Microeconomic reforms and the revival in Australia's growth in productivity and living standards

Dean Parham*
Assistant Commissioner
Productivity Commission, Canberra

Paper presented to the Conference of Economists, Adelaide, 1 October 2002
Session on *Microeconomic Reform Revisited*

Abstract

Microeconomic reforms were introduced from the mid-1980s to stem the slippage in growth in Australia's productivity and living standards. Productivity growth more than doubled in the 1990s to reach a record high. A range of possible explanations for the productivity surge are examined in the paper. The three most plausible are microeconomic reforms; education and skills in the workforce; and the rapid uptake and smart use of information and communications technologies. To a certain extent, these three factors have interacted. The surge in productivity growth has underpinned growth in average incomes that is strong by both historical and international standards.

* Paul Roberts assisted with the preparation of this paper. Helpful comments on a previous draft were received from Productivity Commission colleagues and from Charlie Aspden of the ABS. The views expressed are those of the author and do not necessarily reflect the views of the Productivity Commission. Author's email: dparham@pc.gov.au.

Microeconomic reforms and the revival in Australia's growth in productivity and living standards

1. Introduction

Raising Australia's growth in productivity has been a principal aim of policy reform. And Australia has experienced a productivity resurgence since the early 1990s. But that change in productivity trend does not, by itself, establish that reforms have been successful. The productivity trends, the estimation procedures and a range of possible explanations have been subjected to a lot of scrutiny, from different points of view — some of it quite sceptical. The scrutiny, of course, is a healthy part of developing understanding of economic trends, the influence of policy and the implications for Australians. The examination and scrutiny has now got to the stage that there is fairly widespread acceptance that Australia has experienced a productivity resurgence and that microeconomic reforms have played a major role (IC 1997, Edwards 1999, Parham 1999, PC 1999, Bean 2000, Dowrick 2000, Forsyth 2000, Treasury 1999, OECD 2001). But that acceptance is not universal and reservations on a few issues remain.

This paper attempts to draw together what we now know about microeconomic reforms and Australia's productivity performance. Clarity on this issue helps to inform future policy making. There are costs as well as benefits to reforms, but examination of productivity and income benefits is more than enough for this paper. The paper takes a broad perspective on microeconomic reforms and their effects. Reforms are examined as a broad stream, rather than individually and specifically.

The next section examines the rationale for introducing reforms — to meet the growing concern, heightened in the 1980s, that growth in Australia's productivity and living standards was in decline and that there would be no recovery without a change in policy direction. Section 3 examines Australia's productivity performance and finds robust evidence of a strong productivity surge — insensitive to changes to official methods and data revisions and common to a variety of methodological approaches. Section 4 examines the range of explanations for the productivity surge. A number of suggested explanations turn out to be largely unimportant. Microeconomic reforms do appear to provide the major explanation. But uptake of information and communication technologies, as well as education and skills, also appear to have played an important but relatively modest role. Section 5 examines trends in living standards. It shows that the productivity acceleration has translated into faster growth in average income. Concluding remarks are made in section 6.

2. The motivation for policy reform

Australia's rate of productivity growth was comparatively weak over most of the 20th century. At the beginning of the century, Australia had the highest level of labour productivity in the world (Maddison 2001), reflecting the combination of a relative abundance of natural resources and a relatively small population. Governments subsequently traded this high productivity position for 'national development' as, with widespread popular support, they encouraged population growth, diversification of the economic base and redistribution of income through a set of policies that had the (perhaps unintended) consequence of holding back growth in productivity and living standards. The policy set included an active immigration program (although this probably did not adversely affect productivity[1]), protective trade barriers, a centralised industrial relations and wage bargaining system and development of economic infrastructure through government funding and ownership.

Australia still enjoyed a relatively high productivity ranking in 1950. Australia's GDP per hour had slipped to 81 per cent of the level of the productivity leader — the USA — but it still ranked 4 among a group of 22 developed or high-income countries (table 1).

Table 1 **International ranking of USA and Australia on average income, labour productivity and labour utilisation[a]**

	1950		*1960*		*1973*		*1990*		*2001*	
	Rank	*% USA*	*Rank*	*% USA*	*Rank*	*% USA*	*Rank*	*% USA*	*Rank*	*% USA*
GDP per capita (1996 $US[b])										
USA	2	(100)	2	(100)	2	(100)	1	(100)	1	(100)
Australia	5	(78)	7	(78)	9	(74)	15	(74)	7	(78)
GDP per hour worked (1996 $US[b])										
USA	1	(100)	1	(100)	2	(100)	5	(100)	5	(100)
Australia	4	(81)	5	(75)	10	(74)	15	(77)	14	(83)
Labour utilisation (Annual hours worked per capita)[c]										
USA	14	(100)	19	(100)	11	(100)	4	(100)	2	(100)
Australia	16	(96)	17	(104)	7	(104)	6	(96)	5	(94)

a Rankings are among 22 of the 24 OECD pre-1994 membership countries. **b** At purchasing power parity. **c** Labour utilisation explains the gap between average income and labour productivity. GDP per capita is equal to GDP per hour worked multiplied by hours worked per capita.

Data source: University of Groningen and The Conference Board, GGDC Total Economy Database, 2002; http://www.eco.rug.nl/ggdc, accessed 7 March 2002.

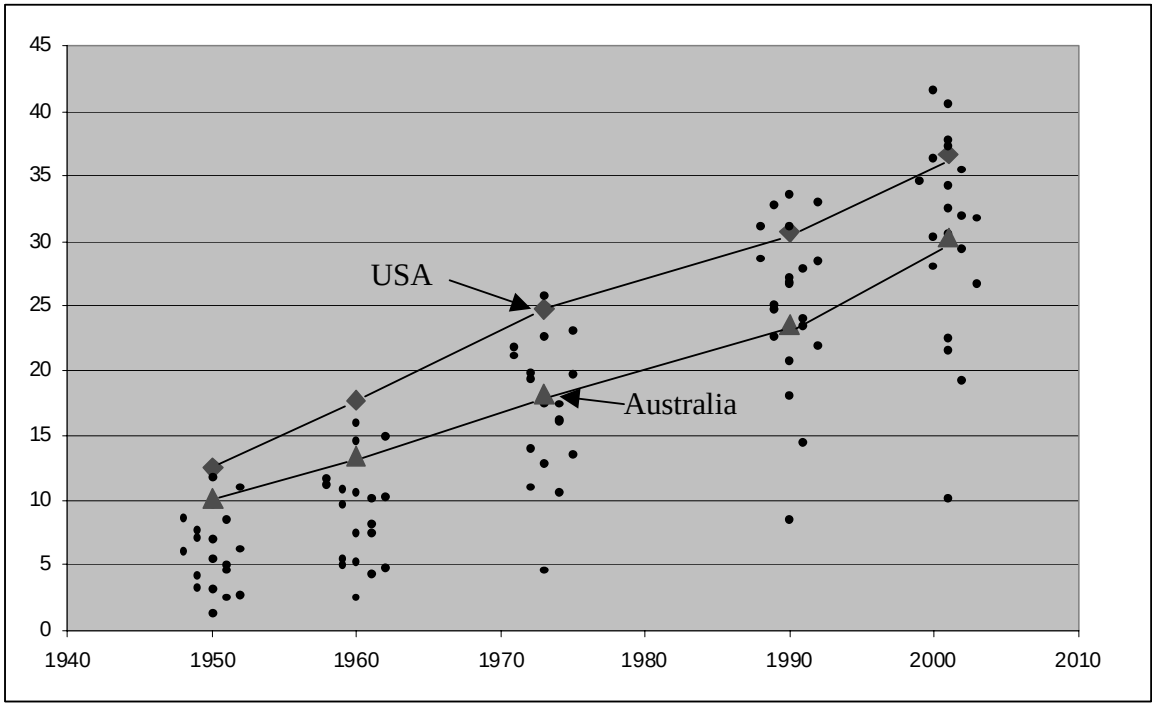
The post-war era was a period in which high-income countries tended to catch up on the leader, bringing closer convergence in productivity levels across countries (figure 1).

1 There is some debate about whether immigration was a net positive influence on average income growth. Without entering into that debate, it can be noted that the relationship is not clearly negative. Indeed, immigrants of working age and skills in demand tend to raise average productivity.

Southern European countries, Japan and Korea[2] were the particularly strong movers. They showed faster productivity growth not only during the post-war 'golden age' but also during the post-1973 slowdown. Some countries even overtook the USA, which slipped in ranking to 5 by 1990 (table 2).

Figure 1 **Labour productivity in OECD countries, 1950, 1960, 1973, 1990 and 2001**

GDP per hour (US$ at purchasing power parity)



Source: Data sourced from University of Groningen and The Conference Board, GGDC Total Economy Database, 2002; http://www.eco.rug.nl/ggdc, accessed 7 March 2002.

Australia did not participate in this 'convergence club'. Its productivity growth was relatively weak, especially during the golden-age productivity boom (table 2). Many countries overtook Australia and, by 1990, its ranking had dropped to 15.

Australia's relatively poor productivity growth also meant relatively poor growth in average income. Growth in average income is also influenced by labour utilisation — average hours worked in the population at large — but Australia's growth in labour utilisation has been above the OECD average (table 2). Australia's per capita GDP grew at about two-thirds of the OECD rate during the boom 1950-73 period and was still below the OECD rate during the post-1973 slowdown (table 2). Australia's average income ranking slipped from 5 in 1950 to 15 in 1990 (table 1).

[2] Korea is not included in the 22 countries in tables 1 and 2 and figure 1.

Table 2 **Average annual growth in average income, labour productivity and labour utilisation**

(per cent)

	1950-73	*1973-90*	*1990-2001*
GDP per capita			
USA	2.4	1.9	2.0
Australia	2.3	1.7	2.5
Europe[a]	3.8	1.7	1.1
OECD	3.6	2.0	1.5
GDP per hour worked			
USA	3.0	1.3	1.6
Australia	2.5	1.5	2.3
Europe[a]	4.6	2.4	1.7
OECD	4.0	2.0	1.8
Labour utilisation (Annual hours worked per capita)[b]			
USA	-0.6	0.7	0.4
Australia	-0.2	0.2	0.2
Europe[a]	-0.8	-0.6	-0.6
OECD	-0.5	0.0	-0.3

a Includes the former East Germany from 1990. **b** Growth in labour utilisation explains the difference between growth in GDP per capita and growth in GDP per hour worked.

Data source: As for table 1.

Why did Australia perform poorly?

A string of economic and policy reviews in the 1960s, 1970s and 1980s[3] attributed Australia's relatively poor productivity performance to a number of structural weaknesses in the economy:

- lack of specialisation and scale;
- manufacturing focused on the domestic market with dependence on agricultural and mining commodities for export earnings;
- poor investment decisions and excess manning in large areas of infrastructure (including electricity, gas, water, communications, transport);
- poor work practices, labour relations, management;
- outdated or inappropriate technologies, combined with low innovation and skill development; and
- a production culture that resisted change rather than rose to meet it.

3 Relevant reviews included the Vernon Committee (1965), Crawford Committee (1979), Jackson Committee (1975) and a number of Tariff Board and Industries Assistance Commission reports.

These, however, were the symptoms of highly regulated product, capital and labour markets and the inefficient provision of economic infrastructure, where the performance of government-owned enterprises was determined in large part by political overlays on their operations.

The growing imperative for reform

Even though there was growing realisation that Australia's growth in living standards was below potential, politically, the rate of progress up to the second half of the 1970s was considered to be sufficient. There was also a fairly widespread belief at the end of the 1970s that there was another commodities boom just around the corner to reinvigorate income growth.

However, a more widespread unease developed in the 1980s as pessimism about the outlook for the terms of trade took hold, competition from Asian manufactures strengthened and Australia slipped further in the international league table of per capita incomes. Australia was being overtaken not only by OECD countries, but by non-OECD countries as well.

This galvanised community support for governments to take policy action to address structural weaknesses in the economy and to raise productivity growth. The approach was not to attempt to raise productivity growth via a 'targeted' or industry-specific strategy. Rather, the approach was largely to release the shackles that had previously restricted productivity growth and to pursue social objectives through more targeted and less-distortionary instruments.

Policy reforms were introduced progressively from the mid-1980s and continued through the 1990s. Reforms have included: deregulation of access to finance; floating the currency; marked reductions in barriers to trade and foreign direct investment; commercialisation (and some privatisation) of government business enterprises; strengthening domestic competition; and changing institutional arrangements to allow greater labour market flexibility.[4] The hallmarks of macro policy have become to rein in budget deficits and to vest the central bank with the clear responsibility to adjust monetary policy settings to target inflation.

The general direction of reforms has been clear, even though the implementation has not always been smooth or seamless. There have been examples of stalling, backtracking and even implementation of measures in the name of reform that have questionable relationship to reform. But such counterexamples do not undermine the general thrust of governments' policies.

4 For a listing of major microeconomic reforms, see Industry Commission (1998).

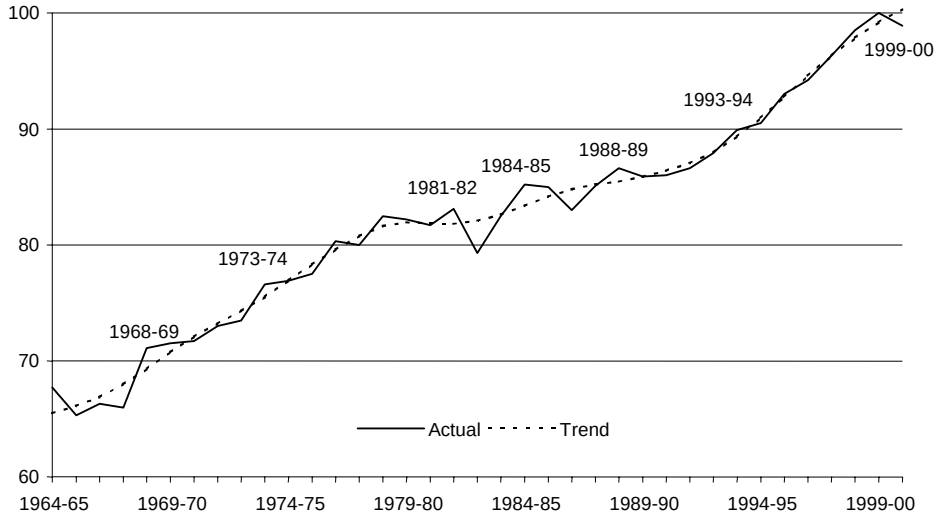
3. The productivity surge in the 1990s

The Australian Bureau of Statistics (ABS) provides the official productivity estimates for the Australian economy. Labour productivity is estimated as the ratio of an index of output (value added) to an index of hours worked. Multifactor productivity (MFP) is measured as the ratio of an index of output to a Tornqvist index of combined inputs of capital and labour. Aggregate productivity is estimated for the market sector of the economy, which covers roughly two-thirds of the economy with output that can be relatively well determined in market transactions, but excludes industries (eg in health, education, defence and public administration) with output measures that largely reflect input usage (eg expenditure on wages) and are therefore meaningless for productivity analysis.

Australia's productivity growth surged in the 1990s. There were 9 years of continuous increase from the trough of the recession in 1990-91 to a productivity peak in 1999-2000 (figure 2). Whilst recovery from the recession could be expected to have played a part in the productivity uplift in the early part of the 1990s, there was clearly more than a cyclical uplift at work to sustain growth over such a long period.

The productivity peaks identified by the ABS are highlighted in figure 2. Some, but not all, troughs and peaks in productivity cycles correspond to troughs and peaks in business cycles. The overlaps reflect the importance of the business cycle as a short-term influence on movements in productivity. But other influences on productivity, such as a shift in technology, can operate independently from the business cycle. The productivity cycle can therefore capture more information relevant to changes in underlying productivity trends than can the business cycle.

Figure 2 **Australia's multifactor productivity, 1964-65 to 2000-01**
Index (1999-2000 = 100)



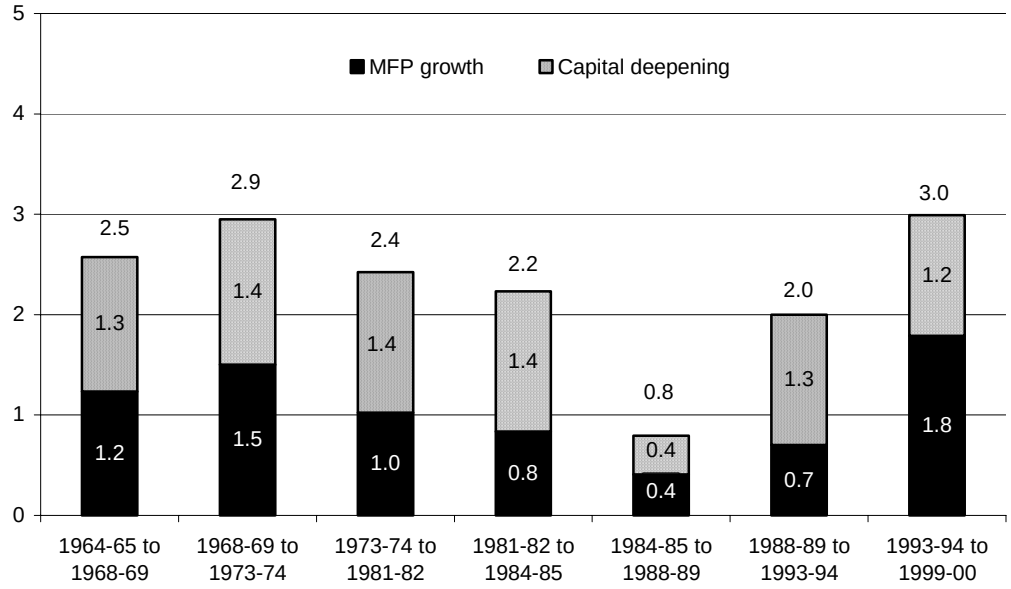
Source: ABS 5204.0 and unpublished estimates.

Figure 3 shows the rates of labour productivity growth over productivity cycles in the market sector of the Australian economy. Measurement over productivity cycles — from productivity peak to productivity peak — greatly reduces the spurious influence of the business cycle on productivity estimates.[5]

The 3.0 per cent annual average labour productivity growth reached in the 1990s cycle is a record high (albeit only just ahead of the rate in the late 1960s and early 1970s). It meant that the underlying rate of productivity growth accelerated a full percentage point in the 1990s, compared with the previous cycle. Productivity growth was also relatively high in the late 1960s and early 1970s but, as discussed earlier, Australia's performance in that period was below potential and below the standards set by other high-income countries.

Figure 3 **Growth in labour productivity over productivity cycles[a], 1964-65 to 1999-2000**

Average annual rates of growth (per cent)



a Productivity cycles are the intervals between productivity peaks, as identified by the Australian Bureau of Statistics.

Data source: Australian Bureau of Statistics (ABS) 5204.0 and unpublished ABS data.

Improved MFP, or efficiency of resource use, was the major factor behind the 1990s productivity surge. MFP growth of 1.8 per cent a year in the 1990s cycle was also a record high and accounted for 60 per cent of the 1990s labour productivity growth. With the rate of

5 Recovery from recession can generate productivity estimates that are distortions from underlying trends. Firms may have hoarded labour and held on to underutilised capital during a recession and, if so, can raise output in the upturn without adding many inputs. High productivity growth estimates in such circumstances are without much meaning. Using the same points (peaks) in productivity cycles controls for the influence of the business cycle.

capital deepening stable, higher MFP growth — a 1.1 percentage point acceleration — accounted for all of the acceleration in labour productivity growth.

The robustness of the evidence

Impressions about whether there has been a productivity surge have been clouded at times by some confusion about the impact of revisions to the official productivity estimates. Quiggin (2001b), for example, considered that 'the Australian productivity miracle seems to have performed a statistical vanishing act', disappearing in ABS revisions. With a little further background on ABS methodology and revisions, it is clear that this view is incorrect.

Change in ABS methodology

The ABS introduced some significant changes to its productivity estimation approach with the 1997-98 issue of the National Accounts, released in April 1999. The Bureau has used the same basic index number methodology since it started generating productivity estimates in the early 1990s.[6] The original implementation was a very standard approach with capital input defined and measured as the net capital stock. One of the most significant changes introduced in the 1997-98 issue was to switch to a capital services measure. Other changes included the introduction of chain-linked volume measures, a much more detailed asset treatment (eg separate identification and treatment of computers) and the inclusion of the Finance & insurance industry in the market sector. These changes were part of international moves to harmonise productivity estimation methodology through adoption of SNA93 conventions.[7]

The essence of the capital services approach is to allow for the decline in economic efficiency of different asset types over time through age-efficiency profiles. The profiles of economic depreciation can be quite different from those of financial depreciation, and so growth in a capital services measure of capital input can differ from growth in a standard (financial) capital stock measure.

The ABS referred to its initial implementation of the capital services estimates as 'experimental'. There were revisions over the first three issues – particularly in the 1998-99 issue, released in November 1999. A major factor in the revisions concerned the treatment of computers and the weighting given to capital in formation of the total input index. These changes raised the estimated growth of capital services and total inputs throughout the estimation period. For given growth in output, higher growth in inputs means lower growth in the productivity residual. The effect of the new methodology and the revisions can be seen in table 3.

---

[6] The Bureau's first issue was in 1989. Annual releases started in 1991. The methodology was set out in Aspden (1990).

[7] Through the ABS's efforts, Australia is the only country to have a fully integrated system with consistency between capital services and productive capital stock measures.

Quiggin (2001b) made much of the fact that productivity growth in the 1990s was revised downward from 2.4 per cent a year (column 1) to 1.7 per cent a year (column 2) between the April and November releases. He declared the 1.7 rate to be 'fairly typical', down from the previous 'stellar' estimates. However, as Banks (2001) pointed out in response, Quiggin failed to mention that ABS estimates had been revised downward for *all* periods. In relative terms, the evidence of a productivity acceleration in the 1990s, compared with earlier productivity cycles, was just as strong (in fact stronger) in the revised estimates (table 3). In a recent article, Quiggin (2002) repeated the partial and misleading view on ABS revisions.

Rather than being 'fairly typical', annual underlying productivity growth of 1.7 per cent (now revised upward to 1.8 per cent) was a record high; and the continuous increase from the trough of the recession established a record duration. In absolute terms 1.7 per cent a year, based on a capital services measure, is very strong productivity growth. Table 3 shows that the equivalent MFP growth, based on a capital stock measure, is 2.7 per cent a year. The high rate of productivity growth was a major part of strong GDP growth averaging just under 4 per cent over the 1990s. Many countries including Japan, Germany, France, the UK, Canada, Italy Spain and, to lesser extent the USA, were not able to achieve Australia's productivity or growth performance.

The figures in table 3 also confirm that the introduction of the capital services measure did not contribute to the identification of a 1990s surge (compare the last three columns). Growth in the capital services measure departs from growth in a capital stock measure especially when the investment mix shifts toward short-lived assets. The rapid uptake of computer and related equipment in the 1990s meant that the capital services measure grew faster than the capital stock measure, leading to lower estimates of productivity growth, all other things equal. The 'old' measure in table 3 is a financial capital stock measure and the 'new' measure is a productive capital stock measure.

Table 3 **Revised and alternative ABS estimates of MFP growth**

	Capital services measure				*Capital stock*	
ABS publication issue	*1997-98*	*1998-99*	*1999-00*	*2000-01*	*1995-96[a] (Old)*	*2000-01 (New)*
ABS productivity cycles						
1964-65 to 1968-69	1.3	1.1	1.1	1.2	1.7	1.9
1968-69 to 1973-74	1.6	1.6	1.5	1.5	2.1	2.3
1973-74 to 1981-82	1.3	0.9	1.0	1.0	1.5	1.4
1981-82 to 1984-85	1.2	0.6	0.8	0.8	1.5	1.2
1984-85 to 1988-89	0.8	0.4	0.4	0.4	0.5	1.1
1988-89 to 1993-94	1.1	0.5	0.6	0.7	0.9	1.3
1993-94 to 1997-98	2.4	(1.7)	(1.7)			
1993-94 to 1998-99		1.7	(1.7)			
1993-94 to 1990-00			1.7	1.8		2.7

Source: ABS 5204.0. [a] ABS 5218.0

Different methodologies

The robustness of the evidence of a productivity surge can also be investigated by reference to other studies and approaches. Table 4 contains estimates of the productivity surge based on econometric modelling (Dowrick 2000), fitted trend lines over expansion periods from trough to peak in business cycles (Gruen and Stevens 2000), as well as the ABS productivity-cycle method and the ABS trend series (estimated with an 11-period Henderson moving average). Quiggin (2001a) considered that productivity growth should be measured over business cycles. For completeness, the table also includes estimates based on growth between peaks in market sector output. However, as reasoned earlier, this is not the best approach.

The different methodologies serve to confirm the evidence of a strong productivity surge in the 1990s. The standard productivity-cycle method provides a mid-range estimate.

Table 4 **Trends in MFP growth and the 1990s acceleration according to different methods**

Per cent per year

	1960s	*1980s*	*1990s*	*Surge*
• ABS methods				
- Productivity cycles[a]	1.4	0.7	1.8	1.1
	(64-65 to 73-74)	*(81-82 to 93-94)*	*(93-94 to 99-00)*	
- Trend[b]	1.6	0.5	1.5	1.0
	(64-65 to 78-79)	*(78-79 to 91-92)*	*(91-92 to 99-00)*	
• Business cycles				
- Peak to peak[c]	1.4	0.4	1.5	1.1
	(64-65 to 73-74)	*(81-82 to 89-90)*	*(89-90 to 99-00)*	
- Expansions[d]	1.6	0.9	1.8	0.8
	(64-65 to 73-74)	*(82-83 to 89-90)*	*(90-91 to 99-00)*	
• Error correction model[e]	2.1	0.4	1.8	1.4
	(64-65 to 73-74)	*(73-74 to 89-90)*	*(89-90 to 98-99)*	

Notes and sources: [a] ABS 5204.0 and Commission estimates based on data from ABS 5204.0. The estimate for the 1980s combines the 1981-82 to 1984-85 and 1984-85 to 1988-89 productivity cycles. [b] Commission estimates based on unpublished ABS data. Trend data estimated by ABS according to an 11-period Henderson moving average. [c] Commission estimates based on data from ABS 5204.0. [d] Gruen and Stevens (2000). Growth rates calculated from fitted trend lines through ABS data from troughs to peaks in business cycles. [e] Dowrick (2000).

An industry perspective

Before moving on to examine the reasons for the productivity surge, it is worth noting that a new set of service industries contributed to Australia's 1990s productivity surge (table 5).[8] The stand-out performer was Wholesale trade. It went from negative measured MFP growth in the previous aggregate productivity cycle (1988–89 to 1993–94) to over 5 per cent annual growth over the 1990s cycle (1993–94 to 1999–2000). MFP also accelerated in other service industries — for example, Construction and Finance & insurance.

The 'traditional' contributors to aggregate productivity growth — Agriculture, Mining, and Manufacturing — did not contribute to the acceleration. Whilst still strong (except for Manufacturing), productivity growth in each of these sectors decelerated in the 1990s cycle. Two other strong performers from the 1980s[9] — Communication services and Electricity, gas & water — also failed to contribute to the surge.

Table 5 **MFP growth[a] in selected industries over the last two aggregate productivity cycles**

Average annual rates of growth (per cent)

	1988-89 to 1993-94	*1993-94 to 1999-2000*	*Acceleration*	*Contribution[b]*
1990s detractors				
Agriculture	4.2	3.4	-0.8	-0.1
Mining	2.3	2.2	-0.1	-0.0
Manufacturing	2.0	0.9	-1.1	-0.5
Electricity, gas & water	4.0	1.6	-2.3	-0.2
Communication services	6.1	4.0	-2.2	-0.2
Cultural & recreational services	-2.4	-3.7	-1.3	-0.1
1990s contributors				
Construction	-0.5	1.1	1.6	0.3
Wholesale trade	-2.0	5.2	7.3	1.2
Retail trade	0.7	1.1	0.4	0.1
Accommodation, cafes & restaurants	-1.9	0.3	2.2	0.2
Transport & storage	0.8	1.8	0.9	0.2
Finance & insurance	0.1	1.2	1.1	0.2

a Industry MFP is measured as the ratio of an index of value added to an index of combined inputs of labour and capital. **b** The contribution figures are percentage point contributions to the acceleration in aggregate productivity growth. Contributions are the industry accelerations multiplied by the industry share in aggregate value added.

Source: Productivity Commission estimates.

8 Some caution about the precision of the industry productivity estimates is appropriate. The estimates reported here are based on a value-added output measure and capital and labour inputs, rather than a gross output measure and KLEMS inputs. There could be some misallocation of aggregate productivity growth across industries.

9 The improved performance in these two sectors in the 1980s, stemmed from the major reform-induced efficiencies (eg better investment decisions and reductions in excess manning) achieved in government enterprises, as well as technological advances in some activities.

4. The influence of policy reforms and other factors

Australia's 1990s productivity surge was also strong by international standards. For the first time, Australia's rate of labour productivity growth exceeded the OECD average. In fact, Australia recorded one of the highest productivity accelerations in the OECD area (Gust and Marquez 2000, OECD 2001a).

The growth performance of OECD countries generally, however, was quite mixed during the 1990s. The OECD (2001b) observed that there were disparities in growth in per capita incomes across countries that did not conform to the traditional convergence pattern. Growth was high in Australia, Ireland and the Netherlands and accelerated in the USA, but slowed in Japan and much of Europe.

The OECD's Growth Project (OECD 2001b) sought to find reasons for the divergent performance. Its first finding was that the proximate factors that distinguished high-performing countries' faster average income growth were superior rates of growth in both (labour) productivity and labour utilisation — more people working more hours and more productively. Australia was in this category.

Drilling further, the Growth Project noted that growth in labour productivity has been influenced by growth in the quality (skills) of labour, capital deepening (especially through investment in information and communication technologies – ICTs) and MFP growth. Differences across countries appeared most marked in MFP growth. The OECD considered that the most important factors contributing to MFP growth in the 1990s were technological advances in the production of ICTs, increased competition (affecting, for example, the entry and exit of firms) and the business use of ICTs (albeit that the identification was considered less 'accurate' in this case).

These factors, identified in the Growth Project, provide touchstones for an examination of contributors to Australia's strong productivity performance in the 1990s. First, however, some other factors that have been raised in Australian discussions warrant review. However, they are not found to provide major explanation.

Some explanations without punch

Recession

A number of commentators, including Quiggin (2001c), have attributed at least part of the 1990s measured productivity growth to recovery from the 1990-91 recession. However, the recession had little effect on the detection of a 1990s productivity surge. First, the continuous increase over nine years from the trough of the recession – a record long period – was too long and too strong to be attributed simply to recovery from recession. Second, the use of peak-to-peak productivity cycles, eg from 1993-94 to 1999-2000, to measure underlying rates

of productivity growth quarantines much of the effect of business cycles. (The surge is also evident in trend estimates, which remove cyclical effects.) Third, the amount of hoarding in the 1990-91 recession is arguable. There was a shakeout of labour and some capital.

World-wide productivity boom

As noted above, there was not a world-wide productivity boom to draw Australia along. Dowrick (2000) also established this point more formally.

Work intensity

Quiggin has emphasised an increase in work intensity as a possible contributor to the upsurge in Australia's measured productivity growth. In my view, there is a fundamental flaw in Quiggin's logic and I outline this below. But I will first address some of Quiggin's specific points. Given the prominence the issue has received, it warrants some detailed attention.

Quiggin (2000, 2001a) identifies three dimensions of work intensity:

- Increases in officially-measured hours of work.

Quiggin views the increase in average hours worked by full-time workers to be one manifestation of increased work intensity. This dimension poses no immediate issue for productivity estimates (and Quiggin does not raise one) as increased hours worked are captured in the labour input measure and are therefore removed from influence on productivity estimates.

- Differences between measured and actual hours of work.

Quiggin (2001a) asserts that the '*unmeasured* increases in working hours have been *demanded* by employers in enterprise agreements for the unionised workforce, and there is little doubt that similar changes have been *imposed* in workplaces not covered by enterprise bargaining….Thus, it is reasonable to *assume* that they account for at least part of any measured productivity gains associated with reform.' (p. 344, *emphasis added*).

One thing needs to be made clear. There is no evidence of any increase in unmeasured *hours at work* in the 1990s associated with enterprise agreements or any other factor. Estimates of hours of work for use in productivity calculations are identified by individuals (workers) in household surveys. Respondents have the opportunity to identify actual total hours worked – whether ordinary time, overtime, paid or unpaid. It would be wrong to give Quiggin's statement the rather bizarre interpretation that employers can force workers to work extra hours and the workers systematically exclude them from their household returns to the ABS. If there is any problem in identifying hours of work from household surveys, it is more likely to be a systematic survey issue – not respondent error specific to the 1990s.

The only divergence between measured and actual hours that could occur, in principle, is a case that Quiggin specifically mentions – the elimination of 'downtime' during hours of work, for example tea breaks. To avoid confusion, the distinction between measured and actual hours is better expressed as a distinction between nominal and effective hours of work. If the downtime extends to 'on-the-job leisure', its elimination could be a genuine and meaningful productivity improvement, and would be sustainable even over the long term. Quiggin does not argue a case that the elimination of downtime generates 'false' or misleading estimates of productivity growth.

- Increased pace of work

Quiggin says that there has been increased pace of work, which has increased stress. He acknowledges that this is difficult to measure. This dimension of work intensity is not an argument that measured productivity growth is 'false', but that measured productivity cannot be sustained *if* people cannot maintain an increased pace of work. Quiggin also asserts that increased work intensity of this form can lead to (unmeasured) reductions in output quality and therefore true productivity.

He calls on 1995 survey evidence that found a majority of employees reported increases in stress, work effort and pace of work over the previous year. But this does not establish that the work rate reached an unsustainable level (or was not adequately compensated to raise individual welfare). Whilst there is anecdotal evidence of cases of stress-related illness, the case that there has been a significant and widespread increase in unsustainable pace of work has not been empirically established.

*** ***

The key issue is not whether work intensity has increased. On the dimensions that Quiggin lists, there is evidence of full-time workers working longer hours and anecdotal evidence of an increase in pace of work in at least some areas of work. An increase in unmeasured hours of work, however, is difficult to accept.

The key issue, however, is whether increased work intensity has improperly distorted productivity estimates. In other words, has an increase in work intensity led to:

- Increases in unmeasured hours work?
  - My above comments suggest they have not.
- A false and misleading effect on productivity?
  - This has not been established and indeed the effects on productivity mentioned seem genuine and meaningful.
- A short-term effect on productivity that is unsustainable and not part of a genuine shift in underlying productivity trends?

- This case has not been established empirically but, by definition, can only have a temporary and ephemeral effect on productivity trends. Workers could only work at unsustainable rates for perhaps months, but surely not years, depending in part on the nature of the job. (Any such ephemeral effects, like business cycle effects, tend to be eliminated by the productivity-cycle calculation method.)

Wooden and Loundes (2002) present evidence to suggest that the distortionary effects of increased work intensity would be minor, at most. They acknowledge the adverse health effects on some, but present evidence that questions whether people are generally being asked to work beyond their sustainable limit. They find evidence that longer workers are more supply driven than demand driven; that actual hours worked are highly consistent with worker preferences; and that jobs with long hours were not associated with additional job dissatisfaction (bringing more-than-compensating remuneration and other desirable characteristics).

Quiggin merely asserts that an increase in work intensity has unmeasured, false and unsustainable effects on productivity. In Quiggin (2000), he supposes that the increase in work intensity is equivalent to an unmeasured increase in working hours of at least 10 per cent – 'more than enough to wipe out the productivity [acceleration] apparent in official statistics'. In Quiggin (2001c), a 5 per cent figure is supposed. But supposition does not establish proof.

There are two other factors that also undermine work intensity as a significant explanation for the productivity surge. First, if work intensity were to provide major explanation for the productivity surge, it would have to be concentrated in certain industries, especially Wholesale trade. This has not been established, but seems very unlikely at least at first glance.

Second, Quiggin's argument is logically inconsistent with the evidence of a productivity acceleration. His argument is that distortionary effects of increased work intensity have falsely and unsustainably raised the estimates of Australia's productivity acceleration. As reasoned above, the evidence of significant distortionary effects is weak. But, even if the distortionary effects were accepted, the critical issue here is one of timing — when any increase in work intensity and any associated distortionary effects kicked in. Implicit in Quiggin's view is that higher work intensity was not in place in the start of the 1990s acceleration period (1993-94), but was in place at the end (1990-2000). This is the only way that the productivity growth in the 1990s cycle could be 'falsely' or unsustainably elevated by work intensity distortions. The higher the 'unsustainable' component, the later the work intensity distortions would have had to have kicked in, because by definition this component is not long lasting. But then, if the increased work intensity only came into play in the very late 1990s, there was a lot of strong productivity growth undistorted by work intensity up until then.

But a scenario in which work intensity only came into play at the end of the decade is highly unlikely. Quiggin's reading of the evidence from the Workplace Relations Survey was that

increased work intensity and stress had kicked in by the mid-1990s (the survey relating to the 12 months before 1995). This is further supported by Wooden and Loundes (2002) who show that the increase in working hours was largely confined to the 1983 to 1994 period. The incidence of longer working hours plateaud in 1994. Commonsense would also suggest that any uplift in pace of work would have likely kicked in during the recession, when there was hefty job shedding, and during the 'jobless recovery', coming out of the recession, when employers were reluctant to take on new staff.

In this more likely scenario, any increased work intensity has kicked in by 1993-94 and any distortionary effects are either constant or in decline during the productivity acceleration period after 1993-94. They are (at most) constant in relation to any false or misleading influence on productivity estimates. They are declining in relation to any unsustainable influence on productivity estimates.

As a consequence, the distortionary effects would have a zero or negative effect on productivity growth over 1993-94 to 1999-2000. There would be zero effect with constant distortion and negative effect with declining distortion.

In this more likely scenario, distortionary work intensity effects would actually bias the estimates of a productivity acceleration *downward* and not upward. The onset of the increased work intensity and distortions would falsely or unsustainably *raise* productivity estimates in the 1988-89 to 1993-94 cycle. (Measured productivity growth was actually relatively low in that cycle, implying at best a minor tangible work intensity effect.) With no or a downward effect in the next cycle, work intensity would reduce the signs of a productivity acceleration. In other words, the influence of distortionary work intensity effects would mean the case for a substantial surge in Australia's underlying productivity growth in the 1990s is even stronger.

Measurement error

It has also been suggested that measurement error may have contributed to the detection of a productivity surge. Nobody would rightly claim that productivity estimates are without at least some degree of measurement error. But for measurement error to contribute falsely to a productivity acceleration, the errors would have to get worse. Measurement error is usually considered to be a greater problem in service industries, leading to underestimates of output and productivity growth. Yet service industries have grown more rapidly than others. Measurement errors in services would therefore tend to reduce, rather than increase, signs of a productivity acceleration.

Property & business services

The exclusion of Property and business services from the market sector of the economy has also been raised a possible source of upward bias in the detection of a productivity

acceleration. The Bureau excludes Property & business services (PBS) because its output measure is principally related to hours worked.

Quiggin (2001a) states that, since most of the output of the PBS sector consists of inputs to the market sector, any error of measurement in PBS output generates an equal and opposite error in measurement of market sector value added. However, actually half of PBS output is directed to the market sector.[10] And, whilst the output of PBS may be difficult to determine in the market place, its cost is not. PBS firms charge well-defined fees for their services. If the cost of purchased services to the market sector can be well determined, so can value added in the market sector (all other things equal). The problem in measurement of PBS output does not translate equally into an error in measurement of market sector value added.

At another level, exclusion of PBS would only cast doubt on the representativeness of the surge in market sector productivity growth if PBS is a relatively large sector (which it is), grew rapidly over the 1990s (which it did) and had productivity growth well below the market sector average (which is doubtful). Australian firm-based evidence and overseas evidence on trends in business services suggest that there have been productivity gains in this sector over the 1990s. There have been moves to reap economies of scale and the sector has become a high user of ICTs that have facilitated productivity gains from firm reorganisation and innovations (see below).

ICTs and productivity growth

I return now to the OECD touchstones on productivity growth factors in the 1990s and begin with an assessment of the role of ICTs. One mechanism – productivity gains through technological advances in the production of ICTs – can be ruled out, as Australia produces comparatively little ICT equipment and software. This still leaves a possible role for investment in ICTs in capital deepening and facilitating MFP gains in business use.

Australia has become a major user of ICTs. The growth of investment in ICTs became especially strong in the 1990s, when investment in hardware grew by 35 per cent a year and software investment grew by 20 per cent a year in real terms.[11] The proportion of Australia's business investment devoted to ICTs ranked 3 in 1999 among OECD countries (OECD 2001c).

---

10 About one-third of PBS is Property services (including Property operators and developers, Real estate agents and Machinery and Equipment hiring and leasing) and about two-thirds is Business services (Legal and accounting services, Scientific research, Technical services, Computer services and Marketing and business management services).

11 The Australian volume estimates of ICTs are based on hedonic price deflators, drawn from a US hardware price deflator (adjusted by a lag and exchange rate movements) and software price deflator that assumes a 6 per cent annual reduction in prices.

There was an uplift in ICT capital deepening (higher ICT use per unit of labour) in Australia from 1995, coming at the same time as the uplift in ICT capital deepening in the USA (Parham, Roberts and Sun 2001). The Australian uplift was also very similar to the USA's in terms of strength (table 6).

However, running counter to the OECD list of factors, ICTs delivered no net capital deepening contribution to Australia's labour productivity acceleration (table 6). The growth in ICT use was at the expense of growth in other forms of capital. There was no change (in fact a slight decline) in the rate of substitution of capital for labour.

With similar uptake of ICTs in the two countries and consistent with US leadership in productivity and ICTs, the USA can be used as a benchmark to assess the extent to which Australia's productivity gains can be associated with ICTs.[12] Assuming no other influence on productivity acceleration, the US acceleration of 0.3 per cent a year sets the upper limit on the contribution of ICTs to MFP acceleration in Australia (table 6).[13]

Table 6 **Contributions to labour productivity accelerations in the 1990s cycle in the USA and Australia**

Per cent per year

	USA	*Australia*[b]
Labour productivity growth	**0.5**	**1.0**
Capital deepening	**0.2**	**-0.1**
- ICT capital	0.3	0.4
- Other capital	-0.2	-0.5
MFP contribution[c]	**0.3**	**1.1**

a Growth in 1992 to 2000 less growth in 1986 to 1992. **b** Growth in 1993-94 to 1999-00 less growth in 1988-89 to 1993-94. **c** MFP growth for the US includes the contribution to labour productivity growth from labour quality.

Source: Updated from Parham, Roberts and Sun (2001).

Some of the 0.3 of a percentage point MFP acceleration must be attributed to *production* of ICTs. Studies, such as Oliner and Sichel (2000), have attributed around 0.3 of a percentage point of aggregate MFP growth to ICT production, although the acceleration was calculated pre- and post-1995; and all of this may not represent a change in trend.[14] The acceleration over productivity cycles could be less — perhaps half — which leaves a contribution of perhaps 1 or 2 tenths of a percentage point from ICT use to the acceleration in underlying

12 Table 6 accounts for labour productivity acceleration over the last two peak-to-peak productivity cycles in the USA and Australia. This introduces a difference between countries in time periods compared (see notes to table 6), but it ensures that contributions to *underlying* rates of productivity growth are compared.

13 For further details, see Parham (2002b)

14 Productivity in ICT production is calculated by the price-dual method. Some of the decline in ICT prices was due to increased competition and was not entirely due to productivity increases (Aizcorbe, 2002).

aggregate MFP growth in the USA. Even if the more favourable pre-and post-1995 figures are used, the most that can be attributed to ICT use is 0.3 of a percentage point.[15]

This assessment suggests that use of ICTs has contributed at most 0.3 of a percentage point and non-ICT factors have contributed the bulk (0.8 of a percentage point or more) to the acceleration in Australia's productivity growth.

But this assessment does not necessary establish that ICTs have been at work in both countries. Some supporting – though still circumstantial – evidence comes from an examination of industry estimates for both the USA and Australia. This shows an overlap in industries that are both high ICT users and stronger productivity accelerators and suggests that the ICT-productivity links are strongest in distribution (wholesale and retail trade), financial intermediation and business services (Parham, Roberts and Sun 2001).

The Australian evidence is consistent with the view put by, for example, Bresnahan, Brynjolfson and Hitt (2002) that it is the innovations in products and processes, enabled by ICT use, that generate the productivity gains. The Finance & insurance industry has been restructured to operate much more through ICTs (for example, ATMs, Internet and phone banking) than through traditional face-to-face contacts. Many new products (for example, financial derivatives) are now on offer. Australian banks, in particular, have been able to support strong growth in output, with quite major reductions in numbers of branches and employees.

A study by Productivity Commission staff (Johnston et al 2000) also found that ICTs played a part in the restructuring of wholesaling activities. Businesses were able to use bar-code and scanning technology and inventory management systems as part of the process of transforming wholesaling from a storage-based to a fast flow-through operation that reduces storage and handling.

But, importantly, reforms were acting as the underlying drivers and facilitators of productivity gains and ICTs were just one component of change. It was not so much that wholesaling became much more ICT intensive or that new breakthrough technologies became available. It was more that the competitive incentives to be productive became stronger and that new flexibilities became open to businesses to use ICTs as part of a more general process of restructuring and transformation.

For example, the motor vehicle industry was looking for efficiencies all along the value chain — and not just in production — to meet the increased competition from cheaper imports entering under lower border protection. The domestic industry has restructured its distribution and customer/production links. Another contributor in some areas was the reform of industrial

---

[15] Comparing the first and second halves of the 1990s produces an acceleration in labour productivity of 0.6 percentage points of annual growth. Taking the contribution of ICT production to be the Oliner and Sichel (2000) figure of 0.3 of a percentage point, leaves 0.3 of a percentage point to be attributed to ICT use (Parham 2002a).

relations processes that allowed greater labour flexibility through the introduction of split shifts and reduced the rigidity of job demarcations between different occupational groups.

The importance of competition as a driver is also indicated by the distribution of the productivity gains. Despite very large productivity gains in wholesaling, the gross rate of profit actually *declined* (Parham et al 2000). That is, the gains were passed on, rather than retained in profit growth.

Education and skills

The next OECD touchstone, increased skills in the workforce, may also have played a role in Australia's productivity growth. Secondary school retention rates and tertiary participation have increased in Australia, particularly amongst females over the past three decades. Workforce experience and training have also increased.

Increased skills can influence productivity growth in two ways. First, skills can directly raise workers' output per hour worked. Second, in line with endogenous growth theory, a more educated and experienced workforce can promote the uptake and further development of advanced technologies (Dowrick 2002). Relatively high skills in the Australian workforce, for example, are likely to have played a part in the rapid uptake of ICTs (Barnes and Kennard 2002).

Skills do not appear to have influenced Australia's productivity resurgence by the first, direct route. According to experimental Australian Bureau of Statistics data, the employment of skills increased more rapidly in the late 1980s and early 1990s. The contribution of skills to measured productivity growth was greatest during the 1988-89 to 1993-94 cycle and declined during the 1993-94 to 1999-2000 cycle. That is, there was not an acceleration in skills to match the 1990s productivity acceleration. In standard growth accounting, the deceleration in skill growth between the two cycles actually detracted from, rather than contributed to, the 1990s productivity acceleration. Furthermore, from an international perspective, Australia showed relatively slow growth in educational attainment in the 1990s and relatively high productivity growth and acceleration. Clearly, other factors have overshadowed the importance of skills and education for productivity growth during the 1990s (Barnes and Kennard 2002).

If, as seems probable, the relatively high *level* of education in the Australian workforce played a part in the rapid uptake of ICTs in the 1990s, education and skills could share responsibility for the part of the 1990s productivity acceleration attributed to ICTs. As just seen, however, the ICTs contribution, though important, has been relatively modest.

To put this in broader perspective, though, education and training remain important to long-term growth and in meeting the changing pattern of demand for skills.

Policy reforms

The OECD touchstones also refer to the importance of competition. Strengthening competition has been a focus of policy reforms.

The Productivity Commission (PC 1999) set out the theoretical links between microeconomic reforms and Australia's productivity performance and explored the empirical links. There have been three important 'themes' among the ways in which reforms have helped to raise Australia's productivity performance:

- sharper competition — through lower trade and foreign investment barriers and domestic deregulation and pro-competition regulation — has provided greater incentives for businesses to improve productivity by seeking out more value-adding products and new markets and by reducing costs;
- greater openness to trade, investment and technology has encouraged greater specialisation and has provided easier access to up-to-date technology and know-how; and
- greater flexibility for businesses to adjust production and distribution processes, through removal of unnecessary business regulation and greater flexibility in work arrangements through award restructuring, certified agreements and then moves toward enterprise bargaining.

Formal analysis of the influence of policy reforms on aggregate productivity growth is not straightforward. Capturing the implementation of reform and specifying an appropriate lag structure to allow for adjustment in production structures are particularly difficult.[16] Reforms were not introduced seamlessly or overnight. Implementation has been drawn out, with variations in pace, over 15-20 years. There has been a mixture of industry-specific measures, introduced at different times, and more general measures, many of which were implemented in phases. Some reforms have been interdependent.

Even so, Salgado (2000) found a positive link at the aggregate level. Support has also come indirectly from the fact that other possible factors have not delivered much explanation (see above). Despite all the effort, substantial alternatives have not been found. Analysis of particular measures, such as reductions in trade barriers and government business enterprise reforms, and case studies of particular firms and industries have also shown strong positive links (for example, PC 1999). A review of proximate determinants of productivity growth found increased trade orientation, increased specialisation (including increased intra-industry trade) and increased adoption of advanced technologies and a higher rate of innovation, stimulated by policy reforms (PC 1999).

16 Adjustment packages, involving government-funded incentives for investment, export and innovation have been offered to some industries, but not others. Some employees have also been offered various forms of adjustment assistance.

Support also comes informally from an assessment against a checklist of productivity 'facts'. Do microeconomic reforms provide adequate explanation for the following?

- The timing of the productivity improvement.
  - Yes. This is most specifically evident in industry and micro studies. But, even at the aggregate level, the timing of reforms, which gathered momentum in coverage and intensity from the mid-1980s, is broadly consistent with the timing of the productivity improvement, allowing for lags.
- The length and strength of the productivity improvement.
  - Yes. Australia's productivity gains have predominantly come from restructuring and modernising production, consistent with the view that Australia has embarked on a much-delayed process of catch-up. Reforms unlocked the restrictions than were holding back the realisation of productivity potential in previous decades. There was some distance for Australia to travel in catching up and a significant gap (for example, with the USA) still remains.
- The industry sources of productivity improvement.
  - Yes. As discussed in the ICT section, the underlying influence of reforms (competition, openness to trade and technology, and flexibility) can be found at least circumstantially in the 1990s productivity accelerations in Wholesale trade and Finance & insurance. They can also been found in other industries in earlier periods, for example, in Electricity, gas & water and Communication services.
- Labour productivity acceleration due to MFP, rather than capital deepening.
  - Yes. The general aim of reforms has been to raise resource efficiency and are quite consistent with MFP gains.

The intensity of domestic reforms also provides an explanation for the relative isolation and strength of Australia's surge. The influence of reforms also provides a plausible explanation as to why Australia shifted from being a technology laggard in the past to being at the forefront of technology uptake and business restructuring. A strong and rapid uptake of ICTs has been part of Australia's 'modernisation' through the 1990s. In previous decades, Australian businesses tended to be technological laggards, except in trade-exposed parts of agriculture and mining. It seems that, in the transition to becoming a more competitive open and flexible economy, Australian businesses found more point in taking up the opportunities that technology and innovation provide and found greater flexibility to use ICTs and other technologies to advantage. There was very little in the way of policy strategy to encourage ICT uptake.

The three main determinants – policy reforms, skills and the uptake of ICTs are interrelated, rather than mutually exclusive. The interrelationship between high levels of education and the absorption of ICTs was mentioned above. And the competitive incentives, openness to

technology and flexibility to adjust – the central tenets of reform – have been crucial in driving the uptake and smart use of ICTs.

5. Trends in living standards

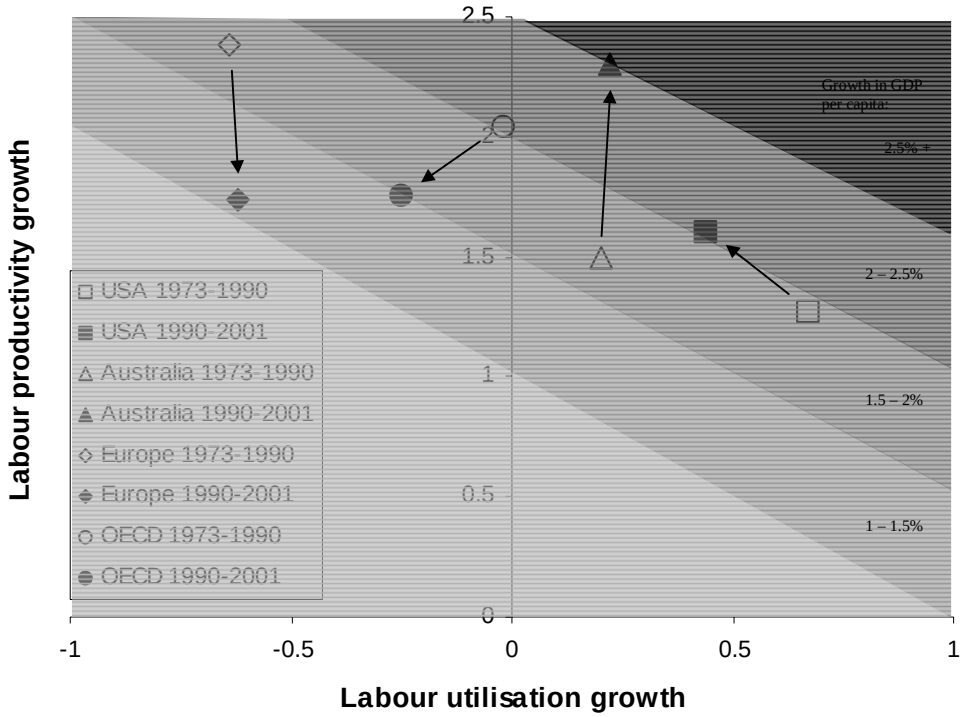
I return now to the international perspective to illustrate the effect of Australia's strong productivity growth on growth in average incomes.

The productivity surge, in combination with continued growth in labour utilisation, fuelled strong growth in average incomes. Australia's GDP per capita ranking climbed to 7 in 2001, from 15 in 1990 (table 1).

Figure 6 illustrates the changes in growth in productivity, labour utilisation and average income in various countries and country groupings. Productivity growth (vertical axis), plus growth in labour utilisation (horizontal axis), equals growth in average income, so that increases in the depth of shade in the diagram represent increases in growth in average income. Growth rates over 1973-1990 and 1990-2001 are compared.

Figure 6 **Contributions to growth in per capita GDP, 1973-1990 and 1990-2001**

Per cent per year



Source: As for table 1

The figure shows how Australia's acceleration in productivity growth in the 1990s translated directly into strong income growth, while growth in labour utilisation was maintained (actually increased slightly). The USA also enjoyed an uplift in average income growth, but it was not as strong. Europe and the OECD generally experienced a decline in average income growth, principally because of slower productivity growth.

In domestic currency terms, the additional percentage point in productivity growth raised average income growth by a percentage point to 3.0 per cent a year from 1993-94 to 1999-2000.

Of course, stronger growth in average income is not everything in terms of improving welfare. A complete review of all relevant issues is beyond the scope of this paper. But I can add a few observations in relation to distribution.

Despite some claims, the distributional trends do not appear to have gone all that badly – at least from a broad perspective.

- At the broadest level, the distribution of the income growth in the 1990s was fairly even between labour and capital.
- There were increases in real wages, profits and, with strong growth in output, growth in employment and reduction in unemployment.
- With stronger competitive forces it appears that productivity gains were not exclusively retained within the relatively high productivity industries in the form of higher wages or profit growth. The gains were largely passed on in the form of lower prices, to the benefit of wider consumers and commercial users.
- At the level of personal income, it appears that, whilst the distribution of earnings has been widening over the past two decades, the tax and transfer system has been quite successful in neutralising the effects on the financially disadvantaged. (Parham et al 2000)

Higher productivity and income growth has also raised the capacity of business and governments to fund environmental and social programs. This is not to obscure the fact that high unemployment and social disadvantage, particularly pockets of poverty, still remain and need ongoing policy attention. But it is to say, as Richard Lester (1998, p48) observed, 'a rising tide will not lift all boats. However, a more rapidly rising tide will leave fewer boats stranded.'

It must also be acknowledged that the dimensions of living standards are becoming more complex. Over recent years, concern has been expressed about such things as social cohesion, participation representation, and service delivery; all under the general heading of 'social capital'. Such concerns also need to be addressed.

6. Concluding remarks

Microeconomic reforms were introduced, particularly from the mid-1980s, with the intention of reversing the slide in Australia's growth in productivity and relative and absolute growth in living standards.

There is robust evidence of a strong productivity surge in the 1990s. Labour productivity and multifactor productivity growth accelerated by around one percentage point – a performance that was impressive in both historical and international terms.

The surge in productivity growth in the 1990s provides circumstantial evidence of the success of reforms. However, beyond that, there is supporting analytical macro, sector and case study evidence. The evidence is not conclusive, but it is strongly suggestive and more able to withstand scrutiny than many other possibilities that have been put forward. Education and skills and the smart use of ICTs have also provided some explanation. But the explanation is relatively modest and, even here, reforms appear to have played at least some underlying part.

Policy reforms have been major drivers and enablers. Reforms have enhanced competitive pressures; opened the economy to trade, investment and technology; and allowed greater flexibility to adjust all aspects of production, distribution and marketing.

In broad terms, reforms have released the shackles on the economy and have both forced and allowed business to modernise. Australia has enjoyed rapid productivity growth while it has embarked on much-delayed catch-up — a process that many other advanced countries undertook in earlier decades. In doing so, reforms have underlined the opportunities for businesses to take advantage of technological and other advances that have and will come along.

A number of commentators, mostly notably John Quiggin, have offered an array of other possible explanations for the productivity surge. But they do not stand up to scrutiny as providing anything more than a minor contribution.

The stronger productivity growth has also underpinned much stronger growth in average income. A percentage point more productivity growth has meant a percentage point more growth in average incomes, rising to 3 per cent a year in the 1990s. At the broad level, there were not strongly adverse distributional trends.

More complex community preferences may see more complex policy pressures in the future. But the evidence that microeconomic reforms have delivered strong productivity growth and enhanced the capacity of the community to pursue its social and environment objectives should enter the policy consideration.

Australia's stronger productivity performance can continue for some time yet. The catch-up view of Australia's productivity surge suggests that the rate of productivity will slow as the ready and obvious changes shorten in supply. On the other hand, the ICT experience suggests

that permanent and dynamic growth-enhancing forces are at work and that the economy is not just in transition to a new higher level of productivity but will maintain some improvement on the rate of productivity growth experienced in the late 1970s through to the early 1990s.

References

Aizcorbe, A. 2002, 'Why are Semiconductor Prices Falling so Fast? Industry Estimates and implications for Productivity Measurement', Federal Reserve Board (mimeo).

Aspden, C. 1990, *Estimates of Multifactor Productivity, Australia*, ABS Occasional Paper, ABS Cat. No. 5233.0, ABS, Canberra.

Banks, G. 2001, 'Get it Right on Productivity Growth', *Australian Financial Review*, 6 March, p. 51.

Barnes, P. and Kennard, S. 2002, *Skill and Australia's Productivity Surge*, Productivity Commission Staff Research Paper, forthcoming (October).

Bean, C. 2000, 'The Australian Economic Miracle', pp. 73–114 in D. Gruen and S. Shrestha (eds), *The Australian Economy in the 1990s*, Reserve Bank of Australia, Sydney.

Bresnahan, T., Brynjolfson, E. and Hitt, L. 2002, 'Information Technology, Workplace Organization and the Demand for Skilled Labour: Firm-level Evidence', *Quarterly Journal of Economics*, February, pp. 339-376.

Crawford Committee (Study Group on Structural Adjustment) 1979, *Report of the Study Group on Structural Adjustment*, (Sir John Crawford, Chairman), AGPS, Canberra.

Dowrick, S. 2000, 'The Resurgence of Australian Productivity Growth in the 1990s: Miracle or Mirage?', Paper presented to the 29th Annual Conference of Economists.

—— 2002, 'Ideas and Education: Level or Growth Effects? (lessons from the Cambridge counter-revolution and implications for Australian economic growth', Paper presented to the National Bureau of Economic Research 13th Annual East Asian Seminar on Economics, Melbourne.

Edwards, J. 1999, *A New Australian Economy*, HSBC Economics & Investment Strategy, HSBC Markets Ltd, Sydney.

Forsyth, P. 2000, 'Microeconomic Policies and Structural Change', pp.235-67 in D. Gruen and S. Shrestha (eds), *The Australian Economy in the 1990s*, Reserve Bank of Australia, Sydney.

Gruen, D. and Stevens, G. 2000, 'Australian Macroeconomic Performance and Policies in the 1990s', pp. 37–72 in D. Gruen and S. Shrestha (eds), *The Australian Economy in the 1990s*, Reserve Bank of Australia, Sydney.

Gust, C. and Marquez, J. 2000, 'Productivity Developments Abroad', *Federal Reserve Bulletin*, October.

IC (Industry Commission) 1997, *Assessing Australia's Productivity Performance*, Research Paper, AGPS, Canberra.

—— 1998, *Microeconomic Reforms in Australia: A Compendium From the 1970s to 1997*, Industry Commission Research Paper, AGPS, Canberra.

Jackson Committee (Committee to Advise on Policies for Manufacturing Industry) 1975, *Policies for Development of Manufacturing Industry*, vol. 1, Report to the Prime Minister, (Mr R.G. Jackson, Chairman), AGPS, Canberra.

Johnston, A., Porter. D., Cobbold, T, and Dolamore, R. 2000, *Productivity in Australia's Wholesale and Retail Trade*, Productivity Commission Staff Research Paper, AusInfo, Canberra.

Lester, R. 1998, *The Productive Edge: How US Industries Are Pointing the Way to a New Era of Economic Growth*, W.W. Horton & Co, New York.

Maddison, A. 2001, *The World Economy: A Millennial Perspective*, OECD Development Centre, OECD Paris.

OECD 2001a, *OECD Economic Surveys: Australia*, OECD, Paris.

—— 2001b, *The New Economy: Beyond the Hype, The OECD Growth Project*, OECD, Paris.

—— 2001c, *OECD Science, Technology and Industry Scoreboard: Towards a Knowledge-based Economy*, OECD, Paris.

Oliner, S. and Sichel, D. 2000, 'The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?', *Journal of Economic Perspectives*, vol. 14, no. 4, Fall.

Parham, D. 1999, *The New Economy? A New Look at Australia's Productivity Performance*, Productivity Commission Staff Research Paper, AusInfo, Canberra.

—— 2002, 'Australia's 1990s Productivity Surge and its Determinants', Paper presented to the National Bureau of Economic Research 13th Annual East Asian Seminar on Economics, Melbourne.

—— 2002b, 'Productivity Gains: Importance of ICTs' *Agenda*, vol. 9, no. 3, pp. 195-210

Parham, D., Barnes, P., Roberts, P. and Kennett, S. 2000, *Distribution of the Economic Gains of the 1990s*, Productivity Commission Staff Research Paper, AusInfo, Canberra.

Parham, D., Roberts, P. and Sun, H. 2001, *Information Technology and Australia's Productivity Surge*, Productivity Commission Staff Research Paper, AusInfo, Canberra.

PC (Productivity Commission) 1999, *Microeconomic Reforms and Australian Productivity: Exploring the Links*, Commission Research Paper, AusInfo, Canberra, November.

Quiggin, J. 2000, 'Microeconomic Policies and Structural Change — Comments', pp. 268–70 in D. Gruen and S. Shrestha (eds), *The Australian Economy in the 1990s*, Reserve Bank of Australia, Sydney.

——, 2001a, 'The Australian Productivity Miracle: A Sceptical View', *Agenda*, vol. 8, no. 4, pp. 333–48.

——, 2001b, 'Golden Age Myth Exposed', *Australian Financial Review*, 15 February, p. 46.

——, 2001c, 'Productivity isn't Working', *Australian Financial Review*, 6 December, p. 54.

——, 2002, 'Miracles are Highly Priced', *Australian Financial Review*, 15 August, p. 70.

Salgado, R. 2000, 'Australia: Productivity Growth and Structural Reform' in *Australia – Selected Issues and Statistical Appendix*, IMF Country Staff Report 00/24

Treasury (Commonwealth) 1999, 'Economic Policy Reform and Australia's Recent Economic Performance', Statement 3, *1999-00 Budget Paper No.1*.

Vernon Committee (Committee of Economic Enquiry) 1965, *Report of the Committee of Economic Enquiry*, (Dr J. Vernon, Chairman), Commonwealth of Australia, Canberra.

Wooden, M. and Loundes, J. (2002), 'How Unreasonable are Long Working Hours?' *Melbourne Institute Working Paper* No. 1 /2002, MIAESR, The University of Melbourne, February.