Agenda, Volume 8, Number 4, 2001, pages 333-348

The Australian Productivity Miracle: A Sceptical View

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Since the beginning of systematic microeconomic reform in the early 1980s, there has been a steady flow of official and unofficial predictions that the improvement in productivity made by possible by reform would yield improved living standards for all, or at least most, Australians. The first such predictions were made by Kasper et al. (1980) who estimated that the adoption of a program of microeconomic reform broadly similar to that subsequently implemented would result in annual growth in income per person of 3.8 per cent for the period 1975–2000, while continuation of past policies would yield annual growth of 1.7 per cent. The implied cumulative net impact of reform was an increase in income of more than 70 per cent.

Subsequent estimates of the benefits of reform, mostly made by government agencies, including the Bureau of Industry Economics (1990), the Economic Planning Advisory Council (1996), Filmer and Dao (1994) and the Industries Assistance Commission (1989), were more modest, but still substantial. The most widely quoted was the estimate made by the Industry Commission (1995) that the implementation of 'Hilmer and related reforms' would yield medium-term benefits equivalent to a permanent increase in GDP of 5.5 per cent. This estimate covered a broad range of reforms, including competitive tendering and contracting, regulatory reform in a number of industries and restructuring of government business enterprises. Although the time-scale for the realisation of benefits was not entirely consistent, the majority of the benefits were projected to be realised over a period of five years. The estimates excluded a number of major reforms that took place during the 1990s including reductions in tariffs, labour market reform and privatisation of public utilities.

The estimates listed above covered overlapping sets of reform initiatives and time periods. However, they all implied that the benefits of microeconomic reform would be equivalent to an increase of at least one percentage point in the growth rate of GDP, and most were presented as partial or conservative. It therefore seems reasonable to summarise the conclusions of these studies by saying that the program of microeconomic reform commencing in the early 1980s was expected to raise the medium-term growth rate of GDP by between one and two percentage points.

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Microeconomic Reform Outcomes

Predictions can be debated indefinitely, but after two decades of reform it seems reasonable to focus on observed outcomes. Within a few years of the onset of microeconomic reform, supporters of reform began to look for, and frequently claimed to have found, evidence of the benefits of reform both in individual sectors and for the economy as a whole.

The first important piece of microeconomic reform in the 1980s was the deregulation of the financial sector. Supporters of this reform pointed to benefits in two main areas. First, the growth of financial takeovers, promoted by 'entrepreneurs' such as Alan Bond, John Elliott, Robert Holmes a Court, Christopher Skase and John Spalvins, was interpreted, following the arguments of Manne (1965), as creating a market for corporate control and promoting more efficient allocation of resources. Bishop, Dodd and Officer (1987:80) concluded that the activities of 'raiders' such as the Bell Group (controlled by Holmes a Court), Bond Corporation (Bond), Elders (Elliott), and Adelaide Steamship (Spalvins) 'lead to more profitable uses of company assets, and as such they play a vital role in the capital allocation process'.

Second, the successful management of the 'banana republic' crisis of 1986, which included large, but temporary, increases in interest rates, was interpreted as evidence that the economy had become more 'flexible' in its response to economic shocks.

A widely noted assessment, was that of Higgins (1989:x)

> We have had a decade of remarkable and fundamental economic and social policy reform; reform which in all its major contours and, arguably, in 99 per cent of its detail, is efficiency-enhancing.

Higgins echoed the views of Henderson (1989) who judged that: Australia had gone further in reducing fiscal imbalance and distortions in the tax system than most OECD countries; was among the leaders in financial market liberalisation and trade liberalisation; and was a model in the transparency of its assistance measures. A similar assessment was offered by Sieper and Wells (1989).

Among other things, the optimistic view of the benefits of reform reflected in Higgins' assessment was used to justify the maintenance of high interest rates during 1989, as a response to inflationary pressures and current-account problems. The resulting recession showed that the economy was not as flexible as had been hoped. It also led to the bankruptcy of most of the leading 'entrepreneurs', exposing a pattern of bad investment decisions and dubious financial manipulations, which cast doubt on claims about the efficiency-enhancing properties of takeovers. Critics, such as Mathews (1991:7) blamed microeconomic reform for the severity of the recession, stating that 'the economy

has been brought to its knees by financial and economic deregulation, the elimination of tariffs, free trade in agriculture [and] privatisation'.[1]

During the early 1990s — a period of high unemployment and relatively slow economic recovery — fewer claims were made regarding the macroeconomic benefits of microeconomic reform. Rather, attention was focused on the concept of multifactor productivity (MFP), which is discussed in more detail below.

Although optimistic claims about productivity outcomes had been made from the late 1980s onwards, the Industry Commission took a more cautious view. In its 1995-96 *Annual Report*, however, the Commission was willing to claim a measure of success (Industry Commission, 1996:3):

> There are early signs that past reforms are contributing to a structural improvement in Australia's productivity performance. In contrast to its poor relative performance previously, Australia's productivity increased at twice the rate of the OECD between 1989 and 1994 ... To sustain this momentum, it is important to lock in the gains from past reforms and seek further improvements in efficiency.

The estimated annual rate of total factor productivity growth between 1989 and 1994 was 1.1 per cent, compared to 0.5 per cent for the OECD as a whole.

The claim that the benefits of reform were already evident has been made with increasing confidence since the mid-1990s. However, there has been a subtle shift in the nature of the claims put forward. The Industry Commission (1996) presented the period 1989–94 as one of recovery from a previous trend of weak and deteriorating productivity growth. By contrast, in more recent assessments of microeconomic reform, the period of decline has been extended into the early 1990s, and it has been argued that strong productivity growth did not commence until 1993-94. Since the benefits of higher productivity growth flow through to higher living standards with a considerable lag, there is an element of 'always jam tomorrow, never jam today' in these shifting timeframes.

Multifactor Productivity

The need to focus on multifactor productivity may be understood in the light of critical responses to official estimates of the likely benefits of microeconomic reform As Forsyth (1992) pointed out in his discussion of the Industries Assistance Commission (1989), this study, like most predictions of the benefits from microeconomic reform, incorporated the assumption that capital stock would grow substantially, either through increased foreign investment or through increased domestic saving. Since this additional capital input would have to earn

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1 Note that neither critics nor supporters of microeconomic reform gave any credence to the revisionist view, popular in the late 1990s, that microeconomic reform did not really get under way until after 1990. This view has some validity in relation to labour markets, but is otherwise inconsistent with the historical record.

the rate of return to capital determined by world markets, estimates of increases in GDP overstate the increase in economic welfare associated with the predicted outcomes.

A related point was made by Quiggin (1997) who argued that many of the reforms analysed by the Industry Commission (1995) were associated with increases in the pace and intensity of work. Thus, the benefits of increased output were achieved at the cost of increased effort by workers. A correct assessment of the welfare benefits of the predicted outcomes would take this cost into account.

The point common to the objections made by Forsyth and Quiggin is that a benefit is not necessarily associated with increasing output if this increase is accompanied by a proportional increase in inputs. Increasing the use of inputs is beneficial only if it is achieved through bringing unemployed workers into the labour force or through the use of unemployed, and immobile, capital and resources. A crucial element of the microeconomic reform debate, however, has been the view that short-term concerns about employment should be subordinated to longer-term measures designed to increase productivity.

For most purposes, then, the most appropriate measures of the economic benefits of microeconomic reform are measures of productivity, that is, the ratio of output (as measured, say, by GDP) to some appropriately-chosen index of inputs of labour and capital. Such measures are typically referred to as measures of 'multifactor productivity' or 'total factor productivity' to distinguish them from partial measures of the productivity of individual inputs such as labour and land.

An important problem in analysing productivity is the need to distinguish underlying productivity trends from cyclical fluctuations. Productivity tends to decline or grow slowly during recessions because firms hoard labour and keep capital partially or completely idle. In the early stages of a recovery, rapid growth can be achieved simply by making full use of existing capacity. During an expansion phase, technical innovations and new enterprises that could not be financed in a recession may be implemented, yielding further productivity gains. Hence, productivity is generally pro-cyclical. The simplest, and generally most appropriate, response to this problem is to measure productivity over the course of an entire business cycle, usually from peak to peak or from trough to trough.

Multifactor Productivity Estimates

Although various measures of economic performance have been used to support claims of improved economic performance in the 1990s, the most important are Australian Bureau of Statistics (ABS) estimates of multifactor productivity growth (ABS, 1998; 1999; 2000). Experimental ABS statistics on multifactor productivity growth, published in 1999, suggested that the period since 1993-94 was one of historically unprecedented productivity growth. Most notably, capital productivity that until the 1990s had consistently declined in line with neoclassical models of the implications of capital deepening, was estimated to have increased significantly since 1993-94.

Although revised estimates of multifactor productivity growth were published in 1999, the revision did not receive the wide publicity given to the original estimates. Some commentators, including Kasper (2000), have continued to rely on the original estimates. Others, including Snape (2000), have presented the revised data, but have adhered to judgements formed on the basis of the original data. Hence, to understand the development of the debate, it is necessary to look at both sets of estimates.

Table 1: Original ABS Estimates of Multifactor Productivity Growth

	Rate of growth of					
Year ending June	*Market output*	*Labour input*	*Labour productivity*	*Capital input*	*Capital productivity*	*Multifactor productivity*
1965–69	5.1	2.5	2.5	7.0	-1.9	1.3
1969–74	4.5	1.6	2.9	6.0	-1.5	1.6
1974–82	2.1	-0.3	2.4	3.9	-1.8	1.3
1982–85	2.0	-0.4	2.2	3.8	-1.8	1.2
1985–89	4.3	3.2	0.9	4.0	0.3	0.8
1989–94	1.8	-0.2	2.0	2.6	-0.8	1.1
1994–98	**4.6**	**1.7**	**3.1**	**3.8**	**0.8**	**2.4**
1965–74	4.8	2.0	2.7	6.5	-1.7	1.5
1981–89	3.3	1.7	1.5	3.9	-0.6	1.0
1989–98	3.0	0.6	2.5	3.1	-0.1	1.7
1965–98	3.4	1.0	2.4	4.4	-1.0	1.4

Source: ABS (1998) and author's calculations.

The initial ABS estimates are presented in Table 1. Column 1 gives time periods, consisting of one or more productivity cycles, as defined by the ABS (see below). The data are derived from the national accounts and therefore refer to financial years. For example, the first row, listed as 1965-69, refers to the four-year period from 1964-65 (the year ending June 1965) to 1968-1969 (the year ending June 1969). All growth rates are computed from ratios of annual values in the same fashion as annual growth rates computed on a 'year-to-year' basis. For example, if Y denotes market output, the growth rate for Y in Column 1 is given by:

$$G = (Y_{69}/Y_{65})^{1/4} - 1 \approx (\ln Y_{69} - \ln Y_{65})/4 \approx (Y_{69}/Y_{65} - 1)/4$$

where Y_{65} denotes the year 1964-65, Y_{69} denotes the year 1968-69, ln is the natural logarithm and ≈ denotes approximate equality.

Column 2 shows the annual growth rate of market sector output. Column 3 shows the annual growth rate of labour input, measured in hours. Column 4 is equal to the difference between Columns 2 and 3, and is the standard measure of labour productivity. Column 5 is the rate of growth of capital services, and Column 6 the associated measure of capital productivity. Column 7, the multifactor productivity growth measure, is the difference between the rate of growth of output and the rate of growth of an input index in which capital and labour inputs are weighted according to an estimate of their share in total input costs. More detail on the derivation of multifactor productivity measures is given in ABS (2000).

Rows 1 to 6 show the results for the six productivity cycles identified by the ABS between 1964-65 and 1993-94. Row 7 (in bold) shows the 'productivity miracle' supposed to have taken place between 1993-94 and 1997-98. Rows 8 to 10 have been derived by combining ABS productivity cycles to correspond more closely to business cycles (see below). Row 11 shows the results for the entire data period.

Although the rate of growth of market sector output from 1993-4 to 1997-8 was no greater than in the period from 1964-65 to 1972-73, the estimated rate of multifactor productivity growth was substantially higher. On the basis of this evidence, Parham (1999:vii) concluded that 'Australia's productivity performance is now at an all-time high. Productivity growth is faster now than in the so-called "Golden Age" of growth around the 1960s.'

Quiggin (1999a, 2000) presented a number of objections to the ABS estimates. One of these objections was that the apparent improvement in capital productivity was inconsistent with the weak investment reflected in the slow rate of growth of capital inputs. A genuine increase in the productivity of capital should increase the number of projects with a positive present value and, therefore, raise the level of investment. An increase in measured productivity combined with weak investment is more consistent with a cyclical recovery in capacity utilisation.

Revised ABS data released in 1999 raised the estimated rate of growth of capital inputs for the 1980s and 1990s and largely resolved this issue (see Table 2). The estimated rate of capital productivity growth was revised down to –0.3 per cent (Table 2, Row 7), better than the historical average, but not startling for an expansion. According to the revised data, productivity growth since 1993-94 has been only modestly better than that of the 'golden age' ending in 1973-74 (an annual rate of 1.7 per cent since 2000 compared to an average of 1.3 per cent in the 'golden age'), rather than clearly superior as was the case with the original estimates.

Another noteworthy feature of the revised data in Table 2 relates to the period from 1988-1989 to 1993-1994 that, at the time, was regarded as providing evidence that microeconomic reform was beginning to yield productivity benefits. According to the revised estimates, multifactor productivity growth in this period was near the all-time low reached in the immediate aftermath of financial deregulation and lower than in any period before the onset of microeconomic

reform. However, as discussed below, this result is sensitive to cyclical timing. For the period 1989-1990 to 1993-1994, the growth rate of MFP was 0.9 per cent, while for the period from 1983-1984 to 1989-1990, the rate was only 0.2 per cent. Thus, a different choice of cyclical timing would give more support to the hypothesis of an improvement in performance.

Table 2: Revised ABS Estimates of Multifactor Productivity Growth

	Rate of growth of					
Year ending June	*Market output*	*Labour input*	*Labour productivity*	*Capital input*	*Capital productivity*	*Multifactor productivity*
1965–69	5.1	2.5	2.5	6.3	-1.1	1.1
1969–74	4.6	1.6	2.9	5.5	-0.9	1.5
1974–82	2.1	-0.3	2.4	4.0	-1.8	1.0
1982–85	1.8	-0.4	2.2	3.7	-1.8	0.8
1985–89	4.2	3.2	0.9	4.6	-0.4	0.4
1989–94	1.8	-0.2	2.0	3.4	-1.5	0.6
1994–00	**4.8**	**1.7**	**3.1**	**5.1**	**-0.3**	**1.7**
1965–74	4.8	2.0	2.7	5.9	-0.9	1.3
1982–89	3.2	1.7	1.5	4.2	-1.0	0.7
1989–00	3.1	0.6	2.5	4.2	-1.0	1.2
1965–00	3.4	1.0	2.4	4.3	-1.1	1.1

Source: ABS (2000) and author's calculations

The second objection to claims of a productivity 'miracle' put forward by Quiggin (1999a) relates to cyclical timing. As noted above, the standard procedure in assessing economic performance over time is to compare cycles on a peak-to-peak or trough-to-trough basis. Since the 1990s expansion did not peak until late 2000, only recent analysis using peak-to-peak comparisons avoids the possibility of bias in favour of the null hypothesis that performance in the 1990s has been no better than in the past. However, any such bias would be small, and, in any case, conservatism is appropriate in testing hypotheses of fundamental economic change.

The literature on recent productivity growth in Australia includes a range of cyclical comparisons, most of which are biased in favour of the hypothesis of a productivity miracle. Parham (1999) focuses on a 'productivity cycle' from June 1994 to June 1998, identified by the ABS on the basis of internal characteristics of the time series of multifactor productivity estimates. As shown in Tables 1a and 1b, the ABS identified four productivity cycles in the period since June 1982,

corresponding fairly closely to the two business cycles (from mid-1982 to late 1989 and from late 1989 to the present) evident in data on GDP, unemployment and other macroeconomic data.

To apply a peak-to-peak approach, it is necessary to estimate the timing of cyclical peaks. One approach is based directly on the ABS productivity data. The market sector data presented in Tables 1a and 1b show that the productivity cycles since 1981-2 fall into pairs. The 1982–5 and 1989–94 cycles, both of which include severe recessions, display low growth in inputs and outputs, particularly labour. The 1985–89 and 1994–00 cycles, both of which occurred during economic expansions, show strong growth in outputs and labour inputs. The two productivity cycles of the 1980s and the 1990s each correspond fairly closely to a single business cycle.

Data limitations and the weakness of the business cycle during the 'golden age' create some problems for the assessment of the period before 1973-74. Contemporary assessments suggest that, following the mild recession of 1960-61, the 1960s were a period of uninterrupted expansion. For this reason, rows 8, 9 and 10 in Tables 1a and 1b show the effect of combining pairs of productivity cycles into three business cycles, namely 1964-65 to 1973-74, 1981-2 to 1988-9 and 1989-90 to 1999-2000.

As shown in Table 1b, the combination of data corrections and the use of appropriate cyclical comparisons eliminate the apparently above-average performance of the 1990s. On measures of output, partial productivity and multifactor productivity, performance since 1988-89 has been: very close to the average for the period since 1964-65; better than the 1980s; but slightly worse than the 'golden age' up to 1973-74.

Conclusions about economic performance in the 1990s are, however, quite sensitive to cyclical timing. The correspondence between productivity cycles and business cycles is close, but not exact. The Melbourne Institute (2001) estimates that the relevant cyclical peak occurred in either November 1989 (growth cycle measure) or December 1999 (classical cycle measure). This is significant because 1989-90 was a year of moderate output growth but very poor capital productivity growth. If 1989-90 is shifted from the 1990s cycle to the 1980s cycle, estimated MFP growth for the 1980s is reduced to 0.4 per cent, and estimated MFP growth for the 1990s is increased to 1.4 per cent, strengthening the case for an economic 'miracle'.

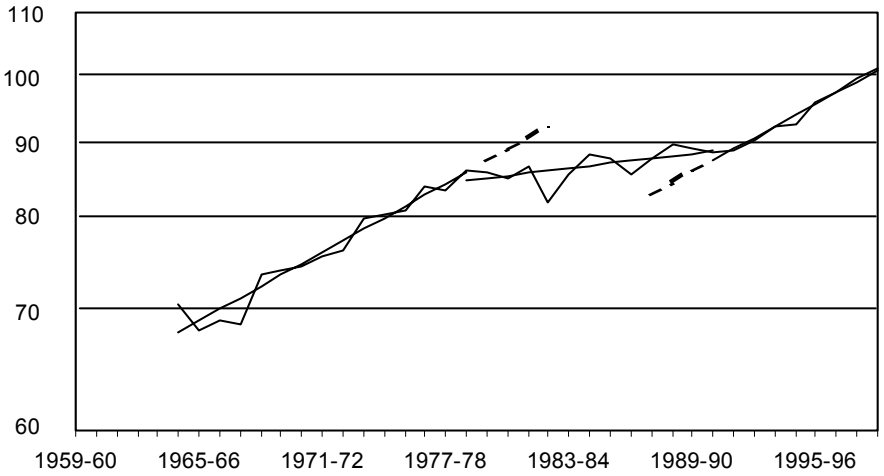
For the period 1964-65 to 1973-74, the classical cycle measure presented by the Melbourne Institute confirms this view. However, the Institute's growth cycle series includes three cycles over this period from 8/1960 to 4/1965, 4/1965 to 1/1971 and 1/1971 to 2/1974. Although the growth cycles do not match the ABS productivity cycles exactly, combining the two growth cycles from 4/1965 to 2/1974 and the two productivity cycles from 1964-65 to 1972-73 gives a reasonably good match.

The estimates presented in Table 1b are consistent with the results of Dowrick (2000) that are also based on the revised data set. Other procedures, not based on complete business cycles, yield different results.

Gruen and Stevens (2000) address the problem of cyclical timing by comparing expansions. In principle, this procedure is unbiased, but is inefficient because the information associated with contractions is discarded. In practice, the comparison is biased in favour of the expansion that followed the deepest contraction, namely that of the 1990s.

Parham (2000) relies primarily on the ABS productivity cycles in his formal analysis. However, his graphical presentation of the data is biased in favour of the hypothesis that performance has improved in the 1990s. A peak-to-peak trend for the 1970s is compared with a peak-to-trough trend for the 1980s and a trough-to-peak trend for the 1990s, as shown in Figure 3 from Parham (2000), reproduced below as Figure 1. The effect is to bias the trend growth line downwards for the 1980s and upwards for the 1990s.

Figure 1: **Multifactor Productivity (Market Sector) 1964-65 to 1998-99**
(Index 1997-98 = 100, log scale)

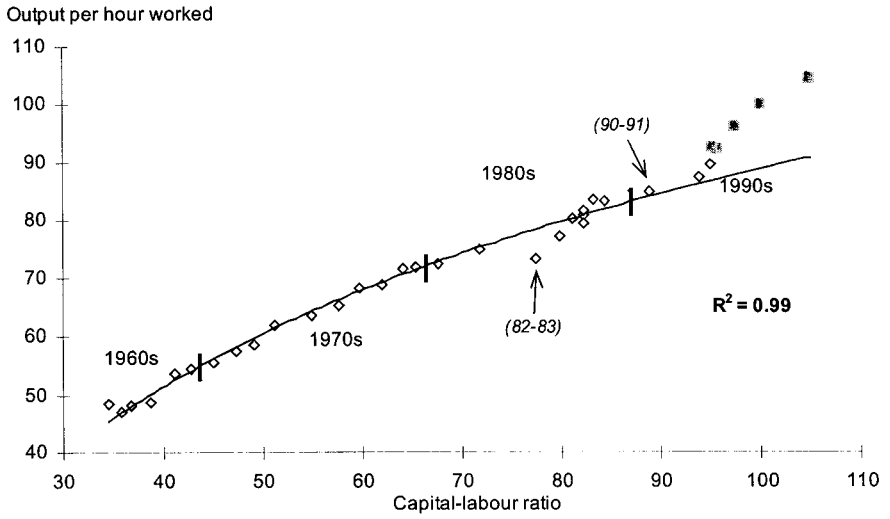


Source: Parham (2000:Figure 3)

The effect of the revision may also be seen by comparing estimates of the relationship between the capital–labour ratio and the output–labour ratio. Figure 2a, from Parham (1999) shows a clear structural break in the relationship after 1990-1. Figure 2b, from Parham (2000) is also drawn to show a structural break, but casual inspection suggests the alternative hypothesis of a linear trend over the period 1974–2000, with no structural break apart from the secular decline at the end of the 'golden age'. Statistical evidence on this point is indecisive.

Figure 2a **Australia's growth path[a], 1964-65 to 1997-98**

Indexes 1996-97 = 100 OLD

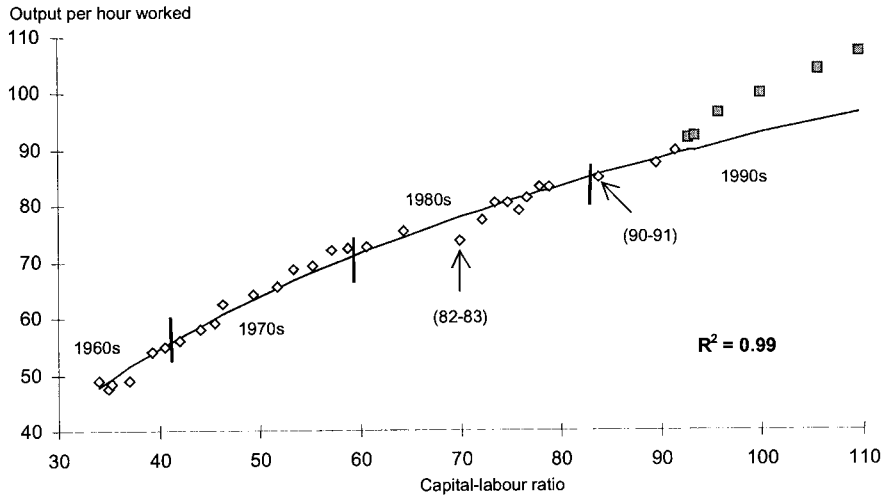


[a] The fitted curve uses data for years up to 1992-93. The curve is of the form $(^{Y}/_{L}) = 40.66 \ln (^{K}/_{L}) - 98.39$. Additional observations from 1993-94 are represented as shaded squares.

Source: Parham (1999:Figure 4.2)

Figure 2b **Australia's growth path[a], 1964-65 to 1998-99**

Indexes 1996-97 = 100 NEW



[a] The fitted curve uses data for years up to 1992-93. The curve is of the form $(^{Y}/_{L}) = 41.82 \ln (^{K}/_{L}) - 99.64$. Additional observations from 1993-94 are represented as shaded squares.

Source: Parham (2000:Figure 1)

The final objection raised by Quiggin (1999a), and expanded by Quiggin (2000), relates to the measurement of labour input. Two issues arise here. The first relates to the construction of estimates of market sector output and employment by the ABS. The ABS confines attention to those sectors for which a reliable measure of market output is available. In particular, this excludes the property and business services (PBS) sector. However, since most of the output of the PBS sector consists of inputs to the market sector, any error in measurement of PBS output generates an equal and opposite error in measurements of value added in the market sector. By assumption, outputs are set equal to inputs in the PBS sector and productivity growth is set to zero. If these assumptions understate the level and growth of PBS productivity, there is a corresponding overstatement of productivity in the market sector. Hence, the most reliable estimate of aggregate market sector output and productivity is obtained by adding the PBS sector to the market sector. However, it should be noted that, to the extent that PBS output is consumed directly by households, this procedure may overcorrect the biases present in the standard measures.

This adjustment is important because employment in the PBS sector grew by 52 per cent during the expansion from 1993-4 to 1997-8. The fact that this growth was primarily due to the outsourcing of a range of business services underlines the unreliability of estimates of productivity for the market sector that exclude PBS. Including PBS employment and output in the market sector reduces estimated annual labour productivity growth for the period 1993-94 to 1999-2000 from 3.1 per cent to 2.4 per cent, but has little effect in other periods.

Gruen and Stevens (2000) suggest an alternative procedure using estimates for the entire nonfarm sector. This yields labour productivity growth rates of 2.0 per cent (1970s expansion), 0.8 per cent (1980s) and 2.2 per cent (1990s) compared to 2.1 per cent, 1.4 per cent and 2.9 per cent respectively for the market sector over the same periods. Whereas in the market sector data, labour productivity in the 1990s is clearly superior to that of the 1970s, for the non-farm sector as a whole there is almost no difference. The main difference with the analysis presented above is that Gruen and Stevens find that the exclusion of PBS overstates productivity growth in the 1980s as well as in the 1990s. The data set used by Gruen and Stevens (2000) may also be used to derive MFP estimates for the period since 1971, using data for the entire period, rather than expansions alone.[2] The resulting MFP growth rates are 1.0 per cent (1971–81), 0.6 per cent (1981–89) and 1.2 per cent (1989–2000).

The second issue involves work intensity and the measurement of labour input. Quiggin (2000) argues that the intensity of work has increased throughout the period of microeconomic reform. Work intensity can be increased on a number of margins. First, the number of officially-measured hours at work can be increased. During the 1990s, the ABS measure of working hours per full-time worker increased from 39 hours per week to 41 hours per week, an increase of around 5 per cent. This increase was offset by an increase in the proportion of

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[2] I thank David Gruen for providing the data set.

part-time workers. Changes in average working hours affect the measured labour input and are therefore taken into account in productivity calculations.

The second margin on which work can be intensified is that of the difference between measured and actual hours of work. An unmeasured increase in hours can arise from reductions in tea and lunch breaks, replacement of continuous shifts with split shifts, pressure to forgo leave entitlements, and so on. Such unmeasured increases in inputs are not taken into account in productivity calculations.

Changes that are likely to generate unmeasured increases in working hours have been demanded by employers in enterprise bargaining negotiations for the unionised workforce, and there is little doubt that similar changes have been imposed in workplaces not covered by enterprise bargaining (Australian Centre for Industrial Relations Research and Training, 1999). Changes of this kind, referred to as increasing 'flexibility', have been presented as an important element of microeconomic reform on many occasions. Thus, it is reasonable to assume that they account for at least part of any measured productivity gains associated with reform.

Roach (1998) argues that unmeasured increases in working hours have been a major source of bias in estimates of productivity growth in the United States. Australian estimates of working hours are based on individual surveys, unlike those in the United States, which are derived from surveys of establishments and thus likely to be more reliable. Nevertheless, many of the biases identified by Roach are relevant to Australia.

The third margin, and the most difficult to measure, is that of 'pace of work'. Most employees report increases in work intensity and stress. The Australian Workplace Industrial Relations Survey undertaken in 1995 (Morehead et al., 1997) found that a majority of employees reported increases in stress, work effort and pace of work over the previous year, while less than 10 per cent reported reductions in any of these variables. This is consistent with evidence from the United Kingdom and some, though not all, other European countries (Green and McIntosh, 2001). Moreover, Green and Macintosh observe that the increases in work intensity are associated with higher productivity (as would be expected) and are positively correlated with exposure to competition and with reductions in union density. Thus, it seems reasonable to conclude that at least some of any increase in productivity associated with microeconomic reform results from increased work intensity. Increased work intensity may also be associated with unmeasured changes in output quality, particularly in the non-market sector where output is imputed rather than being measured directly. If measured labour input and measured outputs are unchanged, an increase in work intensity should be associated with higher output quality. However, where increases in work intensity are imposed through reductions in employment with no change in measured output, output quality will decline.

The evidence of increasing work intensity resolves a number of puzzles that arise from the standard interpretation of the 1990s as a decade in which both labour productivity and total factor productivity increased rapidly. The first puzzle is why employment growth has been weaker in the 1990s than in the

1980s. The second is why, despite high unemployment, real wages have increased more in the 1990s than in the 1980s. The third is why the aggregate rate of GDP growth has been no higher in the 1990s than in the 1980s.[3]

The hypothesis of increased work intensity implies that effective labour input has grown more rapidly than measured hours of work, while productivity and wages per unit of effort have grown more slowly than measured productivity and hourly wages. As with the revisions to the capital stock series noted above, adjustment of the estimated labour input to take account of increases in work effort would eliminate all the apparent paradoxes.

Another issue in the measurement of labour input is that of composition effects. The proportion of the labour force employed full-time has declined over the 1990s, with the decline being particularly evident among younger workers and less-qualified older workers. Consequently, the full-time workforce now contains a higher proportion of prime-age and qualified workers. Given the process of downsizing and selective attrition that has contributed to the contraction of full-time employment, it is likely that remaining full-time workers also have unmeasured characteristics more favourable to productivity than those that have left the workforce. As with increased work intensity, productivity growth from this source it is not sustainable.

Finally, in assessing the growth performance of the 1990s, it is necessary to take account of sources of productivity growth other than microeconomic reform. These include, technological change, such as increased use of information technology and increased skills and experience in the workforce (human capital). The magnitude of technological change associated with information technology, and the extent to which a flexible economy has contributed to technological innovation, have been the subject of vigorous debate in the United States. However, technological change related to information technology is largely exogenous to Australia. Hence, the only potential impact of microeconomic reform can be to accelerate the rate of adoption of technical innovations.

As regards human capital, Australia's performance in the 1990s is a subject of deep concern. During the 1980s, measures of educational attainment, such as the rate of school completion, improved dramatically and contributed to higher levels of skills in the workforce of the 1990s. Largely as a result of programs of microeconomic reform, rates of school completion declined in the 1990s (Quiggin, 1999b). Other things being equal, this can be expected to reduce economic growth in the future.

In the short term, changes in the composition of the workforce can affect average productivity. It is commonly argued that the depressed real wage growth associated with the Accord on Prices and Incomes during the 1980s led to increased employment growth and reduced labour productivity growth as less-skilled workers were drawn into employment. Conversely, the relatively weak

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[3] The average rate of GDP growth has been about 3.5 per cent in both decades. Growth in GDP per person was higher in the 1990s, but the rate of population growth should not have been an important constraint on growth in view of the sustained high unemployment that characterised the entire decade.

growth in employment (particularly full-time employment) during the 1990s might be associated with an increase in average skill levels and therefore in productivity.

Concluding comments

Claims that the Australian economy has experienced a productivity 'miracle' or entered a 'new era' have been made with increasing frequency and confidence since the late 1990s. Krugman (1998), in his discussion of the Asian financial crisis, described Australia as the 'miracle economy of the financial crisis'. Although this accolade referred to macroeconomic management, many Australian commentators attributed the successful management of the Asian crisis to the benefits of microeconomic reform, just as the successful management of the 'banana republic' crisis in 1986 had been attributed to the flexibility arising from financial deregulation.

This optimistic view has been reflected in the titles of more formal assessments of Australia's economic performance. Bean (2000) assessed the 'miraculous' performance of the Australian economy (quotation marks in original). Parham (1999) uses the term 'new economy' (no quotation marks in original) and claims that that 'Productivity growth is faster now than in the so-called "Golden Age" of growth around the 1960s'.

Similar claims have been made on behalf of many developed countries in the past twenty years. A partial list includes Ireland, Finland, Japan, the Netherlands, New Zealand, Sweden, the United Kingdom and the United States. Such claims typically appear over-optimistic in retrospect. The performance of the OECD economies as a group remains significantly weaker than it was during the 'golden age' of the 1950s and 1960s, despite strong performances by particular economies in particular cycles. In these circumstances it is appropriate to subject evidence of allegedly 'miraculous' performance to critical scrutiny.

Claims of a fundamental improvement in Australia's economic performance do not stand up to such scrutiny. To summarise, when cyclical comparisons are made on a peak-to-peak basis, using revised ABS data, the productivity performance of the 1990s no longer appears miraculous, though it does exhibit some recovery from the very weak performance of the 1980s to levels comparable with those of the 1970s. The recovery in the 1990s appears stronger, and the performance of the 1980s weaker, if the Melbourne Institute cycle dates are used in place of those derived from the ABS productivity data. On the other hand, much of the apparent recovery arises from measurement errors associated with an inappropriate definition of the market sector and the failure to take account of increases in the effective labour input arising from unmeasured increases in working hours and work intensity.

The claim that economic performance in the 1990s was comparable with that of the 'golden age' of the 1960s is inconsistent with the empirical evidence. There is some evidence of a recovery in productivity growth from the very low levels of the 1980s. However, in view of the difficulty of estimating changes in the

effective labour input, and the sensitivity of the outcomes to issues of cyclical timing, no firm conclusion can be drawn on this point.

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I thank the Editors, Nancy Wallace and two anonymous referees for helpful comments and criticism. This research was supported by an Australian Research Council Senior Fellowship