

# Appendix

This appendix contains supporting evidence for the December Bulletin 2023.

## A primer on productivity

### Box 1 – A primer on productivity

#### What is productivity?

Productivity measures the rate at which output of goods and services are produced per unit of input. It is calculated as the ratio of the quantity of output produced to some measure of the quantity of inputs used. Many factors can affect productivity growth such as: technological improvements, workforce skills, changes in other inputs (such as capital), competitive pressures and the business cycle.

#### What are the main measures?

Two metrics are commonly used to measure aggregate productivity. **Labour productivity** is the ratio of output to hours worked. Output is typically defined as gross value added (the total value of a firm's production minus intermediate inputs). **Multifactor productivity (MFP)** is the ratio of output to a combined input of labour and capital. It is generally considered to be a better measure of technological change and efficiency improvements than labour productivity.<sup>1</sup>

This bulletin does not include multifactor productivity because it is not included in the quarterly national accounts.

#### What parts of the economy are we measuring?

The most accurate estimates of productivity are for those industries where prices are set in markets – known as the 'market sector' – and where it is therefore easier to measure output (in terms of real industry gross value added). This Bulletin provides estimates for the 16 market sector industries and the 3 non-market sectors industries.<sup>2</sup>

<sup>1</sup> Usually, the growth in labour productivity exceeds the growth in multifactor productivity. The difference between the two is the contribution from 'capital deepening'.

<sup>2</sup> Labour productivity can also be measured for the whole economy (in terms of real GDP per hour worked). Labour productivity measured in this way contributes to growth in living standards but is a poorer indicator of technological change and efficiency improvement because of the difficulty measuring output in health, education and public administration.

## Detailed productivity statistics

**Table 1 – Whole economy and market sector growth rates, per cent<sup>a,b</sup>**

	Latest Quarters		Quarterly average		Through the year
	Jun 23 to Sep 23	Mar 23 to Jun 23	Q4 2022 to Q3 2023	Q4 2018 to Q3 2023	Sep 22 to Sep 23
<b>Whole Economy</b>					
Output (real GDP)	0.2	0.4	0.5	0.6	2.1
Hours worked	-0.7	2.1	1.0	0.6	4.3
<b>Labour Productivity</b>	<b>0.9</b>	<b>-1.6</b>	<b>-0.5</b>	<b>0.0</b>	<b>-2.1</b>
<b>Market sector</b>					
Output (gross value added)	-0.1	0.6	0.5	0.5	1.9
Hours worked	-0.6	1.8	0.7	0.4	2.8
<b>Labour Productivity</b>	<b>0.6</b>	<b>-1.2</b>	<b>-0.2</b>	<b>0.1</b>	<b>-0.9</b>

a. Some figures will not appear to add correctly due to rounding to one decimal place. Gross value added (GVA) output is Gross domestic product (GDP) less taxes less subsidies on products and the statistical discrepancy. Labour productivity is the growth in output per unit of labour input. b. All values are in real, chain weighted, terms. Through the year estimates show the change between the current quarter and the corresponding quarter of the previous year.

Sources: Commission estimates based on: ABS (2023, *Australian National Accounts: National Income, Expenditure and Product*, September 2023, Cat. no.5206.0, table 1).

**Table 2 – Industry-level growth rates, per cent**

	Labour Productivity			GVA			Hours worked		
	Q3 2023	Q2 2023	Average quarterly change (Annual)	Q3 2023	Q2 2023	Average quarterly change (Annual)	Q3 2023	Q2 2023	Average quarterly change (Annual)
<b>All 19 industries</b>									
Agriculture, forestry and fishing	-3.7	-2.3	2.9	-3.5	-0.1	4.0	0.2	2.3	1.1
Mining	-2.3	-2.0	-2.8	-1.0	0.2	0.1	1.4	2.2	3.0
Manufacturing	2.5	-4.5	-0.5	-0.3	0.7	0.1	-2.7	5.4	0.7
Electricity, gas, water and waste services	1.0	-3.3	-0.4	-2.6	2.1	-0.5	-3.6	5.5	-0.1
Construction	4.4	-3.2	1.9	0.8	0.9	0.7	-3.4	4.3	-1.0
Wholesale trade	1.5	0.3	-0.8	-0.9	-1.8	-0.5	-2.4	-2.0	0.4
Retail trade	2.6	-2.0	-0.7	0.6	-0.2	-0.3	-1.9	1.8	0.5
Accommodation and food services	0.3	2.0	-0.8	1.5	0.3	1.2	1.1	-1.6	2.1
Transport, postal and warehousing	1.0	0.8	-0.3	1.4	1.9	1.3	0.5	1.2	1.7
Information media and telecommunications	-7.0	-2.9	-0.1	2.6	1.5	2.2	10.3	4.6	2.6
Financial and insurance services	2.9	-3.3	0.1	0.1	0.3	0.1	-2.7	3.7	0.1
Rental, hiring and real estate services	-3.0	-3.7	-1.6	0.9	2.9	1.2	4.0	6.9	2.9
Professional, scientific and technical services	3.1	-2.0	-1.3	0.6	0.2	-0.4	-2.4	2.2	1.1

	Labour Productivity			GVA			Hours worked		
	Q3 2023	Q2 2023	Average quarterly change (Annual)	Q3 2023	Q2 2023	Average quarterly change (Annual)	Q3 2023	Q2 2023	Average quarterly change (Annual)
<b>All 19 industries</b>									
Administrative and support services	-5.0	7.8	2.1	-1.7	1.9	0.6	3.5	-5.5	-1.3
Public administration and safety	4.3	-2.9	-0.3	1.1	0.4	1.0	-3.0	3.4	1.3
Education and training	1.7	-4.9	-1.4	0.4	0.4	0.4	-1.3	5.7	2.2
Health care and social assistance	1.3	-0.3	-1.5	1.8	0.8	0.8	0.5	1.1	2.3
Arts and recreation services	-9.0	-6.7	-3.5	2.0	0.6	0.9	12.1	7.8	4.8
Other services	0.9	2.0	0.6	0.0	2.5	1.7	-0.9	0.5	1.1

Sources: Commission estimates based on ABS (2023, *Australian National Accounts: National Income, Expenditure and Product*, September 2023, Cat. no.5206.0, table 6) and ABS (2023, *Labour Account Australia*, September 2023, industry summary table).

## Productivity data revisions

Previous ABS account releases can be subject to revisions due to more up-to-date data and seasonal adjustments. It is important to examine these revisions in case they change Australia's productivity story. The tables below show revisions from the September 2023 quarterly release for aggregate and industry statistics.

**Table 3 – Revisions to whole economy and market sector growth rates**

	Revision on Q2 2023		Difference (percentage point)
	Before	Now	
<b>Whole Economy</b>			
Output (real GDP)	0.4	0.4	0.0
Hours worked	2.4	2.1	-0.3
<b>Labour Productivity</b>	<b>-2.0</b>	<b>-1.6</b>	<b>0.4</b>
<b>Market Sector</b>			
Output (Gross value-added)	0.4	0.6	0.2
Hours worked	2.2	1.8	-0.4
<b>Labour Productivity</b>	<b>-1.7</b>	<b>-1.2</b>	<b>0.5</b>

Sources: Commission estimates based on ABS (2023, *Australian National Accounts: National Income, Expenditure and Product*, September 2023, Cat. no.5206.0, table 1) and ABS (2023, *Australian National Accounts: National Income, Expenditure and Product*, June 2023, Cat. no.5206.0, table 1).

**Table 4 – Revisions to industry Gross Value Added (GVA)**

	Revision on Q2 2023		Difference (percentage point)
	Before	After	
<b>Market sector</b>			
Agriculture, forestry and fishing	0.9	-0.1	-1.0
Mining	-1.3	0.2	1.5
Manufacturing	0.7	0.7	0.0
Electricity, gas, water and waste services	2.9	2.1	-0.8
Construction	2.2	0.9	-1.3

Market sector	Revision on Q2 2023		Difference (percentage point)
	Before	After	
Wholesale trade	-1.5	-1.8	-0.3
Retail trade	-0.1	-0.2	-0.1
Accommodation and food services	0.4	0.3	-0.1
Transport, postal and warehousing	1.1	1.9	0.8
Information, media and telecommunications	0.3	1.5	1.2
Financial and insurance services	0.2	0.3	0.1
Rental, hiring and real estate services	2.6	2.9	0.3
Professional, scientific and technical services	-0.3	0.2	0.5
Administrative and support services	1.8	1.9	0.1
Public administration and safety	0.5	0.4	-0.1
Education and training	0.4	0.4	0.0
Health care and social assistance	0.9	0.8	-0.1
Arts and recreation services	0.9	0.6	-0.3
Other services	1.2	2.5	1.3

Sources: Commission estimates based on ABS (2023, *Australian National Accounts: National Income, Expenditure and Product*, September 2023, Cat. no.5206.0, table 6) and ABS (2023, *Australian National Accounts: National Income, Expenditure and Product*, June 2023, Cat. no.5206.0, table 6).

**Table 5 – Revisions to industry hours worked**

Market sector	Revision on Q2 2023		Difference (percentage point)
	Before	After	
Agriculture, forestry and fishing	4.3	2.3	-2.0
Mining	2.0	2.2	0.2
Manufacturing	3.7	5.4	1.7
Electricity, gas, water and waste services	6.4	5.5	-0.9
Construction	4.9	4.3	-0.6
Wholesale trade	-2.2	-2.0	0.2
Retail trade	3.1	1.8	-1.3
Accommodation and food services	-1.5	-1.6	-0.1
Transport, postal and warehousing	0.1	1.2	1.1
Information, media and telecommunications	3.9	4.6	0.7
Financial and insurance services	2.6	3.7	1.1
Rental, hiring and real estate services	4.3	6.9	2.6
Professional, scientific and technical services	4.7	2.2	-2.5
Administrative and support services	-4.5	-5.5	-1.0
Public administration and safety	2.9	3.4	0.5
Education and training	7.0	5.7	-1.3
Health care and social assistance	0.9	1.1	0.2
Arts and recreation services	9.3	7.8	-1.5
Other services	2.2	0.5	-1.7

Sources: Commission estimates based on ABS (2023, *Labour Account Australia*, September 2023, industry summary table) and ABS (2023, *Labour Account Australia*, June 2023, industry summary table).

**Table 6 – Revisions to labour productivity**

Market sector	Revision on Q2 2023		Difference (percentage point)
	Before	After	
Agriculture, forestry and fishing	-3.3	-2.3	1.0
Mining	-3.3	-2.0	1.3
Manufacturing	-2.9	-4.5	-1.6
Electricity, gas, water and waste services	-3.3	-3.3	0.0
Construction	-2.5	-3.2	-0.7
Wholesale trade	0.7	0.3	-0.4
Retail trade	-3.1	-2.0	1.1
Accommodation and food services	1.9	2.0	0.1
Transport, postal and warehousing	0.9	0.8	-0.1
Information, media and telecommunications	-3.4	-2.9	0.5
Financial and insurance services	-2.3	-3.3	-1.0
Rental, hiring and real estate services	-1.6	-3.7	-2.1
Professional, scientific and technical services	-4.7	-2.0	2.7
Administrative and support services	6.5	7.8	1.3
Public administration and safety	-2.4	-2.9	-0.5
Education and training	-6.1	-4.9	1.2
Health care and social assistance	0.0	-0.3	-0.3
Arts and recreation services	-7.6	-6.7	0.9
Other services	-1.0	2.0	3.0

Sources: Commission estimates based on ABS (2023, *Labour Account Australia*, September 2023, industry summary table) and ABS (2023, *Labour Account Australia*, June 2023, industry summary table).