lab-All}$  is the Gini correlation between labour income and total income (capital and labour).

This formula is a 'generalised' Gini coefficient, meaning it is not bounded above by 1. While this makes its value harder to interpret, it allows for the inclusion of negative income values, which is useful when using unit record data that often have negatives.

The marginal impact on inequality of an increase in capital income is the derivative with respect to a 1 percentage point increase in capital income (Lerman and Yitzhaki 1985, p. 152):

$$\frac{\partial Gini_{All}}{\partial e_{Cap}} = Share_{Cap} \times (Gini_{Cap} \times corr_{Cap-All} - Gini_{All})$$

where:  $\partial Gini_{All}$  is the change in the all income Gini coefficient,  $e_{Cap}$  is a 1 percentage point increase in capital income for all individuals.

This decomposition indicates that a 1 percentage point increase in capital income across the board is an increasing function of the current capital share, the Gini coefficient and capital and the Gini correlation between capital income and total income. It is also a decreasing function of the current Gini coefficient for all income sources indicating that if the Gini coefficient is higher relative to total income (e.g. capital income is more unequally distributed than income generally) then this will mean the marginal effect of capital on inequality will be higher.

The Commission estimated the marginal impact of increasing capital shares using data from the Household, Income and Labour Dynamics in Australia (HILDA) survey (table 5). Only market sources of income – capital and labour income – are included in the analysis, and unincorporated business income is treated as labour income. The latter approximation is not problematic as in most industries the vast majority of GMI is labour

income.<sup>13</sup> The results were the same when unincorporated business earnings were excluded. Private pensions were counted as capital income.

**Table 5 – Estimates of the marginal effect of a higher capital share on the Gini coefficient<sup>a,b,c</sup>**

	Gini coefficient (Labour + capital)	Gini coefficient (Labour)	Gini coefficient (capital)	Correlation (labour, total income)	Correlation (capital, total income)	Capital share of income	Marginal effect of 1 p.p. increase in capital income
2001	0.466	0.492	0.946	0.957	0.441	0.093	-0.005
2002	0.467	0.493	0.936	0.959	0.439	0.090	-0.005
2003	0.467	0.493	0.951	0.957	0.445	0.094	-0.004
2004	0.461	0.480	0.946	0.956	0.505	0.102	0.002
2005	0.456	0.475	0.956	0.948	0.521	0.112	0.005
2006	0.454	0.472	0.948	0.943	0.544	0.119	0.007
2007	0.464	0.489	0.943	0.946	0.508	0.112	0.002
2008	0.444	0.463	0.962	0.943	0.522	0.115	0.007
2009	0.448	0.466	0.968	0.947	0.516	0.109	0.006
2010	0.447	0.469	0.975	0.950	0.473	0.098	0.001
2011	0.455	0.477	0.991	0.951	0.465	0.100	0.001
2012	0.446	0.465	0.985	0.947	0.504	0.103	0.005
2013	0.454	0.479	0.971	0.943	0.483	0.104	0.002
2014	0.454	0.477	0.943	0.941	0.519	0.114	0.004
2015	0.449	0.473	0.945	0.945	0.493	0.108	0.002
2016	0.446	0.475	0.934	0.941	0.466	0.111	-0.001
2017	0.449	0.470	0.965	0.941	0.520	0.114	0.006
2018	0.436	0.467	0.985	0.936	0.440	0.103	0.000
2019	0.442	0.470	0.969	0.940	0.460	0.104	0.000
2020	0.433	0.461	0.942	0.941	0.444	0.105	-0.002

**a.** Unit of analysis is ‘equivalised’ households (rather than individuals) which means the households’ income has been normalised by the size of the household (larger households have lower cost of living per person). Labour income is wages, salaries and unincorporated business income. Capital income is private pensions, incorporated business income and investment income (not including capital gains). **b.** Methodology for calculating marginal effect of increase in capital is the marginal effect in the formula above multiple 0.1 (e.g.. to show the approximate marginal effect of a 10 percentage point rise in the capital share of income). **c.** Methodology to estimate Gini coefficients and correlation between capital and total income, and labour and total income from (Van Kerm 2010).

Source: Commission estimates using HILDA unit record data from the 2021 release.

<sup>13</sup> By the Commission’s preferred method of splitting GMI, the labour portion of GMI averaged about 39% between 1994-95 and 2021-22.

A 1 percentage point increase in capital income across the board – all else being equal – has a small and inconsistent (sometimes positive, sometimes negative) marginal effect on the Gini coefficient of all income. That is, in these estimates, an across the board increase in capital income sometimes increased inequality a little and sometimes decreased inequality a little.

These results rest on the proviso ‘all things being equal’. In practice, things are rarely held constant. A change in the capital share of income is likely to coincide with a change in the Gini coefficients of both labour and capital income as well as a change in the correlation between these income sources and overall income. Put differently, this analysis assumed that while there was an increase of capital income, the relative distribution of capital income was unchanged. What the above analysis shows is not the ‘true’ effect of the change in share capital income on overall income inequality but rather demonstrates that the effect is complicated and not always in the expected direction.

## Appendix E – Estimates of long-run decoupling from 1959-60

While the ABS produces methodologically-consistent statistics to estimate decoupling from 1985-86 to 2021-22, earlier data from 1959-60 to 1984-85 (available in hard copy only) do not provide the split between the total hours worked by employees and owner-managers, with data only available for the headcount of each type of employed person. Consequently, the longer series estimated below are not as reliable as those otherwise shown in this report.

### E.1 Methodology

We considered two methods to estimate the hours worked by employees and the owner-managers between 1959-60 and 1984-85:

- Method 1 – assume that the change in the share of hours worked by employees (of total hours worked) is proportional to the change in the share of employees in the headcount of all employed persons. That is, if the share of employees in the headcount of total employed persons fell by 1%, then the share of employees in total hours worked also fell by 1%. This amounts to assuming that the ratio of hours worked per employed person of owner-managers and employees is constant over time. So, for example, if owner-managers worked 10% more hours than employees in 1985-86, this was held constant for the years before this.
- Method 2 – assume that the share of hours worked by employees (of total hours worked) is constant from 1959-60 to 1985-86.

In practice, these methods produced similar estimates of producer wages between 1959-60 and 1984-85 (figure 21). This reflects the share of employees in the headcount of employed persons was stable over this period. Because of the similarity in results, the Commission used the simpler option (method 2).

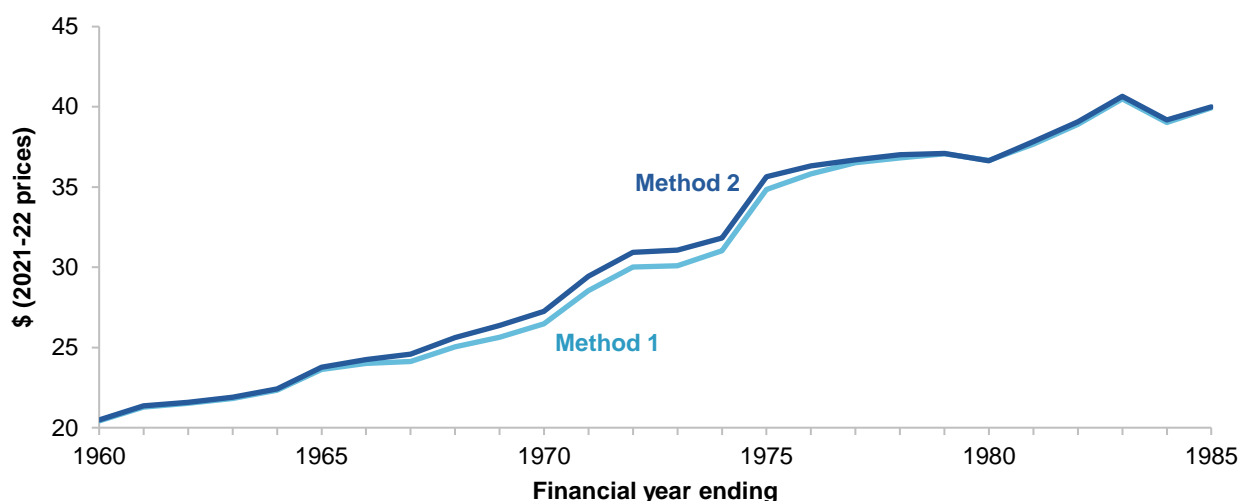
ABS only publishes estimates of total hours worked for all employed persons (owner-manager and employees) from 1974-75 onwards in the *Australian System of National Accounts*. To obtain a measure of hours worked prior to this date, the Commission used the *Penn World Tables* (which are themselves based on old LFS estimates) to extrapolate backwards.<sup>14</sup>

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<sup>14</sup> Strictly speaking, the *Penn World Tables* use the estimates of employment and hours from the *Total Economy Database* which in turn make use of old LFS data (De Vries and Erumban 2022; Inklaar and Timmer 2013).

### Figure 21 – Using data about headcount of owner-managers and employees does not affect estimates of real wages<sup>a</sup>

Producer wages using two different methods of estimating employee hours between 1959-60 and 1985-86



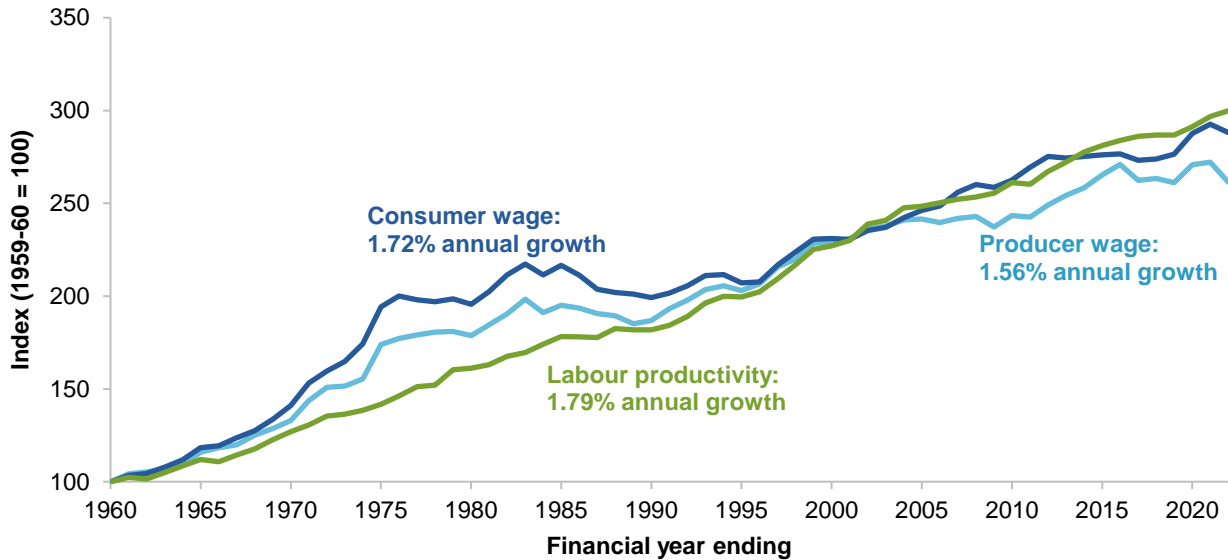
a. Producer wages are deflated by GDP deflator. b. Methodology outlined above.

Source: Commission estimates using ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204.0., tables 1, 6 and 16; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003., industry summary tables; *The Labour Force, 1964 to 1968 (historical supplement)*, Reference no. 6.20, table 11; *The Labour Force, Australia, 1978 (including revised estimates from August 1966)*, Cat. no. 6204.0, table 14); *Labour Force, Australia, 1978–95*, Cat. no. 6204.0, table 8); Feenstra, Inklaar and Timmer (2015).

## E.2 Decoupling from 1959-60 to 2021-22

The longer data series shows periods of both wage overhang and wage decoupling (figure 22). In the 1960s and 1970s, wage growth tended to exceed labour productivity growth (a ‘real wage overhang’), which was seen as one precipitating factor for the high inflation and unemployment rates of that period (Russell and Tease 1988, pp. 5–8). Various reforms and other structural changes in the 1980s and 1990s more closely aligned wage growth wages with productivity growth by the end of the mid-1990s. Producer and consumer wages then roughly grew in line with productivity between the mid-1990s and early 2000s before then growing at a slower pace (likely from the nascent mining boom driving up mining profits, as discussed above) until about 2010-11. Between 2010-11 and 2015-16, producer wages roughly grew in line with productivity again, but in the past few years the COVID-19 induced inflation led to wages falling while productivity growth continued. These patterns are mirrored in the labour income share over the same period (figure 23).

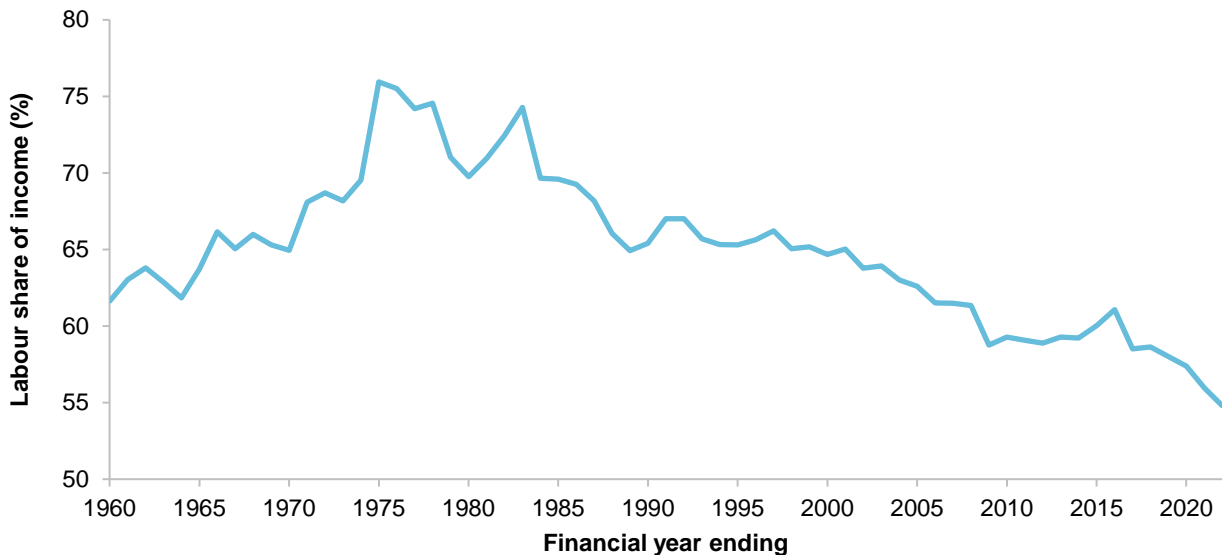
**Figure 22 – In different periods, both wage overhang and decoupling have been evident  
Producer wages, consumer wages and labour productivity from 1959-60 to 2021-22**



a. Producer wages are wages deflated by the implicit GDP deflator and consumer wages are wages deflated by CPI.  
b. Methodology outlined above.

Source: Commission estimates using ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204, table 46; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003, industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001, table EQ05; *Consumer Price Index, Australia*, Cat. no. 6401, table 1).

**Figure 23 – Labour income share of income since 1959-60<sup>a</sup>**



a. Labour share of income is compensation of employees plus imputed owner-manager labour income (appendix B.1) divided by total factor income. Note that the labour share here is slightly different from that implied by the data underpinning the chart above. This is because GDP is the relevant output measure for decoupling, while total factor income is the relevant income measure for the labour income share. The difference between the two is very small (with a correlation of 0.95 for their log difference).

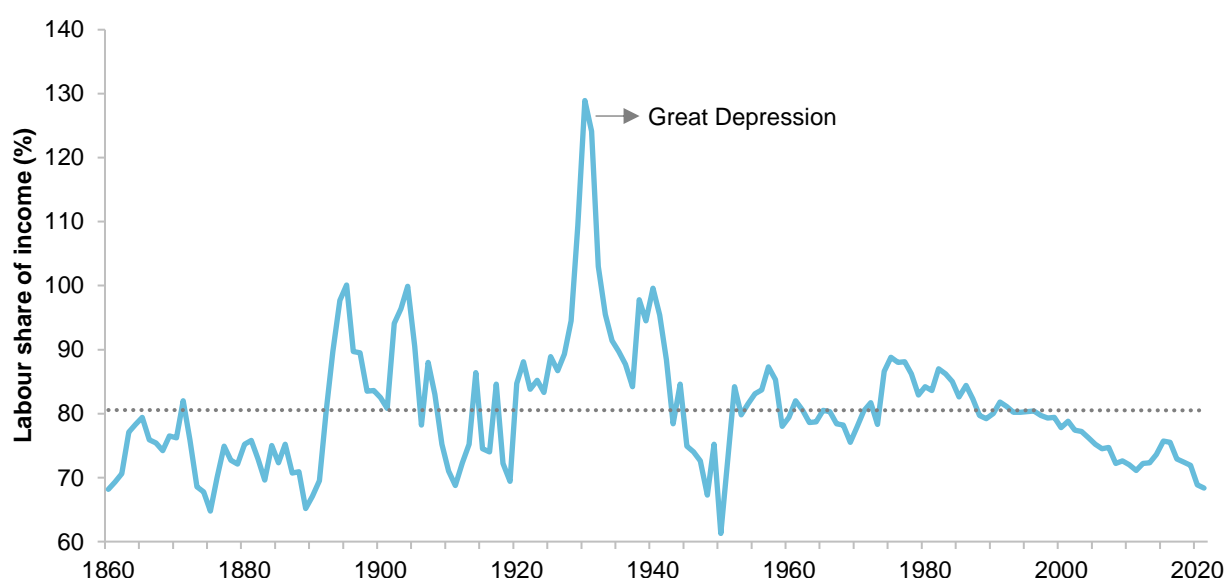
Source: Commission estimates using ABS (*Australian System of National Accounts, 2021-22*, Cat. no. 5204, table 46; *Labour Account Australia, March 2023*, Cat. no. 6150.0.55.003, industry summary tables; *Labour Force, Australia, Detailed, April 2023*, Cat. no. 6291.0.55.001, table EQ05; *Consumer Price Index, Australia*, Cat. no. 6401, table 1).



### E.3 The labour income share from 1860 to 2021

Longer-run data on the labour income share from 1860 and 2021 suggests that current levels are low compared with historical levels, but are not uniquely so (figure 24).<sup>15</sup> There has been no trend in the long-run share (with reversion of *this* measure to around 65–85%). However, it should not be inferred that this will persist given there may be fundamental shifts in technologies (like artificial technology) that break the pattern of the past. There is also a strong countercyclical tendency to the labour share income – during the Great Depression, for example, labour income was greater than 100% of national income (that is, capital income after depreciation was negative). Similar behaviour can be observed around the 1890 Depression. The more stable labour share of income in the post-Second World War period likely indicates the stability of profits and unemployment that was induced by a more interventionist macroeconomic policy framework.

**Figure 24 – Labour share of national income between 1860 and 2021<sup>a</sup>**



a. National income is GDP less net taxes and subsidies, and less depreciation.

Source: Madsen and Robertson (2022).

<sup>15</sup> Based on pre-publication data generously provided by Jakob Madsen and Peter Robertson from the University of Western Australia. The estimates are based on a different measure of labour income than those shown in this report for the last 60 years, but nonetheless shows similar patterns for overlapping periods. The authors define labour income as the share of GDP less taxes, subsidies and capital depreciation. This is the labour share of 'net' (after depreciation) national income as opposed to the usual presentation of the labour share of 'gross' (before depreciation) income.

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