

Introduction

This report provides measures of multifactor productivity (MFP) for Queensland and the Rest of Australia for the period 1985-86 to 2009-10. It is an historical perspective of Queensland's productivity performance analysed in terms of productivity cycles, the last of which is estimated to have ended in 2007-08.

The *Queensland State Accounts* (QSA), published quarterly by Queensland Treasury, provides a measure of Queensland's economic performance relative to the Rest of Australia. In addition to these quarterly estimates of Gross State Product (GSP), Queensland Treasury has developed a methodology to estimate multifactor productivity (MFP) growth which provides a more comprehensive understanding of the drivers of economic growth. This report follows the publication *An Historical Analysis of Productivity in Queensland* which provided a more in-depth discussion on productivity concepts and Queensland's historical productivity performance.

One advantage of estimating MFP growth is that it allows economic growth to be decomposed into the contribution from accumulation of inputs: labour and capital, and MFP. In this publication, MFP is analysed from the following three perspectives:

- productivity cycles;
- long term trends; and
- contribution to living standards.

Annual data are also presented in Appendix 1.

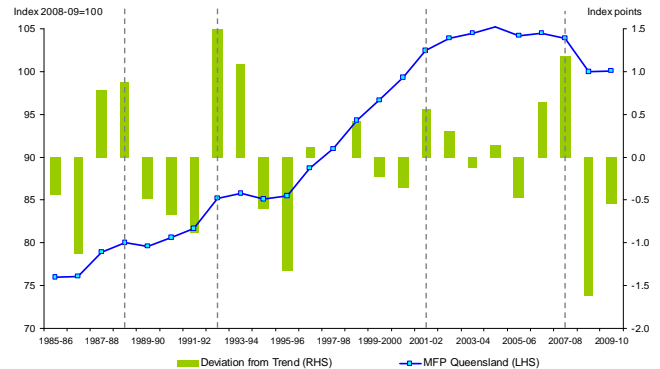
Productivity cycles

Short term movements in productivity should be interpreted with caution as productivity estimates are volatile from year-to-year. Such changes in measured productivity may not be truly indicative of productivity trends as these short term fluctuations may reflect the degree to which firms are utilising their capital stock or the fact that employment growth tends to lag output growth. A common method of examining changes in productivity over time involves identifying and dividing the data into productivity 'growth cycles'. These growth cycles are determined by comparing the annual MFP estimates with their corresponding long term trend estimate¹. The maximum deviation of the MFP index above its trend is the primary indicator of a growth cycle peak.

The green bars in Figure 1 represent the deviation of the original MFP series from the trend MFP series, where a

positive deviation indicates that the original MFP estimate is greater than its trend equivalent in that year.

Figure 1: MFP index and deviation from trend, Queensland



Source: OESR estimates

For Queensland, the obvious growth cycle peaks are 1988-89, 1992-93, 2001-02 and 2007-08². As such, this publication focuses on the cycles 1988-89 to 1992-93, 1992-93 to 2001-02 and 2001-02 to 2007-08³. Although there are some small differences between these growth cycle peaks and those identified for the Rest of Australia, the use of the three cycles mentioned above facilitates the comparison of productivity performance between Queensland and the Rest of Australia in this report.

MFP growth in Queensland accelerated between the first two productivity growth cycles, before moderating in the most recent cycle of 2001-02 to 2007-08. Productivity gains were particularly strong in the mid-to-late nineties and continued into the early part of the subsequent decade. This acceleration through the 1990s coincided with an extended period of economic expansion in Queensland in an environment where productivity gains were also contributing to robust growth in the national economy following the recession earlier in the decade.

Nationally, the productivity surge of the 1990s is likely explained by some combination of microeconomic reforms (such as reduced trade barriers and competition reform), workforce human capital and the introduction and use of new technologies. It should be noted that these factors are interconnected and, for example, reform induced exposure to competition may have encouraged the adoption of new technologies, while education facilitates potential uptake.

¹ For more information on productivity growth cycles see *An Historical Analysis of Productivity in Queensland* (<http://www.oesr.qld.gov.au/products/publications/historical-analysis-productivity-qld/index.php>).

² The September quarter 2010 edition of the Queensland State Accounts (QSA) incorporated significant historical revisions by the ABS to the components of Queensland GSP. Due to these revisions, annual deviations of the original MFP series from the trend MFP series have subsequently been revised, resulting in a change in timing of growth cycle peaks compared with previous analysis.

³ The periods 1985-86 to 1988-89 and 2007-08 to 2009-10 represent only partial productivity growth cycles due to their unidentifiable start- and end-point respectively.

Research by the Productivity Commission⁴ indicates that the lagged impact of microeconomic reforms of the 1980s is likely to have played “at least some underlying part” in the acceleration of productivity growth over the period 1992-93 to 2001-02.

Queensland recorded solid output growth⁵ through each cycle, peaking at 5.0 per cent average annual growth in the most recent productivity cycle, 2001-02 to 2007-08 (Table 1). By comparison, the Rest of Australia experienced average annual growth in output of 3.1 per cent between 2001-02 and 2007-08.

Queensland MFP grew by an average annual 0.2 per cent between 2001-02 and 2007-08, down from 2.1 per cent growth in the previous productivity cycle and 0.2 percentage point above the MFP estimate for the Rest of Australia. The moderation in Queensland MFP was largely due to a substantial increase in capital investment over this period. Growth in capital services accelerated to 6.0 per cent in the most recent productivity cycle, 2.3 percentage points higher than the 3.7 per cent average annual growth recorded between 1992-93 and 2001-02.

Table 1: Economic and productivity growth and related measures^(a)

	1988-89 to 1992-93	1992-93 to 2001-02	2001-02 to 2007-08
Queensland			
Output	3.7	4.9	5.0
Multifactor productivity	1.6	2.1	0.2
Labour productivity	2.0	2.5	0.9
less Capital deepening	0.4	0.4	0.7
Combined labour and capital inputs^(b)	2.1	2.8	4.8
Hours worked	1.7	2.4	4.0
Capital services	2.9	3.7	6.0
Rest of Australia			
Output	1.5	3.8	3.1
Multifactor productivity	0.8	1.6	0.0
Labour productivity	1.9	2.1	0.9
less Capital deepening	1.1	0.5	0.9
Combined labour and capital inputs^(b)	0.7	2.1	3.1
Hours worked	-0.4	1.6	2.1
Capital services	3.4	3.3	5.0

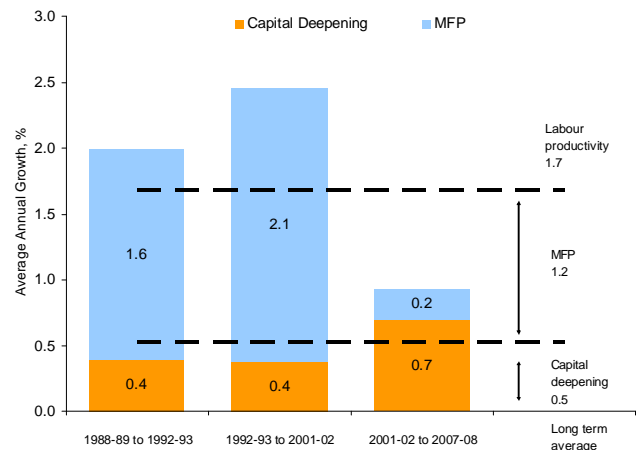
(a) Sum of component contributions to growth may not add as they are multiplicative rather than additive.

(b) Weighted in terms of labour and capital income shares.

Source: OESR estimates

Estimates of labour productivity can be decomposed into the contribution of MFP growth and the rate of capital deepening⁶ (Figure 2). This distinction is important as while labour productivity is a more commonly used measure, it can mask the true rate of change in productivity due to variations in capital deepening.

Figure 2: Labour productivity growth and its components over productivity cycles, Queensland



Source: OESR estimates

The strong rise in capital services is also reflected in the increased contribution by capital deepening to labour productivity over the period 2001-02 to 2007-08 (to an average annual contribution of 0.7 percentage point). This follows an average contribution by capital deepening of 0.4 percentage point over each of the first and second productivity cycles.

The recent strength in capital deepening was recorded despite acceleration in the growth rate of hours worked (to 4.0 per cent per annum) since the previous cycle. By comparison, the Rest of Australia recorded average annual growth of 2.1 per cent and 5.0 per cent in hours worked and capital services respectively between 2001-02 and 2007-08.

Long term trends

This section summarises estimates of long term (1985-86 to 2009-10) economic growth for Queensland and the Rest of Australia and provides a decomposition of economic performance. Queensland’s output growth has exceeded that of the Rest of Australia in all but three of the past 24 years and has averaged 4.6 per cent per annum, 1.5 percentage points above average annual economic growth recorded in the Rest of Australia of 3.1 per cent (Table 2).

⁴ *Microeconomic reforms and the revival in Australia’s growth in productivity and living standards*, Paper presented to the Conference of Economists, Adelaide, 1 October 2002.

⁵ For the purposes of this publication, output is defined as GSP less the ownership of dwellings industry.

⁶ Defined as the ratio of the growth in capital to the growth in labour.

Table 2: Long run productivity growth^(a)

1985-86 to 2009-10	Queensland	Rest of Australia
	Per cent	Per cent
Output	4.6	3.1
Multifactor productivity	1.2	0.8
Labour productivity	1.7	1.5
less Capital deepening	0.5	0.8
Combined labour and capital inputs^(b)	3.4	2.3
Hours worked	2.9	1.5
Capital services	4.4	4.1

(a) Sum of component contributions to growth may not add as they are multiplicative rather than additive.

(b) Weighted in terms of labour and capital income shares.

Source: OESR estimates

Over the period 1985-86 to 2009-10, Queensland's stronger economic performance relative to the Rest of Australia was primarily due to higher growth in combined labour and capital inputs of 3.4 per cent per annum compared with 2.3 per cent for the Rest of Australia. This stronger growth in inputs was complemented by higher MFP growth in Queensland than the Rest of Australia. Queensland MFP growth between 1985-86 and 2009-10 was 1.2 per cent per annum on average, 0.4 percentage point higher than the Rest of Australia growth of 0.8 per cent.

Queensland labour productivity grew by 1.7 per cent per year on average between 1985-86 and 2009-10. By comparison, labour productivity in the Rest of Australia grew by 1.5 per cent in average annual terms over the same period. In Queensland, the major contributor to labour productivity growth was MFP (1.2 percentage points) with capital deepening contributing 0.5 percentage point. This highlights that growth in Queensland labour productivity over the past 24 years has been primarily driven by improvements in production efficiencies (MFP) as opposed to increasing workers' access to capital.

The lower level of capital deepening in Queensland does not imply under-investment or a decline in the level of capital. It simply reflects labour inputs relative to capital inputs growing at a faster rate in Queensland than in the Rest of Australia. In fact, Queensland capital services grew at a faster rate (4.4 per cent) per annum than that of the Rest of Australia (4.1 per cent), while Queensland hours worked grew at an average rate of 2.9 per cent per annum, almost double the rate recorded in the Rest of Australia.

Recent analysis by the Productivity Commission⁷ suggests that special developments in three industries can explain much of the recent decline in MFP growth at the Australian level. The industries identified by the

Commission were mining; electricity, gas and water; and agriculture.

The Commission found that the significant decline in Australia's mining industry MFP was due to:

- declining resource quality;
- firms taking profit opportunities due to higher export prices by utilising more labour in existing mines to lift output quickly; and
- capital investment in expanded and new mines that will only lift output in the future.

Queensland's mining industry gross value added (a measure of industry output) recorded average annual growth of 1.5 per cent between 2004-05 and 2009-10. By comparison, aggregate hours worked in the Queensland mining industry rose an average annual 12.6 per cent over the same period. Further, the strong rise in estimated mining related capital expenditure (21.0 per cent average annual growth in nominal terms over the five years to 2009-10) is likely to have given the appearance of a decline in Queensland's mining MFP in recent years.

The Productivity Commission also indicated that the decline in MFP in Australia's electricity gas and water industry is due to very low rainfall during this five year period exerting downward pressure on water consumption and consequently water output together with a large increase in capital investment on infrastructure to secure future water supply.

Queensland was significantly affected by the recent period of very low rainfall. The Queensland Government responded by making significant investments in water infrastructure throughout the State⁸, particularly in South East Queensland, to help alleviate the impacts of the severe drought and ensure security of supply for current and future domestic, commercial, industrial and rural users.

Living standards

Gross State Income (GSI) is a traditional indicator of living standards and is defined as GSP adjusted for the terms of trade. GSI is not intended to be an all encompassing measure of wellbeing. Instead, it is a purposefully defined measure that is constructed within the scope of economic measurement and which does not capture, for example, social and environmental changes which may impact on the wellbeing of a region's inhabitants.

Queensland real GSI per capita (in 2008-09 dollars) rose from \$31,013 in 1985-86 to \$54,923 in 2009-10. Figure 3

⁷ Productivity Commission Submission to House of Representative Standing Committee on Economics, *Inquiry into Raising the Level of Productivity Growth in the Australian Economy, 2009*.

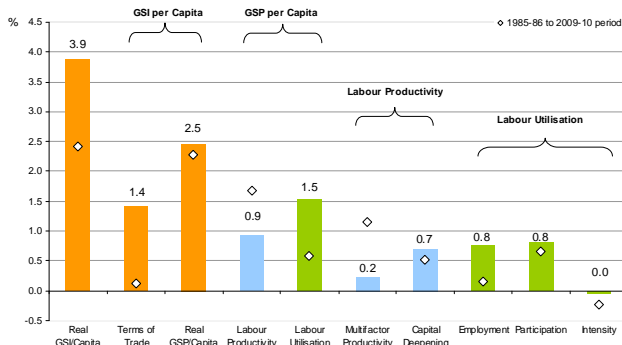
⁸ See *Queensland State Budget 2008-09, Capital Statement* (Budget Paper No. 3).

illustrates a decomposition of Queensland GSI per capita growth into its components over the most recent productivity cycle, 2001-02 to 2007-08, as well as the full period 1985-86 to 2009-10.

Over this six year period, real GSI per capita in Queensland grew at an average rate of 3.9 per cent per annum, to which the terms of trade contributed 1.4 percentage points and real GSP per capita the remaining 2.5 percentage points. In turn, the main contributor to growth in real GSP per capita was labour utilisation (1.5 percentage points). Meanwhile, labour productivity contributed 0.9 percentage point to growth in real GSP per capita, made up of a 0.2 percentage point and a 0.7 percentage point contribution by MFP and capital deepening respectively.

The main contributors to the 1.5 per cent growth in labour utilisation were employment growth (a reduction in the unemployment rate) and an increase in the labour force participation rate. Employment and participation both contributed 0.8 percentage point, while intensity had a neutral impact over the period 2001-02 to 2007-08. The intensity component implies that the average hours worked per employee was unchanged over this period.

Figure 3: Decomposition of growth in Queensland GSI per Capita, 2001-02 to 2007-08^(a)



(a) Sum of component contributions to growth may not add as they are multiplicative rather than additive.

Source: OESR estimates and ABS 3101.0 and 6202.0

For a more detailed technical explanation see *An Historical Analysis of Productivity in Queensland* on the OESR website (<http://www.oesr.qld.gov.au/products/publications/historical-analysis-productivity-qld/index.php>).

Appendix 1 – Long term indexes of productivity and related measures (2008-09 = 100)

	Productivity				Output		Inputs					
	MFP		Labour		QLD	ROA	Total inputs		Hours worked		Capital services	
	QLD	ROA	QLD	ROA			QLD	ROA	QLD	ROA	QLD	ROA
1985-86	76.0	83.4	68.6	70.5	34.5	49.7	45.5	59.6	50.3	70.5	37.1	40.7
1986-87	76.1	83.1	68.6	70.7	36.0	50.8	47.4	61.1	52.5	71.8	38.6	42.3
1987-88	78.9	84.6	71.6	72.1	38.7	53.7	49.0	63.5	54.0	74.5	40.4	44.2
1988-89	80.0	83.9	71.9	71.8	41.7	55.5	52.2	66.1	58.0	77.2	42.3	46.5
1989-90	79.6	83.9	71.4	72.4	43.6	57.3	54.7	68.3	61.0	79.3	44.0	48.8
1990-91	80.6	83.7	73.3	73.2	44.0	56.9	54.6	68.0	60.1	77.7	45.2	50.5
1991-92	81.7	83.9	74.5	74.3	45.2	56.8	55.4	67.7	60.7	76.5	46.3	51.8
1992-93	85.2	86.7	77.8	77.5	48.3	58.9	56.6	67.9	62.0	76.0	47.4	53.1
1993-94	85.8	88.0	78.1	78.7	50.2	61.2	58.5	69.6	64.3	77.8	48.6	54.5
1994-95	85.1	88.1	76.6	78.6	52.6	63.5	61.8	72.1	68.6	80.8	50.2	56.1
1995-96	85.5	90.0	77.5	80.4	54.1	66.4	63.2	73.8	69.8	82.6	52.0	57.8
1996-97	88.7	91.8	81.3	82.7	57.0	68.8	64.3	74.9	70.2	83.2	54.3	59.8
1997-98	91.0	94.1	83.5	85.5	60.4	71.8	66.4	76.3	72.3	84.0	56.4	62.1
1998-99	94.4	97.0	87.3	88.7	64.1	75.4	68.0	77.7	73.5	85.0	58.8	64.4
1999-00	96.7	96.9	89.9	88.7	68.0	78.0	70.3	80.5	75.6	87.9	61.5	67.0
2000-01	99.3	97.4	93.0	90.0	70.8	79.1	71.3	81.2	76.1	87.9	63.5	69.1
2001-02	102.5	100.3	96.7	93.6	74.4	82.0	72.6	81.8	76.9	87.6	65.6	71.2
2002-03	103.9	100.0	98.1	94.0	78.6	84.2	75.6	84.1	80.1	89.6	68.5	74.2
2003-04	104.5	101.6	99.0	96.4	82.1	87.6	78.6	86.2	83.0	90.9	71.5	77.5
2004-05	105.2	101.0	99.6	96.8	87.2	89.4	82.9	88.5	87.6	92.4	75.4	81.2
2005-06	104.2	100.7	99.9	97.5	90.1	92.0	86.5	91.4	90.2	94.3	80.3	85.8
2006-07	104.5	100.6	100.9	98.3	95.8	94.7	91.7	94.2	95.0	96.3	86.3	90.2
2007-08	103.9	100.4	102.3	99.0	99.7	98.4	95.9	98.0	97.5	99.4	93.3	95.3
2008-09	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2009-10	100.1	100.1	102.3	101.9	102.0	102.3	101.9	102.2	99.7	100.3	105.5	105.7
Growth rates over productivity cycles (%)												
1988-89 to 1992-93	1.6	0.8	2.0	1.9	3.7	1.5	2.1	0.7	1.7	-0.4	2.9	3.4
1992-93 to 2001-02	2.1	1.6	2.5	2.1	4.9	3.8	2.8	2.1	2.4	1.6	3.7	3.3
2001-02 to 2007-08	0.2	0.0	0.9	0.9	5.0	3.1	4.8	3.1	4.0	2.1	6.0	5.0
Growth rates over full period (%)												
1985-86 to 2009-10	1.2	0.8	1.7	1.5	4.6	3.1	3.4	2.3	2.9	1.5	4.4	4.1