
A Recent developments in Australia's productivity

This is the first of the Commission's annual updates on productivity developments in Australia. Being the first, it includes additional background and discussion of longer-term trends, which will be only selectively included in future productivity updates where relevant to contemporary observations and issues.

Australia's most recent productivity performance raises a number of questions — in particular, why such a sharp decline in productivity growth occurred, which factors that affected this decline might have run their course, and what can be done to accelerate productivity growth.

This appendix covers the main messages from the Commission's submission to the House of Representative Economics Committee inquiry into productivity (PC 2009), together with an examination of Australia's productivity performance since that time. It examines: what productivity is and why it is important; Australia's long-term productivity trends; key factors behind these trends; Australia's most recent productivity results (bearing in mind that the most recent estimates may be subject to revision); and productivity challenges in the future.

A.1 What is productivity and why is it important?

Productivity is a measure of how efficiently an economy is operating. Growth in productivity is an important determinant of long-term economic growth and hence income growth. As such, Australia's future productivity performance will affect the robustness of its recovery from the recent global financial crisis as well as its longer-term prosperity and capacity to address emergent challenges such as population ageing and climate change.

There are two main measures of productivity (box A.1). The most commonly referred to is labour productivity, which is a measure of the amount of output

produced per hour worked and is generally calculated as value added¹ divided by hours worked. However it is not, despite its title, a good indicator of labour efficiency. A finding of growing labour productivity is typically due in part to an increase in output resulting directly from additional capital investment and other complementary factors, as well as improvements in the way labour is used.

Labour productivity is a catch-all concept which enables output to be compared with the actual hours worked by the labour force. Given the way it is defined, labour productivity growth accounts for most of the growth in real income over the long term.

Box A.1 Labour productivity versus multifactor productivity

Labour productivity is a measure of the amount of output produced per hour worked, and is generally computed as value added divided by hours worked. However, as value added reflects the return to both labour and capital, it is more appropriate to consider the ratio of value added to 'a unit bundle' of both capital and labour — this is multifactor productivity (MFP).

It is straightforward to show (though a little algebra is required) that labour productivity growth is equal to the sum of MFP growth and a term proportionate to the growth in the ratio of capital to labour — this term is known as capital deepening. So labour productivity growth can arise through an increase in MFP or through an increase in the ratio of capital to hours worked — that is, more capital per unit of labour input.

To the extent that growth in labour productivity arises from an increase in capital deepening rather than MFP, it is the additional capital (per unit of labour) that is the source of the additional output (per hour worked). As capital is a scarce resource, this capital deepening comes at a cost which must be offset against the value of the additional output. In a hypothetical case where capital deepening is positive and MFP growth is zero, labour productivity growth will also be positive (equal to the growth in capital deepening). However, the additional (relative) capital cost fully offsets the increase in value added so that in net terms the community is no better off even though there has been labour productivity growth.

It is this lack of explicit accounting in labour productivity for the additional (relative) resource cost of capital that can lead to labour productivity being a misleading indicator of changes in the productive efficiency of the economy. In contrast, MFP accounts fully for both capital and labour resource costs.

Australia's official multifactor productivity (MFP) statistics measure the amount of output (value added) obtained from a combined unit of capital and labour. This

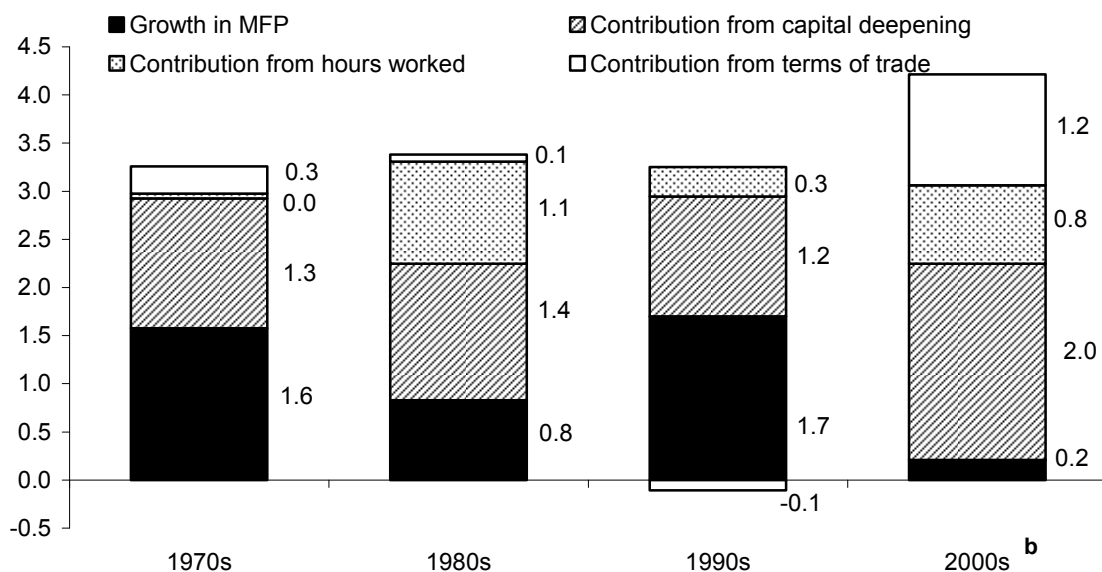
¹ Value added is defined as the value of output less the value of all inputs other than capital and labour. In this appendix, value added refers to value added in real terms. Gross domestic product (GDP) is value added for the whole economy.

enables economic growth to be analysed in terms of the contributions from each of its constituents: growth in labour, in capital and in MFP. Being the more comprehensive indicator of productive efficiency, MFP contributes policy relevant insights into the various determinants of growth. The “headline” focus in this appendix will be MFP, with commentary on labour productivity (LP) where that adds value to the analysis of MFP outcomes. LP will also be presented for the current year recognising that MFP estimates are usually lagged by about 6 months.

Figure A.1 shows the contribution to Australia’s real income growth over the past four decades, from changes in capital inputs, labour inputs, MFP and the terms of trade. Changes in the terms of trade — the prices of Australian exports relative to imports — have had only a small effect over the longer term, though in the most recent decade sustained increases in commodity prices have made a large contribution to income growth. A favourable shift in the terms of trade raises living standards by giving Australian income more purchasing power over imports.

Figure A.1 Contributions to income growth — the importance of MFP

Estimated contributions to growth in real gross domestic income^a
Percentage points, average annual rates (to 2008-09)



^a Gross domestic income is GDP adjusted for changes in the terms of trade. Estimated contributions to growth in real gross domestic income are based on the assumption that the proportionate contributions to income growth from inputs and MFP are the same for the total economy as for the market sector (the ABS does not estimate MFP growth for the non-market sector). ^b 2000s are calculated under the ABS System of National Accounts 2008 basis, all other time periods calculated under the ABS System of National Accounts 1993 basis.

Data source: Commission calculations based on ABS (*Australian System of National Accounts, 2008-09*, Cat. no. 5204.0 and earlier issues).

Separating out the growth in labour and capital, and changes in the terms of trade, Commission estimates suggest that MFP growth has been responsible for almost one-third of total real income growth over the last four decades (figure A.1). The contribution of MFP growth to income growth has varied considerably over the decades. It is interesting to note that, in the most recent decade, factors affecting mining have been a particular influence on the contributions to income growth — with a lower contribution from MFP growth and a higher contribution from the terms of trade. The interplay between income growth and productivity growth in mining is discussed below.

A.2 Australia's long-term productivity trends

Over the 35 year period from 1973-74 to 2008-09 (the duration of Australia's official productivity time series) annual MFP growth in the Australian market sector has averaged 0.8 per cent a year. In this appendix, the 'market sector' is that part of the economy for which productivity is well-measured — all the economy except health, education, defence, public administration, and difficult to measure property, business and personal services within the business sector.²

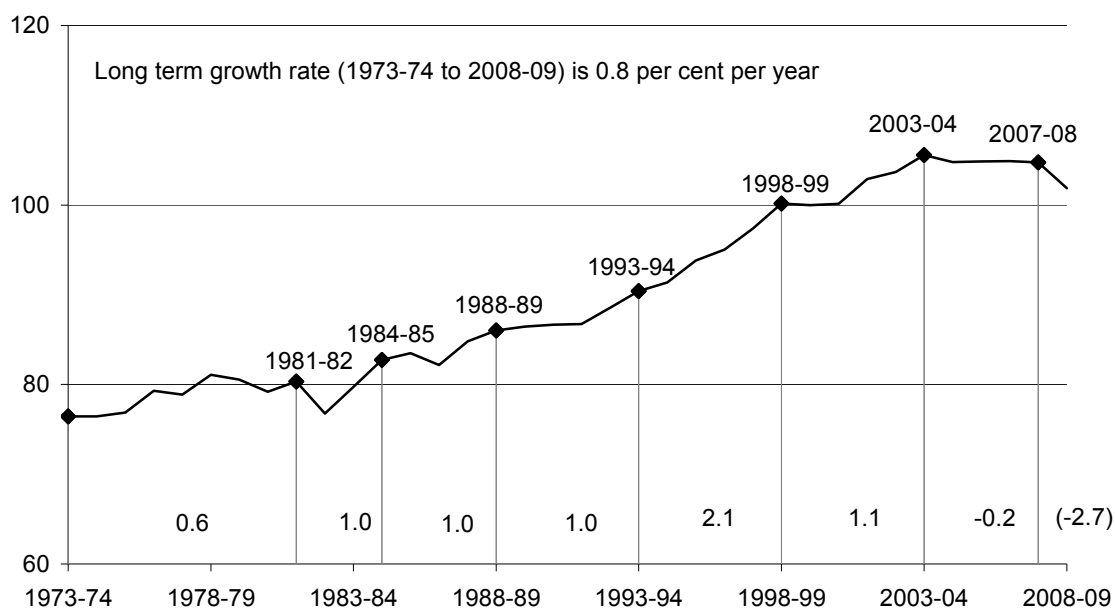
As a result of the many factors that influence the components of measured productivity growth, rates of MFP growth in the Australian market sector vary considerably over time. For example, productivity tends to slow during dips in the business cycle, and can sometimes slow during early stages of rapid investment growth and then accelerate as output from that investment 'catches up'. To avoid comparisons of productivity (or productivity growth rates) across inappropriate points of time the ABS identifies productivity cycles — periods over which average growth in MFP can be most appropriately compared. These cycles frequently (though not always) coincide with the period between successive peaks in MFP.

Figure A.2 provides a time series of the level of (an index of) MFP for the Australian market sector between 1973-74 and 2008-09, together with the ABS defined productivity cycles and the average annual rates of MFP growth within each cycle. The final year, 2008-09, is the first year since the previous cycle concluded in 2007-08 and is thus not a cycle in itself. However, the growth rate of MFP in 2008-09 is included for completeness.

² The industries within the ABS *Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006* that are excluded are: Health care & social assistance; Education & training; Public administration & safety; Rental, hiring & real estate services; Professional, scientific & technical services; Administrative & support services; and Other services.

Figure A.2 Market sector^a MFP index and growth rates across productivity cycles, 1973-74 to 2008-09

Index 1999-2000 = 100 and per cent per year



^a The market sector consists of 12 selected industries (ANZSIC06 Divisions A to K and R).

Data source: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010).

Average productivity growth rates have varied considerably across the seven completed cycles since 1973-74. However, the standouts are the very high average growth rate recorded in the 1993-94 to 1998-99 cycle, and the subsequent decline, particularly the very low (negative) growth recorded in the last complete cycle from 2003-04 to 2007-08.

Australia's average annual MFP growth rate during the 1993-94 to 1998-99 productivity cycle, at 2.1 per cent, was substantially above the rates recorded in any of the other productivity cycles and more than twice the long-term average.

Compared with the previous cycle from 1988-89 to 1993-94, growth in the 1993-94 to 1998-99 cycle was broadly based, encompassing a variety of industries. Comparing columns one and two in table A.1, of particular note were the productivity improvements in Wholesale trade, Construction, Transport, postal & warehousing, and Accommodation & food services. There were, however, also sectors with lower relative performance, such as Mining.

Table A.1 Growth in MFP by industry and productivity cycle

Per cent per year

	1988-89 to 1993-94	1993-94 to 1998-99	1998-99 to 2003-04	2003-04 to 2007-08
Agriculture, forestry & fishing	4.0	4.0	3.5	-1.2
Mining	3.0	0.6	-0.4	-4.2
Manufacturing	0.1	0.4	1.7	-0.9
Electricity, gas, water & waste services	3.2	1.9	-2.0	-4.4
Construction	-0.5	2.8	1.0	0.8
Wholesale trade	-2.1	5.8	1.3	0.3
Retail trade	2.0	2.3	1.3	0.5
Accommodation & food services	-0.3	1.7	0.5	0.1
Transport, postal & warehousing	1.7	2.3	2.4	1.6
Information, media & telecommunications	6.3	3.8	-0.5	0.9
Financial & insurance services	4.9	1.3	1.2	2.5
Arts & recreation services	-1.6	-1.5	1.4	-1.0
Market sector^a	1.0	2.1	1.1	-0.2

^a The market sector consists of the 12 selected industries (ANZSIC06 Divisions A to K and R) as listed in the table.

Source: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010).

Average annual MFP growth in the 1998-99 to 2003-04 cycle, at 1.1 per cent, was closer to the long-term average of 0.8 per cent, but in the next cycle to 2007-08 it averaged -0.2 per cent. The decline in growth rates was broadly based in both cycles.

Productivity growth fell broadly and quite substantially in the 1998-99 to 2003-04 cycle compared with the previous cycle (the second and third columns in table A.1). Average MFP growth fell by one percentage point or more in seven of the twelve industry sectors making up the market sector. Manufacturing and Arts & recreation services were the only industries to record significant increases in average productivity growth compared with the earlier cycle. Average rates of MFP growth in Electricity, gas, water & waste services, along with Wholesale trade and Information, media & telecommunications, fell by more than 3 percentage points, though Information, media & telecommunications recovered to some extent in the following years.

In the 2003-04 to 2007-08 cycle, productivity growth fell further in ten of the twelve market sector industries with MFP growth in each of Agriculture, forestry & fishing, Mining, Manufacturing, Electricity, gas, water & waste services, and Arts & recreation services falling by more than another 2 percentage points.

Average annual MFP growth in Mining has fallen from -0.4 per cent in the 1998-99 to 2003-04 cycle to -4.2 per cent in the 2003-04 to 2007-08 cycle, and Agriculture, forestry & fishing has fallen from 3.5 per cent to -1.2 per cent. In addition, Manufacturing MFP growth has fallen from 1.7 per cent to -0.9 per cent per year, Electricity, gas, water & waste services has fallen from -2.0 per cent to -4.4 per cent, and Arts & recreation services has fallen from 1.4 per cent to -1.0 per cent.

These five industries together accounted for more than a third of total market sector value added in 2007-08, so the falls in MFP growth in these industries had a large effect on aggregate market sector MFP growth. However, special circumstances largely explain the poor MFP performance of three of these five sectors.

Since the last complete cycle, MFP growth was -2.7 per cent in 2008-09 — the global financial crisis clearly played a role in this result, which is discussed briefly in section A.4.

A.3 Key factors behind Australia's productivity performance

Factors behind the surge of the 1990s

There has been considerable debate about the reasons for the productivity surge in the 1990s and, in particular, the link to the program of macroeconomic and microeconomic reforms that preceded and coincided with it. The Commission has undertaken analysis of other potential causes and has found that they were not significant in explaining the surge in productivity. For example:

- Australia was not carried along by an international productivity boom. Indeed, Australia's MFP growth performance during this period was at the front of OECD countries.
- The surge in productivity was not the normal result of recovery from the early 1990s recession. The improved performance was longer and stronger than in previous recoveries. Besides, focusing on average growth rates across the productivity cycle abstracts from cyclical influences.
- Higher skill levels in the workforce did not have a significant direct impact on productivity growth in this period. Analysis in a Commission Staff Research Paper by Barnes and Kennard (2002) of ABS estimates of MFP adjusted for labour quality showed there was a decline in the contribution of labour quality improvement in the period of the surge relative to that of the 1988-89 to 1993-94 cycle. While more recent revised ABS statistics, estimated under new national

accounts methodology, show an increase in the contribution of labour quality improvement between these cycles, that increase is very small (less than 0.1 of a percentage point).

- It cannot be concluded that Australia's acceleration in productivity growth arose from any special technological leap forward. While some other countries, including the United States, derived some productivity benefit from rapid advances in the *production* of information and communication technologies (ICTs) in the 1990s, Australia produced little in the way of ICTs and so did not access that source of productivity gain. As far as the use of ICTs is concerned, a Commission Staff Research Paper (Parham, Roberts and Sun 2001) found that while the adoption of information technology in Australia had contributed to LP growth through increasing the amount of capital available to labour, it appeared to have very little role to play in the increase in market sector MFP growth over the period.

The removal of these possible explanations as likely causes of the surge in productivity leaves the reforms of the latter part of the 1980s and the 1990s as the prime candidate. This is not surprising, as the reforms were predicated on the need to remove policy-related sources of inefficiency that were seen as holding back relative living standards.

A return to more typical productivity growth rates following the surge was to be expected as the easily accessible gains were realised. This was indeed the case, with MFP growth falling back to an annual average rate of 1.1 per cent through the 1998-99 to 2003-04 cycle.

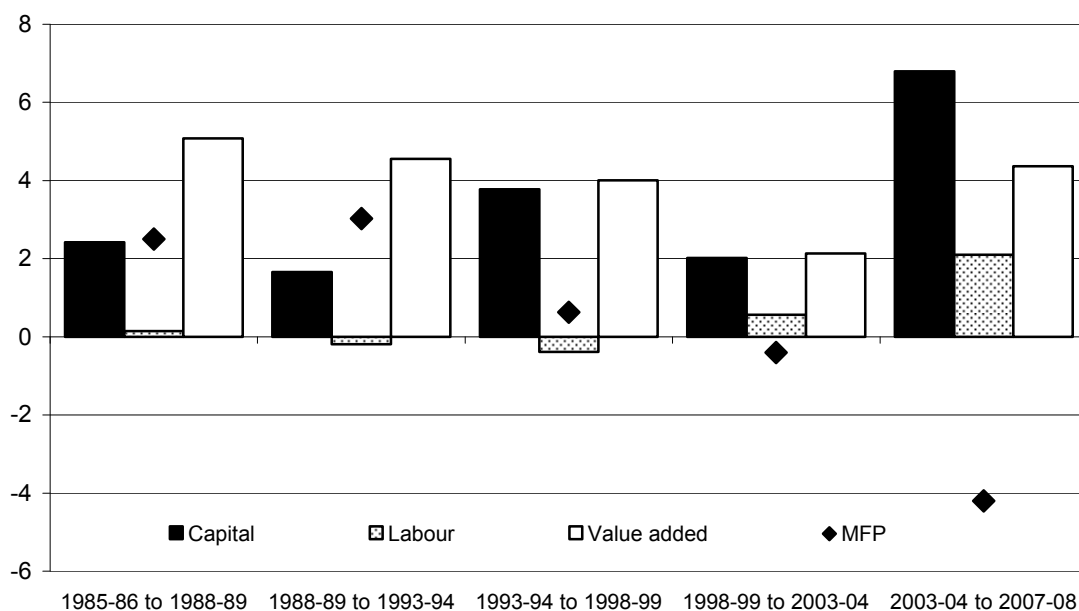
What caused the more recent productivity reversal?

The poor MFP growth (average annual rate of -0.2 per cent) in the most recent complete productivity cycle (2003-04 to 2007-08) is largely explained by phenomena peculiar to a few key industry sectors.

The mining boom: good for incomes, bad in the short term for productivity?

In the most recent complete cycle, 2003-04 to 2007-08, average annual MFP growth in Mining has been -4.2 per cent (figure A.3).

Figure A.3 Value added, capital and labour input components^a of MFP growth in Mining, by productivity cycle
Average annual growth rate



^a Capital and labour inputs are weighted by their relative shares of income.

Data source: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010).

For each productivity cycle shown in figure A.3, and subsequent similar figures, the white bars represent average annual growth in value added, and the black and shaded bars represent the weighted average annual growth rates in the contribution of capital and labour, respectively. The capital and labour contributions are weighted by their respective shares of income. The diamonds represent average annual MFP growth rates — approximately equal to the difference between value added growth (the white bar) and input growth (the sum of the black and shaded bars).

A Commission Staff Working Paper *Productivity in the Mining Industry: Measurement and Interpretation* (Topp et al. 2008) shows that ongoing systematic decline in the quality and accessibility of mineral resources has had a significant impact on measured productivity growth in mining. In some instances this results in an increase in extraction costs and in some instances in a decrease in output quality — both of these effects put downward pressure on MFP growth in the mining industry. This study’s estimates suggest that in the absence of such depletion, *long-term* MFP growth (1974-75 to 2006-07) in mining would have averaged a little over

2 per cent a year compared with official estimates of essentially zero for that period.³

In addition to this, the recent boom in demand for, and the associated rise in the price of, certain mineral resources has led to less efficient, but now profitable, short-term production opportunities being taken up. *This leads to lower measured productivity, but higher profits and gross domestic income* (as shown in figure A.1).

Also, in an effort to gear up production to take advantage of profit opportunities arising from the rapid growth in mineral demand, mainly from China, the mining industry expanded capital and labour inputs at an extraordinary rate. Recent massive capital investment, but with long lead times to full production, has reduced measured MFP growth in mining.⁴ In official productivity estimates, investment is accounted for in the period of expenditure, but lags of around 3 years before associated output is realised are not uncommon in major new capital investments in the mining sector.

While this is a temporary phenomenon and will be ‘paid back’ in years to come as the output ‘catches up with’ the investment, it will continue to influence measured productivity throughout periods of unstable investment (either rapid growth or decline). Topp et al. (2008) estimated that around one-third of the decline in mining MFP between 2000-01 and 2006-07 was accounted for by this phenomenon.

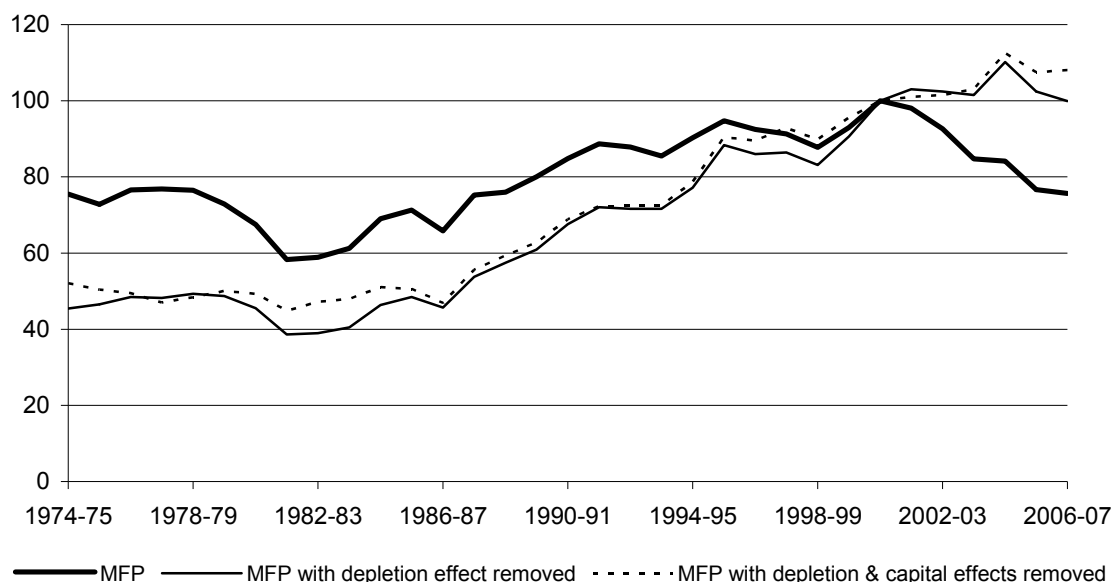
Once the resource quality effects and capital lag effects are removed, measured MFP growth in Mining has positive trend growth between 2000-01 and 2006-07 (figure A.4) — the effect is particularly strong in more recent years because of very strong capital growth and capital/output lags.

³ This study was based on data from the 2006-07 ABS industry MFP dataset and differs slightly from the estimates presented in figure A.3, which are based on the 2008-09 ABS industry MFP dataset.

⁴ A sluggish response in investment in associated transport infrastructure has also been cited by some as a potential drag on productivity in Mining.

Figure A.4 **Mining MFP level with and without depletion and capital lag effects, 1974-75 to 2006-07^a**

Index 2000-01 = 100



^a The estimates in Topp et al. (2008) are based on ABS (*Experimental Estimates of Industry Multifactor Productivity, 2006-07*, Cat. no. 5260.0.55.002), the latest available data at that time. These differ from the estimates used in figure A.3, which are based on the 2008-09 issue of the same ABS publication.

Source: Topp et al. (2008, p. 99).

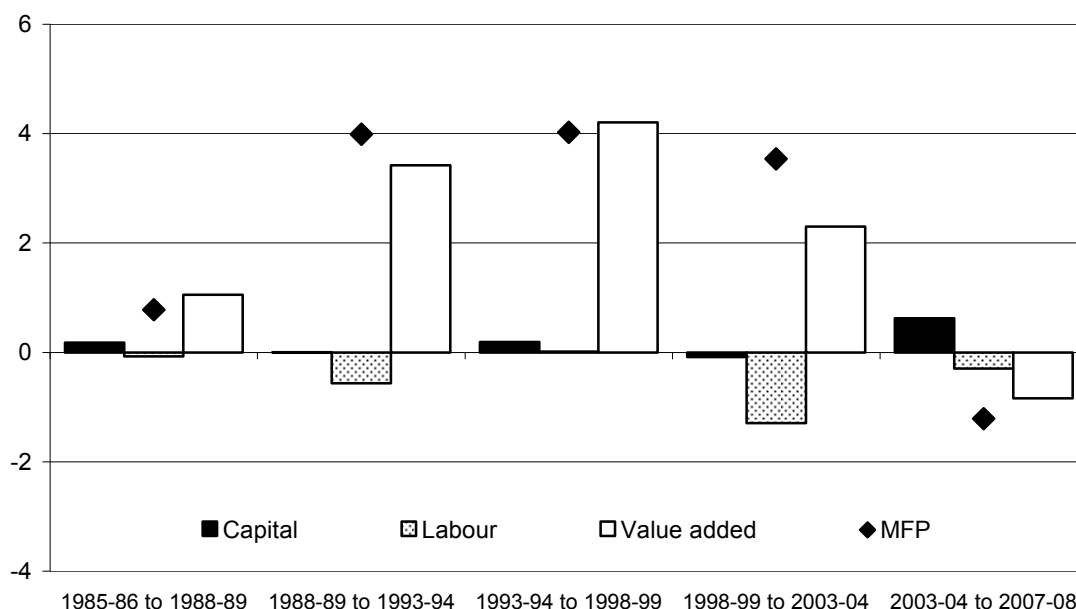
Agricultural productivity reduced by drought

The generally low rainfall and reduced rate of runoff per unit of rainfall⁵ since the turn of the century has had a significant effect on MFP growth in Agriculture, forestry & fishing and particularly so in the exceptionally low rainfall years of 2002-03 and 2006-07.

In the most recent cycle, 2003-04 to 2007-08, average annual MFP growth in Agriculture, forestry & fishing has been -1.2 per cent, following strong average annual MFP growth of between 3 and 4 per cent across each of the preceding three complete productivity cycles (figure A.5). This outcome is a direct consequence of the severe drought induced fall in the sector's value added of 15.3 per cent in 2006-07, with MFP growth of -17.1 per cent in that year.

⁵ For example, it has been estimated that a mean rainfall reduction of 13 per cent in the southern Murray-Darling basin, over the decade to 2006, led to a mean runoff reduction of 39 per cent (SEACI 2008).

Figure A.5 Value added, capital and labour input components^a of MFP growth in Agriculture, forestry & fishing, by productivity cycle
Average annual growth rate



^a Capital and labour inputs are weighted by their relative shares of income.

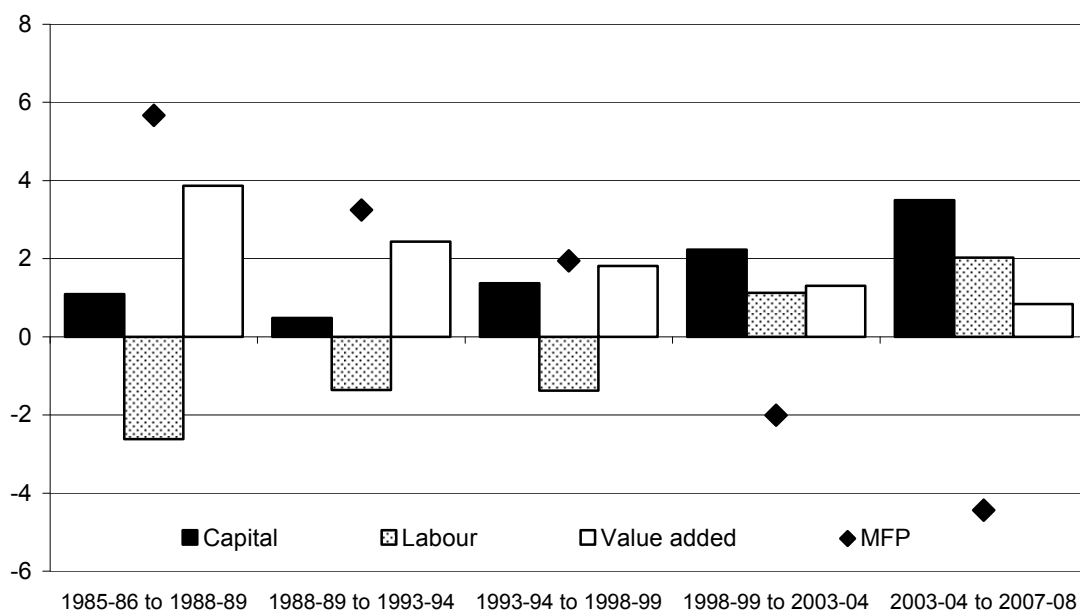
Data source: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010).

While there is typically a strong ‘bounce back’ in value added following particularly poor rainfall years, the timing of these events relative to the officially defined productivity cycles for the market sector as a whole has resulted in a drag on overall productivity in the 2003-04 to 2007-08 cycle. It is notable that agricultural MFP growth was around 14 per cent in 2008-09.

Electricity, gas, water & waste services experienced significant capital expansion and low value added growth

Another sector exhibiting strong declines in MFP since 1998-99 is Electricity, gas, water & waste services (EGW&WS). This was one of the industries to have exhibited the largest productivity gains from the economic reforms in the 1980s and 1990s, but has since gradually declined to have the lowest MFP growth in the most recent cycle, at -4.4 per cent (figure A.6).

Figure A.6 Value added, capital and labour input components^a of MFP growth in EGW&WS, by productivity cycle
Average annual growth rate



^a Capital and labour inputs are weighted by their relative shares of income.

Data source: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010).

The combined effects of Australia’s growing population, increasing demand for energy consumption, and (recently) less reliable rainfall are giving rise to significant increases in the demand for capital (and labour) inputs in this sector with gross fixed capital formation (chain volume measure) in 2007-08 almost twice that in 2003-04 and almost four times that in 1995-96.

Like agriculture, MFP growth in EGW&WS has also been adversely affected by poor rainfall and reduced runoff this century — particularly the water industry, but electricity also (most notably hydro electricity). Between 2000-01 and 2007-08, value added in the water industry fell by some 17 per cent.⁶

In response to drought induced water shortages there has recently been a rapid increase in capital investment in desalination plants and in recycling and conservation capital. Lags in the realisation of the full benefits from these frequently large and complex investments are likely to have further depressed measured productivity growth in this sector.

⁶ Based on ANZSIC 1993 data underlying the 2007-08 ABS industry MFP dataset — estimates for water are combined with those for waste services under ANZSIC 2006 based estimates underlying the 2008-09 ABS industry MFP dataset.

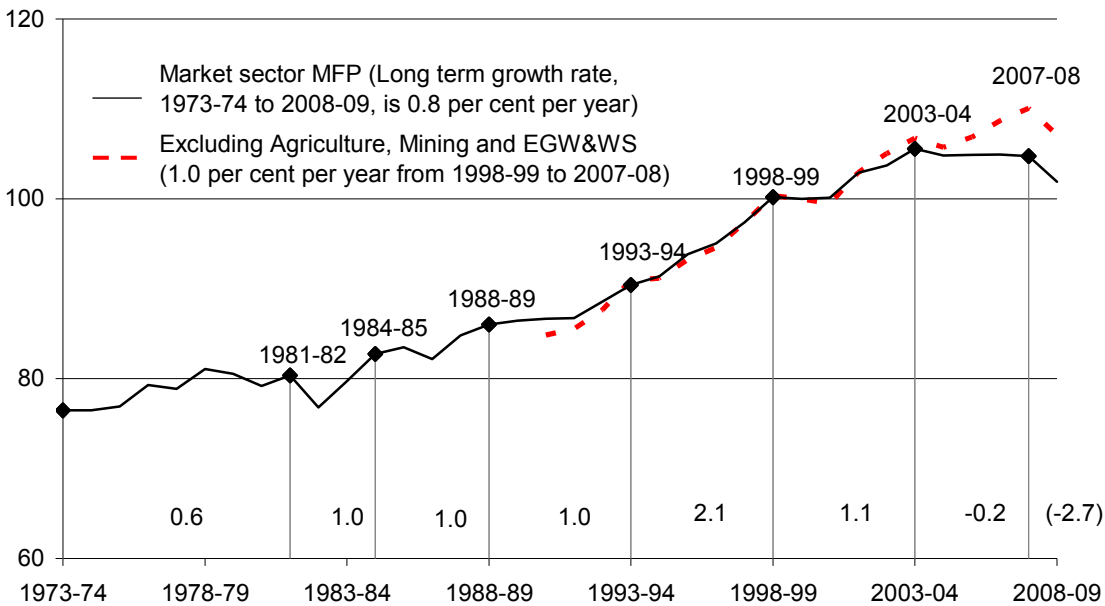
This raises the issue of the effect on measured productivity of actions taken to assure security or continuity of supply — an issue relevant to both water and electricity. In the simplest case, actions to ensure continuity of supply may involve investment in extra capacity that may be excess to business-as-usual requirements but would be needed during disruptions or emergencies. Continuity of supply can be considered a quality aspect of output but it is generally not measured in productivity calculations (quality adjustments are measured for only a few products, such as motor vehicles and computers). Given this, actions taken to ensure continuity of supply may decrease measured productivity if they increase capital without any commensurate increase in measured output.

The three sectors collectively had a large impact on MFP growth

Once the influence of these three ‘special’ sectors is removed from the market sector aggregate, average annual MFP growth in the 2003-04 to 2007-08 cycle rises to 0.8 per cent (compared with -0.2 per cent for the full market sector) — a full 1 percentage point per year higher, and equal to the long-term average (figure A.7). Commission estimates indicate that these three sectors accounted for almost 80 per cent of the recent decline in MFP growth relative to the 1998-99 to 2003-04 cycle.

Figure A.7 Market sector^a MFP, and the impact of poorer performing sectors, productivity cycles, 1973-74 to 2008-09

Index 1999-2000 = 100 and per cent per year



^a The market sector consists of 12 selected industries (ANZSIC06 Divisions A to K and R).

Data source: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010).

Despite the poor productivity performance of the market sector over the 2003-04 to 2007-08 productivity cycle, *gross domestic income* has grown strongly (figure A.1 in section A.1), largely through strong growth in capital and labour inputs and exceptionally strong growth in the terms of trade. The irony of this is that the major driver of the terms of trade, the resources boom, is also a major cause of the recent poorer than usual MFP growth in the mining sector.

A.4 Most recent productivity results

While MFP growth is best interpreted over productivity cycles, recent annual productivity estimates are of interest and relevance to a general discussion of economic performance, even though they may be subject to revision and do not yet constitute a complete cycle.

The most recent MFP estimates available are for 2008-09 (the 2009-10 estimates will not be released by the ABS until late October 2010). In addition, quarterly estimates for labour productivity for the entire economy are available for 2009-10 — these estimates, together with data on value added, hours worked and capital expenditure, provide some indication of likely MFP growth in 2009-10.

MFP growth in 2008-09

Australian market sector MFP fell abruptly in 2008-09 by -2.7 per cent, the largest recorded drop in 25 years and one in which the global financial crisis clearly played a role. Value added growth was -0.3 per cent, with growth in inputs (weighted by income shares) of just below zero for hours worked and 2.5 per cent for capital.

Estimates of MFP growth during this period are currently not available for most OECD countries. However, similar MFP growth rates to that for Australia have been reported by the national statistics agencies of the Netherlands (-2.0 per cent in 2009), Canada (-2.2 per cent in 2009) and New Zealand (-3.1 per cent in year ended March 2009).⁷ Compared with Australia, these countries had considerably larger falls in value added and hours worked. Capital growth was less in New Zealand than in Australia and was negative in Canada and the Netherlands.

A number of Australian industry sectors exhibited very poor MFP growth in 2008-09 — Mining, Transport, postal & warehousing, Manufacturing, Construction, and EGW&WS (table A.2)

⁷ Sourced from Statistics Netherlands (2010), Statistics Canada (2010) and Statistics New Zealand (2010).

Table A.2 Growth in MFP by industry and its components, 2008-09

Per cent per year

	<i>MFP</i>	<i>Value added</i>	<i>Capital^b</i>	<i>Labour^b</i>
Agriculture, forestry & fishing	14.1	16.2	0.8	1.1
Mining	-8.9	2.2	9.2	2.9
Manufacturing	-5.4	-6.2	1.6	-2.4
Electricity, gas, water & waste services	-3.3	5.0	4.3	4.3
Construction	-4.6	-1.8	1.9	1.1
Wholesale trade	-1.0	1.6	1.6	1.1
Retail trade	2.5	1.4	1.5	-2.6
Accommodation & food services	-0.1	-0.4	1.3	-1.5
Transport, postal & warehousing	-5.9	-1.0	2.5	2.8
Information, media & telecommunications	-3.1	-1.8	2.8	-1.4
Financial & insurance services	-1.8	-1.5	1.1	-0.7
Arts & recreation services	2.7	6.2	1.4	2.0
Market sector^a	-2.7	-0.3	2.5	-0.0^c

^a The market sector consists of the 12 selected industries (ANZSIC06 Divisions A to K and R) as listed in the table. ^b Capital and labour inputs are weighted by their relative shares of income. ^c Actual value was -0.03.

Source: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010).

A notable exception is Agriculture, forestry & fishing, for which MFP growth was around 14 per cent in 2008-09 — illustrative of a ‘bounce-back’ in value added following particularly poor rainfall years. ‘Bounce-backs’ of this size are not atypical, with MFP growth of 26 per cent in 2003-04 after low rainfall in 2002-03.

While the issues discussed above in respect of EGW&WS and Mining remain relevant to the 2008-09 year, the global financial crisis also played a major role in the poor MFP outcome for the market sector as a whole. Value added declined significantly in some sectors — for example, Manufacturing; Financial & insurance services; Information, media & telecommunications; and Construction — without a commensurate decline in either the capital base or in labour. In the short-term, firms generally do not fully adjust inputs to downturns in demand — they keep underutilised equipment and tend to ‘hoard’ labour (particularly skilled labour) in anticipation of an upturn.

Value added in the market sector fell by 0.3 per cent in the year. Hours worked fell by a smaller amount (less than 0.1 per cent, and only just below zero when weighted by its income share) and capital services grew by over 5 per cent in the year (2.5 per cent when weighted by its income share). It is the strong growth in capital services together with the decline in value added that has given rise to the negative MFP growth. However, on a positive note, the strong increase in capital services suggests some confidence in future economic growth in aggregate and at the industry sector level.

Prospective MFP growth in 2009-10

While the most recent MFP estimates available are for 2008-09, estimates for 2009-10 are available for labour productivity (LP). Trends in LP growth and MFP growth can differ, but the components of LP growth can provide some insight into likely MFP growth. Growth in LP is equal to the sum of capital deepening (which is proportionate to the growth in the ratio of capital services to hours worked) and MFP growth. Therefore, early estimates of growth in LP, investment and hours worked can sometimes provide a useful indication of likely developments in MFP growth in advance of the release of official MFP growth estimates.

Table A.3 **LP growth and related variables, expanded market sector^a, 2008-09 and 2009-10**
Per cent per year

<i>Growth in:</i>	2008-09 ^b	2009-10 ^c
<i>Expanded market sector</i>		
Labour productivity	0.3	1.8
GDP ^d	-0.1	1.6
Hours worked	-0.5	-0.2
Investment ^e	7.1	-3.1
Capital services	6.0	na
MFP	-2.8	na

^a The expanded market sector consists of 16 selected industries (ANZSIC06 Divisions A to N, R and S).

^b These 2008-09 estimates are from the last annual national accounts (ABS Cat. no. 5204.0, 2008-09) and associated experimental industry MFP dataset (ABS Cat. no. 5260.0.55.002, 2008-09) and are likely to be revised in the soon to be released annual national accounts for 2009-10. ^c These 2009-10 estimates are annual estimates from the ABS quarterly national accounts for June 2010 (Cat. no. 5206.0) and may be subject to revision in the soon to be released annual ABS national accounts for 2009-10 (Cat. no. 5204.0).

^d GDP of the expanded market sector, not the whole economy. ^e The investment indicator is total private business investment (which does not include dwellings and ownership transfer costs).

Sources: Based on ABS (*Experimental Estimates of Industry Multifactor Productivity, Australia: Detailed Productivity Estimates, 2008-09*, Cat. no. 5260.0.55.002, Reissue 5 February 2010); ABS (*Australian System of National Accounts, 2008-09*, Cat. no. 5204.0); ABS (*Australian National Accounts: National Income, Expenditure and Product, June Quarter 2010*, Cat. no. 5206.0).

Based on quarterly estimates since 2008-09, LP growth for 2009-10 is expected to be around 1.8 per cent for the expanded market sector⁸, which is significantly higher than the 0.3 per cent in 2008-09 (table A.3). Also, capital deepening in the expanded market sector is likely to be lower in 2009-10 than 2008-09, given the

⁸ The ABS does not release quarterly data for the market sector as defined in this paper, only for an expanded market sector that includes an additional four industries: Rental, hiring & real estate services, Professional, scientific & technical services, Administrative & support services and Other services. However, the direction of change in this series is generally correlated with that for the narrower market sector.

apparent slowdown in investment⁹ combined with a slower decline in hours worked. This suggests that the rise in LP growth is likely to be associated with a substantially better MFP growth outcome in 2009-10 than in 2008-09.

However, MFP growth in Mining and in EGW&WS might be expected to remain weak in 2009-10.

- In Mining, the research of Topp et al. (2008) suggests that while the capital lag effects can be expected eventually to raise measured MFP growth, the resource quality depletion effect is likely to continue to be an ongoing detractor from the productivity enhancing effects of technology and other efforts to improve business management and operations, with an uncertain longer-term net outcome.
- The EGW&WS sector continues to present productivity measurement challenges. Although recent rain may have increased dam storage levels, particularly in Queensland, water restrictions are still in place in many states. This quantity rationing of water means that there is still some downward pressure on urban water consumption and a large ‘bounce back’ in value added of the kind that occurred in Agriculture is therefore not likely. In addition new sources of water (such as desalination and recycling of water), which were put in place to ensure security of water supply, rely on significant new capital. This will keep productivity lower than would otherwise have been the case. However, the drivers of productivity in the various sub-industries within the EGW&WS sector differ. The Commission’s current research into productivity in these sub-industries will improve the understanding of productivity performance in the EGW&WS sector.

A.5 Productivity challenges in the future

Productivity growth will be a major determinant of Australia’s future income growth and of how well the country meets long-term challenges — such as those relating to the environment, population ageing and recovery from the global financial crisis. At the same time, responses to these challenges will, in themselves, impact on productivity growth and on its measurement.

⁹ It should be noted, however, that negative investment growth does not necessarily imply negative capital services growth. Although investment levels have fallen, so long as the level of investment is greater than depreciation, there will still be an addition to the capital stock.

If renewable energy targets are to be met, for example, there will need to be a change in the proportion of electricity supplied using different technologies. To the extent that renewable energy capital is relatively expensive per unit of output, an increase in the share of renewable energy will lead to lower measured MFP. While there may be a benefit in terms of reduced greenhouse gas emissions, that benefit is not currently accounted for in official MFP estimates. Similar considerations arise in respect of policy responses to the increasing demand for water in constrained natural supply conditions (fixed or declining rainfall). The introduction of desalination plants, additional recycling and conservation capital, and stringent quantity constraints, will continue to exert downward pressure on measured MFP.

An ageing population will increase demands on Australia's aged care and health care systems (PC 2005b). Many of these services are provided in the non-market sector of the economy, for which there are, as yet, no official MFP growth statistics (because of measurement difficulties). If the non-market sector share of the economy grows, measured market sector MFP growth will become less indicative of overall productivity in the economy. Population ageing can also affect aggregate productivity because average productivity levels differ across age groups. Empirical estimates suggest that, on average, a person's productivity levels initially increase with age before declining after middle age. However, the Commission found (PC 2005b) that there is currently insufficient evidence to confirm whether ageing per se will affect Australia's aggregate labour productivity prospects. This is because there is a variety of, sometimes offsetting, ways in which ageing could affect productivity. For example, the net effect on productivity depends on whether the gains from a reduced share of inexperienced (and less productive) young workers are outweighed by the falls in productivity associated with a growing share of the oldest workers.

As noted earlier, the global financial crisis led to significant declines in demand in some sectors of the Australian economy in 2008-09. This fall in demand was associated with a decline in MFP growth because the decline in output occurred without a commensurate decline in either the capital base or in labour. Global recovery will help underpin growth in demand for Australian production and thereby support domestic productivity performance in general, and particularly through the utilisation of any residual excess capacity in the near term.

Whatever the measurement challenges, an increase in overall productivity depends on the performance of individual firms, and on the competitive pressures that result in better performing firms and industries prevailing over others. In its submission to the recent House of Representatives Economics Committee inquiry into productivity (PC 2009), the Commission identified three key platforms

underpinning future productivity improvement — incentives (the external pressures and disciplines on organisations to perform well, including through competition); flexibility (the ability to make changes to respond effectively to market pressures); and capabilities (the human and knowledge capital, as well as infrastructure and institutions, needed to effect productivity enhancing changes). Appropriate policy initiatives will be needed in all these areas to enhance Australia's future productivity performance.