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AUSTRALIA

Selected Issues and Statistical Appendix

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Approved by Asia and Pacific Department

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I. Is Australia a "New Economy"?[1]

A. Introduction

1. The question of whether Australia is a "new economy"[2] has been drawing increasing attention over the recent past. First, Australia has recorded an impressive growth performance over the 1990s, outstripping even that of the US (Table I.1). The post–1995 acceleration of labor productivity growth in the US was the trigger for the burgeoning of the "new economy" literature. In Australia, most studies to date have focused on the role of the wide ranging structural reforms since 1985 in bringing about the acceleration in productivity[3]. More recently, however, the quest for the fundamental factors underlying Australian productivity growth has focused attention on the growth–enhancing effects of the adoption of information processing and communication technologies.[4]

Table I.1. Output, Labor Productivity and Total Factor Productivity Growth, Selected Countries

(Average annual percent change)

	GDP Per Capita 1/			Labor Productivity 2/			Total Factor Productivity 3/		
	1980-90	1990-98	1995-98	1980-90	1990-98	1995-98	1980-90	1990-98	1995-98
Australia	1.6	2.4	2.7	1.2	2.0	2.3	0.8	2.1	2.1
US	2.0	2.2	2.7	1.1	1.7	1.9	0.8	1.1	1.1
Canada	1.5	1.2	2.0	1.0	1.1	1.1	0.3	0.7	0.7
New Zealand	1.2	0.8	1.4	1.6	0.4	0.3	0.6	1.1	-
Japan	3.3	1.6	1.1	2.6	1.3	1.1	1.6	0.7	0.8
Finland	2.2	1.3	2.7	2.4	2.9	2.8	2.2	3.1	3.5
Sweden	1.5	0.9	1.7	1.6	2.4	2.4	0.9	1.7	1.7
Norway	2.4	2.9	3.1	2.1	2.5	2.1	0.7	1.9	1.6
Ireland	3.0	5.6	6.3	3.5	3.2	3.2	3.4	3.5	3.2
UK	2.2	1.8	2.2	1.9	1.8	1.9	-	1.2	1.3
Germany	1.9	0.9	1.2	1.6	1.9	1.9	1.1	1.0	1.1
France	1.6	1.2	1.3	1.9	1.4	1.1	1.6	0.9	0.8
Spain	2.3	2.2	2.4	2.4	1.7	1.4	1.6	0.6	0.4

Source: OECD (Scarpetta, Bassanini, Pilat and Schreyer, Working Paper n.248, 2000).

1/ Trend GDP per capita, total economy.
2/ Trend GDP per employee, total economy.
3/ Trend TFP, business sector, estimated as Solow residual with time varying factor shares.

[1] Prepared by Roberto Cardarelli, (x38059) who is available to answer questions.

[2] This term is used here in its narrow sense, that is, to indicate the fundamental changes in economic activities which have been associated with the diffusion of information processing and communication technologies (ICT).

[3] Productivity Commission (1999), Salgado (1999), Bean (2000).

[4] Parham (1999).

2. Another impetus for the interest in determining Australia's new economy credentials is the weakness of the Australian dollar over most of 2000, which led many commentators to wonder whether the international investment community was penalizing Australia for being an "old economy," in particular for the lack of a large ICT–producing sector.

3. The objective of this paper is to analyze the contribution of ICT capital to the Australian productivity performance within a formal, growth accounting framework. This is done by using official data released by the Australian Bureau of Statistics, which adds rigor to the analysis, but requires caution when comparing the results with those of other countries due to measurement differences, and with cross–country studies that are based on consistent but somewhat arbitrary definitions of ICT outputs, inputs and prices.[5]

4. This paper concludes that the rapid process of ICT capital accumulation in Australia has started to pay off in terms of output and labor productivity growth. The ICT capital contribution to growth has increased dramatically in the last decade, and ICT capital now accounts for about two–thirds of the total growth contribution from capital deepening.

5. While most of the labor productivity acceleration of the late 1990s has been due to an increase in the rate of growth of total factor productivity (TFP),[6] an important result from the perspective of establishing Australia's "new economy" credentials is the existence of a positive relationship between ICT capital accumulation and TFP growth across Australian industries. While this is not definitive proof that Australia is benefiting from the positive network externalities associated with the usage of new technologies, the existence of such a relationship, at a minimum, leaves open the possibility that the recent TFP upsurge may mark the start of a new phase of growth for Australia.

6. The rest of the paper is organized as follows. The next section presents the formal growth accounting framework that has been generally used to identify the main channels through which ICT affect aggregate productivity. Within this section, special emphasis is given to the measurement of capital services and the contribution to growth of ICT capital. Section C presents the results of some studies that have analyzed the impact of ICT on productivity and output growth in the US. Section D replicates the growth accounting exercise for a group of Australian industries, since determining the impact of ICT on productivity requires examining what is happening at an industry level. Section F concludes.

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[5] Schreyer (1999), Goldman Sachs (2000), Daveri (2000).

[6] All studies reported in footnote 3 are unanimous in their interpretation of the acceleration in TFP growth as the product of the structural reforms implemented since the mid–1980s. Parham (1999) shows that this acceleration, far from being cyclical, corresponds to a structural break in the Australian growth path; as a result, in 1998 labor productivity was 15 percent higher than it would have been had the economy remained on its historical growth trajectory.

B. A Growth Accounting Framework For the New Economy

7. In order to evaluate the contribution of new technologies to output and labor productivity growth, the following, well established, growth accounting equation can be used:

$$[1] \quad \Delta \ln Y_t = \alpha_t \Delta \ln K_t + \beta_t \Delta \ln L_t + \Delta \ln A_t$$

Based on a constant returns to scale production function ($\alpha+\beta=1$) and perfect competition in the goods and labor markets, output (y_t) growth can be accounted for by increasing use of capital, (K_t) and labor (L_t) inputs, each weighted by their share of total income (α and β), and by a residual (A_t), commonly named total factor productivity (TFP), which captures any growth in output that is not associated with input usage, that is, any disembodied technical change.

8. A first set of refinements to this equation can be made by distinguishing between ICT and non–ICT capital stocks, replacing labor input with a quality–adjusted index (q), and expressing all variables in per capita terms (lower–case variables indicate rates of growth of each variable less the rate of growth of unadjusted labor), resulting in the following equation:

$$[2] \quad \Delta \ln y_t = \alpha_{IT,t} \Delta \ln k_{IT,t} + \alpha_t \Delta \ln k_t + \beta_t \Delta \ln q_t + \Delta \ln A_t$$

9. A further refinement of the basic equation can be made by splitting the TFP growth into three components. First, a spillover effect related to the usage of ICT capital (θ) is introduced in order to single out "super–normal" returns, that is, the returns associated with this type of capital which are not paid to anyone and thus are part of TFP. Second, following Domar (1961), TFP growth can be disaggregated between growth in the ICT–producing sector and in the rest of the economy, using the two sectors' shares of total gross output as weights:

$$[3] \quad \Delta \ln y_t = \alpha_{IT,t} \Delta \ln k_{IT,t} + \alpha_t \Delta \ln k_t + \beta_t \Delta \ln q_t + [\alpha_{IT,t} \theta k_{IT,t} + \mu_{IT,t} \Delta \ln \tilde{A}_{IT,t} + (1-\mu_{IT,t}) \Delta \ln \tilde{A}_t]$$

10. This equation allows us to distinguish three channels through which ICT affects output and labor productivity growth: 1) via its role as a capital input; 2) via the TFP increase in the ICT–producing sector; and 3) via the TFP increase associated with the spillover effects related to the usage of the new technologies.[7]

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[7] The accumulation of ICT capital may be affecting growth also by inducing an improvement in labor quality, a channel that is not explicitly identified in [3]. De Long and Summers (1991) stress that employees learn new skills and more efficient production methods after the installation of new equipment. As at least part of the quality change in labor is caused by the

(continued)

11. Much of the discussion in the new economy literature has focused on the distinction between the usage of ICT (affecting labor productivity though the first and third channel) and its production (working via the second channel). In some sense, it can be argued that the more important measure of the new economy is the third channel, which is associated with externalities that cause an economy–wide increase in TFP. In this case, the adoption of ICT would be equivalent to an upward shift of the production function and lead to higher, long–term output and productivity growth rates. On the other hand, the ICT contribution to growth through the other two channels could be interpreted as a one–time transition to higher levels of productivity that occurs when new types of capital goods become available and start replacing old vintage of capital, and labor. In this case, a high contribution of new technologies to growth could indicate that such capital has reached a sufficiently large proportion of the total capital stock to be quantitatively significant.

C. The U.S. Benchmark

12. Before turning to the evidence for Australia, productivity estimates for the US are presented as they serve as an important benchmark for other countries (Table I.2).[8] The recent, sustained acceleration of labor and total factor productivity in the US has been interpreted quite differently by different researchers, largely because of the different methodologies adopted in estimating equation [3]. Oliner and Sichel (2000), and to a lesser extent Jorgenson and Stiroh (2000), lean toward the view that ICT has played a significant role in generating a

Table I.2. Contribution to Growth, United States and Selected Countries

(In percent)

	United States									
	Oliner-Sichel			Jorgenson Stiroh			Gordon		Selected Countries, 1996-99 1/			
	1996-99	Accel.	2/	1995-98	Accel.	2/	Accel.	2/	US	Japan	UK	Euroland
Labor productivity	2.6	1.0		2.4	1.0		0.8		2.7	1.9	1.8	1.4
Capital deepening	1.1	0.5		1.1	0.5		0.3		1.3	1.7	0.7	0.7
IT: Hardware	0.6	0.4		0.5	0.3		-		0.5	0.9	0.7	0.3
IT: Software	0.3	0.0		0.3	0.1		-		0.2	0.1	0.1	0.1
IT: Communications	0.1	0.1		0.1	0.1		-		0.0	0.1	0.1	0.0
Other capital	0.1	0.0		0.0	0.0		0.0		0.5	0.6	-0.2	0.3
Labor quality	0.3	-0.1		0.3	-0.1		0.1		-	-	-	-
TFP	1.2	0.7		1.0	0.6		0.3		1.4	0.2	1.1	0.7
ICT	0.7	0.3		0.4	0.2		0.3		0.8	0.6	0.4	0.3
Other sectors	0.5	0.4		0.6	0.4		0.0		0.6	-0.3	0.7	0.4

1/ Selected country estimates are based on Goldman-Sachs, October 2000.
2/ Accel. is the difference in labor productivity growth between 1996-1999 and 1991-1995 for Oliner and Sichel; between 1995-1998 and 1990-96 for Jorgenson and Stiroh; and between 1995-1999 and 1972-1995 for Gordon.

ICT capital accumulation, the framework described by equation [3] tends to underestimate the real contribution of ICT to growth.

[8] An important caveat is that methodological differences in the level of statistical sophistication limit the scope for reliable international comparison of productivity data. However, this is a less serious concern for Australia, because the ABS has closely followed methodologies and conventions similar to those in the US for measuring ICT capital stocks and prices.

fundamental change in U.S. economy's growth. On the other hand, Gordon (2000) and Bosworth and Triplett (2000) represent the more agnostic view that the ICT "revolution" has not had the same impact of the general–purpose technologies introduced in the past century, such as railways and electricity.

13. More specifically, despite some difference in methodology,[9] Oliner and Sichel and Jorgenson and Stiroh obtain similar estimates, and attribute around a quarter percentage point of the acceleration in labor productivity since 1995 to the ICT production process (TFP growth in the ICT sector) and a half percentage point to capital deepening, all of which is due to the accumulation of ICT capital. Together, ICT contributes for around three quarters of the recent labor productivity acceleration.[10]

14. In contrast to the other two studies, Gordon focuses on identifying the cyclical component of the U.S. labor productivity surge and finds that about half of the U.S. labor productivity acceleration after 1995 has been a cyclical phenomenon. Disaggregating the trend labor productivity acceleration, he finds that half is accounted for by the TFP increase in computer production and the other half by ICT capital deepening. Hence, in sharp contrast with the first two studies, Gordon sees no TFP growth outside the ICT sector, and takes this as proof that ICT cannot be considered a significant, pervasive technological breakthrough.

D. The New Economy Contribution to Growth in Australia

The First Channel: ICT Capital Deepening

15. This section estimates the growth accounting equation [3] for Australia using official Australian Bureau of Statistics (ABS) data on output, inputs and prices, and analyzes the role played by ICT in the Australian labor productivity growth, starting with the contribution of ICT capital deepening.

16. A key step in assessing the new economy credentials of Australia is to obtain a measure of disembodied TFP, corresponding to an upward shift of the technological frontier. To do this, it is crucial to express both capital and labor in quality adjusted terms, to take into account the fact that technology and other factors tend to improve the quality of the factors of production over time. In particular, this means that the ICT capital stock in [3] must capture changes in the quality of capital associated with investments in ICT capital goods.

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[9] Jorgenson and Stiroh use a broader concept of output, including consumer durables and imputed service flows from owner–occupied houses.

[10] Both studies identify the key source of ICT contribution to growth with the high efficiency gains experienced in the ICT sector (especially semiconductors), which has been reflected in a sharp decline in computer prices. This in turn has led to massive computer investments, as both firms and household sought to cut costs by substituting toward relatively cheaper inputs.

17. A first step to capturing capital quality changes associated with investments in ICT capital is to recognize that calculating price changes by comparing identical products over time (as normally done) would completely miss the quality (that is, output) improvement associated with the rapid succession of progressively more powerful speed, memory, disk capacity and many other features of computers and ICT hardware. Thus, price indexes of such products should be calculated by taking into account the change in the products' characteristics, through a so called "hedonic" function. Doing this amounts to redistributing the growth of nominal investments in ICT from prices to volumes and, therefore, to embody technological changes in capital stock.

18. The U.S. has used hedonic price indexes for computer equipment since 1985 and only a few countries have followed this methodology to deflate their investments data. In Australia, the ABS has adopted hedonic prices compiled by the U.S. Bureau of Economic Analysis (BEA) to deflate investments in Computers and Peripherals, while nominal investments in software are deflated by an index that is assumed to decline by 6 percent per year (an estimate also used by Statistics Canada and constructed by observing the trend of software prices for popular PC software).

Table I.3. Investment in ICT, Australia

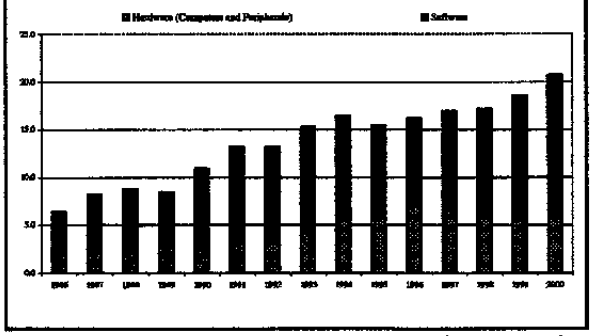
(In percent)

	1986-1990	1990-1995	1995-2000
Average annual rate of change (volume)			
All capital	4.8	2.0	6.3
Hardware	45.5	33.2	33.5
Software	35.6	20.3	23.4
Average annual rate of change (prices)			
All capital	6.3	1.2	0.1
Hardware	-13.4	-10.3	-20.6
Software	-5.6	-5.7	-5.7

Source: Staff estimates based on ABS data.

19. Table I.3 shows that ICT investments in Australia have grown at double digit rates since the middle of 1980s. In particular, growth in investment in hardware (computers and peripherals) has been very high, reflecting the marked reduction in hardware prices. The much higher growth of investments in ICT capital compared to other types of capital has caused a significant increase of the of ICT share of non–building investments. In 2000, investment in hardware and software accounted for over 20 percent of total non building investment (Chart I.1), compared to about 6 percent in 1986. However, a note of caution is warranted about the sustainability of this process, particularly since, in the second half of the 1990s, investment in hardware has not accelerated significantly, despite a sharp increase in the rate of decline of prices.

Chart I.1. Investment in Computer Hardware and Software as a Share of Total Investment, Australia



20. It is interesting to examine how Australia stacks up against other advanced economies in ICT capital accumulation. To overcome the problems associated with cross–country comparability of data, some authors (Schreyer, 2000, and Daveri, 2000) have used U.S. hedonic prices to deflate other countries IT nominal investments.[11] The result of this exercise is reported in Table I.4. The figures for Australia are broadly similar to the ones reported in Table I.1 as far as investment in hardware is concerned (this should not be surprising since, as noted above, ABS has adopted U.S. hedonic prices). On the other hand, the growth of investment in software is considerably lower, reflecting the much smaller rate of decline of software prices in the U.S. compared to the 6 percent assumed by the ABS.

Table I.4. Investment in ICT, Other Countries

(In percent)

	Australia	USA	UK	Canada	Japan	Finland
Average rates of change (volume), 1992-1997						
Hardware	33.8	31.4	29.7	27.5	23.0	30.3
Software	19.0	13.4	13.9	16.6	12.1	12.2
Average rates of change (prices), 1992-1997						
Hardware	-18.1	-18.0	-16.6	-17.4	-20.0	-17.1
Software	-1.5	-1.2	0.5	-0.5	-3.6	-0.1
IT investments as a share of total fixed investments (in current prices), 1997 1/	16.6	19.2	26.2	17.1	16.2	13.5

Source: Daveri (2000). Nominal investments are from the WITSA/IDC database, with the exception of the US (data from BEA). WITSA (World Information Technology and Service Alliance) is a consortium of 32 ICT industries associations around the world. IDC (International Data Corporation) is a research and consulting company on ICT industries.

1/ Investments in hardware, software and communication equipment.

21. Keeping these differences in mind, the evidence that emerges from the two tables is that the pace of investment in ICT during the 1990s has been higher in Australia than in any other industrialized country. Having started from a lower share of total non–residential investment, the higher pace of ICT accumulation has allowed Australia to (at least partly) catch up with most of these countries.

22. The next step in constructing a quality–adjusted capital stock is to express the capital stock in "efficiency" units.[12] This is done by recognizing that older capital goods provide fewer productive services than new ones, as their efficiency declines with age following the release of new, more efficient, models or simply because of "wear and tear." For each capital asset a measure of its productive capacity can be obtained through the perpetual inventory equation:

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[11] In more detail, the authors construct "hedonic" price indexes for ICT investments in several countries under the assumption that the rate of change of ICT prices with respect to other capital goods is the same in each country as in the US. The same methodology is followed by the Goldman Sachs study whose estimates are presented in Table I.2.

[12] The methodology described here was first proposed by Jorgenson and Griliches (1967) and is now adopted by several national statistical agencies, such as the US BLS and the ABS. In particular, the ABS has started releasing data on productive capital stocks in 1998 and revised these estimates in 1999. The data on capital stocks used in this paper are still defined as experimental.

$$[4] \qquad K_{t,j} = \sum_{i=0}^{T} \varphi_{i,j} I_{t-i,j}$$

where $I_{t,j}$ is the (real) investment in capital asset j at time t and $\phi_{i,j}$ is the parameter that captures the rate at which efficiency of the investment in asset j made in t-i is written down over time. $K_{t,j}$ is defined as the "productive" capital stock since it measures the income–generating capacity of the assets. As such it differs from the net capital stock, which is more a "wealth" indicator as it reflects the current market value of the asset (Oliner and Sichel, 2000). The difference between the two measures of capital is especially relevant for ICT capital assets, as their productive efficiency decline much less with age[13] but their economic depreciation (value losses) is high.

23. The concept of capital input that is appropriate for equation [3] is the flow of productive services that each asset provides during a period of time. The basic assumption here is that the flow of capital services is proportional to the asset's productive capital value, and thus declines with age as well.[14] Given the heterogeneity of capital goods, each with a different age–efficiency profile, total capital services must be obtained as the weighted average of individual flows. As in equilibrium "rental prices" (the prices that would be charged to rent a unit of capital) are equal to marginal productivities of the capital goods, the contribution of every assets to total capital services is weighted by an estimate of its rental price.

24. Weighting capital services by rental prices has an immediate consequence for the ICT contribution to output and labor productivity growth.[15] In equilibrium, rental prices for ICT capital tend to be much higher than for other assets, as computers depreciate rapidly and have large negative capital losses (thus, ICT capital must have a greater marginal productivity if it is to be held at all). This implies that investments in ICT goods receive a larger weight in the estimate of capital services than in the estimate of the net capital stock. The related, positive quality change in the stock of capital implies a stronger contribution of capital deepening to growth, at the expense of TFP.

25. At the same time, the combination of higher marginal productivity and falling prices implies that ICT capital has a very high q–ratio, inducing firms to substitute towards this type of capital. Using rental prices allows this substitution process to be captured in the estimate

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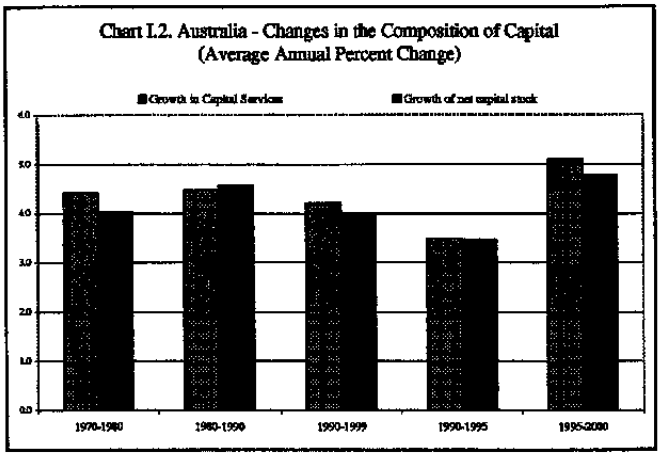
[13] ABS follows the BLS in adopting an hyperbolic age–efficiency function, according to which the efficiency of ICT assets declines by small amounts at first and rapidly at the end.

[14] This assumption amounts to ignoring the fact that utilization of capital services may vary depending on the stage of the business cycle. In this paper, the business cycle's contribution to the total factor productivity estimates is neutralized by applying a Hodrick-Prescott filter to both output and inputs in equation [3].

[15] Annex I.1 describes more in detail the aggregation process.

of capital services. A summary indicator of the compositional change of capital stock towards the more productive ICT capital is obtained for Australia by looking at the difference between growth of capital services and growth of net capital stock. Chart I.2 confirms that the rapid accumulation of ICT assets has brought about a positive compositional effect in Australia's capital stock, especially in the second half of the 1990s.

26. The relative contribution of ICT capital on growth within equation [3] depends on its share of total income (α_{IT}). This share is more likely to be large if ICT is a great share of total capital and/or if the relative rental price between ICT and other capital assets is high. While the rapid decline of ICT prices has reduced the relative rental price for ICT goods (Chart I.3 shows the steady fall in the relative rental prices for selected industries in Australia), the massive investment in ICT capital goods during the 1990s has raised the share of ICT in the total productive capital stock. The net result of these opposing forces has been a sharp increase of the ICT capital income share, especially for software (Table I.5).



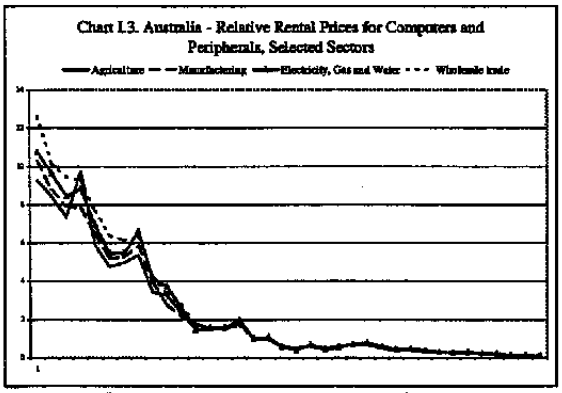


Table I.5. Income Shares of ICT Capital, Australia

(In percent)

	1970-1980	1980-1990	1990-1995	1995-2000
Hardware	0.1	0.9	2.0	2.4
Software	0.2	1.0	1.7	2.1

Source: Staff estimates based on ABS data.

27. Once capital services and asset income shares are estimated for ICT and non–ICT assets, their contribution to output and labor productivity growth can be quantified within equation [3].[16] Table I.6 shows that the ICT contribution to growth has been increasing

[16] As for the other variables in [3], output is measured in terms of valued added, labor input is the number of hours worked, the labor income share is the ratio of compensation of employees plus net taxes on labor to total income, and the capital income share is 1 minus the labor income share. All data are taken from the Australian System of National Account 1999–2000 and refer to the market sector, a special industry grouping comprising only those industries (listed in section E) for which output can be satisfactorily estimated.

steadily in Australia over the last 30 years, both in absolute and relative terms. While ICT capital (the sum of hardware and software) accounted for about 2 percent of capital deepening in the first half of 1970s, it explains about two thirds of capital deepening in the 1990s. Further, while the acceleration of labor productivity in the second half of the 1990s has coincided with the growth of TFP, the acceleration of ICT capital deepening has accounted for almost 0.2 percentage points of labor productivity growth and has offset the negative contribution coming from the slower rate of accumulation of other types of capital. Another piece of evidence that the incessant rate of ICT accumulation in Australia over the last 20 years has finally paid off is that, on average in the last 5 years, ICT capital has contributed to output growth for around 0.9 percentage points per year.

28. Comparing the figures in Table I.6 with those in Table I.2 shows that, in the period 1995–2000, ICT capital deepening contribution to labor productivity growth in Australia was broadly the same as in the U.S., considerably larger than in the UK and the Euro area, and smaller only compared to Japan.

Table I.6. Contribution to Growth, Australia

(In percent)

	1965-1970	1970-1980	1980-1990	1980-1985	1985-1990	1990-1995	1995-2000	Acceleration in 1995-2000
Output growth	5.2	3.1	2.7	2.4	3.0	3.3	3.8	0.5
Labor	1.0	0.2	0.6	0.4	0.8	0.6	0.6	0.0
Capital	2.5	1.6	1.5	1.5	1.6	1.7	1.7	0.1
IT: Hardware	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.2
IT: Software	0.0	0.0	0.1	0.2	0.3	0.4	0.4	0.0
TFP	1.6	1.3	0.6	0.6	0.6	1.0	1.5	0.5
Labor productivity	3.4	2.8	1.7	1.7	1.9	2.3	2.8	0.5
Capital deepening	1.7	1.5	1.1	1.2	1.2	1.2	1.3	0.1
IT: Hardware	0.0	0.0	0.1	0.2	0.2	0.3	0.5	0.2
IT: Software	0.0	0.0	0.1	0.1	0.3	0.3	0.4	0.0
Other capital	1.7	1.5	1.0	0.9	0.7	0.6	0.4	-0.1
TFP	1.6	1.3	0.6	0.6	0.8	1.0	1.5	0.5

Source: Staff estimates based on ABS data.

29. A rough estimate of the ICT capital contribution to labor productivity growth through the ICT–related improvement in the quality of labor (see footnote 7) shows that this is not likely to be a very large factor for Australia. The wage differential between high–skilled and other workers in Australia has increased by 4 percentage points from 1986 to 1998 (De Laine, Laplagne and Stone, 2000). Over the same period, the share of high–skilled workers over total employment has increased by 12 percentage points. Even identifying all high–skilled workers with those using ICT at work, these numbers suggest that ICT has contributed about 0.5 percentage points to the increase of the average wage (and, thus, of labor productivity) over the period 1986–1998, only 0.04 percentage points per year. This result also suggests that the overall contribution of labor quality to the labor productivity growth in Australia has been probably of a second order magnitude.[17]

[17] In the same way as for capital services, an index for "labor services" can also be estimated as the weighted average of hours worked by different age–gender–education groups, with the weights equal to the different groups share of total labor compensation. Estimating such index for Australia, Bassanini, Scarpetta and Visco (2000) also conclude that its contribution to output growth has been relatively modest.

The Second Channel: The Production of ICT

30. Table I.6 shows a relatively large contribution to output growth from TFP, reflecting disembodied technical changes, organizational and managerial changes, and other aspects that are not captured by factor accumulation. An assessment of the second and third channels through which ICT or the new economy might affect growth requires a more detailed analysis of this TFP dynamic.

31. For the purpose of this discussion, a broadly defined ICT–producing sector is made up of those industries involved in the production of computers, peripherals, software and any other means of information processing and communication. This sector in Australia is not separately identified in official statistics. However, an indication of the relative importance of the second channel in equation [3] may be obtained by looking at others statistics about the ICT sector in Australia relative to other countries.

32. An OECD study[18] ranks industrialized countries according to 4 key indicators, the ratio of employment, value added, R&D and trade in their ICT sector with the totals for the business enterprise sector. According to this study, Australia belongs to the low ICT intensity group, with two medium (R&D and trade) and two low (value added and employment) ratings (Table I.7). The relatively low weight of the ICT sector in the Australian economy suggests that this is unlikely to play a significant role in the growth accounting equation [3].

Table I.7. Indicators of ICT Sector, 1997, Selected Countries

(In percent)

	Employment (share of ICT in total business sector)	Value added (share of ICT in total business sector)	R&D (share of ICT in total business sector)	Trade (share of ICT in total trade)
Australia	2.6	4.1	26.8	8.9
New Zealand	2.1	-	17.7	7.4
Canada	4.6	6.5	43.7	9.8
Finland	5.6	8.3	51.0	18.1
Ireland	4.6	-	47.7	33.1
US	3.9	8.4	38.0	15.9
UK	4.8	8.7	21.8	14.9
Japan	3.4	5.8	40.4	19.2
European Union	3.9	6.4	23.6	11.0

Source: *Measuring the ICT sector*, OECD, 2000.

The Third Channel: Spillovers Effects from ICT Capital Accumulation

33. As pointed out in Section B, one test for the existence of a "new economy" is whether, in addition to its contribution to capital deepening, the larger use of ICT capital has caused an increase in TFP growth and whether the TFP increase is sufficiently broad–based and extended across the economy in order to support the possibility of spillovers and externalities associated with the usage of ICT capital. An analysis of the dynamics of TFP in different industries of the economy is thus needed to assess the importance of the third

[18]OECD, 2000.

channel in equation [3]. The next section extends the growth accounting exercise for Australia to a sectoral level.

34. Before presenting the results of the analysis of sectoral TFP growth, however, it should be stressed that while the main focus of this paper is on ICT investment (spending on ICT by the business sector) much of the recent debate on the "new economy" has focused on total spending on ICT (by households and the public sector as well as businesses) taken as a proxy for the diffusion of new technologies across the population. A ranking of OECD countries based on their total spending on ICT as a share of GDP (using data on ICT nominal investments from the WITSA/IDC database) indicates that in 1997 Australia was second only to New Zealand and well above the U.S. and all the other OECD countries. Other indicators for the degree of penetration of ICT across the economy are reported in Table L8, and all show the high degree of usage of new technologies by Australian households relative to other industrialized countries.

E. A Cross–Industry Analysis

35. While the figures in Table L8 are an important signal of the degree of diffusion of ICT in everyday life, it would be simplistic to base an assessment of a country's ability to benefit from a significant ICT contribution to output growth solely on such indicators. In order to make such a judgment a further step is required, namely to establish a link between a country's capacity to adopt new technologies and its ability to "incorporate" them in the production process.[19]

Table L8. Indicators of ICT Diffusion, Selected Countries

	Percentage of Households With Access to PCs 1/	Internet Host Per 1000 Inhabitants 2/	Internet Cost 3/ (OECD=100)	Internet Users 4/ (% of pop.)	Spending on ICT 5/ (% of GDP)
Australia	45.9	61.0	73.3	23.4	8.5
New Zealand	27.6	62.0	89.5	18.0	8.7
Canada	36.0	93.0	83.6	21.2	7.7
Finland	42.0	122.0	61.3	30.5	6.2
Ireland	-	30.0	96.2	7.2	5.9
Sweden	68.0	95.0	70.5	29.0	8.4
US	42.1	119.0	77.1	28.3	7.7
UK	58.0	45.0	92.0	13.7	7.8
Japan	25.8	22.0	81.8	-	7.6
European Union	-	30.0	-	8.6	6.3

1/ OECD, Information Technology Outlook (quoting National Statistical Offices).
2/ Internet Software Consortium (ISC) (www.isc.org).
3/ OECD. The figures refer to the cost of access to Internet for 20 hours including VAT.
4/ Computer Industry Almanach Inc. (www.c-i-a.com).
5/ OECD, Information Technology Outlook.

[19] An example of the need to take these figures with a pinch of salt comes from the 1999–2000 "Business Use of Information Technology" survey of business use of computers and the Internet, published by the ABS. This survey shows that, as of June 2000, about 60 percent of Australian firms had Internet access, but only 23 percent of them used the Internet for activities associated with buying goods and 28 percent in activities associated with selling goods.

36. This can be assessed by applying the growth accounting equation [3] to the eight market sector industries: Agriculture, Forestry & Fishing; Mining; Manufacturing; Electricity, Gas & Water; Construction; Retail Trade; Wholesale Trade; Transport & Storage; Communications; Accommodation, Cafes & Restaurants; Finance & Insurance; and Cultural & Recreation Services.[20]

37. Two caveats are necessary before proceeding. The first one is to keep in mind the well–known problems in measuring the output of service industries. A couple of examples illustrate the issue at stake.[21] One of the most relevant innovations related to the investment in ICT capital within the banking sector is the diffusion of ATMs, which, among other benefits, has allowed great saving of time, permitted transactions 24 hours a day and greatly reduced the need to carry cash balances. Nonetheless, such quality (and, thus, output) improvements are generally not captured in the national account statistics (with the only exception of the U.S.). Similarly, in the retail sector, the shift from department stores to lower–price outlets is typically treated as a reduction in quality, not prices. Such a shift (and the related value of increased product variety) is explicitly ruled out in the construction of price indexes which follow a specific product in a specific store (the same way in which price indexes of computers follow the "box," rather than what is inside it, thereby missing the increase in power and speed).

38. The second caveat is that a fully satisfactory estimate of sectoral TFP would require using industry gross output, and treating material inputs as a separate factor of production in the growth accounting approach. However, in the absence of this series for Australian industries, the estimates below are based on industry value added.[22] As a large part of the output of the service sector is sold as an intermediate input to other industries, errors in measuring their output will likely result in an over–estimation of the labor and total factor

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[20] For each of these industries capital input is obtained as described by equation [7] in Annex I.1. As the hours worked at a sectoral level are available only from 1986, the results are obtained only from this year onwards. The labor income shares for each industry are obtained as the ratio of the compensation of employees to the industry value added.

[21] Bosworth and Triplett (2000) provide a more detailed discussion of this issue.

[22] In contrast to the "sectoral" approach to industry productivity proposed by Domar (1961), and based on the "gross output" concept, using a net output concept (such as value added) implies that the intermediate inputs purchased from other sectors are subtracted from the sector's gross output rather than recognized as a separate factor of production (in addition to the primary factors, labor and capital). By providing an explicit role for intermediate goods and services as a source of industry growth, the "gross output" concept allows the aggregate TPF gains to be correctly allocated among industries (this is also the method adopted by the BLS in estimating productivity for US industries). For a detailed treatment of these issues, see Gullickson and Harper (1999).

productivity gains accruing to the receiving industry. While in the aggregate this is irrelevant, as under–estimation of productivity gains for one industry is offset by over–estimation for another one, a growth accounting exercise conducted at the sectoral level using a value added concept of output may end up erroneously allocating productivity gains across different industries[23].

39. For the purpose of this paper, these problems are especially relevant because the largest purchases of ICT capital in Australia are by the service sector. Table I.9 shows that, in 1987–2000, communications, finance and insurance, accommodation cafes and restaurants and cultural and recreational services have invested in computers and peripherals at a much stronger pace than other industries. The same picture is obtained by looking at the dynamics of the ICT capital stocks. Table I.10 shows that the three most "ICT–capital intensive" sectors are finance and insurance, construction and wholesale trade for software, and finance and insurance, retail trade and cultural and recreational services for hardware.

Table I.9. Investment in Hardware (Computers and Peripherals), Volumes

(In percent)

	1987-1995	1995-2000
Agriculture, Forestry & Fishing	2.4	2.5
Mining	5.1	6.0
Manufacturing	6.1	7.6
Electricity, Gas & Water	-0.8	11.8
Construction	3.7	3.0
Wholesale Trade	3.3	6.3
Retail Trade	7.1	10.0
Accommodation, Cafes & Restaurants	5.0	14.1
Transport & Storage	0.6	2.1
Communications	7.5	19.4
Finance & Insurance	5.2	18.6
Cultural & Recreation Services	7.4	21.6

Source: Staff estimates based on ABS data.

Table I.10 ICT Capital Services, Shares of Total Capital and Rates of Growth (Annual Averages), 1995-2000

(In percent)

	Hardware				Software			
	Capital intensity	Rank	Rate of growth	Rank	Capital intensity	Rank	Rate of growth	Rank
Agriculture	0.11	11	25.7	9	0.02	12	16.5	2
Mining	0.06	12	31.6	4	0.15	11	14.4	8
Manufacturing	0.24	10	28.6	7	0.57	9	14.7	4
Electricity, gas and water	0.55	8	51.2	1	0.21	10	12.2	11
Construction	0.89	5	25.2	10	2.15	2	15.7	3
Wholesale Trade	0.88	6	26.7	8	1.93	3	14.5	7
Retail Trade	1.61	2	30.0	6	1.77	5	14.5	6
Accommodation, Cafes and Restaurants	0.50	9	30.8	5	0.83	8	14.7	5
Transport & Storage	0.74	7	16.2	12	0.87	7	13.2	10
Communications	0.96	4	36.7	3	1.56	6	11.3	12
Finance & Insurance	2.79	1	24.1	11	5.51	1	22.7	1
Cultural & Recreation Services	1.50	3	39.8	2	1.88	4	14.1	9

Source: Staff estimates based on ABS data.

40. The main objective of this section is to examine the cross–industry relationship between ICT capital and TFP growth. The data on investments and capital stocks would suggest a larger relative ICT capital contribution to labor productivity growth in the service sector industries. Are these also the industries reporting the highest increases in TFP?

41. Table I.11 shows that the industry with the highest TFP growth in the most recent period 1995–2000 was wholesale trade, followed by agriculture, communication services,

[23] In analyzing the link between ICT growth and TFP, this paper thus restricts its focus to within–industry effects and ignores possible spillovers effects across industries. For example, network gains may occur between the manufacturing and wholesale sectors, implying that growth in ICT usage in the wholesale sector could produce TFP gains in the manufacturing sector.

and finance and insurance.[24] Labor productivity growth in these industries has also benefited from a relatively high contribution from ICT assets, but with two exceptions. The first one is agriculture, with a relatively low contribution from both hardware and software. The second one is wholesale trade, which has been taking relatively less advantage from hardware[25].

42. Overall, the data from Table I.11 provide mixed signals on the existence of a positive relationship between TFP and ICT capital. On the one hand, labor productivity and TFP growth have been very large in some service industries which have been intensely investing in ICT technologies. This is a relevant result per se, first because it seems to contradict the so–called "ICT paradox" (largely identifiable with the slow labor productivity growth in the ICT–intensive service sector), and second because it occurs despite the problems in output measurement that were stressed above, and that are probably causing an underestimation of the productivity gains in the service sector.[26]

Table I.11. TFP and ICT Contribution to Labor Productivity Growth, 1995-2000

(Average annual rates of change)

	Estimates			Rank		
		Capital deepening			Capital deepening	
	TFP	Hardware	Software	TFP	Hardware	Software
Agriculture	3.7%	0.1%	0.1%	2	11	12
Mining	0.3%	0.1%	0.1%	11	12	11
Manufacturing	0.6%	0.5%	0.3%	9	7	7
Electricity, gas and water	1.0%	1.6%	0.1%	7	1	10
Construction	1.4%	0.8%	0.4%	6	6	3
Wholesale Trade	4.2%	0.3%	0.3%	1	10	5
Retail Trade	0.5%	0.8%	0.3%	10	5	4
Accommodation, Cafes & Restaur.	0.8%	0.5%	0.2%	8	8	9
Transport & Storage	1.9%	0.4%	0.3%	5	9	6
Communications	3.2%	1.1%	0.4%	3	3	2
Finance & Insurance	2.9%	1.3%	1.8%	4	2	1
Cultural & Recreation Services	-4.3%	0.9%	0.3%	12	4	8

Source: Staff estimates based on ABS data.

43. While the large ICT capital accumulation and the very strong increase in TFP in some of the industries considered (such as finance and insurance) support the notion of a new economy, Table I.11 also shows that there have been some industries which have experienced a modest TFP growth even with a relatively substantial contribution to growth from ICT assets, particularly cultural and recreational services. However, abstracting from this sector and plotting together TFP growth rates and the ICT share of total capital services

[24] Estimates of the sources of labor productivity growth for the market sector industries in different periods of time is reported in Annex I.2.

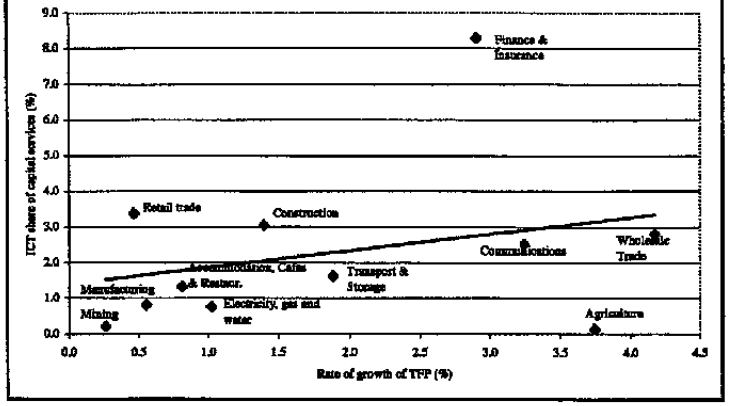
[25] This can be explained by the low ICT capital intensity of agriculture (the lowest for software and the second lowest for hardware) and the relatively low hardware capital intensity of the wholesale trade sector (Table I.10).

[26] The acceleration in labor and total factor productivity in the service sector is not solely an Australian phenomenon, as recent estimates for the US also show a pick–up in some of these industries, in particular in wholesale trade, retail trade and finance (see Council of Economic Advisors, 2001).

in each industry suggests that there is indeed a positive relationship between TFP growth and ICT capital intensity across Australian industries[27] (Chart I.4).

44. Clearly, the correlation showed in Chart I.4 does not suggest a causal link between investments in ICT and TFP growth. There could be other, common factors that are driving both variables in the period of time considered, such as the structural reforms being implemented in Australia since the mid 1980s. The counter argument to this observation could be that the essence of the new economy story for Australia is the fact that these reforms have led to organizational changes, improved management techniques, and a more business–friendly institutional environment, Although these factors would be reflected in a long–term, sustainable increase of TFP growth, at the same time, the reforms have encouraged the trend towards an upgrading of new technologies in production processes and more active interest in product and process innovation, with resultant strong incentives for ICT capital accumulation.

Chart I.4. Australia - TFP Growth and ICT Share of Capital Services, 1995-2000



45. In other words, the key argument of this story is that, *especially in the context of the more favorable environment produced by structural reforms*, the sustained accumulation of ICT capital was likely to be associated with a profound reorganization of economic activities, aimed at taking advantage of the network externalities allowed by the new technologies. These externalities are in theory capable of changing the nature and the boundaries of firms, allowing activities that are currently carried out within hierarchical structures to take place by market transactions, reducing intermediation, squeezing out monopoly rents, reducing inventory costs, moving activities from the market to household and from households to the market. In particular, the commercial use of Internet, both at a business–to–business and business–to–consumer level, would be mostly responsible for this shift in the technological paradigm.

[27] The coefficient of correlation, measuring the degree of linear correlation between TFP growth rates and ICT shares of capital, is positive and equal to 0.3. Chart I.4 plots TFP growth with ICT capital intensity, and not the growth of ICT capital, as spillovers effects are likely to become relevant only when the stock of ICT capital becomes sufficiently large.

46. While it is safe to conclude that it is still too early for the statistics to capture the full potential of the ICT network externalities, the more limited objective pursued in this paper is to use a traditional growth accounting framework to examine whether there at least signs of the positive impact of ICT capital on TFP growth, following the proponents of the new economy story. At an aggregate level, the analysis suggest that ICT capital accumulation has certainly played a great role in the productivity acceleration recently experienced by Australia. Taking the analysis to the sectoral level shows that, despite the measurement problems, one cannot rule out the possibility that ICT capital had a part in the TFP acceleration across industries. On the whole, these results suggest that the market concerns that Australia is still an "old economy" are misplaced.

F. Conclusions

47. Using official data from the Australian Bureau of Economic Statistics and a formal growth accounting framework, this paper shows that the rapid accumulation of ICT capital over the last two decades in Australia has played a significant role in explaining the impressive, structural acceleration of labor productivity after 1995. About half of the labor productivity growth in the last 5 years can be explained by capital deepening, and around two–thirds of total capital deepening can be attributed to ICT capital (hardware and software). A comparison with other countries shows that the ICT capital contribution to productivity growth in Australia has been as large as in the U.S. and well above the average for the countries in the Euro area.

48. A key test for the new economy story is whether ICT capital accumulation has caused an economy wide acceleration in TFP growth. Extending the growth accounting framework to the sectoral level, this paper shows that, despite measurement problems, there is a correlation between TFP growth rates and ICT share of capital services across industries. This leaves the door open to the possibility that Australia will be in a position to benefit from the network externalities associated with the diffusion of ICT in economic activity.

References

Australian Bureau of Statistics, 1999–2000, *Business Use of Information Technology*.

Bassanini, Andrea, Stefano Scarpetta and Ignazio Visco, 2000, "Knowledge, Technology and Economic Growth: Recent Evidence from OECD Countries," *OECD Working Paper*, No.259.

Bean, Charles, 2000, "The Australian Economic Miracle: a View From the North," in *The Australian Economy in the 1990s*, Reserve Bank of Australia.

Bosworth, Barry and Jack Triplett, 2000, "What's New About the New Economy? IT, Economic growth and Productivity," Brooking Institution. (http://www.brook.edu/views/papers/bosworth/20001020.htm)

Bosworth, Barry and Jack Triplett, 2000, "Productivity in the Services Sector," Brooking Institutions, forthcoming in *Services in the International Economy* ed. by Robert M. Stern, (http://www.brook.edu/views/papers/triplett/20000112.htm)

Council of Economic Advisors, 2001, *Economic Report of the President, Washington*, US.

Daveri, Francesco, 2000, "Is Growth an Information Technology Story in Europe Too?," *IGIER Working Paper*, n.168.

DeLaine, Craig, Patrick Laplagne and Susan Stone, 2000, "The Increasing Demand for Skilled Workers in Australia: The Role of Technical Change," *Staff Research Paper*, (Canberra: Productivity Commission).

DeLong, Bradford and Lawrence Summers, 1990, "Equipment Investment and Economic Growth", *National Bureau of Economic Research, Working Paper Series*, NO. 3515

Domar, Evsey, 1961, "On the Measurement of Technological Change", *Economic Journal*, (December).

Goldman–Sachs, 2000, "The ICT Revolution—New Data on the Global Impact," *Global Economics Weekly* (October).

Gordon, Robert, 2000, "Does the "New Economy" Measure up to the Great Inventions in the Past?," *Journal of Economic Perspectives*, Vol. 14 (Fall), No. 4

Gullickson, William and Michael J. Harper, 1999, "Possible Measurement Bias in Aggregate Productivity Growth," *Monthly Labor Review* (February) pp. 47–67

Jorgenson, Dale and Zvi Griliches, 1967, "The Explanation of Productivity Change," *Review of Economic Studies*, Vol. 34, No. 3.

Jorgenson, Dale and Kevin Stiroh, 2000, "Raising the Speed Limit U.S. Economic Growth in the Information Age," *Brooking Papers on Economic Activity*, 31:1.

OECD, 2000, *Science and Technology Outlook.*

OECD, 2000, *Measuring the ICT Sector.*

Oliner, Stephen and Daniel Sichel, 2000, The Resurgence of Growth in the late 1990s: is Information Technology the Story, *Federal Reserve Board Working Paper* (February).

Parham, Dean, 1999, "The New Economy? A New Look at Australia Productivity Performance," *Staff Research Paper*, (Canberra: Productivity Commission).

Productivity Commission, 1999, "Microeconomic Reforms and Australian Productivity: Exploring the Links," *Staff Research Paper*, (Canberra: Productivity Commission).

Salgado, Ranil, 2000 "Australia: Productivity Growth and Structural Reforms," *IMF Country Report 00/24* (Washington: International Monetary Fund).

Scarpetta Stefano, Andrea Bassanini, Dirk Pilat and Paul Schreyer, 2000, "Economic Growth in the OECD Area: Recent Trends at the Aggregate and Sectoral Level", *OECD/ECO Working Paper*, n.21.

Schreyer, Paul, 2000, "The Contribution of Information and Communication Technology to Output Growth: a Study of the G7 Countries," *OECD/DSTI Working Paper*, 2000/2.

Weighting Capital Services by Rental Prices

Ignoring taxes and fiscal incentives, the rental price for the asset *j* at time *t* can be estimated as:

$$[6] \qquad c_{t,j} = P_{t,j}(r_t + \delta_j - \pi_{t,j})$$

In equilibrium, the gross return on investing one dollar in asset *j* (the term in brackets on the right hand side of this expression) must be sufficient to cover opportunity costs (*r*, the net nominal rate of return on capital, assumed equal for all assets), the loss in market value with ageing (d_j, the depreciation rate for asset *j*) and the capital gains or losses associated with a change in price of the asset (π_j, the rate of change of the asset *j* price, $P_{t,j}$). The rate of growth of capital services, the appropriate measure of capital input to be used in equation [3], is thus obtained as:

$$[7] \qquad \Delta \ln K_t = \sum_j v_{j,t} \Delta \ln K_{t,j}$$

where

$$[8] \qquad v_{j,t} = \frac{1}{2}\left(\frac{c_{t,j}K_{t,j}}{\sum_j c_{t,j}K_{t,j}} + \frac{c_{t-1,j}K_{t-1,j}}{\sum_j c_{t-1,j}K_{t-1,j}} \right)$$

The official ABS data used in this paper distinguish between 15 types of assets. These are: Computer software, Computers and peripherals, Road vehicles, Other transport equipment, Industrial machinery and equipment, Electrical and electronic equipment, Other plant and equipment, Non–dwelling construction, Ownership transfer costs, Inventories, Land, Livestock, Mineral exploration, and Artistic originals.

For each of them the ABS provides different estimates of productive stocks and rental prices depending on the industry where they are used and, for each industry, on whether they belong to the corporate or unincorporated sector. Following equation [7], rental prices are used to weight the rates of change of each asset's productive capital stock, both within and across industries. The sum of these weighted rates of change gives the aggregate capital services. For the industry analysis the same methodology is followed, this time weighting only corporate and unincorporated productive capital stocks within the same industry.

If the growth contribution of asset *j* (i.e., ICT capital) is to be seen separately in equation [3], it would be the product of this asset's capital services and its share of total income. In turn, this share can be expressed as the product of the share of total capital income accruing to asset *j* and the share of capital over total income:

$$[9] \qquad \alpha_j = \frac{c_{t,j}K_{t,j}}{\sum_j c_{t,j}K_{t,j}} \frac{\sum_j c_{t,j}K_{t,j}}{p_Y Y_t}$$

Table I.2.1. Source of Labor Productivity Growth, by Industry

	1987-2000	1990-1995	1995-2000
Agriculture			
Labor productivity growth	3.1%	2.8%	3.5%
TFP	2.6%	2.1%	3.7%
Capital deepening	0.5%	0.7%	-0.2%
Hardware	0.1%	0.1%	0.1%
Software	0.0%	0.0%	0.1%
Mining			
Labor productivity growth	5.6%	5.7%	5.2%
TFP	1.4%	1.8%	0.3%
Capital deepening	4.2%	3.9%	5.0%
Hardware	0.1%	0.1%	0.1%
Software	0.1%	0.1%	0.1%
Manifacturing			
Labor productivity growth	2.8%	3.2%	2.3%
TFP	1.1%	1.3%	0.6%
Capital deepening	1.7%	1.8%	1.8%
Hardware	0.4%	0.4%	0.5%
Software	0.3%	0.3%	0.3%
Electricity, gas and water			
Labor productivity growth	7.5%	7.8%	6.3%
TFP	2.9%	3.5%	1.0%
Capital deepening	4.6%	4.3%	5.3%
Hardware	0.8%	0.4%	1.6%
Software	0.1%	0.1%	0.1%
Construction			
Labor productivity growth	0.4%	0.7%	1.3%
TFP	-0.6%	-0.9%	1.4%
Capital deepening	1.1%	1.6%	-0.1%
Hardware	0.7%	0.7%	0.8%
Software	0.5%	0.5%	0.4%
Wholesale trade			
Labor productivity growth	2.7%	1.9%	5.4%
TFP	1.9%	1.1%	4.2%
Capital deepening	0.8%	0.7%	1.2%
Hardware	0.3%	0.2%	0.3%
Software	0.4%	0.4%	0.3%

Table I.2.1. Source of Labor Productivity Growth, by Industry (Concluded)

	1987-2000	1990-1995	1995-2000
Retail trade			
Labor productivity growth	1.0%	1.1%	2.3%
TFP	-0.6%	-0.4%	0.5%
Capital deepening	1.5%	1.5%	1.8%
Hardware	0.7%	0.6%	0.8%
Software	0.4%	0.5%	0.3%
Accom., cafes and restaurant			
Labor productivity growth	-1.0%	-1.4%	1.4%
TFP	-1.8%	-2.3%	0.8%
Capital deepening	0.8%	0.9%	0.6%
Hardware	0.4%	0.3%	0.5%
Software	0.3%	0.3%	0.2%
Transport and storage			
Labor productivity growth	2.1%	2.2%	2.5%
TFP	1.1%	1.1%	1.9%
Capital deepening	1.0%	1.1%	0.6%
Hardware	0.4%	0.5%	0.4%
Software	0.3%	0.4%	0.3%
Communication services			
Labor productivity growth	7.6%	7.9%	6.4%
TFP	4.3%	4.9%	3.2%
Capital deepening	3.3%	3.0%	3.2%
Hardware	0.7%	0.5%	1.1%
Software	0.7%	0.7%	0.4%
Finance and insurance			
Labor productivity growth	5.2%	4.4%	6.4%
TFP	2.0%	1.3%	2.9%
Capital deepening	3.2%	3.2%	3.5%
Hardware	1.2%	1.0%	1.3%
Software	1.4%	1.2%	1.8%
Cultural and rec.services			
Labor productivity growth	-0.8%	-0.6%	-0.9%
TFP	-3.3%	-2.8%	-4.3%
Capital deepening	2.5%	2.2%	3.5%
Hardware	0.6%	0.5%	0.9%
Software	0.4%	0.4%	0.3%

II. Technology Transfer and R&D: A Cross–Country Regression[1]

A. Introduction

1. A considerable part of the debate on the "new economy" has been centered on the issue of the benefit of being a producer versus a user of frontier technology.[2] A view that has attracted a good deal of attention especially among market analysts is that Australia is an "old economy" and is unlikely to benefit from the productivity gains associated with the "new economy" because of its small ICT production base. Their view has been challenged by those who call attention to the widespread diffusion of ICT throughout the Australian economy. In their view, new technologies (either embodied in capital goods or disembodied, such as those associated with international R&D and patenting) can be imported from abroad, and the existence of a domestic production is not a necessary condition to claim "new economy" credentials. Indeed, Chapter I confirms that Australia has greatly benefited from adopting new technologies, and that it is well placed to take further advantage from ICT capital accumulation in the future.

2. This paper addresses the following question: Even assuming that new technologies (either embodied in capital goods, such as computers, or disembodied, such as those associated with patenting) can be imported from the technological "leaders," does the existence of a domestic base of innovation help in facilitating the transfer of technology and making it more efficient?[3] This question has clear policy implications as Australia considers its approach to supporting innovation following the Innovation Summit in 2000.

3. This paper's findings support the view that R&D plays an important role in the "catch–up" process. Specifically, using a panel of 14 OECD countries during 1981–1997, this paper concludes that an increase in the rate of growth of R&D expenditure raises the rate at which new technologies may be transferred to an economy which is still catching up to the technological frontier. The main policy implication for Australia is that strenghtening

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[1] Prepared by Roberto Cardarelli (x38059), who is available to answer questions.

[2] With reference to the US, these two different positions can be identified with the studies of Gordon (2000), who attributes the recent acceleration of labor productivity growth only to the ICT producing sector, and those of Oliner and Sichel (2000) and Nordhaus (2001), who find evidence of a post-1995 acceleration of total factor productivity growth outside the ICT producing sector.

[3] A large number of studies within the OECD have addressed the interaction between R&D and productivity growth (see OECD, 2000, for a comprehensive review). In particular, one recent contribution by Verspagen (2001) shows that R&D seems to have a crucial part in the catching–up process and that recent trends suggest that the absorption of foreign technology increasingly requires more active efforts, with technological differences between countries translating more easily into growth rate differentials.

domestic innovation capacity and setting sound incentives for R&D is likely to pay off in the future and can contribute to sustaining the current pace of economic growth.[4]

4. The rest of the paper is organized as follows. The next section presents the theoretical framework and the data used in the estimation (Annex 1 contains the detailed description of the sources of data and of the methodology followed in estimating levels and rates of growth of total factor productivity). Section C presents the results of the panel data estimation, and section D concludes.

B. Methodology and Data

5. The key hypothesis of interest in this paper is whether an increase in R&D raises the rate at which new technologies may be transferred to an economy which is behind the technological frontier. This hypothesis is tested by estimating an equation which is the reduced–form of a "β–convergence" productivity model (Bernard and Jones, 1996), according to which total factor productivity (TFP) in country j is a function of country–specific innovation (γ_j) and of the technology transfer from the frontier country F (the U.S.), which is a function of the productivity gap between the two countries:[5]

[1] $$\ln\left(\frac{TFP_t^j}{TFP_{t-1}^j}\right)=\gamma_j(\xi_j)+\lambda_j(\xi_j)\ln\left(\frac{TFP_{t-1}^j}{TFP_{t-1}^F}\right)$$

6. The two terms γ_j and λ_j are assumed to be log–linear function of economic variables (ξ_j) that are generally thought to affect the economy's ability to assimilate existing technologies or generate innovations. In addition to R&D activity, the econometric estimation considers education, openness to trade, and an indicator of labor market flexibility. The last two variables may be interpreted as proxies for the structural reforms that

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[4] According to the *2001 Economic Report of the President,* the US Federal Government increased funding for basic research at a 2 percent annual real rate in the last 6 years and supplies over half of all basic research funds in the country. Besides providing direct funding, government policies in the US have created a favorable climate for private R&D through the tax code (one of the most favorable among OECD countries) and though encouraging the formation of strategic technology alliances among private sector firms. Partly as a consequence of these policies, private sector real spending on basic R&D in the US has grown at an astounding average annual rate of 17 percent since 1991.

[5] The steady state implication of this model is that countries with the lowest initial relative productivity level should also experience the highest rate of growth of relative TFP. Further, in steady–state, the productivity gap is absorbed and TFP levels differ only because of different country–specific rates of innovation, as: $\ln\left(\frac{TFP^j}{TFP^F}\right)=\frac{\gamma_j-\gamma_F}{\lambda_j}$

have been undertaken in many industrialized countries, including Australia which contributed, inter alia, to improving the ability and incentives to import and make use of new technologies. The main objective of the estimation is to show whether, once the contribution of these other economic variables is taken into account, R&D affects the rate at which the productivity gap with the "leader" economy is absorbed (through the technology transfer) λ_j[6] and/or the domestic rate of innovation γ_j. To take into account the possibility that it is the rate of change of R&D activity (rather than its level), that matters for TFP growth, equation [1] is estimated using both log levels and first differences of the R&D variables.

7. The analysis is based on a three measures for R&D activity: total gross expenditure on R&D (GERD), total R&D personnel as a share of total employment; and the number of resident patent applications. As far as the other variables are concerned, the choice of indicators is limited by the availability of sufficiently long time series data. The gross enrollment ratios in tertiary education has been used as a proxy for human capital.[7] The openness of the economy is proxied by the ratio of the sum of exports and imports to GDP. The degree of flexibility in the labor market is proxied by the number of working days lost in disputes. Also, a cyclical variable (the rate of change in the consumption of electricity) is introduced in order to control for the impact of changes in capacity utilization on the rate of growth of TFP[8].

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[6] In Cameron, Prouding and Redding (1997), another channel is the quantity of the technological know–how that can be transferred from the leading economy, as the productivity gap on the right hand side of [1] is multiplied by a parameter ω_j not necessarily equal to 1 ($\omega_j \in (0,1]$). Both the theoretical and empirical results are not sensitive to this generalization, and in what follows this effect is not identified separately (being observationally equivalent to the effect of domestic innovation, γ_j).

[7] Tertiary education corresponds to the ISCED levels 5, 6 and 7 and is provided at universities, teachers' colleges, higher professional schools, which requires, as a minimum condition of admission, the successful completion of secondary education or evidence of the attainment of an equivalent level of knowledge. Clearly, some caution is required when using this indicator for inter–country comparison, since the countries do not always classify degrees and qualifications at the same ISCED levels, even if they are received at roughly the same age or after a similar number of years of schooling. Further, this indicator only measures levels of educational attainment i.e., the quantity of schooling, and does not necessarily capture the quality of the education.

[8] It is worth stressing that the objective of this paper is not to "explain" productivity growth. Such an ambitious objective would require conducting the analysis at an industry or firm level. The omission of variables that are generally supposed to play a role in the productivity growth story can be justified in view of this observation. For example, foreign direct investment is certainly an important channel of technology transfers across countries, and is likely to affect productivity growth and catching–up. The omission of this variable, however,

(continued)

8. The estimation uses panel data for 14 OECD countries[9] between 1980–1997. However, the labor market variable is not available for 4 countries (Denmark, Japan, Netherlands and Norway), while for Germany only pre–unification data are available. Since tertiary education data covers only the post–unification period for Germany, in the regression which uses labor market and education variables Germany too drops out, and the total number of countries considered falls to 9.

9. TFP levels are calculated as the Solow residuals, that is, residuals from a neoclassical growth accounting equation (derived from a constant return to scale production function and based on the hypothesis of perfect competition). However, for this exercise, neither capital nor labor is adjusted for changes in quality, due to data limitations.[10] In particular, the stock of capital does not reflect the "capital services" methodology presented in Chapter I, and labor productivity is estimated as output per employee. Total factor productivity, therefore, incorporates embodied technological progress and the improvement in labor quality. However, while the latter effect should be captured by the human capital variable, the lack of quality–adjusted capital should not be a cause of concern, as the main objective of the estimation is to check whether R&D affects the transfer of new technologies from the frontier country, including those embodied in capital assets.

Table II.1. TFP Growth Rates and TFP Levels Relative to the United States

	TFP growth			Relative TFP		
	1981-90	1990-97	1995-97	1981-90	1990-97	1995-97
Australia	0.50	1.28	1.43	78.13	78.00	78.87
Canada	0.13	0.42	0.52	85.95	79.81	78.01
Denmark	0.50	1.63	1.21	60.39	56.74	57.20
Finland	2.19	2.71	3.65	58.62	62.66	64.35
France	1.85	0.75	0.76	75.91	76.32	74.93
Germany	1.17	-0.68	0.79	77.25	68.87	66.66
Ireland	3.73	3.82	5.68	56.46	67.55	69.01
Italy	1.10	0.80	0.95	68.88	68.54	67.53
Japan	1.90	0.63	1.32	69.35	69.47	67.91
Netherlands	1.30	1.04	0.65	76.81	77.82	76.68
New Zealand	0.98	0.57	0.24	59.43	57.98	57.99
Norway	0.11	1.96	1.07	54.74	52.60	52.69
Spain	1.76	0.72	0.39	68.00	68.57	66.89
United Kingdom	2.35	1.90	1.16	61.74	66.29	67.52
United States	1.12	0.97	1.10	100.00	100.00	100.00

Source: See Annex II.1.

10. Table II.1 shows that estimated TFP levels lie below that of U.S. for each country in the sample, for the whole period considered. It shows that Australia pulled ahead of other countries, and now has TFP levels second only to that of the U.S. At the same time,

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is not a serious drawback in the present context, where the objective is to use cross–country panel data regressions to shed some light on the relative importance of R&D on the speed of these transfers. At the econometric level, allowing the intercept to vary across country should absorb country-specific (exogenous) effects that are not captured by regressors.

[9] These are: Australia, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, UK

[10] The data sources and the methodology followed to derive relative TFP levels are reported in Annex 1.

Table II.2 shows that Australia lags behind most of the other countries in the sample in terms of R&D expenditure and, to a lesser extent, in terms of the share of R&D personnel over total employment (although it is ahead of the U.S. for the latter variable).[11] As for the other economic variables, over the period 1990–1997 Australia had one of the highest gross tertiary enrolment ratios in the sample (second only to Canada and U.S.), while the impact of the labor market and trade reforms over the 1990s is evidenced by the decline in the number of days lost for industrial disputes and by the rapid increase in the degree of openness of the economy compared to the previous decade.

Table II.2. R&D Indicators and Other Variables Affecting TFP

	GERD		RES		PAT		EDU		OPEN		LAB	
	1981-90	1990-97	1981-90	1990-97	1981-90	1990-97	1981-90	1990-97	1981-90	1990-97	1981-90	1990-97
Australia	1.2	1.5	1.0	1.2	1.7	1.5	28.8	57.6	26.5	29.4	-0.10	-0.12
Canada	1.4	1.6	1.0	1.1	0.3	0.2	72.4	91.0	44.9	52.4	-0.12	-0.05
Denmark	1.3	1.7	0.9	1.2	0.5	0.5	30.5	42.6	53.6	51.2	-	-
Finland	1.6	2.2	1.1	1.8	2.7	2.4	37.0	61.6	47.2	47.8	-0.04	-0.01
France	2.2	2.3	1.4	1.5	0.7	0.4	31.1	47.0	37.7	36.6	-0.11	-0.05
Germany	2.6	2.4	1.7	1.5	8.0	6.8	31.6	40.7	50.3	42.9	-0.26	-
Ireland	0.8	1.2	0.7	0.9	0.2	0.2	23.4	35.9	98.2	110.8	-	-0.27
Italy	1.1	1.1	0.8	0.9	-	0.7	26.7	38.8	35.7	34.5	-0.12	-0.16
Japan	2.7	2.9	1.8	1.8	62.7	63.4	29.0	34.0	19.9	15.9	-	-
Netherlands	2.0	2.0	1.4	1.6	0.6	0.4	32.5	45.3	98.5	91.0	-	-
New Zealand	1.0	1.0	0.7	0.8	0.3	0.2	34.4	54.4	45.7	45.6	-0.09	-0.42
Norway	1.4	1.7	1.0	1.2	0.2	0.2	32.0	52.2	52.0	51.2	-	-
Spain	0.6	0.8	0.5	0.8	0.5	5.1	29.0	43.3	29.7	33.0	-0.02	-0.08
United Kingdom	2.2	2.0	1.3	1.2	5.1	3.6	23.1	41.7	42.3	42.0	-0.17	-0.24
US	2.6	2.6	0.8	0.9	16.6	18.9	63.8	80.0	14.4	16.9	-0.13	-0.03

Source: See Annex II.1.

GERD: Nominal total R&D expenditure (as a percentage of GDP).
RES: Numbers of total R&D personnel (as a percentage of total employment).
PAT: Number of resident patent application (share of total).
EDU: Gross tertiary enrollment ratio.
OPEN: Ratio of Imports plus Exports over GDP.
LAB: Working days lost for industrial disputes, average annual rate of change.

C. Econometric Results

11. Turning to the econometric of equation [1], given the relatively small number of time series observations, a country–by–country set of regressions would leave very few degrees of freedom and compromise the efficiency of the estimates. Pooling observations across countries increases the numbers of degree of freedom and permits the exploitation of the

[11] In particular, the behavior of business R&D expenditure in Australia has been a cause of concern (see Maddock, 2000). After it reached a peak in 1995 (0.85 percent of GDP), business R&D fell by almost 15 percent in the following 4 years (to 0.65 percent in 1999). This was largely a consequence of the cut in the tax concession for business R&D from 150 percent to125 percent, and of the narrowing of the range of expenditure subject to such concessional treatment. Partly to correct this trend, in January 2001 a series of measures were announced to boost Australia's ICT innovation ability, involving a tax concession of 175 percent for additional R&D expenditure.

cross–country variation in the independent variables. The regressor coefficients are imposed to be the same across countries but the constant is allowed to vary and represents country–specific determinants of TFP growth that are not explicitly included in the equation. Within this fixed–effect pooled approach, a generalized least squares approach is followed, in order to deal with the likely existence of cross–section heteroskedasticity (possibly reflecting parameter heterogeneity). Further, to mitigate a possible endogeneity problem, all regressors are lagged one period.[12]

12. As the key objective of the exercise is to identify a possible relationship between R&D and the speed of technological absorption, initially equation [1] is estimated with only the relative TFP gap and the R&D interaction term as explanatory variables. Other variables (human capital, openness, and labor market flexibility) are then included, to check whether the relationship between TFP growth and R&D is robust to the inclusion of other factors that may affect TFP growth or is the spurious outcome of their omission. The final step of this specification strategy is to verify that the previous results are robust to the introduction of the country specific R&D term. If this is not the case, then one could deduce that R&D matters primarily because it affects the domestic rate of innovation, rather than the speed of catching–up.

13. The main result of the estimation is that only when R&D is proxied by the rate of change of R&D spending does there seem to be a relationship between R&D activity and the speed of technological transfer. Table II.3 shows the results of the regressions obtained with the log difference of GERD as a proxy for R&D. In the simplest specification (Specification I) the R&D interaction term has the correct sign (a negative coefficient implies a positive impact on productivity growth for all variables except the labor market proxy), but is insignificant at a 10 percent level. The relative productivity gap is both correctly signed and significant at a 10 percent critical level. After the introduction of the other variables (Specification II), the R&D interaction term is still correctly signed and becomes significant.[13] Further, all the other variables have the expected sign, even if they are all not

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[12] As an example of the endogeneity problem, the same R&D activity can be affected by a larger accumulation of human capital and/or by the more flexible labor market or the larger openness of the economy. No single econometric technique is likely to offer complete insulation against possible endogeneity problems. Moreover, the nature of the sample, and in particular the relatively small number of observations, prevents the adoption of the conventional remedy for this problem, namely, the use of instrumental variables estimation (with the lagged values of the independent variables as instruments).

[13] As mentioned above, introducing the other variables results in restricting the number of countries from 14 to 9. This suggest that the results are sensitive the choice of countries in the sample. While some form of (pre–regression) analysis of the data would be required to evaluate the contribution of the different subset of countries to the regression results, and thus to identify the existence of different regimes, such an exercise is prevented here from the

(continued)

significant at the 10 percent level (except the trade variable). Finally, the introduction of the log differences of GERD as a separate term does not change the sign and significance of both the R&D interaction term and the relative productivity gap (Specification III). However, the log difference of GERD is correctly signed but insignificant, suggesting that R&D primarily affects the transfer of technology from abroad rather than the country–specific rate of innovation. Specification IV shows the final specification, obtained by eliminating the log–level of the labor variable, which was incorrectly signed and insignificant. All the other variables have the correct sign and are significant at a 5 or 10 percent critical level.[14]

14. While estimating [1] with the R&D expenditure variable gives some encouraging results, the same is not true when using the two other proxies for R&D, the R&D personnel (as a share of total employment) and the number of resident patent application.[15] In both cases, the R&D interaction term is either incorrectly signed and/or insignificant at the 10 percent threshold, or is accompanied by a wrongly signed productivity gap term, something which is clearly inconsistent with the model being estimated.

15. The lack of a relationship between these R&D variables and TFP growth is not a new result,[16] and can be explained by several factors. The first relates to the relevance of the measures to proxy innovation. Not all patents leads to innovative production or products (indeed, only few of them are valuable), and not all R&D personnel is involved in knowledge–producing activities and not all operate with the same efficiency. It is reasonable to expect that this problem is less severe when using an expenditure (dollar–denominated) measure of R&D.

16. Further, it can be argued that R&D spending and the number of patent applications do not capture the same aspects of technology accumulation. As they are the output of innovation activity, patents should be considered more as an indicator of the country ability

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relatively scarce number of observations available. Only one major outlier is eliminated from the initial database, the TFP rate of growth for Germany in 1991 (the unification year).

[14] In addition to the R^2 and the Durbin–Watson, the normality of the residuals is not rejected when tested through a Bera–Jarque test, while the F–test reject the hypothesis that all parameters are jointly zero. Further, for equation III and IV all fixed effects (the constant allowed to vary across countries) are significant at a 5 percent level.

[15] For sake of brevity these results are not shown in this chapter.

[16] Hall (2000) shows that, in work relating the market value of individual firms to innovation indicators, patents typically have less explanatory power than R&D expenditure measures. Using a panel of UK firms, Stoneman and Kwon (2000) estimate an equation where investments undertaken to change technologies depend on a number of variables that affect the speed of diffusion, and they also find that their model works better with R&D expenditure than with patents.

to develop new knowledge. On the other hand, a relatively large part of R&D spending is usually related to assimilating foreign technology and, therefore, could be expected to work better as a determinant of the speed of productivity catching–up (Verspagen, 2001).

17. The estimates reported in Table II.3 are consistent with other research that shows a relationship between the rate of change in R&D and the acceleration in TFP (see Bassanini et al, 2000). Using the coefficients reported in this table, it is possible to estimate that, for a country with a relative TFP level of 79 percent, like Australia in 1997, a 1 percent increase in total expenditure on R&D increases the rate of growth of TFP by between 0.1 and 0.4 percentage points in the first year (and by diminishing amounts thereafter).[17]

D. Conclusions

18. The objective of this paper was to address the question of the importance and relevance of R&D spending in raising productivity growth, and in earning "new economy" credentials. A large literature on the subject emphasizes the importance of international technological spillovers in determining productivity convergence, and the benefits associated with following the country on the technological frontier. At the same time, however, several studies stress that the absorption of foreign technology can greatly benefit from the development of domestic innovation and R&D abilities.

19. Using data on a panel of OECD countries for the period 1981–1997, this paper estimates a reduced–form productivity convergence model and finds that an increase in R&D expenditure positively affects the rate of technology transfer, and thus the speed of absorption of ICT from abroad. The main policy implication for Australia is that additional effort in developing domestic innovation capacity through setting the right incentives for R&D is likely to pay off richly in the future and can contribute to sustaining the current pace of productivity growth.

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[17] This estimate is based on the lower and upper bounds of the parameter estimates for the R&D interaction term in the different specifications of Table II.3.

References

Bassanini, Andrea, Stefano Scarpetta and Ignazio Visco, 2000, "Knowledge, Technology and Economic Growth: Recent Evidence from OECD Countries," *OECD Working Paper* No.259.

Bernard, Andrew and Charles Jones, 1996, "Productivity across Industries and Countries: Time series Theory and Evidence," *Review of Economic and Statistics*, Vol. 78, No. 1

Cameron, Gavin, James Prouding and Stephen Redding, 1998, "Productivity Convergence and International Openness," *Bank of England, Working Paper Series*, n.77.

Council of Economic Advisors, 2001, *Economic Report of the President*, Washington, US.

Gordon, Robert, 2000, "Does the "New Economy" Measure up to the Great Inventions in the Past?," *Journal of Economic Perspectives*, Vol. 14 (Fall), No. 4

Hall, Bronwyn, 2000, "Innovation and Market Value," in *Productivity, Innovation and Economic Performance*, ed. by Ray Barrell, Geoff Mason and Mary O'Mahony, (Cambridge University Press).

Maddock, Rodney, 2000, "Social Costs and Benefits from Public Investments in Innovation," *Quarterly Bulletin of Economic Trends*, Melbourne University, No. 4.

Nordhaus, William, 2001, "Productivity Growth and New Economy", *National Bureau of Economic Research, Working Paper Series*, No.8097.

Salgado, Ranil, 2000 "Australia: Productivity Growth and Structural Reforms," *IMF Country Report,* 00/24 (Washington: International Monetary Fund).

Stoneman, Paul and Myiung Joong Kwon, 2000, "Gross Investment and Technological Change: A Diffusion Based Approach," *Productivity, Innovation and Economic Performance*, ed. by Ray Barrell, Geoff Mason and Mary O'Mahony (Cambridge: Cambridge University Press).

Verspagen, Bart, 2001, "Economic Growth and Technological Change: An Evolutionary Interpretation," *OECD/STI Working Papers,* 2001/1.

Table II.3. Result of the Regression With GERD as R&D Variable 1/

	I	II	III	IV
Gap (-1)	-0.057 (0.074)	-0.328 (0.024)	-0.538 (0.017)	-0.557 (0.005)
GERD*Gap (-1)	-0.049 (0.292)	-0.176 (0.013)	-0.182 (0.095)	-0.185 (0.092)
GERD (-1)	-	-	-0.046 (0.242)	-0.045 (0.242)
Open*Gap (-1)	-	-0.135 (0.261)	-0.307 (0.060)	-0.308 (0.059)
Open (-1)	-	-0.087 (0.058)	-0.156 (0.012)	-0.156 (0.012)
Edu.*Gap (-1)	-	-0.051 (0.158)	-0.097 (0.031)	-0.097 (0.031)
Edu (-1)	-	-0.023 (0.146)	-0.049 (0.017)	-0.048 (0.016)
Lab.*Gap (-1)	-	0.017 (0.203)	0.010 (0.538)	0.013 (0.023)
Lab (-1)	-	0.002 (0.712)	-0.001 (0.866)	-
Bus.cycle	0.138 (0.004)	0.142 (0.071)	0.105 (0.211)	0.102 (0.210)
R-squared	0.33	0.48	0.48	0.48
Adjusted R-squared	0.33	0.35	0.34	0.35
Durbin-Watson	1.60	1.70	1.88	1.88
Cross-section used	14	9	9	9
Total panel obervations	155	87	85	85
Sample (adjusted):	1984-97	1984-97	1984-97	1984-97

1/ R&D variable--GERD, total gross expenditure on R&D (as a % of GDP);
Dependent Variable--TFP growth; method--GLS (cross section weights);
White Heteroskedasticity-Consistent Standard Errors & Covariance;
P-values for T-statistics in parenthesis.

Calculation of TFP and Data Definitions and Sources

TFP growth: it is calculated using the following Thornqvist–Theil divisia index:

$$\ln\left(\frac{TFP_t^j}{TFP_{t-1}^j}\right)=\ln\left(\frac{Y_t^j}{Y_{t-1}^j}\right)-\overline{\alpha}_t^j\ln\left(\frac{L_t^j}{L_{t-1}^j}\right)-\left(1-\overline{\alpha}_t^j\right)\ln\left(\frac{K_t^j}{K_{t-1}^j}\right)$$

where

$$\overline{\alpha}_t^j=\frac{\alpha_t^j+\alpha_{t-1}^j}{2}$$

is the labor income share, averaged over two consecutive years. The data used to estimate TFP rate of growth are all derived from the Economic Outlook, OECD. In particular: Y is the real GDP for the business sector (GDPV) in 1995 prices; K is the gross capital stock for the business sector (KBV) in 1995 prices; L is the employment of the business sector (ETB); the labor income share is compensation of employees (WSSS) divided by current GDP (GDP) excluding net indirect taxes (indirect taxes, TIND, less subsidies, TSUB). This ratio is multiplied by the ratio between total employment (ET) and dependent employees (EE), to take account of the self–employed. The capital income share is obtained as 1 minus the labor income share.

Relative TFP: it is obtained through the following interspatial divisia index (see Hall and Jones, 1998):

$$\ln\left(\frac{TFP_t^j}{TFP_t^F}\right)=\ln\left(\frac{Y_t^j}{Y_t^F}\right)-\frac{1}{2}\left(\alpha_t^j+\alpha_t^F\right)\ln\left(\frac{L_t^j}{L_t^F}\right)-\left[1-\frac{1}{2}\left(\alpha_{t-1}^j+\alpha_{t-1}^F\right)\right]\ln\left(\frac{K_t^j}{K_t^F}\right)$$

where F refers to the frontier country, the U.S. The data are the same used to estimate the TFP growth. Output and capital stock data are expressed in U.S. dollars using a 1995 PPP exchange rate (from WEO).

R&D: Total Gross Expenditure on R&D as a share of GDP (GERD), R&D Personnel as a share of total employment, number of Resident Patent Applications (according to the relationship of patentee to patent offices). Source: Basic Science and Technology Statistics, OECD.

Human capital; gross enrollment in tertiary education (total enrolment in tertiary education expressed as a percentage of the population of the age–group which officially corresponds to the given level of education). Source: UNESCO.

Openness: obtained as ratio of the sum of exports and imports to GDP. Source: International Financial Statistics, IMF.

Labor: working days lost for industrial disputes. Source: OECD, Main Economic Indicators.

Business Cycle: rate of change of the consumption of total electricity (kWh per capita). Source: OECD Energy Balance Statistics.

III. Sources of Fluctuation in Australia's Real Effective Exchange Rate[1]

A. Introduction and Summary

1. The recent behavior of the Australian exchange rate provides the main motivation for this study. In particular, the key development of the past years that has preoccupied observers of the Australian economy has been the sharp weakening of the Australian dollar ($A) against the U.S. dollar. Although, this decline can be seen as a continuation of a much longer term trend depreciation, the fall in 2000 has been particularly accentuated and resembles the pace of decline at the height of the Asian crisis.

2. Set against a background of strong growth and low inflation, generally sound fundamentals, and relatively favorable economic prospects, the recent fall in the exchange rate has been puzzling. In particular, the variables believed to be the main driving forces of the $A in the past—commodity prices, the current account deficit and associated external imbalances, and interest rate differentials—appear not to be relevant in the recent movement of the currency. Indeed, prices of Australian commodities have been strengthening, the current account deficit has narrowed markedly and the trend looks set to continue, and interest rate differentials versus the U.S. have not moved significantly. For this reason, many analysts have focused on a number of ad hoc explanations that have not been supported by a rigorous macroeconomic framework.

3. This paper addresses these issues by examining the relative importance of various kinds of shocks in accounting for movements in the real exchange rate since the end of the Bretton Woods period. Although the main focus of this study is Australia, the inclusion of two other "commodity currencies"—the Canadian dollar and the New Zealand dollar—which the $A has generally tended to track closely may provide additional insights into the behavior of the Australian dollar. In particular, the paper focuses on the long–term relationship between the exchange rate and other macroeconomic variables and makes explicit use of the properties of a standard open economy macro model. A four variable structural vector autoregression (VAR) model is estimated to analyze more systematically how different shocks feed into exchange rate movements and to assess their relative importance. Another important part of this exercise will be to analyze how various shocks have contributed to real exchange rate movements over time.

4. Methodologically, this paper follows the approach proposed by Blanchard and Quah (1989) for the identification of "fundamental" shocks through restrictions on their long–run effects and builds on the literature that has extended that empirical strategy to an open economy setting.[2] The advantage of this methodology is that it identifies the macroeconomic

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[1] Prepared by Giovanni Dell'Ariccia (x38135) who is available to answer questions.

[2] See among others Lastrapes (1992), Clarida and Gali (1994), and Fisher (1996).

shocks that could simultaneously affect the variables in the system (e.g., exchange rates, output, relative prices, etc.), without making assumptions on the short–run dynamics or on the contemporaneous exclusion of any shock from any of the equations in the system. An early contribution to the literature was made by Clarida and Gali (1994), who estimated a model with relative output, relative prices, and the real exchange rate for a group of G-7 countries. However, the application of similar models to small open economies has been limited by the additional complication introduced by the need to control for the terms of trade.

5. To take account of the fact that real exchange rate variations are associated with changes in the relative levels of domestic versus foreign variables, this paper estimates the structural vector autoregression (VAR) model with the real effective exchange rate, relative output, the relative price level, and the terms of trade all measured relative to a trade weighted basket of countries (Table III.1). Using long–run identifying restrictions, this methodology allows the identification of four different types of shock: shocks that directly affect the terms of trade; shocks to the long–run level of relative output; demand shocks; and pure monetary, or nominal shocks.[3]

6. The estimated model can then be used to describe the reaction of the different variables to the four identified macro shocks and to decompose the historical variation of the forecast error into four fundamental components. The estimated impulse response functions for Australia confirm the positive relationship between the terms of trade shocks and the real exchange rate, but do not support the idea of a positive impact of relative supply innovations. Nominal and demand shocks have the expected response: demand shocks cause an appreciation of the real exchange rate through an increase in the interest rate differential, while nominal shocks are associated with a depreciation. The historical decomposition exercise delivers more interesting results. In particular, it suggest that a negative relative demand component, possibly associated with the compression in interest rate spreads following the fiscal consolidation of the 1990s, accounts for most of the recent downward pressure on Australia's real exchange rate.

7. The paper is organized as follows; the next section briefly reviews the related empirical literature; Section C reports some stylized facts about the Australian dollar and reviews some of the explanations proposed for the recent exchange rate developments; Section D briefly describes the properties of the general open economy macro model underlying the empirical estimations; Section E describes the empirical methodology; Section F describes the data and reports some time–series characteristics of the variables; Section G reports the main results; and Section H concludes.

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[3] An intuitive way to distinguish between the last two shocks is to think of demand shocks as impacting the IS curve and of nominal shocks as affecting the LM curve.

B. A Brief Survey of the Literature

8. There is a relatively long tradition of empirical papers focusing on the identification of the sources of exchange rate fluctuations. Overall, these studies have had mixed success in explaining movements in the exchange rate. In an early paper on the subject, Lastrapes (1992) uses restrictions on the long–run behavior of economic variables to distinguish between real and nominal shocks to the exchange rates for the G-7 countries over the 1973–1989 period. His finding suggest that real shocks tended to dominate nominal shocks for both the real and the nominal exchange rates. One shortcoming of this study is that by using a bivariate VAR, it can only identify two kinds of shocks. Indeed, the author acknowledges, that in the presence of multiple kinds of real shocks (e.g. real demand and supply shocks), his identification strategy would be potentially compromised. Clarida and Gali (1994) solve this problem by introducing a three equation open macro model and estimating it using Blanchard–Quah type restrictions to identify supply, demand, and monetary shocks. They find that demand and monetary shocks play an important role in explaining real exchange rate fluctuations, while supply shocks contribute only marginally.

9. Using cointegration analysis, Gruen and Wilkinson (1994) examine the relationship between Australia's real exchange rate, terms of trade, and interest rate differential over the period 1969–1990. They cannot find a stable relationship between the terms of trade or interest rate differentials and the real exchange rate over the full period. However, they find that since the floating of the Australian dollar at the end of 1983, both interest rate differentials and the terms of trade have stable relationship with the exchange rate. Henry and Summers (1999) estimate a GARCH model of the real A/US bilateral exchange rate for the 1971–1998 period. They conclude that changes in the A/US exchange rate are influenced by changes in commodity prices and in the real US$/Yen exchange rate. Interest rate differentials do not appear to play a significant role.

10. The present study closely follows the methodology used by Fisher (1996) and Prasad (1999) and related to Clarida and Gali (1994). Fisher (1996) estimates a structural VAR model for Australia and New Zealand with the nominal exchange rate, the price level, and the terms of trade, all measured in relative terms vis–à–vis the U.S. He finds that real terms of trade shocks are far more important than nominal shocks in accounting for nominal exchange rate fluctuations in both countries. In addition, positive real terms of trade shocks have a significantly positive effect on the price level in New Zealand, but the effect is negligible for Australia. Prasad (1999) estimates a similar model with relative output, real effective exchange rate, and the relative price level, all measured with respect to a trade–weighted basket of countries. His main findings are that for Australia real demand shocks have been the main determinant of the real exchange rate movements; while for New Zealand nominal shocks have been relatively more important. The present study adds to these results by integrating the approaches in Fisher (1996) and Prasad (1999) and considering a four–variable VAR, which permits the distinction between terms of trade shocks and relative supply shocks that are not directly related to the terms of trade.

C. Stylized Facts

11. This section summarizes some stylized facts about the behavior of the Australian dollar with a view to examining some of the explanations that have emerged for its recent depreciation. In this context, some similarities and differences with the Canadian dollar and the New Zealand dollar will be also highlighted.

12. One stylized fact is the relationship between the real effective exchange rate and the terms of trade—which in these countries is closely related to commodity prices (see Figure III.1). The relationship is particularly strong in Australia, where the terms of trade have traditionally been used to track exchange rate movements.[4] For this reason, the significant divergence of the Australian dollar from the value predicted by the terms of trade has been especially puzzling.[5] One possible explanation for such a divergence is a break in the structural parameters of the equation describing the relationship between the exchange rate and its determinants. In particular, some analysts have argued that over the years Australia has become more diversified, gradually losing the characteristics of a commodity based country. Thus, terms of trade shocks may have become progressively less important, relative to other influences on the exchange rate such as interest rate differentials and relative income growth.

13. In a simple exercise, a real exchange rate "tracking equation" based on interest rate differentials and the terms of trade is estimated. To examine the evolution of the relative importance of these two factors, the equation is estimated for two separate periods: 1985:1–1991:4 and 1992:1–2000:2. More specifically, we regress the real effective exchange rate on Australia's terms of trade and real interest rate differentials. Note that this regression involves variables that should be treated as endogenous. Consequently, the results should be considered as correlations and no causal interpretation should be given to the coefficients. Real rates were calculated subtracting actual inflation for the year ahead from long–term rates.[6] The interest rate differential was calculated as the difference between Australia's real rate and the arithmetic average of U.S.'s, Japan's, and Germany's real rates.

14. The equation was estimated in an error correction form as in Beechey et al. (2000). The examination of the results of the two regressions (see Table III.2) provides evidence to suggest that the relationship between interest rate differentials and the real exchange rate has

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[4] See Gruen and Kortian (1996) and Beechey et al. (2000).

[5] In November 2000 the real effective exchange rate was about three standard deviations below the level predicted by the tracking equation used by most analysts, based on terms of trade and interest rate differentials (see Beechey et al., 2000). Although similar episodes of divergence have occurred in the past, they were before the floating of $A.

[6] As in line 61 of the IFS.

become increasingly more important.[7] In particular, all the coefficients of the error correction specification have the expected sign in both sample periods. However, the terms of trade coefficient is significant only in the first period, while the interest rate differential coefficient is significant only in the second period. This evidence appears consistent prima facie with the idea that the interest rate spread compression associated with Australia's fiscal consolidation of recent years is one important factor in explaining the recent depreciation of the Australian dollar.

15. A second stylized fact is the relationship between the country's net foreign asset position and the real effective exchange rate (see Figure III.2). It has been argued that in the long run the increasing service burden of a growing foreign liabilities requires larger trade surpluses, and hence a more depreciated real exchange rate. Although theoretically compelling, that argument does not seem to be supported by the data. First, the explanation is at odds with the evidence from Canada, whose currency followed long–run trends similar to Australia, while its NFA position remained roughly stable and even improved relative to GDP toward the end of the sample. Likewise, no clear pattern is discernible with respect to the REER and the NFA position in New Zealand. Second, the argument would require that, over time, the income balance worsens and that the REER depreciation is matched by a progressive improvement in the trade balance. However, in Australia both variables have remained roughly stable relative to GDP.

16. In view of the inability of these long–run regularities to account for the recent real depreciation, a number of alternative less conventional explanations have also emerged in the attempt to explain the behavior of the $A. However, only anecdotal evidence exists to support or refute these hypotheses. The first contends that the weakness of the Australian dollar is closely linked to the technology divide: Australia, with a smaller share of the economy involved in the development and production of ICT products and services relative to the U.S., has failed to attract foreign investment flows related to the technology sectors. While it is true the Australian stock market did not soar to levels of the NASDAQ or other "high–tech heavy" stock markets elsewhere in the world, this explanation sits sharply at odds with the fact that in the second half of 2000 the depreciation of the $A continued even while a sharp correction was underway in U.S. technology stock prices.[8]

17. A related story suggests that it is the gap in relative prospects between the U.S. and Australia that is the chief driving force behind recent exchange rate movements. According to this thesis downward revisions of expectations on Australia's output growth relative to U.S.'s output growth were at the root of the sharp exchange rate depreciation until the end of

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[7] However, econometric problems associated with omitted variables and endogeneity of the regressors may bias standard tests of coefficient stability in this case (see Rigobon, 2000).

[8] Macfarlane, I., "*Recent Influences on the Exchange Rate*," November 9, 2000. Available at www.rba.gov.au .

the year. The recent appreciation of the $A appears to reflect a downward revision of expectations about the near–term prospects for the U.S. Although there appear to be little good reason for markets to have been skeptical about Australia's growth prospects, this explanation at least appears to be consistent with actual exchange rate movements observed in 2000.[9]

D. Theoretical Considerations

18. This section reviews briefly the main characteristics of a standard open economy macro model whose properties are exploited in this paper's empirical framework. In particular, the differential short–run and long–run properties of a model with sticky prices can be used to identify the different "fundamental" shocks to the real exchange rate in the empirical estimation. In what follows variables will be expressed in relative terms. i.e. domestic relative to foreign levels.

19. The theoretical framework begins with the familiar hypothesis of long–run monetary neutrality. According to this assumption, real variables are, in the long–run, invariant to innovations in money supply and in money demand. Hence, any model incorporating such an assumption will have the property that the long–run coefficients of nominal (or monetary) shocks on real variables are zero. In the context of this paper, this means that "nominal shocks" can be identified as innovations that have no long–run effect on the terms of trade, relative output, and the real exchange rate. Exogenous monetary policy innovations are an example of this kind of shock. In the short run, unless prices are fully flexible, an exogenous increase in the money supply lowers real interest rates leading to higher output growth and to capital outflows that in turn cause an exchange rate depreciation. However, in the long run, prices increase, causing a real exchange rate appreciation and reducing real money balances that in turn lead to higher interest rates and lower growth. In equilibrium, all real variables return to their pre–shock levels.

20. A second building block is the assumption of sticky prices. With sticky prices, exogenous shocks to aggregate demand have only short–run consequences for output, with such consequences being reversed as prices adjust in the long run. However, exogenous demand shocks would have long–run effects on the real exchange rate and the price level. Consider fiscal tightening as an example of this kind of shock: in the short run, a fiscal tightening compresses output through a reduction in aggregate demand, while interest rates drop responding to the reduction in the demand for money. This in turn leads to capital outflows and an exchange rate depreciation necessary to maintain interest rate parity. In the

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[9] Some analysts have compared the expected growth gap between the United States and Australia to movements in the exchange rate and find that they track movements in 2000 quite well. However, over a longer period (i.e., the 1990s), movements in the expected growth differential does not perform well in explaining the behavior of the $A. See Asia Economic Viewpoints, Chase Manhattan Bank, September 2000.

long–run, prices fall leading to a recovery in aggregate demand in turn resulting in an increase in output. The new long–run equilibrium will be characterized by the same output level as in the initial equilibrium, lower prices, and a lower real exchange rate as, for a given output, an improved current account balance partly compensates for the reduced public component of aggregate demand. In the context of the empirical model in this paper, these properties permit the identification of "demand" shocks as innovations that have long–run effects on the real exchange rate, and potentially the price level, but not on output and the terms of trade.

21. Finally, the assumption of a small open economy permits the assumption that the terms of trade are fully exogenous, so that "supply shocks" can be identified as innovations that have long–run effects on output, the real exchange rate, and the price level, but not the terms of trade; while autonomous "terms of trade shocks" are the only innovations that have long–run consequences for all variables.

22. One caveat is worth noting about the assumption that innovations to relative output or "supply shocks" have no long–run effects on the level of the terms of trade. Because all the countries considered in this paper are small open economies, it is reasonable to assume that changes in domestic output do not affect the terms of trade. However, changes in relative output may also reflect changes in the output of partner countries which may, through a change in the demand for commodities, have an effect on the terms of trade. For this reason the robustness of the results is tested by estimating the model under the alternative identifying assumption that the terms of trade do not affect relative output, while supply shocks may affect the terms of trade in the long run.

E. Empirical Methodology

23. The theoretical considerations in the previous section imply that relative output, the real exchange rate, and the price level are non–stationary. Hence, the first step in implementing the empirical methodology is to test and confirm the non–stationarity of these series. The model is then estimated in first differences that are confirmed to be stationary. A reduced–form VAR is set up with the real effective exchange rate, relative output, the relative price level, and the terms of trade. The model builds on the framework used by Clarida and Gali (1994) by including relative terms of trade in the analysis. The inclusion of this additional variable is necessary since the terms of trade have been identified as an important determinant of the real exchange rate for small resource–based economies like Australia and New Zealand.[10]

24. In the spirit of Blanchard and Quah (1989), and as discussed in the previous section, the following identifying restrictions are used. First, only terms of trade shocks are expected to affect the relative terms of trade in the long run (this assumption implies three restrictions

[10] See Koya and Orden (1994), and Gruen and Wilkinson (2000) and references therein.

on the four–variable VAR). Second, the paper follows the standard macro literature and assumes that demand shocks (a shift in the IS curve) and nominal shocks (a shift in the LM curve) have no long–run effect on the level of output (two more restrictions). Finally, a sixth restriction is that nominal shocks do not affect the long–run level of the real exchange rate. These six restrictions give the model a lower triangular structure in the long–run. The restrictions are sufficient to make the model exactly identified and can be used to transform the errors from the reduced–form VAR model into a set of structural disturbances that can be interpreted as terms of trade, supply, demand, and nominal shocks (see Annex III.1 for details). An important advantage of this approach is that short–run dynamics are left unconstrained, as all shocks are allowed to affect any of the variable in the short–run.

F. Data and Preliminary Analysis

25. This section describes the data used in the VAR and presents some descriptive statistics from the preliminary analysis of the dataset.

26. For Australia, the levels of these four variables from 1963:3 to 1999:4 are reported in Figure III.3.[11] Variables were normalized to 1970:1 and transformed into logarithms. Relative output was relatively volatile around a broadly unchanged level until the 1990s when it witnessed as significant upward trend. The real exchange rate fluctuated substantially since the floating of the Australian dollar, partly reflecting movements in the terms of trade. In addition, a long–run declining trend is discernible in the exchange rate, again partly in reflection a similar evolution of the terms of trade. The increases in exchange rate volatility after 1973 (end of the Bretton Woods period) and 1983 (end of the $A crawling peg) are clearly visible, and so is the sharp devaluation of the $A after the floating of 1983.

27. Figure III.4 reports the same variables for New Zealand. Contrary to Australia and Canada, in New Zealand relative output declined substantially over the past four decades. The real exchange rate depreciated sharply in 1974–75, and then again in 1984. The New Zealand dollar appears to be on a long–run declining trend, albeit a less pronounced trend than for the Australian dollar. The exchange rate appreciation and the relative price stabilization in the early 1990s are both likely to reflect the monetary tightening associated with the introduction of inflation targeting.

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[11] Lack of a complete set of data for 2000 precluded its inclusion in the sample. All data in this paper are from the IFS, the OECD, and the Reserve Bank of Australia. Relative output for Australia, Canada, and New Zealand is constructed using each country's domestic real GDP and the trade–weighted average of the real GDP of its trading partners (although not complete, the data in this paper covers well above 90 percent of total trade for each country). Similarly, the relative price level is constructed using domestic CPI and a trade–weighted average of the CPI of partner countries. Finally, the real effective exchange rate was computed using the nominal effective exchange rate and the relative price level.

28. Figure III.5 shows that in Canada relative output increased sharply in the 1970s, stabilized in the 1980s, and exhibited a decline in the 1990s, probably mainly reflecting the unilateral strength of the U.S. economy. Canada's real exchange rate and terms of trade both followed a long–run declining trend starting in the 1970s.

29. Before proceeding to estimate the VAR, the time–series properties of the variables are examined. In particular, the variables are tested for deterministic–trend non–stationarity using an ADF test. Results are reported in Table III.3. For all three countries it is not possible to reject the null hypothesis of a unit root for relative output and prices. Similarly, it is not possible to reject the unit root hypothesis for the terms of trade and the real exchange rate for Canada and New Zealand; while in the case of Australia the rejection is very weak and depends crucially upon the order of augmentation.

30. These results suggest that it should be possible to obtain stationarity by taking the first differences of these variables. Indeed, as Table III.3 reports, the ADF test (without trend term) for the first differences confirms that it is possible to reject the null of non–stationarity of the first differences for all four variables in all three countries.

G. Results

31. This section presents estimates of the structural VAR described above. Although the system was estimated using first differences, for ease of exposition and interpretation the results are presented in levels. The number of lags or the order of the VAR (four for all three countries) was selected by the Akaike information criterion. The baseline sample period was 1974:1–1999:4. However, the system was also estimated over different sub–samples in order to test the robustness of the results and examine possible changes in how the real exchange rate reacts to fundamental shocks. One important caveat is that, give the sample period ends with the fourth quarter of 1999, the results in this section cannot rigorously explain the most recent developments in the Australian real exchange rate.

32. The effects of fundamental shocks on the levels of the terms of trade, relative output, the real exchange rate, and the relative prices are examined in two ways. First, impulse responses are reported and analyzed; and second, the historical decomposition of the real exchange rate forecast error is examined.

Impulse Responses

33. Figures III.6-III.8 present the impulse responses for Australia under different specification and for different samples. Figure III.6 reports the full–sample impulse responses for each variable to one–standard deviation positive innovation in each of the fundamental shocks: terms of trade, supply, demand, and nominal (standard error bands were computed using the Monte Carlo method and are not reported for brevity of exposition). These impulse responses were obtained by cumulating those resulting by the first–differences VAR. Key findings are as follows:

- The three identifying restriction that supply, demand and nominal shocks have no long–run effect on the terms of trade clearly show in the top–left panel, where only terms of trade shocks have permanent effects.

- Similarly, in the bottom–left panel, relative output reacts significantly only to supply and terms of trade shocks.

- More interestingly, the top–right panel shows that, as expected, innovations in the terms of trade have a strong and permanent effect on the level of the real exchange rate; while positive relative supply shocks are a source of only temporary real appreciation, and to a much more limited extent (not significant).

- Consistently with Prasad (1999) and Fisher (1996), and the predictions of standard open economy macro models, permanent demand shocks have a positive effect on the real exchange rate; while nominal shocks cause only temporary shifts in the real exchange rate.

- Finally, the bottom–right panel shows that nominal shocks have a permanent positive effect on the relative price level, while supply shocks have a permanent negative effect; demand and terms of trade innovations have no significant effect on the relative price level.

34. In summary, these results confirm the importance of the terms of trade in determining Australia's real exchange rate, while offering only very weak support to the idea that the depreciation of the $A in the late 1990s was due to a negative shock to the expectations on the relative output performance of Australia and the U.S.[12] Rather, they are consistent with the thesis that a relative contraction of aggregate demand may have been responsible for the weakness of the Australian dollar. Indeed, the estimates suggest that, over the sample period, shocks to relative output have had only small and temporary positive effects on the real exchange rate.

35. Figure III.7 reports the impulse responses for Australia's real effective exchange rate over different periods. The top panel reports the results for an extended sample, which includes some of the Bretton Woods years and the first oil shock: 1963:3 – 1994:4. The center panel graphs the impulse responses estimated over the baseline period 1974:1 – 1999:4. Finally, the bottom panel reports the results for the period since the floating of the Australian dollar, 1984:1 –1999:4. There are no striking differences among the three panels. However, not surprisingly, the relatively larger impact of a terms of trade shock over the floating period is noticeable.

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[12] Supply shocks are the main innovations affecting relative output in the medium run. To that extent, they can be interpreted as shocks to expectations.

36. Finally, as a test of the robustness of the results to the identifying assumptions, Figure III.8 reports the impulse responses of Australia's real effective exchange rate under some alternative identifying assumptions (bottom panel). As noted above, the main concern related to the assumption of exogeneity of the terms of trade movements. It is possible that large changes in demand may affect the terms of trade calling into question the validity of the identifying assumption that the terms of trade are independent from relative output in the long run. One way to test the robustness of the results from the baseline specification is to reverse this identifying assumption. Under this alternative specification, terms of trade shocks have no long–run effect on relative output, while supply shocks may have long–run consequences for the terms of trade. These impulse responses are very similar to those for the baseline specification and confirm the robustness of the results from the corresponding identification assumptions.

37. Turning to the comparison with other "commodity currencies," Figure III.9 reports the full sample results for New Zealand.

- Again, the three identifying restriction that supply, demand and nominal shocks have no long–run effect on the terms of trade can be seen clearly in the top–left panel, where only terms of trade shocks have permanent effects; and a similar argument applies to the bottom–left panel.

- A striking difference with Australia is the negative response of relative output to a positive terms of trade shock. One interpretation of this results is that the strict use of MCI as a trigger in the inflation targeting framework may have caused the New Zealand authorities to react in a contractionary manner to positive terms of trade innovations. However, this result could be also due to the strong correlation between Australia's and New Zealand's terms of trade (0.64 in the 1960–2000 period) and the large weight of Australia in New Zealand's relative output.

- Turning to the top–right panel, in New Zealand as in Australia, both a terms of trade shock and demand shock have a positive permanent effect on the real exchange rate. However, the relative importance of the terms of trade in the exchange rate determination is much less pronounced than in Australia.

- Another difference relative to Australia is the significant positive effect of a terms of trade shock on the relative price level (bottom–left panel). This result is consistent with Fisher (1996) who also finds the terms of trade to be important for relative prices in New Zealand, but not in Australia. This difference may be partly explained by the different reaction of Australia's and New Zealand relative output to terms of trade shocks.

38. Finally, Figure III.10 reports the impulse responses for Canada.

- The top–right panel shows that, unlike for Australia and New Zealand, a terms of trade shock does not have a positive effect on the real exchange rate; while it has a positive effect on relative output (bottom–left panel).

- The bottom–right panel shows that the relative prices impulse responses are similar to those for Australia and New Zealand with the exception that a positive terms of trade shock has a negative effect on the relative price level.

Historical Decomposition of the Forecast Error

39. Next, this section examines the historical decomposition of the unconditional forecast error for the real effective exchange rate. This error represents the unforecastable innovation in the level of the exchange rate and can be decomposed into components attributable to each of the four fundamental shocks identified in the structural VAR.

40. Figure III.11 depicts the exchange rate forecast error and its decomposition for Australia. The top panel reports the actual forecast error and each of the subsequent panels depicts what the forecast error would have been if only that particular kind of shock had hit the system in the sample period. Overall the terms of trade and demand components account for most of the forecast error, while the supply and nominal components seem to have a more limited role.

- Turning to the evolution of the various components, it appears that in the late 1970s the terms of trade component accounted for most of the downward pressure on the real exchange rate; the demand component was first marginally positive and turned negative at the end of the decade; while the supply and nominal components were broadly neutral.

- In the first part of the 1980s (characterized by a wide U.S. dollar cycle) the terms of trade were mostly a depreciating factor, while real demand sustained the exchange rate. Both factors and the nominal components account for the 1986 depreciation and the turnaround of the terms of trade is mainly responsible for the recovery after 1987.

- A similar, although less pronounced, pattern can be described for the terms of trade component in the1990s. In addition, the nominal component which played a broadly neutral role in the first half of the sample became an overall positive factor in the late 1980s and the early 1990s, reflecting a relative tightening of monetary policy associated with the adoption of inflation targeting. Finally, in the late 1990s, the negative demand component possibly associated with the fiscal consolidation and the consequent compression of interest rate spreads was the main factor putting downward pressure on the exchange rate, while the supply and terms of trade components played a mitigating role.

41. Figure III.12 show the decomposition of New Zealand's exchange rate forecast error. As for Australia, the terms of trade and real demand components play an important role, and the supply component represents only a marginal contribution. However, unlike for Australia, in New Zealand the nominal component seems to have played an important role as well.[13]

42. In the late 1980s, the terms of trade and the demand component accounted for most of the appreciation of the New Zealand dollar. In the early 1990s, the demand (likely associated with the marked fiscal consolidation) and the supply components contributed to the depreciation, while the nominal component represented a sustaining factor reflecting (as for Australia) the new monetary policy discipline. Indeed, since the late 1980s the transition to an inflation targeting regime is clearly visible in the sharp increase of the nominal component of the forecast error. Recent developments seem to be accounted by a downward movement in demand and nominal components.

43. Finally, Figure III.13 presents the error decomposition for the Canadian exchange rate. Overall the terms of trade component, although important, accounts for a smaller percentage of the forecast error than for Australia and New Zealand. Instead, the real demand component is the main contributor, accounting for an overwhelming part of the unforecastable real exchange rate movements.

H. Conclusions

44. This paper set out to examine in a systematic manner the sources of real exchange rate fluctuations and possibly shed some light on some recent developments in the Australian dollar exchange rate. A structural VAR model of the terms of trade, relative output, the real effective exchange rate, and relative prices was estimated for Australia, New Zealand, and Canada.

45. The estimated model was then used to describe the reaction of the real exchange rate to four different macro shocks and to decompose the historical variation of the forecast error into four fundamental components. The results for Australia confirm the positive relationship between the terms of trade shocks and the real exchange rate. In addition, the historical decomposition exercise shows that terms of trade and real demand innovations account for most of the unforecastable real exchange rate variation. The empirical evidence does not support the idea—popular amongst market analysts—of a positive impact of relative supply innovations on the real exchange rate, and suggests that a contraction in Australia's relative aggregate demand, possibly associated with the fiscal consolidation and the Asian crisis, has accounted for most of the downward pressure on the Australian dollar in the late 1990s. The terms of trade and relative output seem to have represented mitigating factors. It is well-

[13] This result is consistent with Prasad (1999) who also find a similar pattern in the comparison of Australia and New Zealand.

known that models of exchange rate dynamics typically have very poor predictive power and there is no reason to presume that the framework employed in this paper should be any different. That said, it appears reasonable to state that the evidence in this paper is consistent with the idea that the recent fall in the $A has been due to demand shocks, but does not rule out the exchange rate having "overshot," especially during 2000.

46. For New Zealand the estimation results suggest that, in addition to terms of trade and real demand innovations, nominal shocks also play an important role. Finally, the results confirm the relatively lower importance of terms of trade shocks for Canada, where the real demand component seems to have an overwhelming importance.

References

Beechey, Meredith, Barucha, Nargis, Cagliarini, Adam, Gruen David, and Christopher Thompson, 2000, "A Small Model of the Australian Macroeconomy," Reserve Bank of Australia Research Discussion Paper, No. 2000–05.

Blanchard, Olivier, and Danny Quah, 1989, "The Dynamic Effect of Aggregate Demand and Supply Disturbances," *American Economic Review*, Vol. 79, pp. 655–673.

Chadha, Bankim, and Eswar Prasad, 1999, "Real Exchange Rate Fluctuations and the Business Cycle: Evidence from Japan", *IMF Staff Papers*, Vol. 44, No. 3, pp. 328–355.

Clarida, Richard, and Jordi Gali, 1994, "Sources of Real Exchange Rate Fluctuations: How Important Are Nominal Shocks?" NBER Working Paper, No. 4658.

Fisher, Lance, 1996, "Sources of Exchange Rate and Price Level Fluctuations in Two Commodity Exporting Countries: Australia and New Zealand," *Economic Record*, Vol. 72, pp. 345–358.

Gruen , David, and T. Kortian, 1996, "Why Does the Australian Dollar Move so Closely with the Terms of Trade?" Reserve Bank of Australia Research Discussion Paper No 9601.

Gruen, David, and Jenny Wilkinson, 1994, "Australia's Real Exchange Rate: Is it Explained by the Terms of Trade or by Real Interest Differentials?" *Economic Record*, Vol. 70, pp. 204–219.

Henry, Olan, and Peter Summers, 1999, "The Volatility of real Exchange Rates: The Australian Case", *Australian Economic Papers*, pp. 79–90.

Koya, Sharmista, and David Orden, 1994, "Terms of Trade and the Exchange Rates of New Zealand and Australia," *Applied Economics*, Vol. 26, pp. 451–457.

Lane, Philip and Gian Maria Milesi–Ferretti, "The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries", IMF Working Paper 99/115 (*forthcoming, Journal of International Economics*).

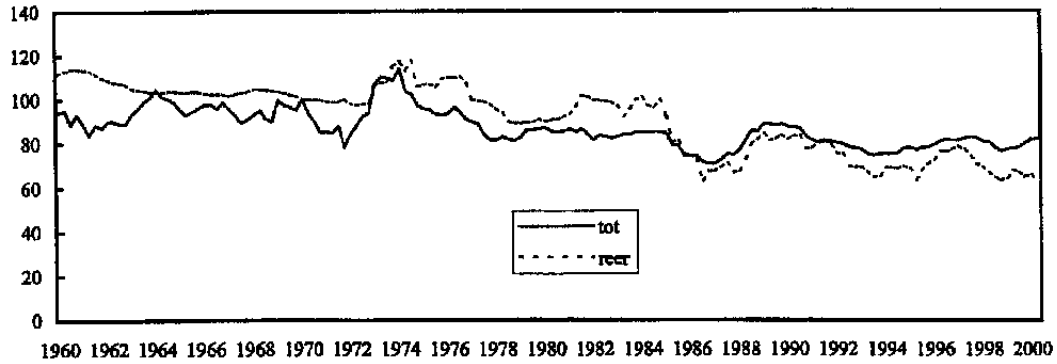
Lastrapes, William, 1992, "Sources of Fluctuations in Real and Nominal Exchange Rates," *Review of Economics and Statistics*, Vol. 24, pp. 530–539.

Prasad, Eswar, 1999, "Sources of Real Exchange Rate Fluctuations: Evidence from Two Small Open economies," mimeo, IMF.

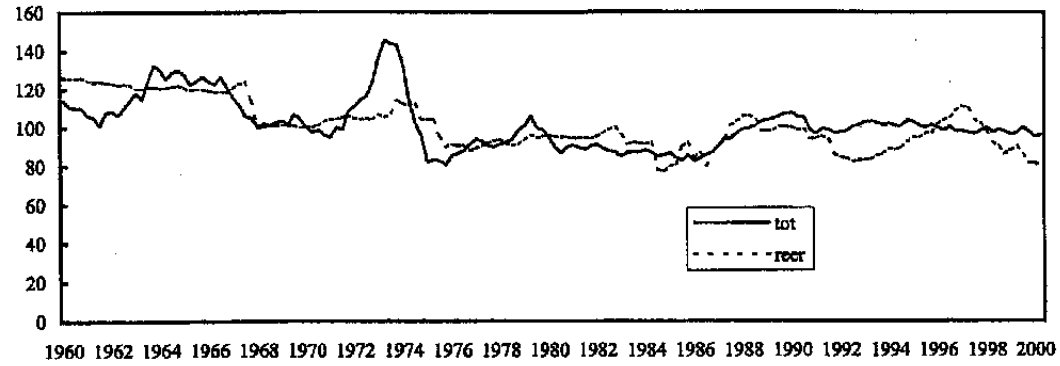
Rigobon, Roberto, 2000, "A simple test for stability of linear models under heteroskedasticity, omitted variable, and endogenous variable problems", MIT mimeo.

Figure III.1. Terms of Trade and REER
(1970 = 100)

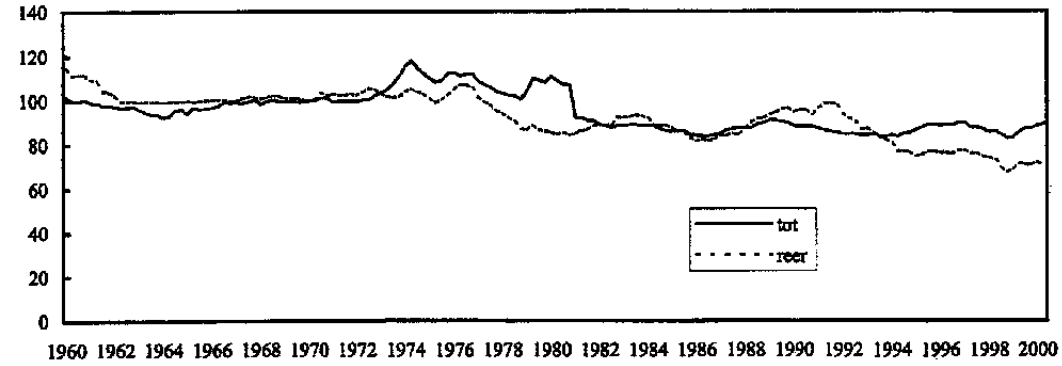
Australia



New Zealand



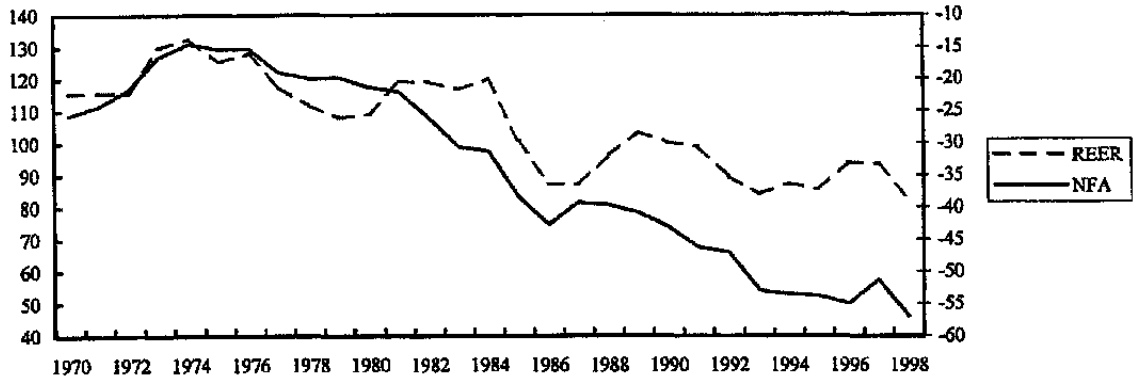
Canada



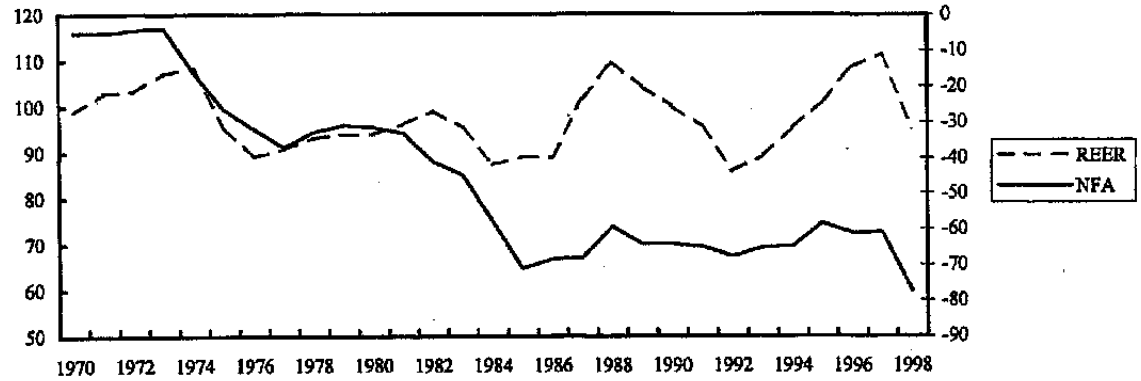
Source: IFS and RBA

Figure III.2. Net Foreign Asset Position and REER
(NFA as percentage of GDP - secondary axis)

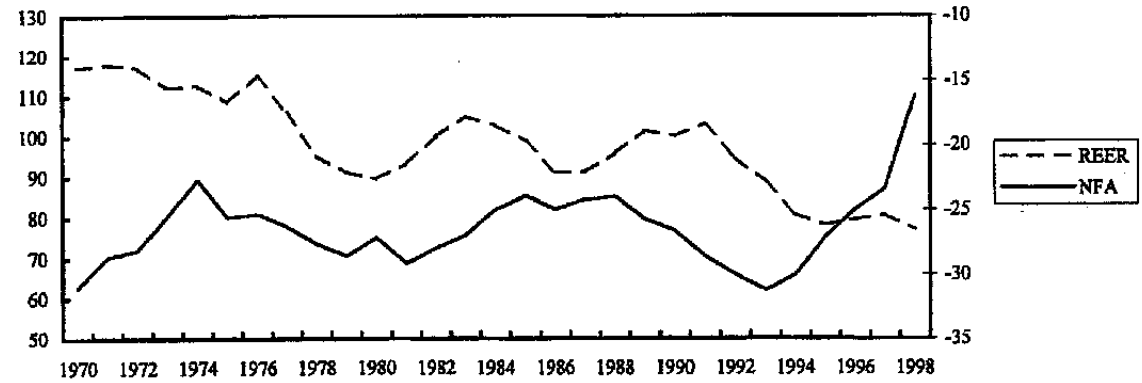
Australia



New Zealand



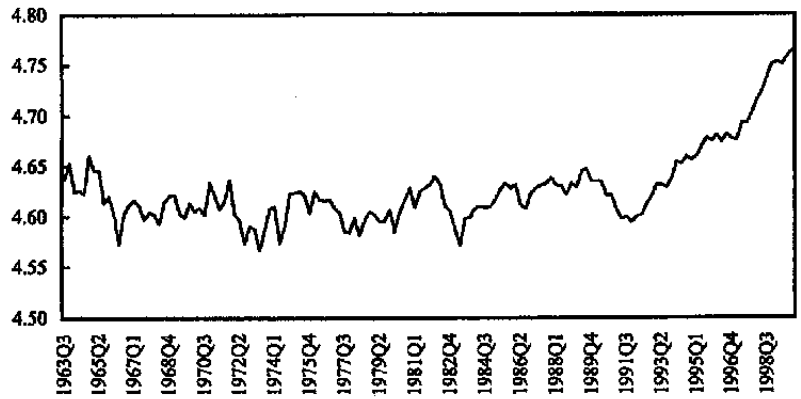
Canada



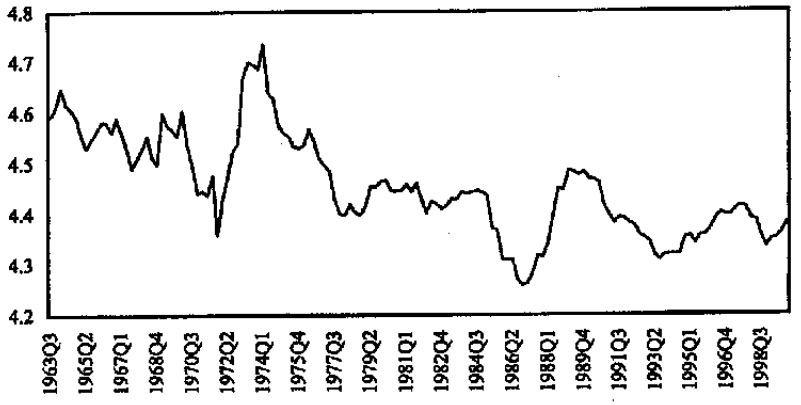
Source: Lane and Milesi-Ferretti (2000).

Figure III.3. Australia: Descriptive Statistics
(in logs, 1970=100)

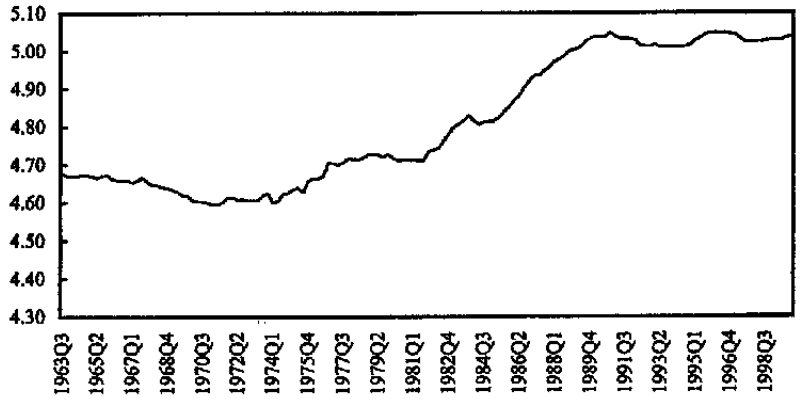
Relative Output



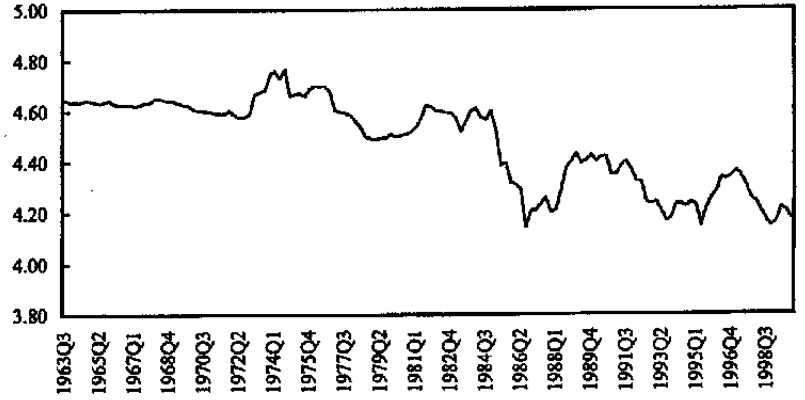
Terms of Trade



Relative Prices



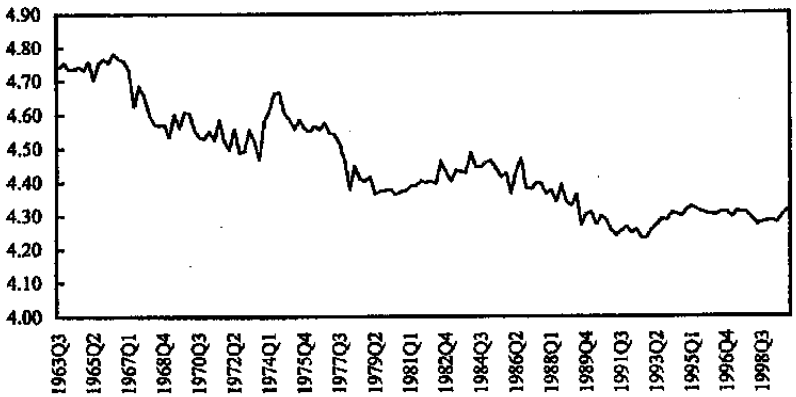
REER



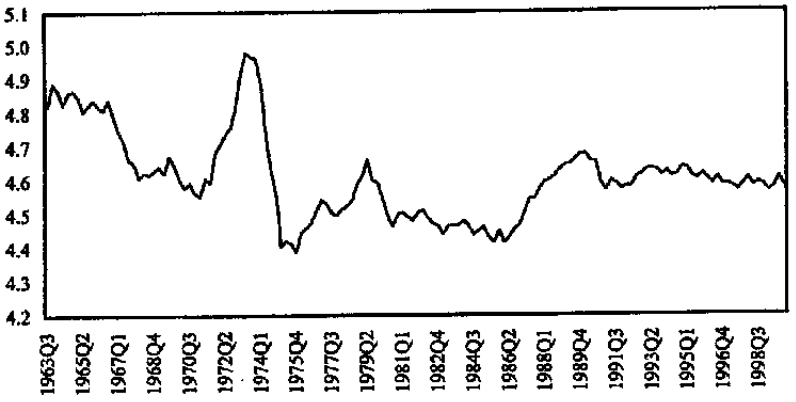
Source: IFS, OECD

Figure III.4. New Zealand: Descriptive Statistics
(in logs, 1970=100)

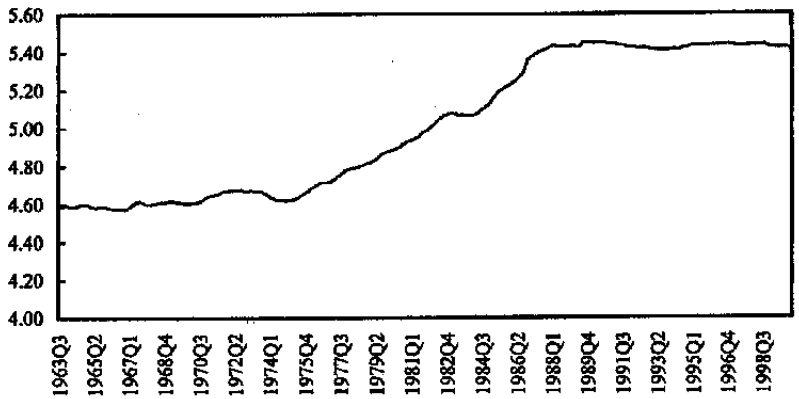
Relative Output



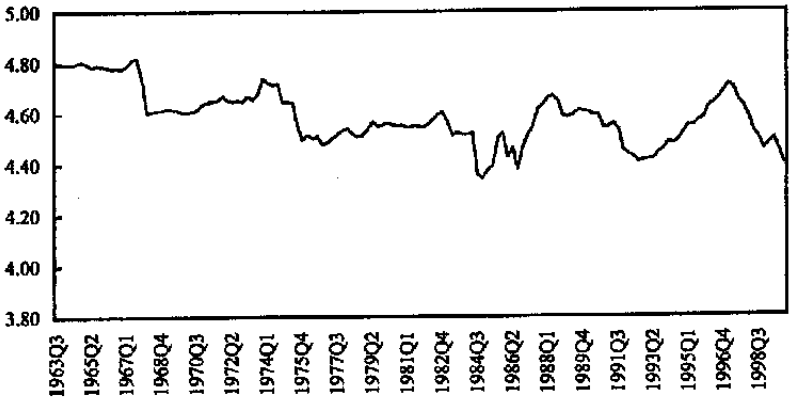
Terms of Trade



Relative Prices

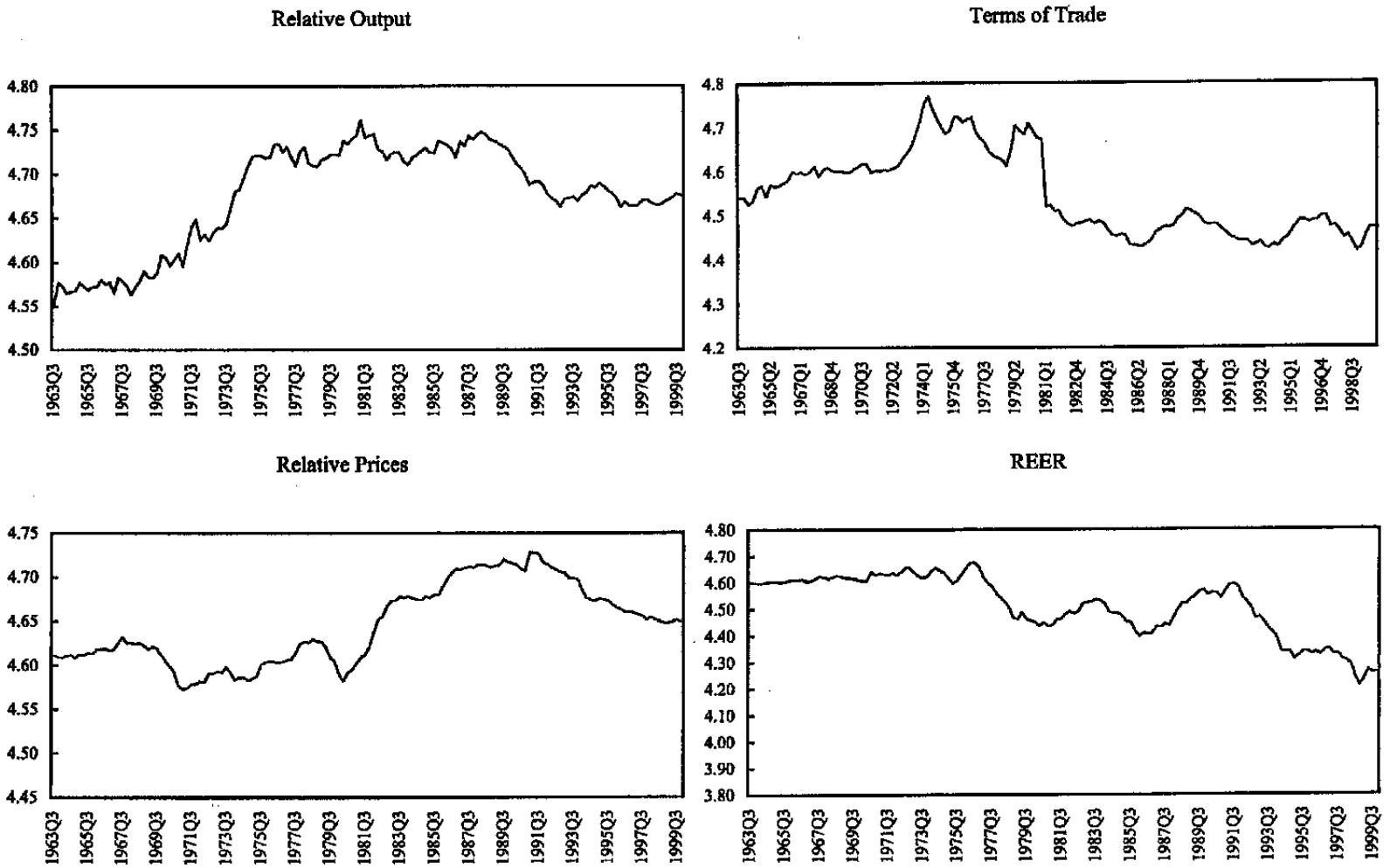


REER



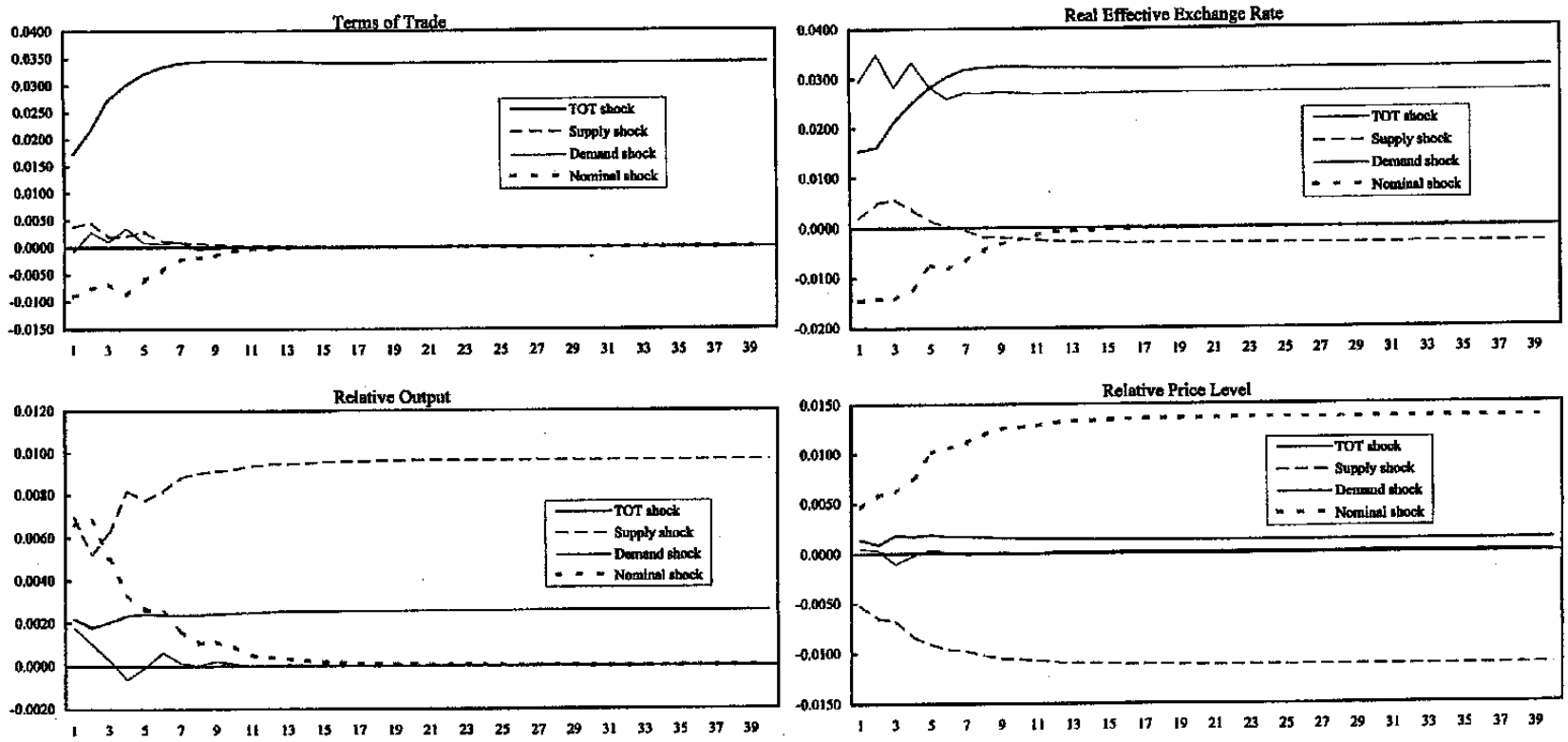
Source: IFS, OECD.

Figure III.5. Canada: Descriptive Statistics
(in logs, 1970=100)



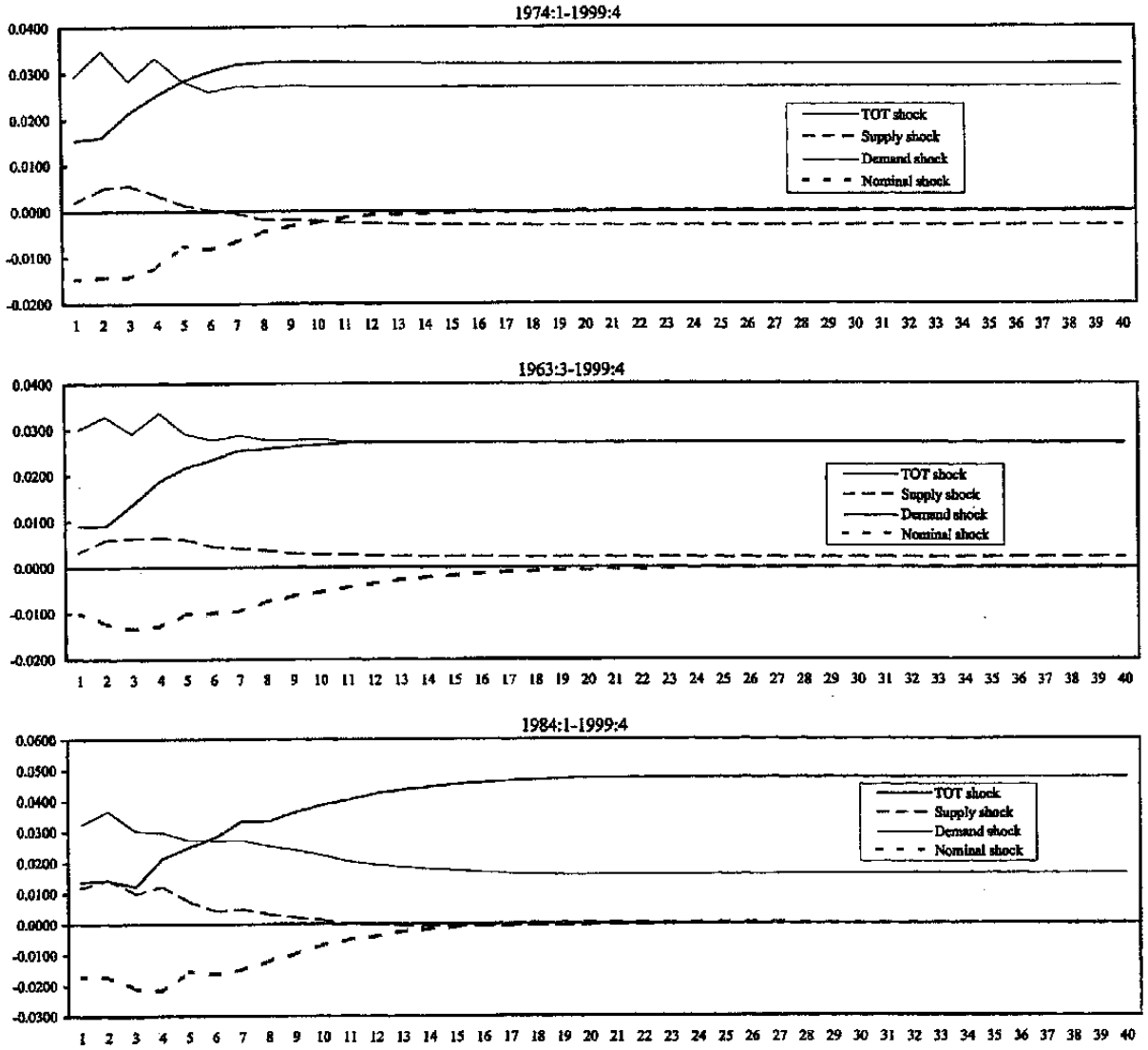
Source: IFS, OECD.

Figure III.6. Australia: Impulse Responses



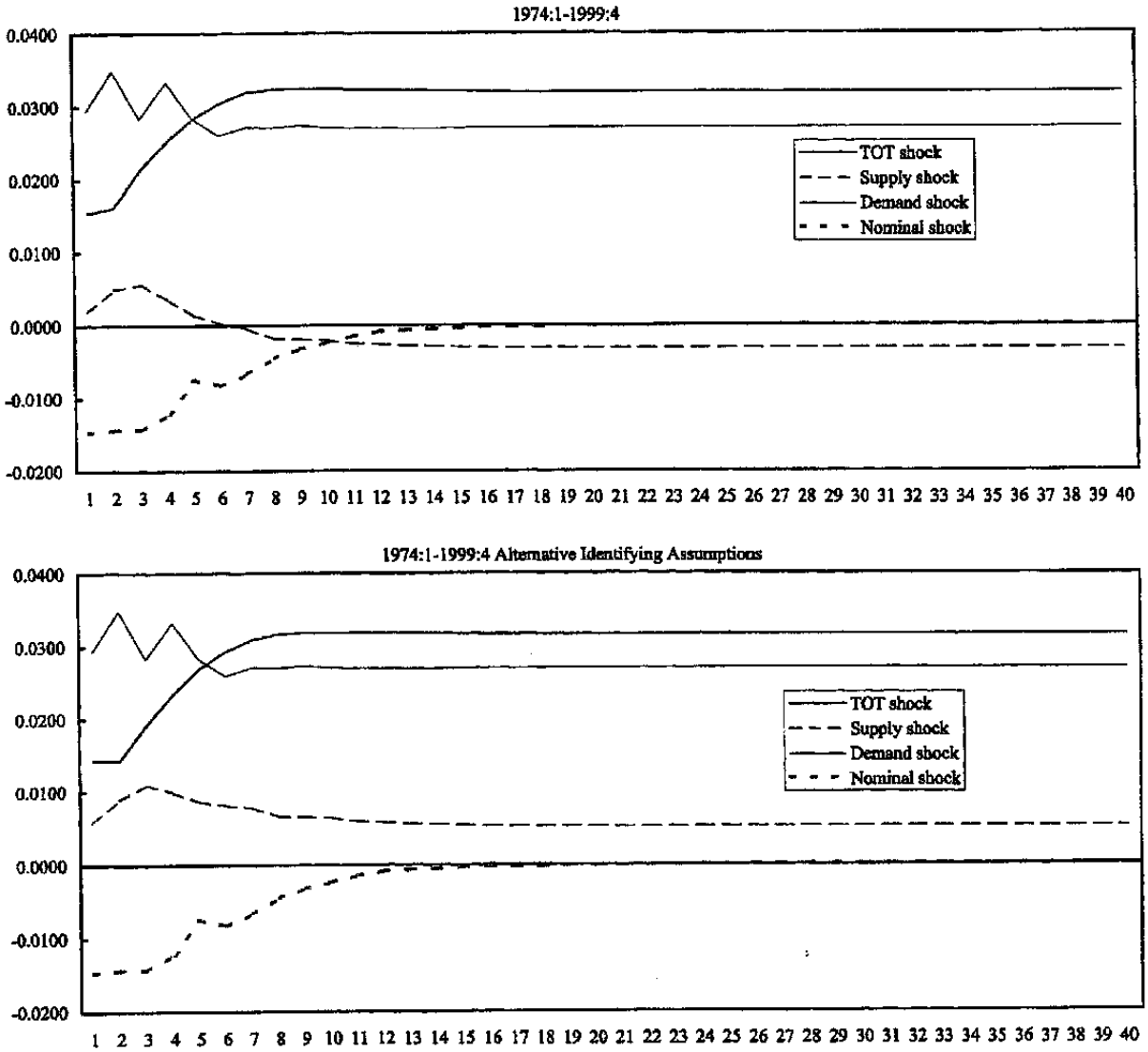
Source: IFS, staff's calculations.

Figure III.7. Australia: REER Impulse Responses over Different Sample Periods



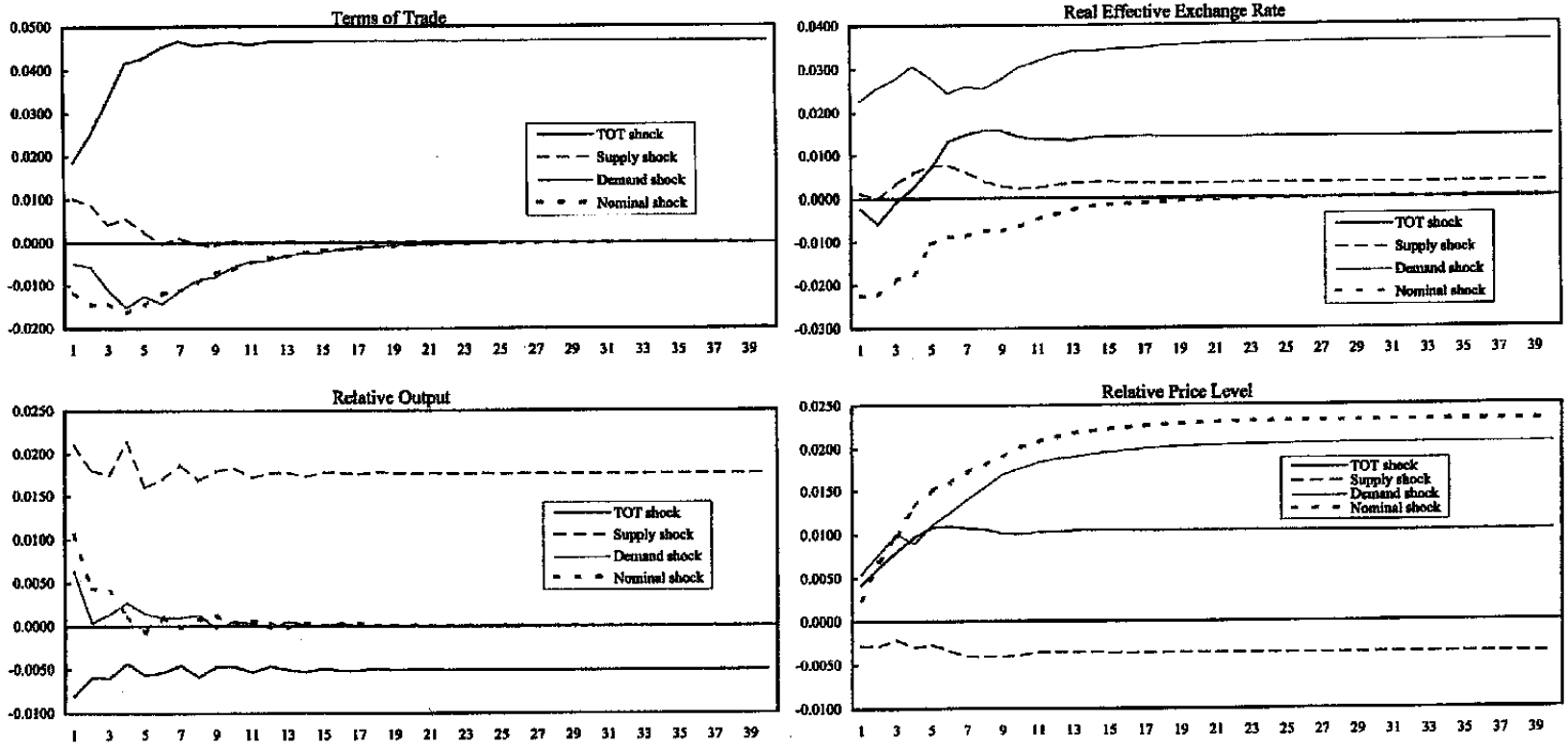
Source: IFS, staff's calculations.

Figure III.8. Australia: REER Impulse Responses Under Alternative Identifying Assumptions



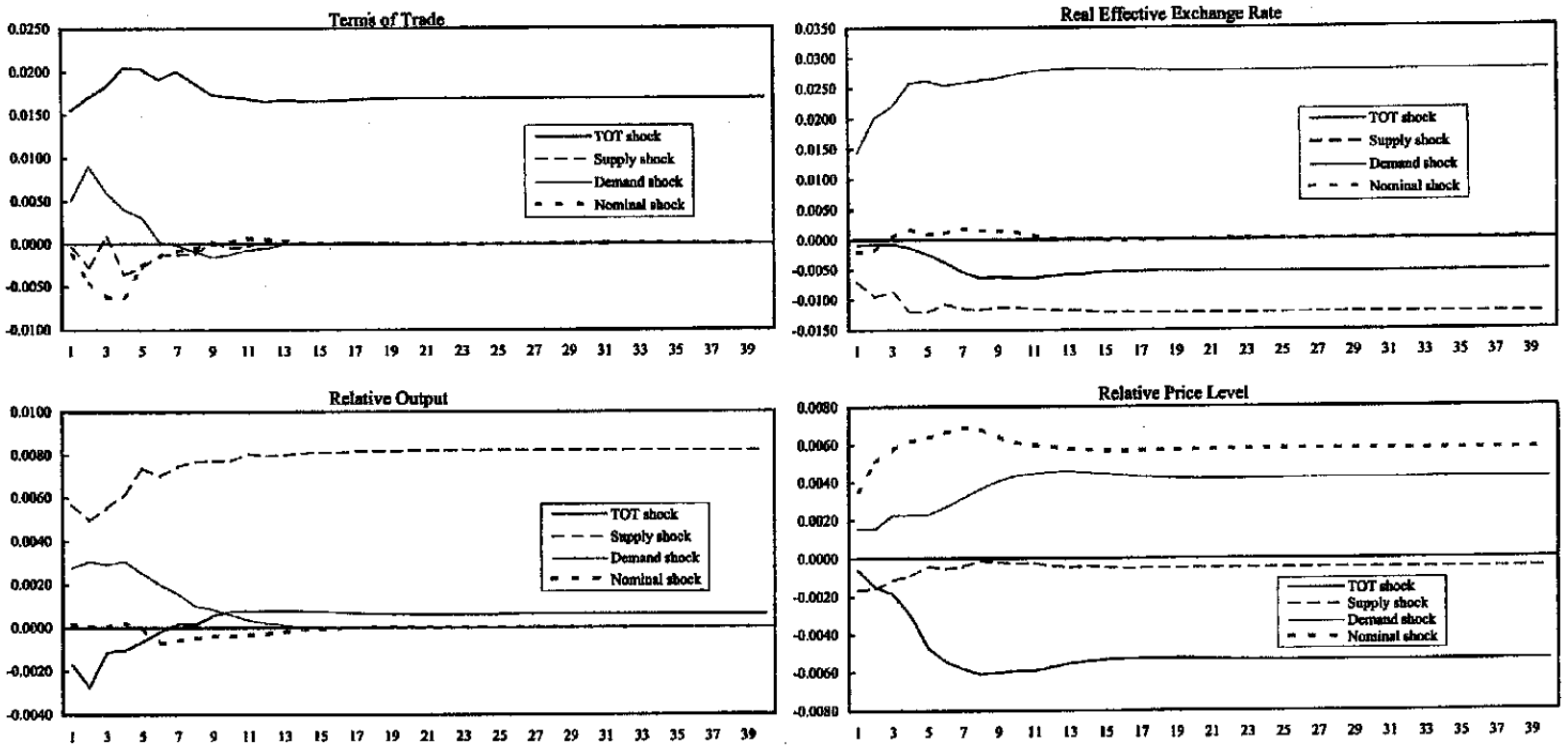
Source: IFS, staff's calculations.

Figure III.9. New Zealand: Impulse Responses



Source: IFS, staff's calculations.

Figure III.10. Canada: Impulse Responses



Source: IFS, staff's calculations.

Figure III.11. Australia: Historical Decomposition of the REER Forecast Error

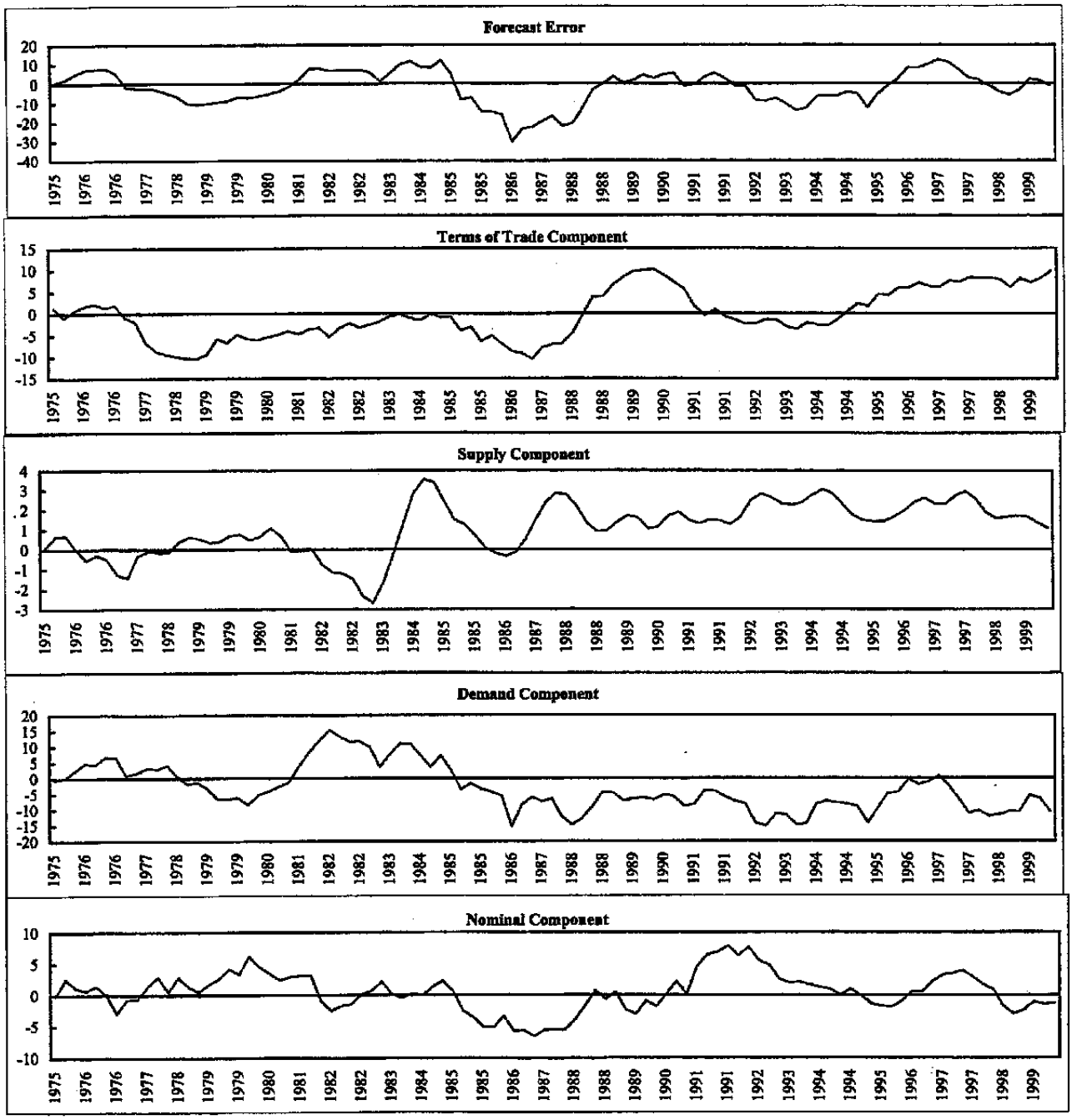


Figure III.12. New Zealand: Historical Decomposition of the REER Forecast Error

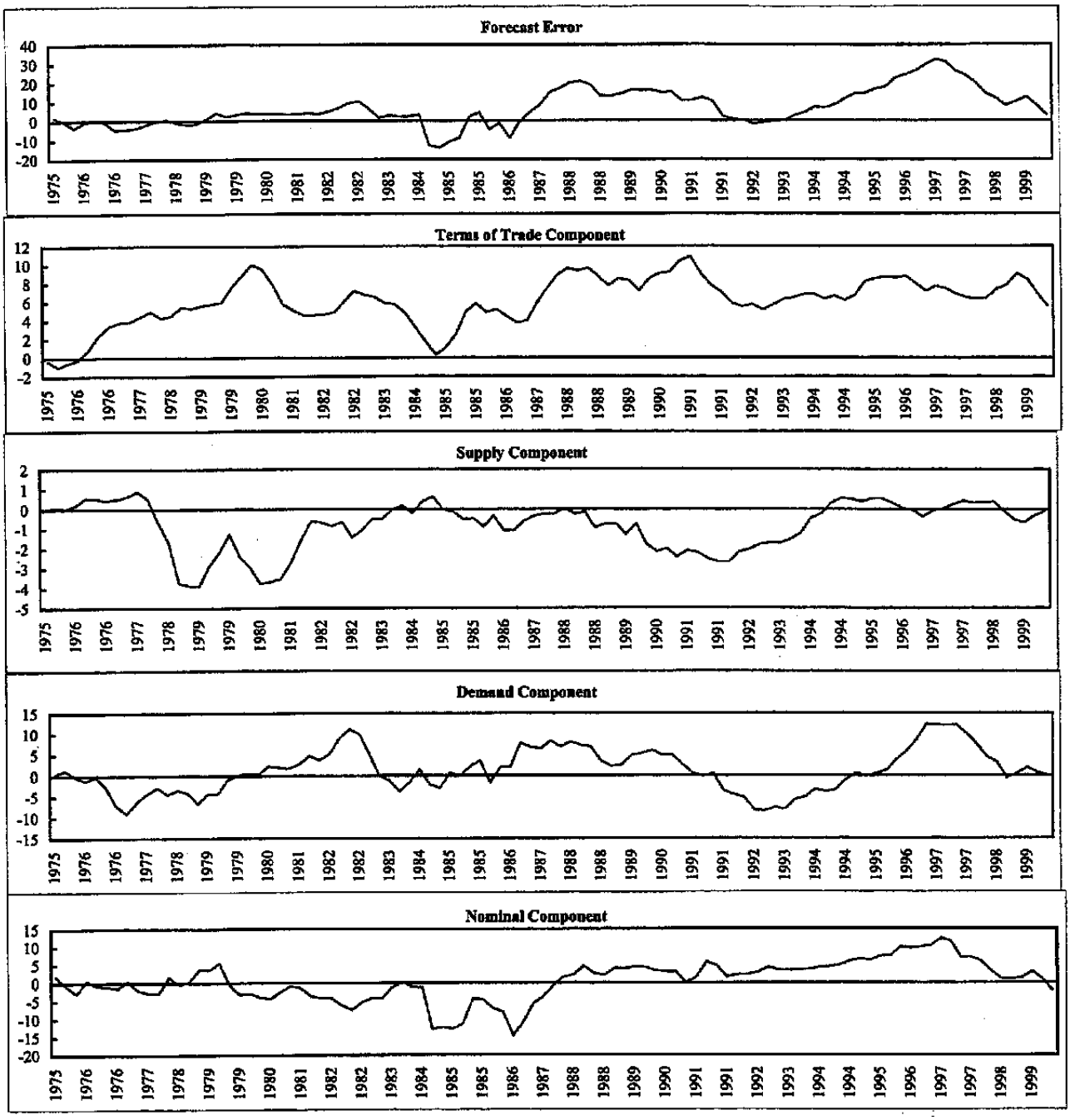


Figure III.13. Canada: Historical Decomposition of the REER Forecast Error

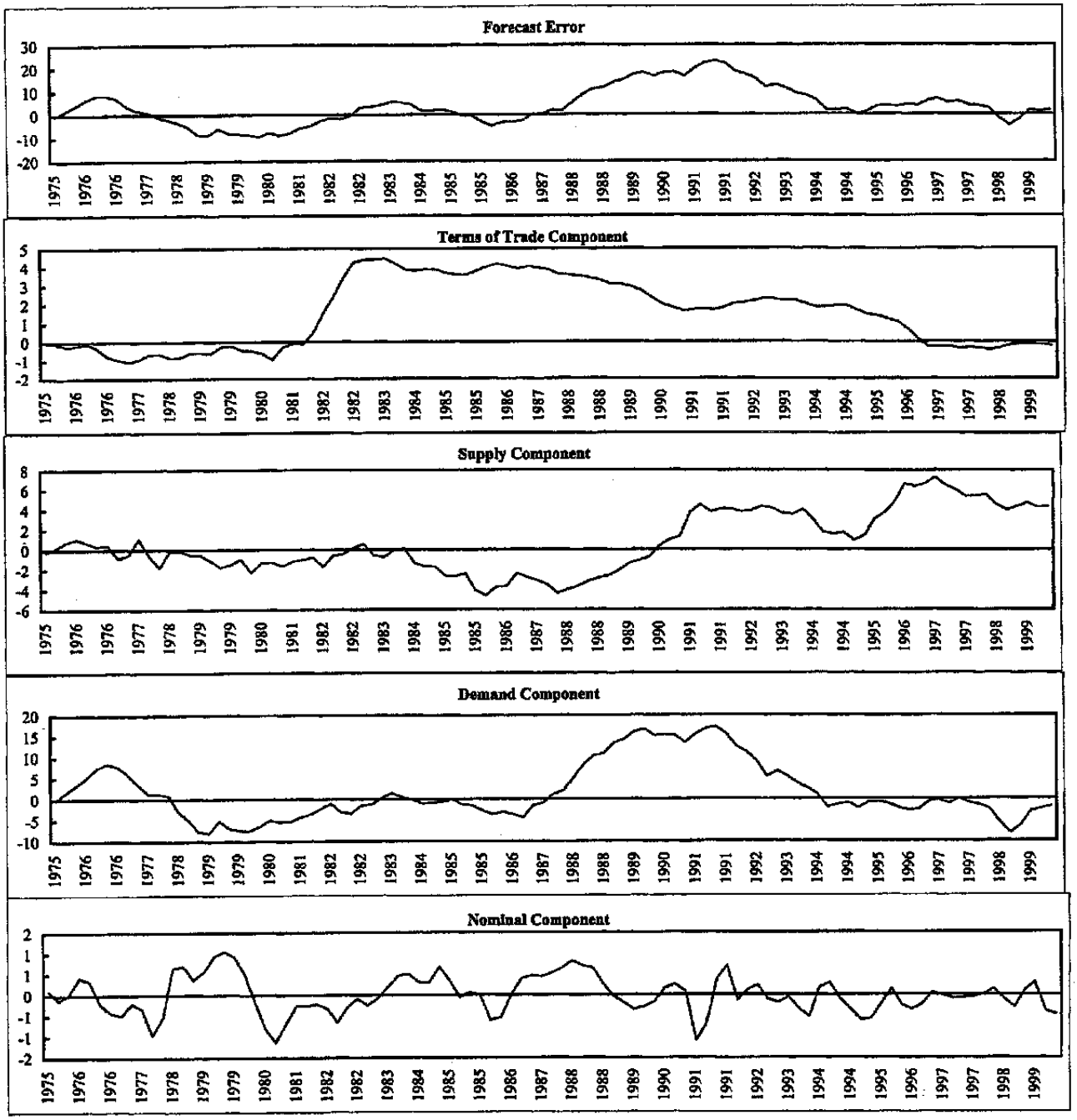


Table III.1. Trade Weights

	Australia	New Zealand	Canada
United States	21.9	16.6	56.2
Japan	20.2	15.3	11.8
Germany	8.9	8.6	5.6
United Kingdom	7.8	8.5	3.9
France	4.9	5.4	3.4
Italy	4.6	5.0	2.8
Taiwan POC	3.8	2.7	2.7
Korea	3.4	2.3	2.8
New Zealand	3.3		
Canada	3.2	2.9	
China	2.9	1.8	1.3
Netherlands	2.9	4.8	1.8
Belgium	2.5	2.8	1.5
Singapore	2.5	1.4	
Hong Kong SAR	2.3	1.6	1.4
Sweden	1.8	1.7	1.4
Switzerland	1.6		
Brazil	1.3		1.2
Australia		13.9	
Denmark		1.6	
Spain		1.4	
Mexico			2.0

Source: IFS. Sample period 1966 -1999.

Table III.2. Australia: Real Exchange Rate Tracking Equation

	1985Q1:1991Q4		1992Q1:2000Q2	
	Coefficients	T-Statistics	Coefficients	T-Statistics
REER (1 lag)	-0.31*	-2.9	-0.41*	-3.8
Terms of Trade (1 lag)	0.29**	2.1	-0.06	-0.42
Interest Rate Differential (1 lag)	0.21	1.1	0.95*	4.5
Change in the Terms of Trade	1.1*	4.9	1.18*	4.4

Source: IFS, * and ** represent significance at the 1 percent, 5 percent, respectively. Constant not reported.

Table III.3. Augmented Dickey-Fuller Statistics

	Australia	New Zealand	Canada
Terms of Trade	-3.8	-3.1	-2.1
Relative Output	-1.0	-3.2	-1.4
REER	-3.9	-3.2	-2.6
Relative CPI	-2.5	-1.0	-1.4
Critical value (95 percent)	-3.4	-3.4	-3.4
Terms of Trade (1st Diff.)	-6.3	-6.2	-7.0
Relative Output (1st Diff.)	-9.9	-6.7	-4.6
REER (1st Diff.)	-4.1	-4.6	-5.0
Relative CPI (1st Diff.)	-3.1	-4.2	-5.5
Critical value (95 percent)	-2.9	-2.9	-2.9

Source: IFS. Sample period 1966 -1999. Regressions include an intercept and a linear trend for the levels. Regressions include an intercept but no trend for the first differences. Order of augmentation selected using the Akaike Information Criterion.

A Formal Description of the Empirical Methodology

This annex provides a formal description of the empirical methodology used in the paper.

Let X_t denote a vector containing the first differences of the relative terms of trade, relative output, the real effective exchange rate, and the relative price level.[1] Then, we can write the reduced-form VAR as

$$B(L)\, X_t = \varepsilon_t, \qquad Var(\varepsilon_t) = \Omega \qquad (1)$$

Where $B(L)$ is a 4x4 matrix of lag polynomials. This VAR can be inverted to obtain the following moving average representation:

$$X_t = C(L)\varepsilon_t, \qquad \text{where } C(L) = B(L)^{-1} \text{ and } C_0 = I \qquad (2)$$

In order to be able to give an economic meaning to the estimation results, one has to derive an alternative moving average representation where the shocks are mutually uncorrelated and can be interpreted as fundamental macroeconomic shocks, that is:

$$X_t = A(L)\eta_t, \qquad Var(\eta_t) = I \qquad (3)$$

The relationship between the reduced-form and the structural parameters are evident from the comparison of equations (2) and (3), namely: $\eta_t = A_0^{-1}\varepsilon_t$ and $A_j = C_j A_0$, for $j = 1, 2, \ldots$ Since the variance covariance matrix, Ω, is symmetric, the identity $A_0 A_0' = \Omega$ entails ten restrictions on the sixteen elements of A_0. Consequently, the identification of the A_0 matrix requires six additional restrictions which are imposed by constraining particular long-run multipliers in the system to be zero.

One can write the set of long-run multipliers as the matrix $A(1) = [A_0 + A_1 + A_2 + \ldots]$, or alternatively, $A(1) = [I + C_1 + C_2 + \ldots] * A_0$. Hence, given the estimates of C_j for $j = 1, 2, \ldots$, by constraining a particular long-run multiplier, one imposes a linear restriction on the elements of the A_0 matrix. As described above, in this paper it is assumed that terms of trade shocks alone have a permanent effect on the level of the terms of trade, that nominal and demand shocks have no long run-effect on the level of output, and finally, that nominal shocks do not have a permanent effect on the level of the real exchange rate. These assumptions restrict the elements (1,2), (1,3), (1,4), (2,3), (2,4), and (3,4) of $A(1)$ to be zero, and make the A_0 matrix uniquely identified.

Finally, because of the lower triangular structure of the $A(1)$ matrix, one can interpret η_{1t}, η_{2t}, η_{3t}, and η_{4t} as the underlying terms of trade, supply, demand, and nominal shocks, respectively.

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[1] The actual data used in this paper are described in Footnote 9.

IV. Welfare Reform—The State of Play and Challenges Ahead[1]

A. Introduction

1. In December 2000, the Australian Government made its initial response to the Final Report of the Reference Group on Welfare Reform (the "McClure Report"),[2] thereby culminating a two year process that has brought welfare reform near the top of the domestic policy agenda. The response signaled a substantial additional budgetary investment in enhancing and complementing Australia's social safety net, noting that welfare reform would be among the highest funding priorities in the 2001/02 Budget. Given the support of the major recommendations of the McClure report across a broad spectrum of civil society, Australia appears set to embark on a comprehensive, long–term reform of its welfare system. In doing so, it would join a growing number of OECD countries including the US, UK and Canada—although the approach in Australia looks likely to remain distinct.

2. The increased interest in welfare reform in Australia stems in large part from the costs—both social and economic—of the persistence of welfare dependency. Key indicators of welfare use (other than those relating to the receipt of unemployment benefits) have showed little or no improvement in 1990s in the face of a prolonged and vigorous economic expansion. In particular: (i) the proportion of the workforce age group receiving some form of income support has risen sharply since the 1960s (much more so than the unemployment rate) while the proportion of jobless of workforce age has actually fallen; (ii) one seventh of workforce age population receives at least 90 percent of its income from government transfers; (iii) public spending on income support has continued to rise as a percentage of GDP; (iv) jobless families are becoming an increasingly prevalent characteristic of the economic landscape (as are two–earner families); and (v) research has shown that that joblessness and welfare dependency of adults can adversely impact the life chances of children, suggesting that social and economic disadvantage could persist across generations.

3. The main drivers of these outcomes are economic and demographic factors, as well as government policies. The most important economic change over the past 30 years has been the increase in the unemployment rate, notwithstanding its steady decline in the current business cycle. The increase in part–time and casual unemployment has also contributed, albeit to a lesser extent. The demographic factors with the most impact have been the increase in lone parenthood, the decline in fertility rates and the aging of the baby boom cohort. Changes in government policy—including expanding the coverage and types of

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[1] Prepared by Paul Gruenwald (x38430), who is available to answer questions.

[2] *Participation Support for a More Equitable Society*, Final Report of the Reference Group on Welfare Reform, Department of Family & Community Services, Canberra (July 2000). The Group comprised members of the community sector, academia, business and government.

income support payments as well those measures aimed at improving targeting through tightening the income and asset tests—have led to an increase in the complexity of the system and have exacerbated existing disincentives for labor force participation.

4. This paper provides an overview of the current state of play regarding welfare reform in Australia and points to key issues and challenges in the period ahead. It is not meant to be a comprehensive study, but rather aims to highlight the main issues as they relate to the economic—rather than the social—dimensions of welfare reform. From this perspective, the key problem is how to provide incentives for and policies which support labor force participation while continuing to offer an adequate safety net and containing budgetary costs—subject to the social and political constraints in the Australian context. Solving this problem is likely to require a gradual, iterative process, drawing on observation of what actually works in practice.

5. The remainder of the paper is structured as follows. Section B looks at the stylized facts of the Australian welfare system and trends in the labor market and welfare use. Section C provides a cross–country (OECD) view of trends in social spending and welfare reform efforts. Section D looks at the need for reform in the Australian welfare system and the key recommendations of the McClure report. Section E presents the Government's initial response to the McClure Report. Section F looks at the expected macroeconomic effects of welfare reform, and Section G concludes with the challenges ahead.

B. Stylized Facts of the Australian Welfare System[3]

The Nuts and Bolts of the System

6. Australia's welfare system (called the "social security" system) is a national system funded out of general revenue. It provides income support payments to over 5 million adults (defined as age 15 and over) out of a total population of 15 million. The main objective of the system is poverty relief rather than income maintenance—welfare payments are designed to provide an adequate income to eligible people. Payments are based on a person's family situation, income and other factors related to need—not on previous earnings. Also, payments are made subject to the claimant satisfying the relevant eligibility requirements, but are not time–limited. Importantly, the system is highly targeted, and features both income and asset tests.

7. There are three broad classes of income support payments, which comprise (in descending order of generosity): pensions; allowances; and special benefits. Details are provided in Boxes IV.1 and IV.2. In theory, pensions are intended to cover situations requiring long–term income support such as old age, severe disability or widowhood.

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[3] The bulk of the material in this section comes from the technical appendices to the Interim Report of the Reference Group on Welfare Reform (March 2000).

Box IV.1. Summary of Eligibility Criteria and Activity Requirements, Main Workforce–Age Income Support Payments

Payment Type	Basic Eligibility Criteria	Labor Force Criteria	Activity Requirements
Pensions			
Widow B Pension	Previously married woman born before July 1937 or who was a lone parent at age 45 and born before July 1942 (no new grants since March 1997)	None	None
Disability Support Pension	Long-term or permanent disability. At least 20 points on the impairment tables	Unable to work full-time for at least the next two years	None
Wife Pension	Wife of a pensioner (no new grants since June 1995)	None	None
Carer Payment	Caring in their own home for a person with permanent or long-term disability	None	Provide full-time personal care or supervision
Parenting Payment Single	Single and primary carer of dependent child(ren) under 16 years of age	None	None
Allowances			
Newstart Allowance/ Youth Allowance	'Unemployed' and not full-time student, available for and willing to undertake suitable work	Not working full-time or in substantial self-employment	Active job search or other activities to improve employment prospects
Parenting Payment Partnered	Partnered and primary carer of dependent child(ren) under 16 years	None	None
Mature Age Allowance	60 years of age but less than Age Pension age	No recent workforce experience, defined as: has not worked at least 20 hours a week for a total of 13 weeks or more in the 12 months before claiming	None
Partner Allowance	Has a partner on income support and was born before July 1955		None
Widow Allowance	Previously married woman over 50 years of age, who was widowed, divorced or separated after turning 40		None
Students Payments			
Austudy Payment/ Youth Allowance (Student)	Full-time student undertaking approved course	None	Satisfactory attendance and/or academic progress
Special Benefit			
	In financial hardship and not eligible for another payment	Unable to earn sufficient livelihood for reasons beyond their control.	May have requirements similar to Newstart or Youth Allowance

Box IV.2. Summary of Payment Rates and Income Tests, Main Income Support Payments for People of Workforce Age

Payment Category	Basic Rates of Payment	Income Tests
Pensions Age Pension Disability Support Pension Carer Payment Parenting Payment Single Mature Age Allowance/ Mature Age Partner Allowance (granted before July 1996)	Single: $394.10 per fortnight (pf) Partnered: $328.90 pf	Free Area: $106 pf (single) $188 pf (couple) plus $24.60 pf per child Tapered reduction rate: For singles payment reduced by 40 cents for each dollar above free area. For couples payment reduced by 20 cents for each dollar above free area.
Allowance Newstart Allowance Sickness Allowance Widow Allowance Partner Allowance Mature Age Allowance (granted after July 1996) Parenting Payment Partnered	Single, no children: $350.80 pf Single, with children or Single, 60+ years, 9+ mths duration: $379.80 pf Partnered $316.40 pf	Free Area: $62 pf Tapered reduction rates: 50 cents for each dollar between $62 and $142pf 70 cents for each dollar above $142pf. Partner income which exceeds cut-out points reduces fortnightly allowance by 70 cents in the dollar.
Austudy Payment	Single or Partnered, no children: $290.10 pf Single, with children: $380.10 pf Partnered, with children: $318.60 pf Higher rates payable to people who have been long-term unemployed.	Free Area: $230 pf Tapered reduction rates: 50 cents for each dollar above the free area $236 and $316pf 70 cents for each dollar above that. Recipients can accumulate an 'income bank' of unused free area up to $6,000.00
Youth Allowance	Single, 16-17 at home: $158.80 pf Single, 18+ at home $190.90 pf Single, not at home or Partnered, no children $290.10 pf Single, with children: $380.10 pf Partnered, with children: $318.60 pf	Full-time students – as for Austudy Payment Other – as for Allowances Parental income test applies if not independent.
Special Benefit	Newstart or Youth Allowance rates apply.	No Free Area Benefit reduced by $1 for every $1 of income.

Allowances, on the other hand, are intended for people with short–term needs such as the unemployed and the sick. Pension payments therefore give more weight to long–term income maintenance while allowances are structured on the expectation that the individual will return to work. As a whole, the system provides: (i) non–activity tested–entitlements for various groups to subsist outside the labor force (most on pensions, although some are on allowances); (ii) allowances for the unemployed and for students; and (iii) a safety net for others in need.

8. Extensive use of means testing in Australia has resulted in a welfare system that costs less and is more redistributive relative to other industrial countries. The consensus is that the system has been very effective in eliminating poverty and providing a strong safety net.[4] Income tests, which are applied on a fortnightly basis, involve:

- a *free area*, or the amount of money a person can earn without any reduction in welfare payments received, and
- one or more *taper rates*, or the proportion of welfare payments withdrawn for each additional dollar of private income earned above the free area.

Free areas and taper rates serve to encourage welfare recipients to earn private income, for example through part time or casual work. In general, pensions have more generous income tests than allowances since recipients are presumed to require longer–term income support. The same logic applies to asset tests. In general, pensions have tapered asset tests, while allowances have "sudden death" cut–out levels, above which no income support is available.

9. A basic element of the Australian approach to welfare is the notion of "mutual obligation."[5] This notion can be interpreted as a view that a contribution from all sectors of society—government, business, communities and individuals—is required for a well–functioning welfare system (or, conversely, that requiring action from only part of the broader society will lead to sub–optimal results). Government and the community have a "mutual obligation" to provide income support to eligible people as well as to provide opportunities for them to participate and improve their situation. Individuals are expected to take up such opportunities—for example, people receiving unemployment benefits are required to actively look for work and to undertake activities such as training that will

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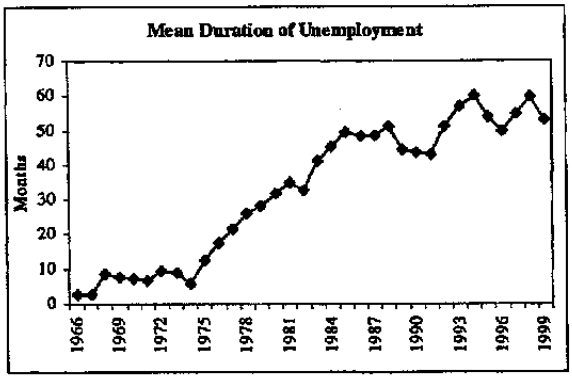
[4] While payment rates vary according to category, age and the presence of a partner and/or dependents, and are adjusted in line with the CPI, the Government has legislated to maintain the single rate of pension at a minimum of 25 percent of male total average weekly earnings.

[5] Mutual obligation will not receive much direct coverage in this paper owing to the focus on labor market incentives—the recommendations of the McClure Report regarding mutual obligations appear in Annex IV.1.

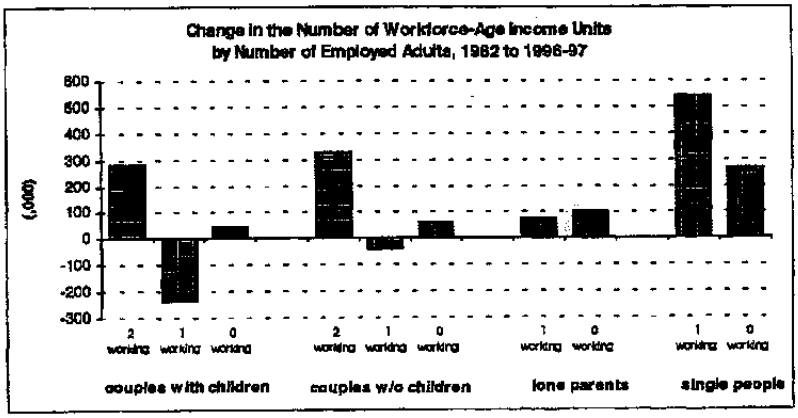
improve their employability. Business has the responsibility to generate wealth and employment, including for those on income support.

Trends in the Labor Market

10. The most prominent trend in the Australian labor market over the past three decades has been the rise in the unemployment rate. While unemployment as a percentage of the workforce age population was steady at around 1 percent from the mid–1960s to the early 1970s, it rose sharply thereafter, and averaged 6½ percent in the 1990s. (By way of comparison, the unemployment rate measured in terms of the labor force averaged 8⅔ percent in the 1990s.)



11. Accompanying the increase in unemployment has been an increase in its duration and a change in its distribution across families. The mean duration of unemployment rose steadily from less than ten weeks in the mid–1970s to over 50 weeks by the early 1990s, where it has remained since. When the period between employment is relatively short, there is a lower likelihood that agents will need to resort to the income support system and job–related skills will remain fresh. On the other hand, longer spells of unemployment both increase the likelihood of using the social safety net and decrease connectedness with the workforce, thereby increasing the risk of persistent joblessness. Importantly, Australian families have also become increasingly divided between two–job households and zero–job households, which has been a strong contributor to the rise in welfare usage. Over the 15 years ending in 1997, the number of families with one working adult fell, while those with two or zero working adults rose.



12. Another important development over the past few decades has been the increase in labor force participation of women and, relatedly, the growth of part–time employment. While male participation fell from 91 percent in the mid–1960s to 81 percent in the late 1990s, female participation rose from 41 percent to 64 percent. Reflecting the higher incidence of part–time work among females, the proportion of part–time workers rose from under 10 percent in the mid–1960s to over one–quarter in the late 1990s. It should be noted

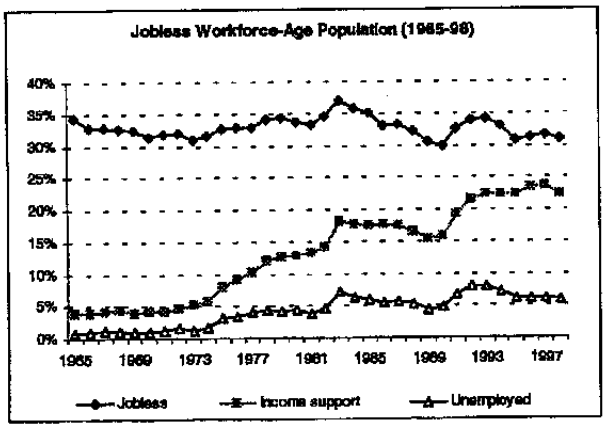
that to the extent that part–time employment reflects worker preferences, and to the extent that the interaction between part–time employment with the welfare system is non–distortionary, the rise in part–time employment is not in itself a negative outcome.

13. Australia also has a significant number of underemployed workers and people marginally attached to the labor force. The underemployed are defined as those part–time workers who would prefer to work longer hours plus full–time employed persons who work less than 35 hours per week due to economic reasons (e.g., if there was insufficient work to allow them to work more hours). The vast majority of underemployed are in the former category. Underemployment is higher for men than for women. Between the 1985 and late 2000, the proportion of men in this category rose from 23 percent to 36 percent, while women rose from 15 percent to 21 percent. The marginally attached are those who would like a job but are either not available for work or not actively seeking work. In September 1999 there were 883,000 marginally attached, and the number of such people is currently at its lowest level since late 1996. The two main groups with marginal attachment are women aged 25–44 engaged in home duties, and students. Over 40 percent of this group received government cash payments as their main source of income.

14. Finally, the Australian labor market is characterized by a high rate of turnover relative to the rest of the OECD. The occupations with the highest turnover—blue collar and lower–skilled white collar positions—are the types most likely to claim welfare benefits. As will be argued below, the high rate of turnover may play a valuable role in absorbing an increase in labor supply resulting from welfare reform.

Trends in Welfare Use

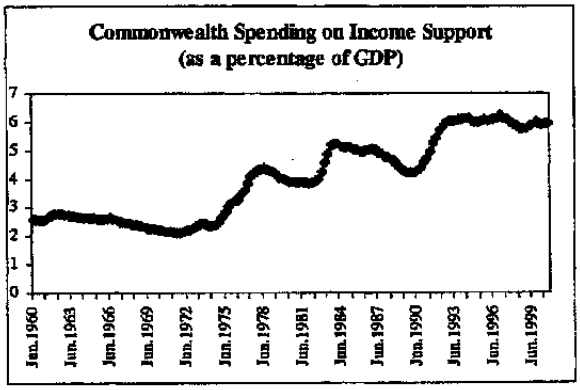
15. Reflecting in part the labor market trends noted above, the proportion of the workforce age population receiving income support has risen sharply over the past three decades from under 4 percent in 1965 to about 22½ percent in 1998—a much higher jump than in the proportion unemployed. While it remains the case that not all jobless people receive income support payments, it is quite clear that the increase in the proportion of the workforce on income support has risen sharply despite a fall in the overall proportion of joblessness. This has been particularly true in the 1990s, where use of income support as a proportion of the workforce age population has not changed appreciably since the end of the 1990–91 recession, while unemployment has dropped steadily.



16. In addition to the rise in unemployment and its duration, several reasons explain the increase in welfare use. First, the proportion of couples with no paid work has increased, mostly due to rising joblessness among men. Second, there have been sustained increases in the rate of lone parenthood—these families are much more likely to be reliant on income support. Third, the number of people combining part–time work and income support has grown sharply. Finally, the aging of the population has contributed to the rise in income support usage reflecting that this cohort has a higher propensity to use the welfare system (see below). Also relevant are the individualization of benefit eligibility in 1995[6] and a number of policy changes aimed at promoting part–time and casual work, the income from which are often complemented by support from the welfare system.

17. Far from being a homogeneous group (which was more the case in the past), the welfare system covers a wide variety of workforce–age people. In 1965, over 40 percent of income support recipients were classified as disabled or sick, more than twice as large as any other group. By 1998, however, the distribution was more balanced with one–third classified as unemployed, 20 percent disabled or sick, 17 percent as partner or child carers, and 14 percent each for lone parents and students.

18. With the rise in the proportion of the workforce claiming income support payments, the fiscal costs have risen sharply. According to Australian Bureau of Statistics data, Commonwealth expenditure on social security (excluding old age payments) was about 2½ percent of GDP from the mid–1960s before jumping to around 4 percent of GDP in the late 1970s, jumping again to 5 percent of GDP in the mid–1980, and again to 6 percent of GDP in the early 1990s, where it stands at present.[7]



19. Income units with no adult in paid employment are much more likely to be on income support than those with working adults. Moreover, the uneven distribution of jobs across families noted above also has intergenerational effects. Children from families receiving income support are two and one–half times more likely to end up on income support themselves than children from families that do not receive income support. Moreover, in Australia joblessness affects a larger proportion of families with children than in most other

[6] In the case of married couples where both partners were unemployed, each is required to file a claim separately—previously, one partner would claim benefits.

[7] The Commonwealth accounts for over 90 percent of total public sector welfare spending.

industrial countries, which results in greater reliance on government support for this group compared to singles and couples without children (Oxley, et al., 1999).

20. Reflecting the trends outlined above, welfare dependency—defined as receiving over 90 percent of income from government cash payments—continues to increase. In 1986, some 12 percent of income units were welfare dependent, rising to over 14 percent in 1996–97. The incidence of dependency is much higher among single persons than couples. Dependency is notably high for lone parents, at over 40 percent. Also, couples with children are less likely to be dependent on welfare than couples without children—the reverse is true for single parents. Dependency was also high among the elderly reflecting an earlier, more general expectation of relying on old–age pension in retirement. It should be noted that long–term reliance on income support is entirely appropriate for certain segments of the workforce age population, including people with serious disabilities that prevent them from taking paid employment and people who provide care for the disabled and elderly. The concern in Australia is that a large and growing proportion of the welfare dependent population is made up of potentially employable adults who would normally be expected to be engaged to some extent in the labor market.

Workforce-age Income Units with at Least 90 Percent of Income from Government Cash Payments, 1986 and 1996-97

	1986		1996-97	
	No. ('000s)	Percent	No. ('000s)	Percent
Couples with children	125.5	6.4	161.9	8.0
Couples w/o children	118.6	9.1	158.9	10.5
Lone parents	147.6	46.8	196.9	41.8
Single persons w/o children	523.7	18.2	718.8	20.4
All workforce age adults	1159.5	11.9	1557.4	14.1

C. Cross–Country Comparisons

21. This section takes a brief look at social spending across the OECD and the emerging consensus in the OECD of "what works" as regards labor market and social policies.[8] Table IV.1 shows data for gross cash social expenditure—defined as labor market plus non–health, non–retirement public expenditure—across a number of OECD countries in 1995.[9] Australia is ranked toward the low end of the spectrum—although it is in the cluster of "Anglo–countries" with which it is often grouped. This result holds up even if one excludes unemployment benefits, which would tend to bias the numbers up or down depending on the relative position of countries in the business cycle. As noted above, Australia's tightly

[8] For labor market policies, see Martin (1999). For social policy, see OECD (1999).

[9] In a ranking of *net* non–health social expenditure (with the netting intending to capture the effect of the tax system) for 1995, Australia comes in 10th out of 12 OECD countries. In that sample, the UK comes in 8th, Ireland 9th, Canada 11th and the US 12th.

targeted income support system has been able to achieve its objectives in a relatively efficient manner as measured by total spending.

22. In recent years OECD countries have shown a greater willingness to innovate in the area of social policy, and a consensus on a "New Social Policy Agenda" has begun to emerge (OECD, 1999). In short, the consensus suggests that there are three pillars in an effective social assistance system: cash assistance; social services and labor market services. Importantly, these three pillars are seen as interrelated—experience shows that progress in welfare reform cannot be made by advancing on only one front. Other factors in the new consensus are that: (i) while there is no trend toward either increasing or reducing the level of cash assistance, there is strong movement toward making benefits dependent on labor market participation including for, after an increasingly short period, lone parents; and (ii) sufficient attention needs to be paid to the fixed costs of labor market reinsertion.

23. A key focus in recent social policy discussions has been on "making work pay." In general, this involves avoiding unemployment traps (where the benefits from unemployment and related benefits approach or exceed post–tax income from work) and poverty traps (where rapid withdrawal of benefits leads to effective marginal tax rates, EMTRs, approaching or exceeding 100 percent). These traps can be avoided through lowering benefits on the one hand and/or lowering taper rates or providing other types of in–work benefits on the other hand.[10] Also included in this class are participation benefits and other schemes that seek to address the issue of the fixed costs of participation.

24. One of the better known and most often analyzed examples of in–work benefits is the Earned Income Tax Credit (EITC) in the US (see, e.g., Disney, 2000 and OECD, 1999). The principle behind the EITC is to lower the EMTR for a person taking up work by providing for an employment contingent tax credit. The trade–off for introducing incentives along the lines of the EITC is that the benefit net is widened to include higher income workers, thus increasing the fiscal cost of the system. For example, the EITC costs ⅓ percent of GDP per year and the UK's Working Family Tax Credit costs about ⅔ percent of GDP year. While there is no presumption that the costs would be different in Australia, it should be noted that the existence of taper rates and free areas in the benefit structure provides the tools to replicate the incentive effects of the EITC without introducing any new program into what is already arguably a fairly complex system.

25. Another, related, area of recent attention by the OECD has been to distinguish active versus passive labor market measures. Active labor market policies and measures are those aimed at improving the access of the unemployed to the labor market and jobs, job–related skills and improving the functioning of the labor market. Passive policies and measures would include unemployment and related social benefits, and early retirement benefits. The

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[10] A simple model showing the relation between taper rates and labor supply is presented in Annex IV.2.

consensus above suggests that active measures would be more effective in achieving social policy goals.

26. Overall, Australia's welfare system is distinguished from those of other OECD countries in a number of ways. As noted above, the income support system in Australia aims at providing an adequate level of income and benefits are not time limited. Also, participation requirements are relatively weak for many of those on income support programs other than unemployment. However, while these benefits are not work contingent, they do serve—through the taper rates and free areas—to subsidize part–time and low paid full time employment, which are seen as important objectives in Australia. While the means tests have led to a highly targeted and cost effective system, they have resulted in high EMTRs relative to the OECD with the attendant work disincentives.

D. The McClure Report

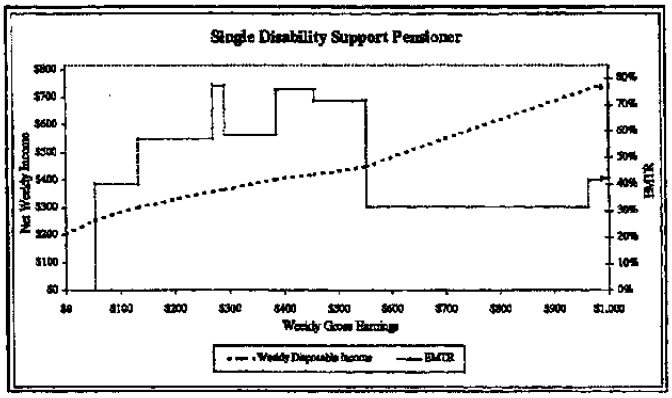
27. Reflecting concern at the increase in welfare dependency as well as the other trends noted above, in September 1999 the Government announced its intention to review the welfare system, and appointed a Reference Group—chaired by Mr. Patrick McClure of Mission Australia (a country–wide community service organization)—to consult with the community and provide advice to the Government. The Group was charged with developing options for changing the income support system and the provision of associated services with the overall aim of preventing and reducing welfare dependency. The Group issued an Interim Report in March 2000 and, after receiving feedback from a broad spectrum of civil society, issued a Final Report in July 2000.

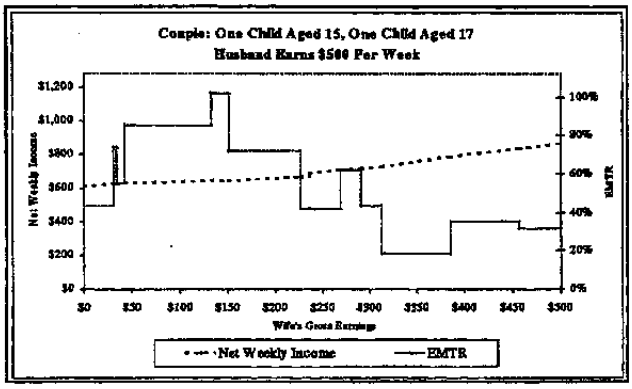
28. The McClure Report noted that the social support system had not responded adequately to the social, demographic and structural changes in the economy. Importantly, the ongoing long expansion (now in its tenth year) has not altered the negative trends outlined above—with a notable exception of unemployment benefits—implying that something more than strong economic growth is required.

29. The McClure Report recognized that the social support system in Australia has its origins in a different environment, one characterized by low, short–term unemployment and the "nuclear family"; i.e., one where income support was more of an exceptional circumstance. As such, the system may be failing those individuals it was designed to help. Four main shortcomings of the current social support system were identified: (i) service delivery is fragmented and not adequately focused on participation; (ii) there is an overly complex and rigid categorical array of benefits; (iii) there are inadequate incentives/rewards for some forms of participation/work, reflecting in particular high EMTRs; and (iv) the system does not provide enough recognition of participation.

30. As already noted, the flipside of Australia's highly targeted and income tested (and, thus, relatively cost effective) welfare system is high EMTRs that arise when the tax and transfer systems interact. Specifically, the high EMTRs arise because of the impact of the taper rates in the transfer system combined with the marginal income tax rates in the tax

system. When several benefits are withdrawn over the same income range, the EMTR can exceed 100 percent, implying that after tax income actually falls as hours worked increase. EMTRs exceeding 80 percent are not uncommon, with obvious effects on workforce participation. The text charts (which are taken from the Interim Report) illustrate the incidence of EMTR for two hypothetical income support recipients: a single person on disability support, and a woman with two children whose husband earns $A 500 per week. High EMTRs can also occur as a consequence of the "bunching" of part–time income (e.g., for seasonal or other intermittent workers), resulting in a diminution of benefits, which are assessed on fortnightly earnings rather than earnings over a longer period. This is the case where the average fortnightly wage would imply a certain level of benefits, but the actual benefits received are much less owing to the existence of free areas and increasing taper rates in the periods when work is actually undertaken.





31. Some progress in improving work incentives was made in conjunction with the introduction of the New Tax System in July 2000. In addition to lowering marginal income tax rates, family assistance was simplified and the related income and asset tests were eased. Also, the taper rate for the new Family Tax Benefit was lowered relative to the arrangements it replaced. The new benefits also increased the assistance for child care, thereby lowering the costs of participation. Overall, EMTRs were lowered for a range of incomes, incentives were improved for low–income families to participate in the labor force, and benefits were increased to families, making them better off when moving to full–time employment.

32. It has also been recognized that the sheer complexity of the income support system may lead to uncertainties about benefits and the associated work incentives—so–called "model uncertainty." This complexity stems in large part from policy changes over the past few decades, where the scope of the welfare system was broadened reflecting an increase in the number of objectives and programs as the social environment on which the system was based changed (e.g., with the rise in the number of lone parents). Available research shows that the perceived return to working is actually less than the actual return. The effect of this complexity—like that of high EMTRs—is to reduce participation in the labor force.

33. The "costs of participation" have also been identified by welfare recipients in the context of the work on the McClure report as a barrier to workforce entry. These relate to the use of formal childcare, transportation costs and start–up costs relating to work or study. Transport costs were particularly relevant for those in rural areas and those with physical disabilities.

34. The Report recommended the creation of a "Participation Support System" built on five, inter–related pillars: individualized service delivery; a simple and responsive income support structure; incentives and financial assistance; mutual obligation; and social partnerships—building community capacity. Below is a sample of proposals from each group. The complete list of recommendations is presented in Annex IV.1.

- *Individualized service delivery*: Design systems for monitoring outcomes from interventions; develop a better means of assessing the capacity of people with disabilities to participate in employment and other activities.

- *A simple and responsive income support structure*. Reconceptualize existing income support payments as "participation support payments;" integrate existing payments for mature age people into a single payment.

- *Incentives and financial assistance*. Introduce a transition bank (see below); develop research bases for, e.g., analyzing optimal withdrawal rates and means testing structures.

- *Mutual obligation*. Implement (phase in) participation models for parents with school aged children; implement a framework for mature aged jobless people which requires some form of (economic) participation.

- *Social partnerships—building community capacity*. Further develop and expand community capacity building in rural and remote areas; develop strategies to foster the growth of micro–businesses.

35. The Report also took the view that the welfare reform process would take time, and divided its recommendations into "initial steps" and medium–to longer–term measures. The distinction was made in light of the need for evaluation of the initial steps and, in some cases, the need for more research to ensure that implementation is guided by good information and sound analysis. Some elements of the package may also require the build–up and maintenance of political momentum.

E. The Government's Response

36. The Government set out its "initial steps" in response to the McClure Report in December 2000. It agreed with the thrust of the Report and its objectives, noting that the income support system had become too rigid and passive, and that it did not encourage

participation. It also agreed that the issue of welfare reform is complex, and that the process will take several years to complete.

37. The Government does not see welfare reform as a cost–cutting exercise—on the contrary, it is expected that implementation will require a substantial upfront investment. Indeed, the objective is to prevent the exclusion of large segments of the population from economic and social participation. In the longer term, it is expected that higher participation rate and the corresponding reduction in the welfare rolls will increase output and lower the public cost for social services (as a percentage of GDP).

38. The objectives of welfare reform—all geared toward reaching the goal of minimizing social and economic exclusion—are threefold: (i) a significant reduction in the incidence of jobless families and jobless households; (ii) a significant reduction in the proportion of the working age population that needs to rely heavily on income support; and (iii) stronger communities that generate more opportunities for social and economic participation. It is expected that the achievement of these objectives would be bolstered by policies designed to support economic and employment growth and to avoid recessions, which have tended to have long–lasting effects on unemployment and the reliance on income support.

39. As to specific recommendations of the McClure Report, the Government will make detailed announcements in the 2001/02 Budget. In the area of incentives the Government has indicated that it will move to develop a transition bank and improve publicity to existing incentives and financial assistance to help meet the costs of participation. The transition bank aims to give casual and intermittent part–time workers the same income support levels as those part–time workers with more uniform work schedules—see Annex IV.3 for details. As noted above, the fortnightly measurement period combined with the existence of free areas and taper rates per fortnight imply that casual part–time workers receive less income support than part–time workers with equal, but more regular, fortnightly income. It is the intention of the publicity program to address more fully the barriers to participation.

40. The Government is also disposed to increase gradually participation requirements for parents with school–aged children, including for sole parents. Australia is one of the few OECD countries that allow sole parents to receive income support until their youngest child turns age 16 without having to look for work. Societal attitudes toward this group are changing in favor of a participation requirement, although a part–time requirement polls much better than full–time requirement in available surveys (Eardley, 2000). In response, the Government has indicated a preference for a gradual approach: recipients with the youngest child 6-12 years will be required to attend an annual interview to discuss training and participation plans, while those with the youngest child 13–15 must develop a participation plan for part–time activity.

41. The Government has also committed itself to ongoing consultation with key stakeholders. An important subject for this process will be the modalities of implementing the more complex medium–term measures in the McClure Report. These will include research on the optimum withdrawal rate and means testing structure, the optimum approach

to improving in–work benefits, and the appropriate balance between full–time and part–time work.

F. Macroeconomic Effects

42. The main macroeconomic effect of successful welfare reform will be an increase in labor supply resulting from improved work incentives. There are several channels for this effect on work incentives, each of which would be expected to have a different response rate (or elasticity). Thus, the scale and pace of these effects is, in the end, an empirical issue.

43. An obvious follow–on issue to a welfare–reform induced increase in the supply of labor is whether there would be a commensurate increase in the demand for labor. If not, then the new labor force participants would simply contribute to a rise in the unemployment rate. However, there are grounds for optimism (Dawkins, 2000).

- The increase in participation should lead to a more efficient labor market (assuming that new participants have the requisite skill mix), implying a lower number of voluntary unemployed—and less wage pressure—for a given level of vacancies.

- The high turnover in the Australian labor market suggests relatively favorable job opportunities for those entering the labor market (compared to a labor market with lower turnover). Although these positions may not be particularly secure or entail sufficient hours, such jobs would be an improvement for those who have been excluded from the labor market.

- Any increase in employment from welfare reform leading to higher aggregate wages would, in turn, increase the demand for goods and services, thereby increasing the demand for labor.

- The effects of recent and prospective reforms in the labor market would reinforce outcomes arising from welfare reforms. In particular, wage flexibility and decentralized bargaining would be complementary to an (appropriately skilled) increase in labor force participation.

44. A successful welfare reform effort would also be expected to provide more flexibility to macroeconomic policy making. Specifically, there would be more scope for expansionary policies without generating wage pressures. The benefits of labor market reforms to date in this area have been evident in the mature phase of the current expansion.

45. Another positive macroeconomic effect of successful welfare reform would be a reduction over the medium– and longer–term in the percentage of GDP devoted to income support payments. This would create scope for a re–allocation of future spending, which would seem particularly desirable in view of the projected effects on the public purse stemming from the aging of the population. A welfare reform induced increase in the participation rate could also serve to mitigate the effects on the budget of population aging.

46. Finally, the success of welfare reform should not be measured in terms of a reduction in the unemployment rate. As noted above, the channels through which labor demand could increase are complex, suggesting that the effect of welfare reform on the unemployment rate is ambiguous.[11] In light of the arguments presented in this paper, better measures of success would be the employment to population ratio and the number of long–term jobless. Any drop in the unemployment rate could therefore be seen as a bonus from welfare reform.

G. Challenges Ahead

47. Overall, the main challenge ahead in implementing welfare reform will be to achieve an appropriate balance among the competing economic, social and political objectives and constraints while making sufficient progress in all of the three pillars identified in the recent work of the OECD to ensure that the reform effort as a whole is viable.

48. Relative to other OECD countries, Australia has placed a priority on targeting income assistance as a way to reconcile the importance of maintaining an adequate safety net while keeping a lid on costs. However, this has had a largely negative effect on work incentives. The economic objective of the welfare reform effort is to shift the balance toward improved work incentives. This effort must face two difficult questions: (i) at what speed to make the transition and (ii) what tools to employ to achieve the desired results. The social and political constraints placed on the process argue for a gradual transition and an incremental use of tools (e.g., improving in–work benefits building on what already is in place)—this is in fact the approach being taken.

49. How well will this strategy work? An approach that is too gradual runs the risk of a tepid labor supply response, little reduction in welfare dependency and a loss of political momentum for reform. An aggressive increase in in–work and related benefits may improve incentives for work, but at the price of an unacceptably large expansion in the fiscal costs. An overly strong push toward participation requirements could risk a political backlash. A balanced approach would seem to require the following:

- Increasing participation requirements relatively aggressively for those who society sees as being able to work (e.g., the young, and parents of school aged children) and in a relatively cautious way for those who have strong constraints on labor force participation (e.g., the physically disabled).

- An early shift in indexation from wages to prices for a sufficiently broad class of benefits. This would allow for the approximate preservation of benefits to wages over the short term, and a reduction of this ratio over time.

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[11] Previous staff work on simulating labor market and welfare reform in Australia (SM/98/219, Supplement 1) has shown that a reduction in real welfare benefits would result in an increase in the labor supply that is not fully offset by higher employment.

- Continued research into the tax–transfer nexus and a willingness to innovate and experiment with measures to foster participation.[12] Resulting policy initiatives should be evidence based.

- Continued progress in labor market reforms needed to increase the efficiency and flexibility of the labor market and help absorb the increase in labor market participation stemming from welfare reform.

50. Finally, the continuation of sound macroeconomic policies and structural reforms must underpin any successful welfare reform effort. Healthy growth in output and employment with an efficient structural base would improve incentives for labor force participation and provide for a relatively smooth transition to employment for those making the transition to work. It would also serve to bolster political support for increased short–term spending on welfare reform aimed at increasing the supply of labor.

[12] Much of the research on the interaction between the tax and transfer system is being undertaken by the Melbourne Institute of Applied Economic and Social Research.

References

Adema, Willem, 1999, *Net Social Expenditure*, OECD Labour Market and Social Policy – Occasional Papers No. 39 (Paris: Organization for Economic Co–operation and Development)

Creedy, John, 1999, "Take–Up of Means–Tested Benefits with Labour Supply Variations," Melbourne Institute Working Paper No. 14/99 (May)

Dawkins, Peter, 1998, "A Plan to Cut Unemployment in Australia: An Elaboration on the 'Five Economists' Letter to the Prime Minister, 28th October 1998," (Melbourne: Melbourne Institute of Applied Economic and Social Research)

Dawkins, Peter, 2000, "Special Topic: Labour Market Issues in Welfare Reform," Quarterly Bulletin, Version 1.00 (Melbourne: Melbourne Institute of Applied Economic and Social Research)

Department of Family & Community Services, 2000, *Technical and Other Appendices*, Interim Report of the Reference Group on Welfare Reform (March) (Canberra)

Department of Family & Community Services, 2000, *Participation Support for a More Equitable Society*, Interim Report of the Reference Group on Welfare Reform (July) (Canberra)

Department of Family & Community Services, 2000, *Government Response—Welfare Reform*, Interim Report of the Reference Group on Welfare Reform (December) (Canberra)

Disney, Richard, 2000, "The Impact of Tax and Welfare Policies on Employment and Unemployment in OECD Countries," IMF Working Paper 00/164 (Washington: International Monetary Fund)

Eardley, Tony, 2000, "Sole Parents and Welfare Dependency," Social Policy Research Centre, Newsletter No. 76 (May)

Martin, John P., 1998, *What Works Among Active Labour Market Policies: Evidence From OECD Countries' Experiences*, OECD Labour Market and Social Policy – Occasional Papers No. 35 (Paris: Organization for Economic Co–operation and Development)

Organization for Economic Co–operation and Development, 1999, *Implementing the OECD Jobs Strategy: Assessing Performance and Policy*

Organization for Economic Co–operation and Development, 1999, *A Caring World: The New Social Policy Agenda*

Oxley, H., Dang T.-T., Förster, M. & Pellizzari, M., 1999, *Income Inequalities and Poverty Among Children and Households with Children in Selected OECD Countries: Trends and Determinants*, Paper for the LIS/DGV Conference "Child Well–Being in Rich and Transition Countries: Are Children in Growing Danger of Social Exclusion?, Luxembourg, 30 September–2 October

Table IV.1. Gross Total Cash Social Expenditures in Selected OECD Countries, 1995 1/

(As a percentage of GDP)

	Public Cash Benefits	Public Pension Spending	Sub-total	Unemployment	Total
Australia	10.7	4.7	6.0	1.3	4.7
Belgium	19.7	10.3	9.4	2.8	6.6
Canada	11.4	4.8	6.6	1.3	5.3
Denmark	21.4	7.7	13.7	4.6	9.1
Finland	22.9	9.1	13.8	4.0	9.8
Germany	17.3	10.9	6.4	1.4	5.0
Ireland	13.2	4.6	8.6	2.7	5.9
Italy	18.0	13.6	4.4	0.9	3.5
Netherlands	19.7	7.8	11.9	3.1	8.8
Norway	15.6	6.2	9.4	1.1	8.3
Sweden	21.4	9.0	12.4	2.3	10.1
United Kingdom	15.4	7.3	8.1	0.9	7.2
United States	8.7	6.3	2.4	0.3	2.1
Unweighted Average	16.6	7.9	8.7	2.1	6.6

Source: Adela (1999).

1/ Total social expenditure comprises cash benefits (shown here) plus health and social services.

Detailed Recommendations of the McClure Report		
	Initial Steps	**Medium to Long Term**
Individualized Service Delivery	• Detailed design of an individualized service delivery system • Develop through a consultative process with key stakeholders, and trial more sophisticated assessment or profiling tools • Commonwealth and State Governments identify the gaps in service provision and break down the current barriers between service provision markets • Expand the range of assistance for mature age people who have become or are at risk of long term joblessness • Solicit through the Job Network and other employment assistance programs • Expand and market the JET program to meet expected demand under a mutual obligations framework for parents • Develop a better means of assessing the capacity of people with disabilities to participate in employment and other activities • Move toward a significant change in the framework of employment services to people with a disability • In consultation with indigenous communities, trial innovations in service delivery for Indigenous people • Further investigate ways in which children from disadvantage families can be assisted via access to quality child care • In consultation with ethnic communities, trial innovations in service delivery for people of culturally and linguistically diverse background • Commission regular evaluations of service interventions using the data made available under individualized service delivery system	• Implement a new individualized service delivery system focused on better coordination between government departments and integration of income support and other services

Detailed Recommendations of the McClure Report		
	Initial Steps	**Medium to Long Term**
Simple and Responsive Income Support Structure	• Develop a participation support payment structure, by simulating and costing alternative approaches, including likely behavioral effects on labor supply, the budget and income distribution • Reconceptualize existing income support payments for people of workforce age • Integrate existing payments for mature age jobless people into a single payment • Simplify and rationalize Newstart Allowance, Sickness Allowance, and Austudy into a single payment for adults who are in the labor market and/or education • Further investigate cash and/or in–kind assistance for the costs of stability	• Implement, in managed stages, an integrated support payment system, which provides adequate income support and incentives for participation • Bring payment withdrawal rates for a participation support payment together to achieve the best balance between targeting assistance to need and providing incentives for self–reliance and taking account of likely labor force behavior
Incentives and Financial Assistance	• Develop the research base necessary for further policy development on work incentives, including optimal withdrawal rates, means-test structures • Undertake pilots to test the merits of alternative approaches that address the costs of participation and the transition from income support to paid employment • Introduce a transition bank and associated administrative measures to improve the incentives for and returns from casual work • Reduce the very high effective marginal tax rates for families caused by the overlap between the means tests for FTB (A) and the Youth Allowance Parental Income Test • Governments work together to identify ways to mitigate the negative financial effects of paid work on public housing tenants	• Introduce an integrated participation support payment system to ensure strong incentives for part time and full–time work and to extend in–work benefits • Adopt participation supplements/accounts to help meet participation costs and assist with the transition to employment • Consider the introduction of income–contingent loans to meet the costs of more expensive forms of education, training and self–employment start–up

Detailed Recommendations of the McClure Report		
	Initial Steps	**Medium to Long Term**
Mutual Obligations	• Develop an overarching mutual obligations framework for the Participation Support System • Develop a model for mutual obligations that emphasizes the expectation to undertake some form of participation • Develop mutual obligations guidelines for indigenous people that strengthen existing family and community structures • Government, business and communities assist people from overseas overcome barriers to participation • Implement a mutual obligations framework for mature age jobless people • Business, government and community jointly establish a comprehensive set of early intervention arrangements • Establish a national framework of triple bottom line (social, environmental and economic) auditing for the corporate sector sponsored by the Prime Minister's Community • Implement, with phased transitional arrangements, a participation model of income support for parents with children under school age, and school going children • Develop participation expectations and requirements for people with disability • Review the capacity for work criterion (the 30–hour threshold) for people with disabilities • Review the level and nature of support for long–term unemployed people • Government and business to work in partnership to achieve attitude change and improve incentives and recognition for business to employ people at risk for long–term joblessness	• Government will continue to resource an adequate safety net income support and related programs to alleviate poverty and provide opportunities for social and economic participation for jobless families and households • Ensure that all levels of government continue and increase their resources of community capacity building • Ensure a forum is available for continuing dialogue with business about their social obligations • Implement the overarching mutual obligations framework for the new Participation Support System

Detailed Recommendations of the McClure Report		
	Initial Steps	**Medium to Long Term**
Social Partnerships: Building Community Capacity	• Further develop and expand the role of Rural Transaction Centres as a focus for community capacity building in rural and remote communities • Resource the Prime Minister's Community Business Partnership to promote and support business involvement in social partnerships • Encourage and support companies with extensive involvement in regional and depressed communities • Develop pilots to encourage business to invest in community economic development and to provide business leadership skills to disadvantaged communities • Ensure that the Stronger Families and Communities Strategy is implemented with the close participation of business and community innovators • Develop strategies to foster the growth of micro–businesses • Develop an on–line clearinghouse for ideas, case studies and general information to support the growth of social entrepreneurship • Continue and increase support for small and micro business development programs • Review programs across government which support community capacity building and encourage social partnerships	• Build on the Stronger Families and Communities Strategy and Regional Solutions to develop an ongoing program to promote the building of social capital and the development of social partnerships • Government, business and community continue to explore together strategies for community capacity building • Broaden opportunities for ongoing dialogue with business regarding their role in the Participation Support System

Taper Rates and Labor Supply

This appendix presents a simple framework for analyzing the effect of an increase in taper rates—the rate at which welfare benefits are withdrawn for increases in income—on labor supply.[1] Under a scaled down, but plausible, benefit structure and Cobb–Douglass preferences, it is shown that this effect is negative for all reasonable parameter values.

Assumed Tax and Benefit Structures

On the tax side, assume that there is a single marginal income tax rate, t ,that applies to all gross income above some threshold, a.[2] If all income comes from earnings, y, after tax income is:

$$y - T = at + y(1-t) \qquad \text{if } y > a \qquad (1)$$

Otherwise, $t = T = 0$. On the benefit side, assume a single program that pays a means tested benefit, B, with taper rate, $s \in (0,1)$—i.e. between 0 and 100 percent—and threshold $a > 0$ (identical to the income tax threshold, for simplicity). Thus,

$$B = s(a - y) \qquad \text{if } a > y \qquad (2)$$

and $B = 0$ otherwise. Moreover, assume that there is a fixed cost, k, of applying for the means tested benefit, which can be regarded as a non–refundable cost of applying for B.

Budget Constraint

The budget constraint in this model is piece–wise continuous, consisting of three sections, corresponding to: (i) those who earn above the threshold, pay tax and receive no welfare benefits; (ii) those who earn below the threshold but do not receive benefits owing to the existence of the fixed cost k of obtain such benefits; and (iii) those who earn less than the threshold and receive welfare benefits.

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[1] This annex draws liberally on Creedy, John, "Take–up of Means–Tested Benefits with Labour Supply Variations," Melbourne Institute Working Paper Series No. 14/99, University of Melbourne, May 1999. The working paper also discusses the take–up rate of welfare benefits—that issue will not be discussed in this appendix.

[2] Since benefit recipients in this simple model do not pay income tax, the tax regime does not need to be specified to obtain the main results. However, it is included for completeness.

Suppose that net of tax income and consumption are synonymous (i.e., that we are in a one–period world) and that the price index is normalized to unity. For those who work and pay tax the budget constraint is $c = y - T(y)$ or

$$c = at + y(1-t) \qquad y \geq a \qquad (3)$$

For those who have $y < a$ but do not claim any welfare benefit the budget constraint is simply

$$c = y \qquad (4)$$

Finally, for those who have $y < a$ and claim welfare benefits the budget constraint is $c = y + B(y) - k$, or :

$$c = (as - k) + y(1-w) \qquad (5)$$

Utility Maximization

This section will derive the labor supply decision consistent with utility maximizing behavior. While, three different cases are possible (as noted above) as to the take up or eligibility of welfare benefits, the only case of interest for the present exercise is those who work, qualify for welfare and claim benefits. Individuals are assumed to maximize their utility over consumption and leisure according to the following Cobb–Douglas function:

$$U(c, h) = c^{\alpha}h^{(1-\alpha)} \qquad (6)$$

where h represents leisure, and the time endowment has been normalized to unity; i.e. labor supply is (1-h). Labor is the only endowment—there are no assumed asset stocks to run down, meaning that labor is the only source of income (other than welfare benefits). There is no bequest motive. If the wage, w, is taken as given and agents live for only one period, then all earnings and benefits are consumed

$$c = (as-k) + w(1-h)(1-s) \qquad (7)$$

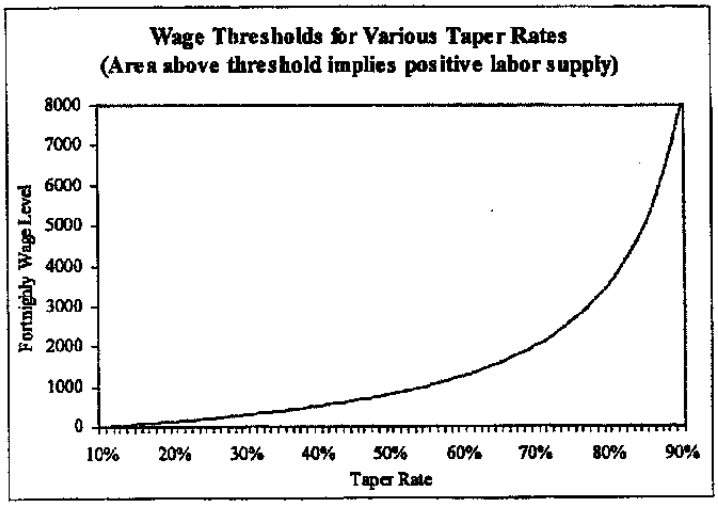
It is straightforward to substitute (7) into (6). The first order condition yields, with a little manipulation:

$$h^* = (1-\alpha) + [(1-\alpha)(as-k)/w(1-s)] \quad (8)$$

If $h^* < 1$, then the agent will find it optimal to work (and will receive welfare benefits as long as $wh^* < a$). To ensure an interior solution it must be the case that

$$(1-\alpha)(as-k)/\alpha(1-s) < w \quad (9)$$

From (9), it is easy to note that the smaller is the taper rate, s, ceteris paribus, the more likely that an individual would supply a positive amount of labor. The figure below illustrates over which constellations of parameters (9) would hold.[3]



Leisure/Labor Supply Effects

We are now in a position to ascertain the effect of changes in the taper rate for welfare benefits on leisure chosen and labor supplied. Differentiating (8) with respect to s yields:

$$dh^*/ds = (1-\alpha)(a-k)/w(1-s)^2 \quad (10)$$

[3] The figure was constructed using the following parameters: $\alpha = 0.5$; $k = 100$ and $a = 1000$.

Which is positive as long as $a > k$; i.e., if the threshold at which welfare benefits end is greater than the fixed cost of applying for such benefits. Since a violation of this condition would imply that no one would claim any welfare benefits, we can conclude that a always exceeds k and that the effect on labor supply (leisure) of increases in the taper rate is always negative (positive).

For completeness, the analysis is taken one step further, and we now look at the rate of increase in leisure/labor supply from changes in the taper rate. Differentiating again,

$$d^2h^*/ds^2 = 2(1-\alpha)(a-k)/w(1-s)^3 \qquad (11)$$

With the requirement that $a > k$ in order to induce anyone to claim welfare benefits, (11) shows that changes in the taper rate s increase leisure (decrease labor supply) at an increasing (decreasing) rate.

A Transition Bank

One of the main measures contained in the Government's initial response to the McClure Report was the creation of a "transition bank."[1] The idea behind a transition bank is to allow those income support recipients with seasonal, casual or other intermittent types of work to be compared similarly under the income test with those who earn an equivalent amount on a regular basis. Under the current system, with its "free area" and "taper rates" implemented on fortnightly time intervals,[2] income support recipients with intermittent work face a much larger reduction in benefits than those with regular, part–time work, with the attending disincentives for labor force participation. This is illustrated below with a series of examples for hypothetical individuals who receive the Newstart (unemployment) Allowance.

Simple Examples

Consider two individuals, X and Y, who are both single and work part time. X works part time on a regular basis, earning $A 100 per fortnight or $A 1,300 over a six month period, while Y works intermittently, earning the same amount over the same period. Y's fortnightly earnings are assumed to range from zero to $A 450. Both X and Y qualify for the Newstart Allowance. The free area for benefits under Newstart Allowance is $A 62 per fortnight, with a taper (or benefit withdrawal) rate of 50 percent for fortnightly income between $A 62 and $A 142, and 70 percent for income over $A 142.

The analysis is undertaken by comparing benefit reductions. Table 1 shows the benefit reductions for person X. Given a free area of $A 62, person X has "non–free income" (i.e., used to calculate a reduction in benefits) of $A 38 each fortnight. Since X's fortnightly non–free earnings fall within the 50 taper rate for non–free income, X faces a benefit reduction of $A 19 per fortnight. On a cumulative basis, person X loses $A 247 over the 13–week period.

The situation is quite different for person Y, who earns the same amount as person X over the 13–week period, but with higher fortnightly earnings variability. Person Y's benefit reductions over the period total $A 646, over two–and–one–half times the reductions faced by person X (Table 2). These reduction range from zero (in weeks where income is zero or inside the free area) to $A256, which is equivalent to 57 percent of that week's income.

The intuition for these differences is straightforward. With the more variable profile, person Y's earnings are more penalized by the income test, which is administered on a fortnightly basis. Alternatively, person Y is "losing" the use of the free area in those weeks where income is zero or negligible, while person X gains the full benefits of the free area. Indeed,

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[1] The material in this annex follows closely Appendix D of the McClure Report (2000).

[2] These concepts are defined in the main text.

while 62 percent of person X's earnings are in the "free area," only 23 percent of person Y's earnings enjoy this status. Moreover, over half of person Y's earnings are subject to the 70 percent taper rate, which kicks in at $A 142 per fortnight, while none of person X's earnings face this taper rate. From a macroeconomic perspective, the high average and effective marginal tax rates negatively affect person Y's labor supply.[3]

Solution: A Transition Bank

Any strategy to ameliorate this problem would need to move away from applying the income test on a purely fortnightly basis, which has the effect, as shown above, of penalizing those income support recipients who have highly variable fortnightly earnings. The intention of a transition bank is to effect such a change. It seeks to achieve this objective by allowing income recipients to build up a stock of unused free area "credits" over time. This stock can then be used as needed as an offset against any fortnightly income earned subsequently in order to increase the amount covered by the free area and lower or eliminate future benefit reduction. Person Y's earning schedule and benefit reductions using a transition bank are shown in Table 4.

As can be seen from the Table, person Y's benefit reductions fall by more than 50 percent when using a transition bank (although they remain about 20 percent higher than person X's) compared to the example above, which would serve to eliminate most of the negative labor supply effects arising from the divergent treatment of similar total income streams. Person Y's high benefit losses in fortnights 6 and 11 under the no transition bank regime have largely been offset by using balances built up in the transition bank. Moreover, since person Y has used up all of the cumulative free area over the 13–week period, the percentage of income not subject to a taper rate is the same as for person X (see Table 3).

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[3] See Annex IV.2 for a discussion of the relation between taper rates and labor supply.

Table IV.3.1. Person X: Benefit Reduction under Newstart Allowance

Period (fn)	Income (fn)	Allowable Free Area	Non-free Income	50% Taper	70% Taper	Benefit Reduction
1	100	62	38	19	-	19
2	100	62	38	19	-	19
3	100	62	38	19	-	19
4	100	62	38	19	-	19
5	100	62	38	19	-	19
6	100	62	38	19	-	19
7	100	62	38	19	-	19
8	100	62	38	19	-	19
9	100	62	38	19	-	19
10	100	62	38	19	-	19
11	100	62	38	19	-	19
12	100	62	38	19	-	19
13	100	62	38	19	-	19
Total	**1,300**			**247**	**-**	**247**

Table IV.3.2. Person Y: Benefit Reduction under Newstart Allowance

Period (fn)	Income (fn)	Allowable Free Area	Non-free Income	50% Taper	70% Taper	Benefit Reduction
1	-	62	-	-	-	-
2	-	62	-	-	-	-
3	-	62	-	-	-	-
4	-	62	-	-	-	-
5	50	62	-	-	-	-
6	400	62	338	40	181	221
7	-	62	-	-	-	-
8	-	62	-	-	-	-
9	-	62	-	-	-	-
10	100	62	38	19	-	19
11	450	62	388	40	216	256
12	-	62	-	-	-	-
13	300	62	238	40	111	151
Total	**1,300**			**139**	**507**	**646**

Table IV.3.3. Summary of Earning Subject to Various Taper Rates

Period (fn)	Person X			Person Y - No Transition Bank			Person Y - With Transition Bank		
	Free Area	50% Taper	70% Taper	Free Area	50% Taper	70% Taper	Free Area	50% Taper	70% Taper
1	62	38	-	-	-	-	-	-	-
2	62	38	-	-	-	-	-	-	-
3	62	38	-	-	-	-	-	-	-
4	62	38	-	-	-	-	-	-	-
5	62	38	-	50	-	-	50	-	-
6	62	38	-	62	80	258	322	78	-
7	62	38	-	-	-	-	-	-	-
8	62	38	-	-	-	-	-	-	-
9	62	38	-	-	-	-	-	-	-
10	62	38	-	62	38	-	100	-	-
11	62	38	-	62	80	308	210	80	160
12	62	38	-	-	-	-	-	-	-
13	62	38	-	62	80	158	124	80	96
Total	**806**	**494**	**-**	**298**	**278**	**724**	**806**	**238**	**256**
(% of Total)	**62%**	**38%**	**0%**	**23%**	**21%**	**56%**	**62%**	**18%**	**20%**

Table IV.3.4. Person Y: Benefit Reduction under Newstart Allowance with Transition Bank

Period (fn)	Income (fn)	Allowable Free Area	Unused Free Area	Transition Bank W/D	Transition Bank Bal.	Non-free Income	50% Taper	70% Taper	Benefit Reduction
1	-	62	62	-	62	-	-	-	-
2	-	62	62	-	124	-	-	-	-
3	-	62	62	-	186	-	-	-	-
4	-	62	62	-	248	-	-	-	-
5	50	62	12	-	260	-	-	-	-
6	400	62	-	260	-	78	39	-	39
7	-	62	62	-	62	-	-	-	-
8	-	62	62	-	124	-	-	-	-
9	-	62	62	-	186	-	-	-	-
10	100	62	-	38	148	-	-	-	-
11	450	62	-	148	-	240	40	112	152
12	-	62	62	-	62	-	-	-	-
13	300	62	-	62	-	176	40	67	107
Total	**1,300**						**119**	**179**	**298**

Table 1. Australia: Selected National Accounts Aggregates at 1998/99 Prices, 1995–2000 1/

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
				(In billions of Australian dollars)				
Private consumption	307.1	317.2	329.5	344.7	362.8	93.0	93.8	94.4
Government consumption	97.1	99.7	101.7	106.0	110.4	29.2	29.8	29.2
Gross fixed capital formation	111.4	117.1	129.7	138.2	146.8	38.7	37.9	36.8
Private business investment	49.2	55.6	63.1	68.9	70.5	17.3	17.2	18.0
Equipment	33.3	37.0	42.9	43.0	45.1	12.2	12.1	12.6
Nondwelling construction	15.9	18.6	20.2	25.9	25.4	5.1	5.0	5.4
Residential construction 2/	32.3	30.4	34.4	38.3	40.9	11.4	12.0	9.6
Other private investment 3/	7.2	8.3	9.4	10.0	11.3	3.0	3.1	3.2
Public sector investment	22.7	22.8	22.8	21.0	24.1	7.0	5.7	6.1
Stockbuilding and work in progress 4/	4.0	2.5	-6.1	3.8	5.5	0.0	0.0	0.9
Gross national expenditure	519.6	536.5	554.8	592.8	625.5	160.8	161.5	161.4
Net exports 4/	-7.2	-5.6	-5.0	-12.3	-18.9	-5.5	-4.7	-3.6
Exports of goods and services	90.1	99.7	111.1	110.7	115.7	30.9	31.6	32.8
Imports of goods and services	97.3	105.3	116.1	123.0	134.6	36.3	36.3	36.4
Statistical discrepancy 4/	-0.7	-0.2	0.2	0.0	1.1	1.1	1.2	1.3
Gross domestic product	510.8	529.9	550.1	580.8	607.7	156.5	158.1	159.1
				(Percent change from previous year)				
Private consumption	5.0	3.3	3.9	4.6	5.2	4.0	4.4	3.9
Government consumption	3.5	2.6	2.0	4.3	4.1	7.1	8.9	5.6
Gross fixed capital formation	4.0	5.1	10.8	6.6	6.2	5.3	6.8	-1.6
Private business investment	13.6	13.0	13.5	9.3	2.3	-1.5	3.4	3.8
Equipment	11.8	11.2	16.0	0.2	4.9	1.9	15.7	9.1
Nondwelling construction	17.4	17.0	8.5	28.5	-2.1	-8.9	-17.7	-6.8
Residential construction 2/	-7.9	-5.9	13.1	11.3	6.8	14.3	18.8	-7.1
Other private investment 3/	15.4	15.5	12.6	6.2	13.3	11.7	14.9	9.0
Public sector investment	1.2	0.3	0.4	-8.1	14.5	7.2	-7.5	-11.7
Stockbuilding and work in progress 4/	0.5	-0.3	-1.6	1.8	0.3	-1.0	-1.6	-0.2
Gross national expenditure	5.0	3.2	3.4	6.8	5.5	3.9	4.2	2.6
Net exports 4/	-0.6	0.3	0.1	-1.3	-1.1	-0.8	0.0	1.1
Exports of goods and services	5.1	10.6	11.5	-0.3	4.5	11.5	12.5	12.4
Imports of goods and services	8.1	8.2	10.3	5.9	9.4	13.7	10.9	5.5
Statistical discrepancy 4/	-0.1	0.1	0.1	0.0	0.2	1.0	0.7	0.4
Gross domestic product	4.4	3.7	3.8	5.6	4.6	4.2	4.9	4.2

Source: Australian Bureau of Statistics.

1/ Quarterly data are seasonally adjusted.
2/ Includes real estate transfer expenses.
3/ Includes livestock and intangible fixed assets.
4/ Contribution to GDP growth, at annual rates.

Table 2. Australia: Sectoral Components of Gross Domestic Product at 1998/99 Prices, 1995–2000 1/

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
Agriculture, forestry, and fishing	14.7	17.0	15.8	17.2	18.2	4.7	4.6	4.7
Mining	22.0	23.6	24.0	24.0	24.8	6.6	6.8	6.8
Manufacturing	67.0	68.7	71.3	72.4	74.7	19.2	19.2	19.0
Electricity, gas, and water	10.4	10.3	10.6	10.9	11.1	2.9	2.9	2.9
Construction	26.4	27.2	28.2	32.4	34.2	8.7	8.8	7.4
Wholesale and retail trade	54.6	57.2	59.9	62.5	65.5	16.7	16.7	16.8
Communication services	12.1	13.3	14.9	16.1	18.3	4.9	5.1	5.1
Finance and insurance	28.5	30.1	31.9	35.4	39.8	10.5	10.7	10.7
Transport and storage	29.3	31.3	32.2	32.9	33.9	8.6	8.8	8.8
Property and business services	53.1	54.4	59.8	64.3	70.6	18.2	18.8	19.6
Government administration 2/	22.9	23.2	23.5	23.1	22.6	5.7	5.8	5.8
Other sectors	169.8	173.6	178.3	189.7	193.9	49.7	50.0	51.6
Gross domestic product	510.8	529.9	550.1	580.8	607.7	156.5	158.1	159.1
			(Percent change from previous year)					
Agriculture, forestry, and fishing	5.8	15.7	-7.2	9.2	5.9	5.1	-1.8	-1.8
Mining	5.2	7.1	1.7	-0.2	3.5	9.6	12.3	9.4
Manufacturing	0.1	2.5	3.8	1.6	3.3	1.4	3.3	1.6
Electricity, gas, and water	0.9	-0.6	2.6	2.9	1.9	3.5	4.5	6.0
Construction	2.8	2.8	3.6	15.1	5.6	2.1	2.3	-14.0
Wholesale and retail trade	7.1	4.7	4.7	4.4	4.7	3.1	3.8	2.4
Communication services	11.4	9.8	12.2	8.2	13.7	11.8	11.6	9.5
Finance and insurance	6.3	5.7	5.7	11.1	12.4	9.1	8.5	6.9
Transport and storage	6.1	7.0	2.8	2.2	3.0	4.1	3.5	2.0
Property and business services	5.1	2.5	9.8	7.6	9.8	7.2	7.3	10.4
Government administration 2/	-0.5	1.4	1.4	-1.8	-2.0	0.9	2.5	2.4
Other sectors	4.9	2.2	2.7	6.4	2.2	3.0	4.4	6.1
Gross domestic product	4.4	3.7	3.8	5.6	4.6	4.2	4.9	4.2

Source: Australian Bureau of Statistics.

1/ Quarterly data are seasonally adjusted.
2/ Includes defense.

Table 3. Australia: Household Income, Expenditure and Savings, 1995–2000 1/

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	June Qtr. 2000	Sep. Qtr. 2000
				(In billions of Australian dollars)				
Sources of income								
Total gross household income	433.1	458.5	475.1	501.4	529.1	133.5	141.8	140.6
Compensation of employees	234.4	250.0	262.6	278.2	293.7	74.6	77.7	79.3
Property income 2/	44.7	45.6	42.7	44.9	48.2	11.1	14.6	12.4
Gross operating surplus--dwellings owned by persons	39.1	42.0	45.5	48.4	49.7	12.9	13.1	12.6
Gross mixed income 3/	47.7	49.0	50.3	54.3	57.1	14.3	14.8	13.5
Social assistance benefits 4/	46.6	50.9	52.0	52.9	56.0	14.1	14.9	16.4
Current transfers to nonprofit institutions	8.1	8.3	9.2	9.6	10.7	2.9	3.0	2.9
Nonlife insurance claims	11.7	11.8	11.8	12.1	12.7	3.3	3.4	3.4
Other	0.9	1.0	1.0	1.0	1.0	0.3	0.3	0.3
Uses of income								
Total household income payable	99.7	106.8	110.4	119.4	125.1	33.2	38.9	29.9
Income tax payable	58.1	63.2	68.2	74.3	77.6	20.1	25.1	15.5
Dwellings and unincorporated enterprises 5/	20.1	20.5	18.0	19.8	21.1	6.2	6.7	7.2
Consumer debt interest	3.7	3.9	3.9	4.2	4.6	1.3	1.4	1.4
Other	17.8	19.2	20.2	21.1	21.9	5.6	5.7	5.8
Gross disposable income	333.4	351.7	364.8	382.1	403.9	100.3	102.9	110.7
Final consumption expenditure	292.9	308.5	325.8	344.0	364.0	90.2	93.9	98.5
Net saving	13.7	15.7	10.1	7.3	7.2	1.5	0.2	3.3
Consumption of fixed capital	26.8	27.5	28.9	30.7	32.7	8.6	8.8	8.9
Gross saving	40.5	43.2	39.0	38.0	39.9	10.1	9.0	12.2
				(Percent change from previous year)				
Sources of income								
Total gross household income	7.8	5.9	3.6	5.5	5.5	6.7	8.4	7.9
Compensation of employees	7.2	6.7	5.0	6.0	5.6	6.0	6.8	8.4
Property income 2/	12.2	2.0	-6.2	5.1	7.3	13.3	15.8	7.0
Gross operating surplus--dwellings owned by persons	7.3	7.6	8.2	6.5	2.6	3.6	5.1	4.5
Gross mixed income 3/	6.3	2.6	2.7	7.9	5.1	9.4	8.8	7.5
Social assistance benefits 4/	6.3	9.2	2.3	1.7	5.7	4.8	8.1	11.7
Current transfers to nonprofit institutions	18.8	2.6	11.6	4.1	11.2	8.8	36.3	-2.5
Nonlife insurance claims	10.6	1.2	-0.5	2.3	5.3	8.7	8.0	6.3
Other	7.8	6.7	6.8	-4.7	5.2	4.2	4.2	3.8
Uses of income								
Total household income payable	14.2	7.1	3.3	8.1	4.8	11.5	9.3	4.3
Income tax payable	12.5	8.7	8.0	8.9	4.4	10.1	5.7	-7.6
Dwellings and unincorporated enterprises 5/	23.4	2.2	-12.0	9.5	6.7	23.3	28.6	36.4
Consumer debt interest	35.1	5.2	-0.1	7.8	9.1	17.4	24.4	23.2
Other	7.2	8.1	5.1	4.6	3.8	3.8	3.5	5.9
Gross disposable income	6.0	5.5	3.7	4.7	5.7	5.2	8.1	8.9
Final consumption expenditure	7.0	5.3	5.6	5.6	5.8	5.1	5.5	7.8
Net saving	-9.1	14.6	-35.4	-27.4	-2.3	-8.9	-111.2	62.4
Consumption of fixed capital	3.8	2.7	4.9	6.2	6.7	8.9	8.6	7.5
Gross saving	-1.0	6.7	-9.7	-2.5	4.9	5.9	45.1	18.3

Source: Australian Bureau of Statistics.

1/ Quarterly data are seasonally adjusted.
2/ Includes investment income of insurance enterprises and superannuation funds attributable to policyholders and imputed interest on government unfunded superannuation arrangements.
3/ Refers to unincorporated enterprises owned by households in which the owners or members of the same household contribute unpaid labor.
4/ Includes workers' compensation.
5/ Unincorporated enterprises owned by households.

Table 4. Australia: Saving and Investment Balances, 1995–2000 1/

(In percent of GDP)

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
Sources of funds for gross accumulation								
Saving	2.1	3.4	3.8	4.4	3.5	5.0	4.2	4.8
Of which:								
Households	8.3	8.3	7.1	6.6	6.5	6.5	5.6	7.4
General government	-0.7	0.5	2.3	4.0	3.6	2.5	4.4	0.0
Consumption of fixed capital	15.6	15.2	15.1	15.3	15.4	15.9	15.5	15.3
National saving 2/	17.7	18.6	18.9	19.7	18.9	20.9	19.7	20.1
Foreign Saving	5.2	3.7	2.9	4.8	5.7	4.4	4.6	4.0
Uses of funds								
Investment	23.1	22.7	22.3	24.3	24.8	23.1	25.3	22.6
Fixed investment	22.7	22.3	23.1	23.8	23.9	23.1	21.9	20.7
Private sector	16.7	16.4	17.4	18.4	18.3	18.6	18.4	17.1
Dwellings	5.0	4.4	4.8	5.3	5.5	6.3	6.6	5.5
Nonresidential construction	2.9	3.3	3.5	4.4	4.2	3.4	3.3	3.5
Equipment	7.7	7.6	7.8	7.5	7.2	7.3	7.0	6.9
Real estate transfers	1.0	1.1	1.2	1.2	1.4	1.5	1.4	1.2
Public sector	4.7	4.4	4.2	3.6	3.9	4.5	3.5	3.6
General government fixed investment	2.3	2.3	2.3	2.2	2.3	2.6	2.1	2.3
Public enterprises' fixed investment	2.4	2.1	1.8	1.4	1.5	1.9	1.4	1.3
Changes in stocks	0.4	0.3	-0.8	0.6	0.8	0.1	0.0	0.7
Statistical discrepancy	-0.2	-0.4	-0.5	0.2	-0.2	2.3	-0.9	1.5

Source: Australian Bureau of Statistics.

1/ Quarterly data are seasonally adjusted.
2/ National accounts basis, as measured by the authorities.

Table 5. Australia: Selected Price Indices, 1995–2000

(Percent change from previous year)

	GDP Deflator	GDP Deflator (Nonfarm)	Private Consumption Deflator	Consumer Price Index			Import Deflator 2/	Export Deflator 2/	Manufacturing Sector	
				Total	Treasury Underlying 1	Non-food			Articles Produced By	Articles Used In
1995	1.8	1.6	2.0	4.6	2.7	4.8	3.2	5.8	3.6	6.2
1996	2.1	2.6	1.9	2.6	2.7	2.6	-6.5	-3.0	0.8	-2.4
1997	1.3	1.5	1.7	0.3	1.7	-0.3	-1.7	0.2	1.2	-1.1
1998	0.3	0.5	1.0	0.9	1.6	0.5	7.0	2.5	0.6	0.0
1999	0.8	1.1	0.5	1.5	1.3	1.0	-4.7	-5.2	0.7	1.3
2000	...	...	...	4.5	...	4.9	...	...	...	...
1998										
Mar. qtr.	0.9	1.0	1.3	-0.2	1.5	-0.5	5.6	4.7	0.9	-0.1
Jun. qtr.	0.8	1.0	1.2	0.7	1.6	0.5	8.8	6.2	1.2	1.6
Sep. qtr.	0.1	0.1	0.8	1.3	1.6	0.9	9.9	3.5	0.9	0.9
Dec. qtr.	-0.4	-0.1	0.6	1.6	1.6	1.0	3.8	-4.0	-0.4	-2.2
1999										
Mar. qtr.	0.7	0.7	0.5	1.2	1.7	0.4	-1.0	-4.8	-0.6	-1.9
Jun. qtr.	0.4	0.8	0.5	1.1	1.7	0.4	-5.7	-8.9	-0.7	-0.9
Sep. qtr.	1.0	1.6	0.6	1.7	...	1.4	-7.8	-7.2	1.0	0.7
Dec. qtr.	1.3	1.3	0.6	1.8	...	1.7	-4.1	0.5	3.1	7.4
2000										
Mar. qtr.	1.8	2.0	0.7	2.8	...	3.2	-0.7	5.1	5.5	13.1
Jun. qtr.	2.4	2.3	1.1	3.2	...	3.5	8.2	14.8	7.4	16.4
Sep. qtr.	4.4	4.2	3.7	6.1	...	6.7	8.5	15.3	7.3	18.0
Dec. qtr.	...	...	...	5.8	...	6.3	...	...	...	...

Sources: Australian Bureau of Statistics; and Reserve Bank of Australia, *Bulletin*.

1/ The consumer price index excluding interest charges, petrol, and certain other items; used as an indicator of underlying inflation. Effective from the September quarter 1999 the Treasury Measure of Underlying inflation was discontinued.
2/ Goods and services.

Table 6. Australia: Labor Market, 1996–2000 1/

	1996	1997	1998	1999	2000	2000			
						Mar.	Jun.	Sep.	Dec.
Labor force									
Total									
In thousands	9,119	9,207	9,342	9,469	9,681	9,599	9,674	9,739	9,712
Percent change 2/	1.3	1.0	1.5	1.4	2.2	2.1	2.6	2.6	1.7
Participation rate 3/									
Total	63.5	63.2	63.3	63.1	63.6	63.4	63.7	63.9	63.5
Male	73.6	73.1	72.9	72.6	72.6	72.4	72.7	72.8	72.5
Female	53.8	53.7	53.9	54.0	54.9	54.6	54.9	55.2	54.7
Employed									
Total									
In thousands	8,339	8,421	8,596	8,784	9,043	8,946	9,024	9,124	9,080
Percent change 2/	1.3	1.0	2.1	2.2	3.0	2.8	3.3	3.5	2.2
Full-time (percent change) 2/	1.0	0.0	1.8	1.7	2.8	2.6	3.2	3.2	2.0
Part-time (percent change) 2/	2.1	4.0	2.9	3.7	3.5	3.5	3.4	4.3	2.8
Unemployed									
Total (in thousands)	780	786	747	684	638	653	651	616	632
Unemployment rate 4/									
Total	8.6	8.6	8.0	7.2	6.6	6.8	6.7	6.3	6.5
Male	8.8	8.8	8.2	7.3	6.7	6.8	6.7	6.5	6.8
Female	8.3	8.3	7.7	7.1	6.4	6.8	6.7	6.1	6.2
Long-term 5/	2.4	2.6	2.6	2.2	1.8	2.0	1.9	1.7	1.6
					(Percent change)				
Employment by sector									
Agriculture, forestry, and fishing	2.7	2.8	-2.2	2.9	1.4	3.4	1.3	1.9	-0.8
Mining	4.5	-7.1	2.1	-9.1	4.4	10.9	0.0	4.8	2.0
Manufacturing	0.3	1.6	-3.3	-2.1	6.2	4.2	10.0	7.2	3.2
Electricity, gas, and water	-13.7	-8.7	-0.7	-1.0	0.7	-0.3	1.0	-3.0	5.1
Construction	-0.8	-2.6	7.2	6.5	5.9	11.1	9.2	5.6	-2.3
Wholesale and retail trade	1.9	-1.1	3.2	3.7	-3.3	-0.4	-4.3	-4.8	-3.9
Communication services	11.3	-7.5	-3.5	2.7	16.8	25.5	15.9	17.2	8.4
Finance and insurance	0.8	-0.6	2.2	-2.4	7.0	6.5	11.3	6.8	3.1
Transport and storage	2.1	0.3	0.0	5.4	-0.7	-8.5	0.5	0.9	4.5
Property and business services	3.1	5.7	8.3	3.6	8.0	4.2	7.3	10.1	10.4
Government administration & defense	0.3	-5.0	-5.6	4.8	0.5	-1.2	-3.8	1.7	5.5
Other sectors	0.8	3.9	3.1	1.4	3.5	2.5	3.1	4.9	3.4

Source: Australian Bureau of Statistics.

1/ Quarterly data are seasonally adjusted. Fiscal year aggregates are cumulated on seasonally adjusted quarterly data.
2/ From previous year.
3/ Labor force as a percent of population aged 15 and over.
4/ In percent of labor force.
5/ Persons unemployed for more than one year.

Table 7. Australia: Employees' Compensation and Unit Labor Costs in the Nonfarm Sector, 1995–2000 1/

(Percent change from previous year)

	1995	1996	1997	1998	1999	2000		
						Mar.	Jun.	Sep.
Average weekly earnings								
Ordinary time: full-time adults	4.8	3.9	4.0	4.2	2.9	4.1	4.3	6.1
Total earnings								
Public: nominal terms	2.5	3.7	5.3	5.2	2.9	3.1	3.2	3.7
Private: nominal terms	3.5	3.3	2.8	2.3	1.6	2.9	4.1	7.7
All employees								
Nominal terms	2.8	3.0	3.1	2.8	1.6	2.8	3.9	6.8
Real terms 2/	0.7	1.0	1.4	1.8	1.1	2.1	2.8	3.0
Average earnings: National accounts basis								
Nominal terms	2.5	5.1	4.4	3.7	3.0	3.8	2.9	3.4
Real terms 2/	0.5	3.1	2.7	2.7	2.4	3.0	1.8	-0.3
Wage cost index 3/	...	...	...	...	3.1	2.9	2.9	3.2
Productivity	1.6	4.3	3.8	4.3	3.3	1.5	1.3	0.7
Implicit deflator of nonfarm GDP	1.6	2.6	1.5	0.5	1.1	2.0	2.3	4.2
Real unit labor costs: Nonfarm sector								
Index 4/	100.3	100.2	100.3	99.4	99.9	98.3	97.9	97.9
Percent change	0.7	0.0	0.1	-0.9	0.5	-1.4	-2.6	-2.0

Sources: Australian Bureau of Statistics; and Reserve Bank of Australia, *Bulletin*.

1/ Quarterly data are seasonally adjusted.
2/ Deflated by the implicit price deflator for private final consumption expenditure.
3/ Series began in the 1997 September quarter.
4/ Average 1998/99 = 100.

Table 8. Australia: Selected Fiscal Indicators, 1995/96-1999/00 1/

(In percent of GDP)

	1995/96	1996/97	1997/98	1998/99	1999/00
Public sector underlying balance (cash basis) 2/ 3/	-1.3	0.1	1.4	-0.2	2.3
Commonwealth underlying general government balance	-1.9	-0.8	0.4	0.9	2.0
Commonwealth revenue	24.0	24.6	24.3	24.6	26.2
Commonwealth underlying expenditure	25.9	25.4	23.8	23.7	24.2
State, territory, and local general government underlying balance 3/	0.5	0.6	0.4	-0.4	0.3
Public trading enterprises balance	0.1	0.3	0.6	-0.7	0.0
Commonwealth General Govt. (accrual basis)					
Revenue	...	...	26.3	25.6	26.9
Income tax revenue	...	...	16.2	17.9	18.0
Indirect and other tax revenue	...	...	7.4	6.2	5.8
Non-tax revenue	...	...	2.7	1.6	2.8
Expenses	...	...	27.4	25.0	25.4
Employees	...	...	3.1	2.7	2.8
Personal benefits	...	...	10.3	10.0	9.7
Grants	...	...	7.2	7.3	7.1
Interest and other financing costs	...	...	1.8	1.6	1.4
Other expenses	...	...	5.0	3.5	4.4
Operating result (revenue less expenses)	...	...	-1.2	0.6	1.5
Adjustment 4/	...	...	0.8	0.0	0.6
Fiscal balance 5/	...	...	-0.3	0.6	2.1
Memorandum items:					
Commonwealth, State and Local General Govt. Aggregates (cash basis):					
Revenue	32.3	33.3	32.8	33.5	34.4
Underlying expenditure	33.8	33.7	32.5	33.4	32.8
Underlying balance	-1.5	-0.4	0.4	0.1	1.6
Structural balance	-1.3	-0.2	0.6	0.0	1.4
Commonwealth structural balance (cash basis)	-1.8	-0.5	0.6	0.9	1.7
Total public sector debt, net	31.2	28.4	23.1	20.9	15.6
Commonwealth general govt. net debt	18.9	18.1	14.7	11.9	8.4
Commonwealth general govt. "net assets" 6/	...	...	...	-13.5	-8.4
Commonwealth gross assets	...	...	...	17.9	20.9
Commonwealth gross liabilities	...	...	...	31.4	29.3
Nominal GDP (A$ billions)	507.0	532.2	564.7	595.4	632.1
Real GDP growth (in percent)	4.4	3.6	4.8	5.4	4.3

Sources: Commonwealth of Australia: *Budget Strategy and Outlook, 1999/00; Final Budget Outcome, 1999/00*; *Consolidated Financial Statements for the Year Ended 30 June 2000*; and Fund staff estimates.

1/ Fiscal year ends June 30.

2/ The underlying balance excludes asset sales and other one-off factors, on a cash basis.

3/ The Commonwealth, state, and public enterprise balances may not add up to the public sector balance due to the effect consolidation.

4/ Asset revaluations less net capital investment (government investment less depreciation).

5/ The accrual equivalent of the underlying cash balance, which measures the government's net lending. Defined as the operating result plus adjustment.

6/ Includes financial and non-financial assets and liabilities, including unfunded superannuation liabilities to public servants.

Table 9. Australia: Commonwealth Government Budget, 1995/96-1999/00

	1995/96	1996/97	1997/98	1998/99	1999/00
		(In billions of Australian dollars)			
Cash Basis					
Total revenue	121.7	131.0	137.0	146.4	165.8
Total expenditure	126.7	127.7	119.5	134.1	143.7
Net advances	-5.3	-7.5	-15.2	-6.9	-9.5
Underlying expenditure 1/	131.2	135.1	134.6	141.0	153.2
Headline balance	-5.0	3.4	17.5	12.4	22.2
Underlying balance 1/	-9.5	-4.1	2.4	5.4	12.7
		(In percent of GDP)			
Total revenue	24.0	24.6	24.3	24.6	26.2
Total expenditure	25.0	24.0	21.2	22.5	22.7
Underlying expenditure 1/	25.9	25.4	23.8	23.7	24.2
Headline Budget balance	-1.0	0.6	3.1	2.1	3.5
Underlying balance 1/	-1.9	-0.8	0.4	0.9	2.0
		(In billions of Australian dollars)			
Accrual Basis					
Total Revenue	...	143.1	148.3	152.7	169.9
Total Expenditure	...	147.0	154.7	149.0	160.4
Net Operating Surplus	...	-3.9	-6.5	3.7	9.5
Adjustments 2/	...	-0.3	4.5	0.2	4.0
Fiscal Balance 3/	...	-4.2	-2.0	3.9	13.5
		(In percent of GDP)			
Total Revenue	...	26.9	26.3	25.6	26.9
Total Expenditure	...	27.6	27.4	25.0	25.4
Net Operating Surplus	...	-0.7	-1.2	0.6	1.5
Adjustments 2/	...	-0.1	0.8	0.0	0.6
Fiscal Balance 3/	...	-0.8	-0.3	0.6	2.1
Memorandum items:					
Commonwealth General Government net debt					
A$ billion	95.8	96.3	82.9	70.6	53.1
As percent of GDP	18.9	18.1	14.7	11.9	8.4

Sources: Commonwealth of Australia: *Budget Strategy and Outlook, Final Budget Outcome, and Mid Year Economic and Fiscal Outlook,* various years.

1/ Excludes net advances.
2/ Asset revaluations less net capital investment (government investment less depreciation).
3/ The accrual equivalent of the underlying cash balance, which measures the government's net lending. Defin operating result plus adjustment.

Table 10. Australia: Commonwealth Budget Revenue, 1995/96-1999/00

	Cash basis			Accrual basis		
	1995/96	1996/97	1997/98	1997/98	1998/99	1999/00
	(In billions of Australian dollars)					
Tax revenue	116.4	125.8	132.2	133.1	143.0	152.5
Income tax	85.5	93.8	98.5	91.3	106.3	113.7
Individuals	60.4	66.5	70.8	...	77.3	83.2
Of which: Gross PAYE	53.3	57.4	62.1	...	68.3	76.7
Companies	18.3	19.2	19.4	...	21.3	24.0
Other	6.8	8.1	8.3	...	7.7	6.5
Indirect taxes and other	30.3	30.9	32.5	41.8	36.7	38.8
Indirect taxes	28.9	29.9	31.3	37.2	32.2	33.5
Sales	13.0	13.3	14.1	15.5	16.4	15.6
Excise	12.8	13.3	13.6	18.0	12.2	14.1
Import duties	3.1	3.3	3.6	3.7	3.6	3.8
Other	2.0	2.2	2.4	4.6	4.5	5.2
Nontax revenue	5.3	5.2	4.7	15.2	9.7	17.5
Of which: Interest	1.4	1.1	1.1	6.4	3.2	9.6
Total revenue	121.7	131.0	137.0	148.3	152.7	169.9
	(In percent of GDP)					
Tax revenue	23.0	23.6	23.4	23.6	24.0	24.1
Income tax	16.9	17.6	17.5	16.2	17.9	18.0
Individuals	11.9	12.5	12.5	...	13.0	13.2
Of which: Gross PAYE	10.5	10.8	11.0	...	11.5	12.1
Companies	3.6	3.6	3.4	...	3.6	3.8
Other	1.3	1.5	1.5	...	1.3	1.0
Indirect taxes and other	6.0	5.8	5.8	7.4	6.2	6.1
Indirect taxes	5.7	5.6	5.5	6.6	5.4	5.3
Sales	2.6	2.5	2.5	2.7	2.7	2.5
Excise	2.5	2.5	2.4	3.2	2.0	2.2
Import duties	0.6	0.6	0.6	0.7	0.6	0.6
Other	0.4	0.4	0.4	0.8	0.8	0.8
Nontax revenue	1.0	1.0	0.8	2.7	1.6	2.8
Of which: Interest	0.3	0.2	0.2	1.1	0.5	1.5
Total revenue	24.0	24.6	24.3	26.3	25.6	26.9

Sources: Commonwealth of Australia: *Budget Strategy and Outlook, Final Budget Outcom and Mid Year Economic and Fiscal Outlook,* various years.

Table 11. Australia: Commonwealth Government Expenditure, 1995/96–1999/00

	Cash Basis			Accrual basis		
	1995/96	1996/97	1997/98	1997/98	1998/99	1999/00
	(In billions of Australian dollars)					
Current expenditures	128.1	131.8	134.5	154.7	149.0	160.4
Goods and services	21.5	21.8	23.5	40.8	30.7	40.0
Of which: Salaries 1/	8.4	8.5	7.5	17.6	15.9	18.0
Dep. and amort. 2/	...	...	...	2.3	2.3	2.6
Transfers	97.4	100.4	102.6	103.6	108.7	111.5
Personal benefit payments	45.5	48.0	48.6	57.9	59.3	61.4
Grants	48.8	49.2	50.5	40.7	43.4	44.6
Grants to States	24.1	24.8	25.3	...	...	...
Grants to nonbudget sector	13.3	13.3	14.4	...	...	...
Other grants 2/	11.4	11.2	10.9	...	...	...
Other	3.0	3.2	3.4	5.0	6.0	5.5
Interest 3/	9.2	9.6	8.4	10.4	9.7	8.9
Capital	-1.4	-3.3	-13.0	...	...	...
Goods and land	0.6	0.5	-0.6	...	...	...
Transfers	3.3	3.6	2.7	...	...	...
Of which: Grants to States	2.6	2.7	2.1	...	...	...
Net advances	-5.3	-7.5	-15.2	...	...	...
Total expenditure	126.7	127.7	119.5	154.7	149.0	160.4
Total underlying expenditure 4/	131.2	135.1	134.6	...	...	...
	(In percent of GDP)					
Current expenditures	25.3	24.8	23.8	27.4	25.0	25.4
Goods and services	4.2	4.1	4.2	7.2	5.2	6.3
Of which: Salaries 1/	1.7	1.6	1.3	3.1	2.7	2.8
Dep. and amort. 2/	...	...	...	0.4	0.4	0.4
Transfers	19.2	18.9	18.2	18.3	18.2	17.6
Personal benefit payments	9.0	9.0	8.6	10.3	10.0	9.7
Grants	9.6	9.3	9.0	7.2	7.3	7.1
Other	0.6	0.6	0.6	0.9	1.0	0.9
Interest	1.8	1.8	1.5	1.8	1.6	1.4
Capital	-0.3	-0.6	-2.3	...	...	...
Goods and land	0.1	0.1	-0.1	...	...	...
Transfers	0.6	0.7	0.5	...	...	...
Of which: Grants to States	0.5	0.5	0.4	...	...	...
Net advances	-1.0	-1.4	-2.7	...	...	...
Total expenditure	25.0	24.0	21.2	27.4	25.0	25.4
Total underlying expenditure 3/	25.9	25.4	23.8	...	...	...
Memorandum items (in $A million):						
Total grants to states	26.7	27.4	27.4	...	...	...
(in percent of GDP)	5.3	5.2	4.8	...	...	...
Cash used in purchase of property, plant, equipment and intangibles	...	...	...	4.5	4.8	5.2
Cash received from asset sales	...	...	...	14.3	7.2	10.1

Sources: Commonwealth of Australia: *Budget Strategy and Outlook, Final Budget Outcome, and Mid Year Economic and Fiscal Outlook*, several years.

1/ In accruals data, total payments to employees.
2/ Depreciation and amortization are included in goods and services expenditure under the accrual accounting measure.
3/ Includes other financing costs under the accrual accounting measure.
4/ Excludes net advances.

Table 12. Australia: Commonwealth Budget Expenditures by Function, 1995/96-1999/00

	Cash Basis				Accrual basis
	1995/96	1996/97	1997/98	1998/99	1999/2000
	(In billions of Australian dollars)				
Defense	10.1	10.1	10.5	11.2	10.0
Education	10.1	10.3	10.8	9.7	10.6
Health	18.6	19.2	20.7	23.3	23.5
Social Security and Welfare	46.8	49.6	50.2	52.8	57.1
Economic Services	9.3	8.6	7.7	7.7	7.8
Public Debt Interest	9.1	9.4	8.4	7.6	9.5
General purpose inter-government transactions	17.8	18.2	17.9	18.4	19.2
Other	10.2	10.5	9.7	10.1	22.7
Total expenditure	132.0	135.9	135.8	140.8	160.4
Total underlying expenditure 2/	131.2	135.1	134.6	141.0	...
	(In percent of GDP)				
Defense	2.0	1.9	1.9	1.9	1.6
Education	2.0	1.9	1.9	1.6	1.7
Health	3.7	3.6	3.7	3.9	3.7
Social Security and Welfare	9.2	9.3	8.9	8.9	9.0
Economic Services	1.8	1.6	1.4	1.3	1.2
Public Debt Interest	1.8	1.8	1.5	1.3	1.5
General purpose inter-government transactions	3.5	3.4	3.2	3.1	3.0
Other	2.0	2.0	1.7	1.7	3.6
Total expenditure	26.0	25.5	24.0	23.6	25.4
Total underlying expenditure 1/	25.9	25.4	23.8	23.7	...

Sources: Commonwealth of Australia: *Budget Strategy and Outlook, Final Budget Outcome, and Mid Year Economic and Fiscal Outlook,* several years.

1/ Excludes net advances.

Table 13. Australia: States and Territories, General Government, 1995/96-1999/00 1/

	1995/96	1996/97	1997/98	1998/99	1999/00
	(In billions of Australian dollars)				
Revenue	84.1	80.8	85.4	92.7	94.8
Cash receipts from operating activities	74.3	79.4	83.6	91.1	93.6
Taxes, fees, and fines	35.5	38.1	40.9	44.1	46.6
Grants received	30.6	31.2	31.8	34.1	36.0
Other	8.2	10.2	10.9	12.9	11.0
Sales of non-financial assets	9.8	1.4	1.8	1.6	1.1
Expenditure	82.1	77.8	83.3	95.2	93.6
Cash payments from operating activities	75.1	70.3	75.6	87.1	84.7
Payments for goods and services	48.3	51.4	55.6	66.7	64.4
Subsidies to public enterprises	20.5	13.5	14.8	15.4	15.9
Interest payments	5.8	4.8	4.5	3.7	3.1
Capital expenditure	7.0	7.5	7.7	8.1	8.8
Net cash flows from operating activities plus net cash flows from investments in non-financial assets	2.1	3.0	2.1	-2.5	1.2
Acquisitions of assets under finance leases and similar arrangements	0.0	0.0	0.0	0.0	0.0
Surplus (+)/Deficit (-)	2.1	3.0	2.1	-2.5	1.2
		(In percent of GDP)			
Revenue	14.7	14.9	14.8	15.3	14.8
Own-source revenue	7.0	7.2	7.2	7.4	7.4
Taxes, fees, and fines	6.0	5.9	5.6	5.7	5.7
Other	1.6	1.9	1.9	2.2	1.7
Grants received	1.9	0.3	0.3	0.3	0.2
Expenditure	16.2	14.6	14.8	16.0	14.8
Current expenditure	14.8	13.2	13.4	14.6	13.4
Of which:	9.5	9.7	9.9	11.2	10.2
Subsidies to public enterprises	4.0	2.5	2.6	2.6	2.5
Interest payments	1.1	0.9	0.8	0.6	0.5
Capital expenditure	1.4	1.4	1.4	1.4	1.4
Net cash flows from operating activities plus net cash flows from investments in non-financial assets	0.4	0.6	0.4	-0.4	0.2
Acquisitions of assets under finance leases and similar arrangements	0.0	0.0	0.0	0.0	0.0
Surplus (+)/Deficit (-)	0.4	0.6	0.4	-0.4	0.2

Source: Australian Bureau of Statistics.

1/ Generated from cash flow statement.

Table 14. Australia: Public Trading Enterprises, All Australian Governments, 1995/96-1999/00 1/

	1995/96	1996/97	1997/98	1998/99	1999/00
	(In billions of Australian dollars)				
Revenue	74.2	75.0	72.2	63.5	60.5
Sales of goods and services	67.8	67.4	66.0	55.9	52.3
Subsidies received	2.7	3.3	3.3	4.9	5.9
Other	3.7	4.3	2.9	2.6	2.3
of which: Interest received	0.9	1.0	0.7	0.5	
Expenditure	81.7	80.8	75.9	68.6	66.7
Current expenditure	71.1	71.1	68.0	57.4	52.7
Operating expenditure	58.9	58.8	55.7	49.3	44.3
Other	12.3	12.4	12.3	8.1	8.5
Of which: Interest payments	5.2	4.8	4.2	3.6	3.3
Capital expenditure	10.6	9.6	7.9	11.1	13.9
Increase in provisions (net)	8.1	7.3	7.0	0.8	6.3
Surplus (+)/Deficit (-)	0.6	1.6	3.4	-4.3	0.1
	(In percent of GDP)				
Revenue	14.6	14.1	12.8	10.7	9.6
Sales of goods and services	13.4	12.7	11.7	9.4	8.3
Subsidies received	0.5	0.6	0.6	0.8	0.9
Other	0.7	0.8	0.5	0.4	0.4
of which: Interest received	0.2	0.2	0.1	0.1	
Expenditure	16.1	15.2	13.4	11.5	10.5
Current expenditure	14.0	13.4	12.0	9.6	8.3
Operating expenditure	11.6	11.0	9.9	8.3	7.0
Other	2.4	2.3	2.2	1.4	1.3
Of which: Interest payments	1.0	0.9	0.7	0.6	0.5
Capital expenditure	2.1	1.8	1.4	1.9	2.2
Increase in provisions (net)	1.6	1.4	1.2	0.1	1.0
Surplus (+)/Deficit (-)	0.1	0.3	0.6	-0.7	0.0
Memorandum items:					
Net operating surplus					
(In $A millions)	11.6	12.0	13.6	11.5	13.9
(In percent of GDP)	2.3	2.2	2.4	1.9	2.2

Source: Australian Bureau of Statistics.

1/ Cash measures. Data for 1999/00 derived from cash flow statement.

Table 15. Australia: Selected Interest Rates, 1995–2000

(In percent per annum; at or near end of period)

	1995	1996	1997	1998	1999	2000			
						Mar.	Jun.	Sep.	Dec.
Daily cash market call rate 1/	7.51	6.21	5.03	4.80	5.01	5.50	6.02	6.28	6.25
Commonwealth government securities									
Treasury bills, 13-week 2/	7.30	6.01	4.96	4.57	5.04	5.68	5.86	6.40	6.09
Three-year note 3/	7.44	6.58	5.49	4.64	6.47	6.38	5.97	6.21	5.27
Ten-year note 3/	8.18	7.37	6.14	4.85	6.75	6.57	6.17	6.12	5.56
NSW, ten-year note 4/	8.44	7.62	6.37	5.41	7.32	6.86	6.60	6.60	5.84
Banks 5/									
Three-month fixed deposits	6.00	5.00	3.80	3.55	3.70	3.80	4.45	4.30	4.00
Investment accounts 6/	3.65	2.00	1.10	0.95	1.00	1.20	1.45	1.35	1.30
Business lending rate 7/	10.75	9.55	8.45	7.95	8.20	8.75	9.30	9.65	9.75
Housing loans 8/	10.50	8.25	6.70	6.50	6.80	7.30	7.80	8.05	8.05
Bank, 90-day commercial bills 9/	7.43	6.11	5.07	4.81	5.65	5.87	6.24	6.57	6.20
Cash management trust 10/	6.60	5.40	4.00	4.30	5.05	4.90	5.55	5.65	...

Source: Reserve Bank of Australia, *Bulletin*.

1/ Daily 11 a.m. call rate. Average of daily figures for the month.
2/ Weighted average yield of notes allotted at the last tender of the month.
3/ Estimated closing yields on last business day of the month.
4/ New South Wales Treasury Corporation assessed secondary market yields.
5/ Predominant or representative rates offered by banks.
6/ Rate on account with balance of $A 10,000 or over.
7/ Indicator variable rate for large businesses.
8/ Standard variable rate loans of large banks on new housing loans to individuals. Prior to April 1986, rates were subject to a maximum; from March 1982, this 13.5 percent per annum. The maximum on loans existing or approved before April 3, 1986 was retained.
9/ Ninety-day yield; average of daily market yields for the week ended the last Wednesday of the month.
10/ Weighted average net yield to unit holders for month shown.

Table 16. Australia: Credit Aggregates, 1998–2000

	1999	1998				1999				2000		
	($A billions)	Mar.	Jun.	Sep.	Dec.	Mar.	Jun.	Sep.	Dec.	Mar.	Jun.	Sep.
		(Percent change over previous year)										
Lending to private sector by: 1/												
Banks	429.6	12.7	11.9	11.7	10.7	10.7	12.0	11.7	12.7	13.6	13.7	13.0
Nonbank financial intermediaries	185.0	7.4	8.1	5.6	5.6	6.8	4.4	4.5	-0.2	-0.5	2.0	4.8
All financial intermediaries	614.5	10.9	10.6	9.6	9.0	9.4	9.4	9.3	8.5	9.0	9.9	10.4
Lending to government sector by: 2/												
All financial intermediaries	36.5	-12.8	-23.5	-8.3	-4.2	4.2	17.2	10.8	26.0	9.2	4.5	-13.7
Total lending	651.0	9.3	8.4	8.4	8.3	9.1	9.8	9.4	9.3	9.0	9.7	9.0
Memorandum item:												
Private Sector Credit												
Housing	246.5	9.8	9.8	10.4	10.0	10.4	10.6	11.0	13.1	13.9	15.0	16.7
Other personal	67.3	10.6	11.6	12.3	13.1	14.1	14.1	14.7	7.8	7.1	8.2	1.8
Business	300.7	11.8	11.0	8.4	7.4	7.7	7.6	6.9	5.1	5.7	6.4	7.3

Source: Reserve Bank of Australia, *Bulletin*.

1/ Loans, advances, and bills held.
2/ Holdings of Commonwealth government, local and semigovernment, and other public authority securities.

Table 17. Australia: Money Supply, 1998–2000 1/

	1999	1998				1999				2000		
	($A millions)	Mar.	Jun.	Sep.	Dec.	Mar.	Jun.	Sep.	Dec.	Mar.	Jun.	Sep.
		(Percent change over previous year)										
Monetary base 2/	29.7	-8.9	-7.9	0.5	6.6	4.3	1.0	-12.1	-6.9	-10.2	-11.6	9.6
M1 3/	125.8	10.4	11.6	8.4	6.1	9.7	7.6	8.5	9.7	8.1	9.8	10.0
Other bank deposits	269.1	3.6	3.8	8.3	8.2	8.7	11.5	9.5	10.3	9.2	7.4	6.4
M3 4/	394.9	5.6	6.2	8.4	7.5	9.0	10.3	9.2	10.1	8.9	8.2	7.5
Borrowings from private sector by NBFIs 5/	88.5	14.7	9.8	13.4	17.6	14.8	15.2	5.5	-3.9	-2.9	-2.9	2.3
Broad money 6/	463.7	6.9	6.0	8.5	8.4	8.9	11.1	8.1	6.8	7.4	6.3	7.2

Source: Reserve Bank of Australia, *Bulletin*.

1/ Figures for currency and bank deposits are average of weekly (Wednesday) data. Figures for borrowings by NBFIs are averages of end-month figures (current and previous month).
2/ The monetary base is the stock of reserve money, consisting of currency outside the Reserve Bank, banks' deposits with the Reserve Bank, and Reserve Bank liabilities to the nonbank private sector.
3/ Currency and current deposits with banks.
4/ M1 plus other bank deposits.
5/ Borrowings (other than from banks and related corporations) by permanent building societies, credit cooperatives, authorized money market dealers, pastoral finance companies, cash management trusts, finance companies, general financiers, and money market corporations.
6/ M3 plus borrowings from the private sector by NBFIs less the latter's holdings of currency and bank deposits.

Table 18. Australia: Banking Soundness Statistics, 1995–2000

(End of period)

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
	(In billions of Australian dollars; unless otherwise indicated)							
Capital								
Tier 1	39.4	42.4	43.9	47.3	50.7	52.2	51.4	53.2
Total	52.1	54.2	59.3	63.6	65.7	68.0	68.4	72.5
Impaired assets	8.8	6.2	4.8	5.8	5.7	5.8	5.5	5.7
Provisions								
Specific	3.3	2.3	2.0	2.2	2.5	2.5	2.6	2.5
General	3.0	3.4	3.9	4.5	4.3	4.6	4.7	4.6
Risk-weighted assets	449	509	587	618	649	671	689	720
Total assets	649	732	834	868	937	958	985	1021
	(As a percentage of risk-weighted assets)							
Capital								
Tier 1	8.8	8.3	7.5	7.6	7.8	7.8	7.5	7.4
Total	11.6	10.6	10.1	10.3	10.1	10.1	9.9	10.1
	(As a percentage of total assets)							
Impaired assets	1.4	0.8	0.6	0.7	0.6	0.6	0.6	0.6

Source: Reserve Bank of Australia, *Bulletin*.

Table 19. Australia: Balance of Payments Summary, 1995–2000 1/

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
	(In billions of Australian dollars)							
Current account balance	-26.2	-20.2	-17.3	-28.8	-35.8	-8.3	-7.4	-5.5
Trade balance	-5.7	-0.9	2.2	-8.3	-15.2	-3.0	-2.4	-2.2
Exports, f.o.b.	71.8	77.0	87.2	89.1	86.6	25.0	27.2	28.0
Imports, f.o.b.	-77.5	-78.0	-84.9	-97.4	-101.9	-28.0	-29.7	-30.2
Services	-1.2	0.0	-0.5	-1.8	-1.6	-0.5	-0.3	1.0
Income, net 2/	-19.0	-19.3	-18.7	-18.2	-18.8	-4.7	-4.6	-4.3
On debt	-7.0	-8.1	-8.6	-7.7	-8.0	-2.3	-2.4	-2.4
On equity	-8.2	-7.7	-7.1	-7.8	-7.4	-1.3	-1.0	-1.5
Other	-1.3	-1.1	-0.7	-0.6	-1.6	-0.4	-0.4	-0.3
Net transfers	-0.4	0.1	-0.3	-0.5	-0.1	0.0	0.0	0.0
Capital and financial account	24.7	18.0	18.5	29.7	30.7	6.1	8.9	...
Capital account	0.8	1.2	1.1	1.3	1.3	0.2	0.1	0.3
Capital transfers	0.7	1.2	1.1	1.3	1.3	0.3	0.1	0.3
Financial account	24.0	16.8	17.4	28.3	29.4	5.8	8.8	...
Direct investment	11.7	-1.1	1.9	4.7	15.0	-1.9	4.9	0.8
Direct investment abroad	-4.4	-8.9	-8.4	-4.8	5.3	-3.2	-2.4	-0.2
Direct investment in Australia	16.1	7.8	10.3	9.5	9.6	1.2	7.3	1.0
Portfolio investment	16.8	25.7	17.1	6.7	14.7	-0.1	4.2	...
Equity securities	1.9	-0.4	11.1	14.2	3.3	-4.4	0.5	...
Debt securities	14.9	26.1	6.0	-7.5	11.3	4.3	3.7	...
Other investment	-4.0	-4.7	2.3	13.7	10.2	-0.1	1.1	...
Assets	-4.3	-7.3	-9.0	0.0	-5.1	-3.4	3.3	...
Liabilities	0.3	2.6	11.3	13.8	15.3	3.3	-2.1	...
Change in reserve assets 3/	-0.5	-3.1	-3.9	3.1	-10.4	8.0	-1.3	0.7
Net errors and omissions	1.5	2.2	-1.2	-0.8	5.1	2.2	-1.6	...
	(In percent of GDP)							
Current account balance	-5.4	-3.9	-3.2	-5.0	-5.8	-5.2	-4.5	-3.3
Trade balance	-1.2	-0.2	0.4	-1.4	-2.5	-1.9	-1.5	-1.3
Net services	-0.3	0.0	-0.1	-0.3	-0.3	-0.3	-0.2	0.6
Net income	-3.9	-3.7	-3.4	-3.1	-3.1	-2.9	-2.8	-2.6
Net transfers	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0
Memorandum items (end of period):								
Net external liabilities	56.2	55.8	55.3	57.9	56.2	60.4	62.6	63.4
Net external equity liabilities	16.9	16.7	14.7	17.4	18.3	18.8	20.1	17.8
Net external debt	39.4	39.2	40.6	40.5	37.9	41.6	42.5	45.6
Level of reserves								
(In $A billion)	20.1	21.8	26.2	25.0	23.6	27.3	27.9	29.2
(In months of imports)	3.1	3.4	3.7	3.1	2.8	2.9	2.8	2.9

Sources: Australian Bureau of Statistics.

1/ Current account data are seasonally adjusted.
2/ Components are not seasonally adjusted and may not add up to the total.
3/ Transaction-based data, excluding the effects of price and exchange rate changes; a minus sign indicates an increase in reserves.

Table 20. Australia: Current Account, 1995–2000 1/

(In billions of Australian dollars)

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
Current account balance	-26.2	-20.2	-17.3	-28.8	-35.8	-8.3	-7.4	-5.5
Trade balance	-5.7	-0.9	2.2	-8.3	-15.2	-3.0	-2.4	-2.2
Exports, f.o.b.	71.8	77.0	87.2	89.1	86.6	25.0	27.2	28.0
Imports, f.o.b.	-77.5	-78.0	-84.9	-97.4	-101.9	-28.0	-29.7	-30.2
Services, net	-1.2	0.0	-0.5	-1.8	-1.6	-0.5	-0.3	1.0
Credits	21.9	23.7	24.8	25.7	26.9	7.0	7.5	8.9
Transportation services	6.4	6.5	6.7	6.8	6.7	1.7	1.8	1.8
Travel	10.7	11.6	11.8	11.6	12.5	3.2	3.6	3.9
Other services	4.8	5.5	6.4	7.2	7.7	2.1	2.2	3.2
Debits	-23.1	-23.7	-25.4	-27.5	-28.5	-7.5	-7.8	-7.9
Transportation services	-8.5	-8.5	-8.7	-9.4	-9.4	-2.5	-2.7	-2.7
Travel	-6.7	-7.4	-8.2	-8.6	-9.4	-2.5	-2.5	-2.6
Other services	-7.9	-7.9	-8.4	-9.4	-9.8	-2.5	-2.5	-2.5
Balance on goods and services	-6.9	-1.0	1.7	-10.1	-16.9	-3.5	-2.7	-1.1
Income, net 2/	-19.0	-19.3	-18.7	-18.2	-18.8	-4.7	-4.6	-4.3
Credits	7.1	7.7	9.7	10.2	10.7	3.4	3.8	4.1
Compensation of employees	0.6	0.6	0.7	0.8	0.8	0.2	0.2	0.2
Investment income	6.5	7.0	9.0	9.4	9.9	3.2	3.6	3.9
Direct investment abroad	3.7	4.5	5.6	5.5	6.2	2.1	2.5	2.7
Portfolio investment assets	2.0	1.6	2.0	2.3	2.4	0.7	0.6	0.6
Other investment assets	0.8	1.0	1.4	1.6	1.3	0.5	0.5	0.5
Debits	-23.7	-24.7	-26.0	-26.3	-27.7	-7.3	-7.6	-8.3
Compensation of employees	-0.4	-0.5	-0.6	-0.8	-0.9	-0.3	-0.2	-0.2
Investment income	-23.2	-24.1	-25.4	-25.4	-26.8	-7.1	-7.3	-8.1
Direct investment in Australia	-11.1	-11.3	-11.9	-12.3	-11.9	-2.8	-3.4	-3.8
Portfolio investment liabilities	-9.9	-10.5	-11.4	-11.0	-12.1	-3.4	-3.1	-3.4
Other investment liabilities	-2.3	-2.3	-2.1	-2.1	-2.8	-0.8	-0.9	-0.8
Unrequited transfers, net	-0.4	0.1	-0.3	-0.5	-0.1	0.0	0.0	0.0
Credits	3.2	3.4	3.7	4.3	4.7	1.2	1.1	1.1
Debits	-3.6	-3.3	-4.0	-4.8	-4.8	-1.2	-1.2	-1.1

Sources: Australian Bureau of Statistics; and IMF, *International Financial Statistics*.

1/ Quarterly data are seasonally adjusted.
2/ Components are not seasonally adjusted and may not add up to the total.

Table 21. Australia: Exports and Imports, 1995–2000 1/

(Percent change from previous year)

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	June Qtr. 2000	Sep. Qtr. 2000
Total exports								
Value	11.4	7.4	11.3	2.5	-1.1	17.1	29.1	29.6
Volume	5.3	10.8	11.1	0.0	4.2	11.5	12.5	12.4
Price 2/	5.8	-3.0	0.2	2.5	-5.2	5.1	14.8	15.3
Total merchandise exports								
Value	11.2	7.2	13.2	2.3	-2.8	20.2	34.3	28.9
Volume	3.5	12.0	13.4	-0.6	4.7	13.4	13.4	8.5
Price 2/	7.4	-4.2	-0.2	2.9	-7.2	5.9	18.5	18.7
Rural exports								
Value	-0.1	15.0	11.4	-3.0	0.9	10.6	17.5	21.5
Volume	-11.6	21.9	13.8	-5.2	11.6	12.2	7.2	7.6
Price 2/	12.8	-5.6	-2.0	2.4	-9.7	-1.4	9.5	12.8
Metals, minerals, and fuels								
Value	16.0	3.0	15.9	6.5	-11.1	27.1	48.7	38.9
Volume	5.8	5.6	14.1	3.2	-4.9	9.3	11.9	6.8
Price 2/	9.7	-2.4	1.7	3.1	-6.7	16.3	33.0	30.0
Manufactured goods								
Value	14.6	7.2	10.9	0.2	4.0	16.5	23.1	21.6
Volume	13.3	13.8	11.8	-3.1	9.8	19.7	16.2	12.9
Price 2/	1.2	-5.8	-0.8	3.4	-5.3	-2.7	6.0	7.6
Services								
Value	12.3	8.1	5.0	3.3	4.6	7.5	13.2	32.0
Volume	11.4	7.0	3.2	2.3	2.5	5.0	9.5	25.8
Price 2/	0.8	1.1	1.8	1.0	2.1	2.4	3.4	4.9
Total imports								
Value	11.7	1.1	8.5	13.2	4.4	12.9	20.0	14.4
Volume	8.2	8.2	10.3	5.8	9.5	13.7	10.9	5.5
Price 2/	3.2	-6.5	-1.7	7.0	-4.7	-0.7	8.2	8.5
Total merchandise imports								
Value	12.4	0.6	9.0	14.7	4.6	14.6	22.0	15.9
Volume	9.8	8.5	12.2	8.3	10.3	15.1	12.6	6.8
Price 2/	2.2	-7.3	-2.9	6.0	-5.2	-0.4	8.4	8.5
Consumption goods								
Value	9.5	2.4	13.7	18.2	5.9	9.4	16.4	19.4
Volume	7.5	6.3	14.5	9.4	8.4	12.5	12.2	13.9
Price 2/	1.9	-3.7	-0.9	8.2	-2.3	-2.8	3.8	4.8
Capital goods								
Value	12.6	1.4	5.4	11.5	10.3	16.3	19.9	3.9
Volume	15.1	16.5	13.6	6.5	22.4	23.1	15.3	2.1
Price 2/	-2.5	-12.9	-7.3	4.7	-9.8	-5.6	4.0	1.8
Intermediate and other goods								
Value	13.8	-0.7	4.5	10.4	5.1	16.3	25.6	21.9
Volume	8.3	6.0	6.2	4.9	10.0	12.1	10.7	6.8
Price 2/	5.0	-6.3	-1.7	5.3	-4.5	3.7	13.4	14.1
Services								
Value	9.5	2.6	7.1	8.2	3.7	6.9	12.9	9.0
Volume	2.6	6.9	4.3	-2.8	7.1	8.6	4.6	0.7
Price 2/	6.8	-4.1	2.6	11.3	-3.1	-1.5	7.9	8.3
Memorandum item:								
Terms of trade (goods and services)	2.5	3.8	1.9	-4.1	-0.5	5.9	6.1	6.3

Source: Australian Bureau of Statistics.

1/ Quarterly data are seasonally adjusted.
2/ Implicit price deflators.

Table 22. Australia: Exports by Commodity Group, 1995–2000

	1999		1995	1996	1997	1998	1999	2000		
	In billions of $A	In percent of total						Mar. Qtr.	Jun. Qtr.	Sep. Qtr.
			(Percent change from previous year)							
Total exports, f.o.b.	86.6	100.0	11.2	7.2	13.2	2.3	-2.8	20.2	34.3	28.9
Nonmerchandise 1/	6.6	7.6	11.4	3.3	32.2	4.3	-25.0	17.0	52.0	2.7
Merchandise	80.1	92.4	11.1	7.6	11.5	2.0	-0.4	20.4	33.0	31.0
Total rural exports	22.1	25.5	-0.1	15.0	11.4	-3.0	0.9	10.6	17.5	21.5
Meat	4.2	4.8	-7.0	-17.9	17.9	14.1	6.4	6.3	24.8	22.9
Cereals	4.9	5.7	-17.3	106.9	4.3	-14.6	-3.3	-2.1	6.0	17.0
Wool and sheepskins	2.5	2.9	5.2	-8.1	12.9	-23.3	-20.7	29.6	43.7	38.7
Other rural exports	10.5	12.1	9.4	8.8	13.5	7.6	8.1	13.9	13.8	18.8
Total nonrural exports	57.9	66.9	15.9	4.8	11.5	4.1	-0.8	24.2	39.1	34.7
Metals, minerals, and fuels	36.7	42.3	16.0	3.0	15.9	6.5	-11.1	27.1	48.7	38.9
Metal ores and minerals	10.6	12.2	17.1	5.4	11.0	12.7	-7.5	7.9	37.9	39.3
Mineral fuels	13.9	16.1	12.7	8.4	16.1	1.7	-5.0	43.5	67.6	59.3
Coal, coke, and briquettes	8.4	9.7	10.1	5.3	12.7	11.8	-14.6	-12.0	9.9	20.4
Other	5.5	6.4	17.7	14.1	21.8	-14.1	14.8	169.8	172.5	112.7
Metals	12.2	14.1	18.5	-3.6	19.5	6.8	-19.8	26.2	37.0	14.9
Gold	4.8	5.6	11.6	3.2	35.3	3.6	-39.1	7.0	23.1	-2.2
Other	7.3	8.5	24.7	-9.0	5.1	10.5	1.3	40.3	45.5	26.9
Manufactured goods	26.1	30.1	14.6	7.2	10.9	0.2	4.0	16.5	23.1	21.6
Machinery	6.7	7.7	20.1	4.6	5.8	-7.5	-2.9	9.4	17.1	18.0
Transportation equipment	4.1	4.8	26.3	18.8	36.2	-9.4	20.7	12.6	37.9	32.4
Other manufactures	10.8	12.5	11.2	8.4	7.0	2.5	9.3	14.5	14.5	17.8
Other nonrural	4.5	5.2	7.0	2.0	11.0	17.4	-8.6	36.1	43.3	26.7

Source: Australian Bureau of Statistics.

1/ Primarily nonmonetary gold exports.

Table 23. Australia: Direction of Trade, 1996–2000 1/

	2000		1996	1997	1998	1999	2000	2000			
	In billions of $A	In percent of total						Mar. Qtr.	Jun. Qtr.	Sep. Qtr.	Dec. Qtr.
			(Percent change from previous year)								
Exports											
Selected countries											
Japan	21.8	19.8	-6.0	8.0	3.4	-3.9	30.8	21.1	34.2	36.6	30.6
United States	11.0	9.9	7.6	27.3	33.7	-0.8	30.4	25.8	36.4	27.2	31.7
New Zealand	6.6	5.9	6.7	9.2	-7.9	17.3	-1.8	5.2	-0.6	8.9	-14.9
United Kingdom	3.8	3.4	10.5	-11.7	95.2	-21.4	0.4	25.6	33.5	24.2	-39.7
Singapore	5.9	5.3	-17.4	22.3	-15.4	24.6	44.7	50.8	35.0	23.3	75.5
Korea	9.0	8.1	20.5	-7.4	-9.7	2.9	42.9	33.4	53.2	57.2	30.9
Taiwan Province of China	5.5	5.0	3.9	18.4	5.1	-2.4	33.3	22.4	30.4	39.6	40.1
China	6.0	5.4	23.8	2.6	-4.7	7.9	47.1	32.1	60.1	37.6	58.0
Selected country groups											
European Union	12.5	11.4	4.7	3.5	42.1	-12.1	15.6	13.6	35.1	26.9	-4.7
ASEAN 2/	15.2	13.7	0.7	11.7	-21.9	11.1	35.2	32.6	31.4	26.3	49.9
Total exports	110.5	100.0	7.4	10.1	4.9	-2.4	27.1	20.1	31.5	30.3	26.3
Imports											
Selected countries											
Japan	15.3	13.1	-14.6	11.7	16.7	2.4	12.3	1.7	12.4	20.7	13.7
United States	23.1	19.8	7.7	0.9	18.6	-1.9	9.4	22.0	19.3	5.0	-4.7
New Zealand	4.5	3.8	1.8	0.9	3.2	7.4	9.2	10.2	17.4	10.3	0.1
United Kingdom	6.9	5.9	8.1	5.7	8.7	-6.5	27.6	26.6	46.5	8.9	30.3
Singapore	3.7	3.2	6.8	-6.9	7.8	55.0	-10.6	7.9	16.2	22.6	-46.4
Korea	4.8	4.1	3.0	27.7	40.6	-6.4	23.0	9.3	35.1	29.6	19.4
Taiwan Province of China	3.5	3.0	-1.5	4.3	10.8	1.7	17.9	13.2	23.1	21.1	14.5
China	9.1	7.8	6.8	14.9	22.9	13.6	37.2	23.6	42.1	36.4	44.9
Selected country groups											
European Union	25.4	21.7	0.2	4.1	13.8	0.2	9.9	6.9	14.9	6.0	11.9
ASEAN 2/	16.5	14.1	12.7	16.7	28.4	21.0	15.6	21.6	25.4	31.3	-5.3
Total imports	116.9	100.0	1.2	6.4	16.0	4.9	15.2	14.6	22.0	16.6	8.8

Source: Australian Bureau of Statistics.

1/ Trade statistics basis.
2/ Association of Southeast Asian Nations.

Table 24. Australia: Gross and Net External Interest Receipts and Payments, 1995–2000

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
				(In billions of Australian dollars)				
Gross interest payments	-13.4	-14.1	-14.4	-13.6	-14.5	-4.3	-4.3	...
Public sector	-5.8	-5.9	-5.2	-3.8	-3.6	-0.8	-0.8	...
General government	-2.4	-2.8	-2.6	-1.9	-1.8	-0.4	-0.3	-0.2
Public enterprises	-3.5	-3.1	-2.5	-1.9	-1.8	-0.4	-0.5	...
Private sector	-7.6	-8.2	-9.2	-9.9	-10.9	-3.4	-3.5	...
Gross interest receipts	2.6	2.3	2.9	3.3	3.1	1.0	1.0	...
Public sector	1.2	0.9	1.2	1.5	1.3	0.4	0.4	...
Official reserve assets	1.0	0.6	0.9	1.0	0.8	0.2	0.2	0.3
Other	0.3	0.3	0.3	0.4	0.5	0.1	0.1	...
Private sector	1.3	1.4	1.7	1.8	1.8	0.6	0.6	...
Net interest receipts	-10.9	-11.8	-11.5	-10.1	-11.0	-3.3	-3.3	...
				(In percent of GDP)				
Gross interest payments	-2.7	-2.7	-2.6	-2.4	-2.4	-2.7	-2.6	...
Gross interest receipts	0.5	0.4	0.5	0.6	0.5	0.6	0.6	...
Net interest receipts	-2.2	-2.3	-2.1	-1.7	-1.8	-2.1	-2.0	...
				(In percent of exports of goods and services)				
Gross interest payments	-14.3	-14.0	-12.8	-11.9	-12.8	-13.4	-12.3	...
Gross interest receipts	2.7	2.3	2.6	2.9	2.7	3.0	2.8	...
Net interest receipts	-11.6	-11.7	-10.3	-8.8	-9.7	-10.4	-9.5	...

Source: Australian Bureau of Statistics.

Table 25. Australia: Capital and Financial Account, 1995–2000

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
	(In billions of Australian dollars)							
Capital and financial account	24.7	18.0	18.5	29.7	30.7	6.1	8.9	...
Capital account	0.8	1.2	1.1	1.3	1.3	0.2	0.1	0.3
Of which: Capital transfers	0.7	1.2	1.1	1.3	1.3	0.3	0.1	0.3
Financial account	24.0	16.8	17.4	28.3	29.4	5.8	8.8	...
Direct investment	11.7	-1.1	1.9	4.8	15.0	-1.9	4.9	...
Direct investment abroad	-4.4	-8.9	-8.4	-4.8	5.3	-3.2	-2.4	...
Equity capital	-2.4	-4.5	-4.7	-2.1	6.5	-1.4	-1.0	...
Reinvested earnings	-3.2	-2.4	-4.3	-2.8	-3.7	-2.0	-1.5	-1.9
Other capital	1.1	-2.0	0.5	0.2	2.6	0.2	0.1	...
Direct investment in Australia	16.1	7.8	10.3	9.5	9.6	1.2	7.3	...
Equity capital	7.7	4.4	4.2	5.6	1.5	1.1	1.9	...
Reinvested earnings	6.1	5.0	6.0	5.0	5.7	1.7	1.9	2.1
Other capital	2.4	-1.5	0.1	-1.0	2.4	-1.6	3.5	...
Portfolio investment	16.8	25.7	17.1	6.7	14.7	-0.1	4.2	...
Assets	-3.8	-4.2	0.2	-3.1	-9.9	-2.3	2.2	...
Equity securities	-1.6	-3.0	-0.5	-2.7	-5.8	-2.5	1.8	...
Debt securities	-2.2	-1.2	0.7	-0.4	-4.1	0.3	0.4	...
Liabilities	20.6	29.9	16.9	9.8	24.6	2.2	2.0	...
Equity securities	3.5	2.6	11.6	16.9	9.1	-1.9	-1.3	...
Debt securities	17.1	27.3	5.3	-7.1	15.5	4.1	3.3	...
Other investment	-4.0	-4.7	2.3	13.7	10.2	-0.1	1.1	...
Assets	-4.3	-7.3	-9.0	0.0	-5.1	-3.4	3.3	...
Liabilities	0.3	2.6	11.3	13.8	15.3	3.3	-2.1	...
Change in reserve assets 1/	-0.5	-3.1	-3.9	3.1	-10.4	8.0	-1.3	0.7
	(In percent of GDP)							
Capital and financial account	5.0	3.5	3.4	5.1	5.0	3.8	5.5	...
Capital account	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2
Financial account	4.9	3.2	3.2	4.9	4.8	3.7	5.4	...
Direct investment	2.4	-0.2	0.3	0.8	2.4	-1.2	3.0	...
Portfolio investment	3.4	4.9	3.1	1.2	2.4	-0.1	2.6	...
Other investment	-0.8	-0.9	0.4	2.4	1.7	-0.1	0.7	...

Source: Australian Bureau of Statistics.

1/ Transaction-based data, excluding the effects of price and exchange rate changes; a minus sign indicates an increase in reserves.

Table 26. Australia: External Assets and Liabilities, 1995–2000

	1995	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000
	(In billions of Australian dollars, end of period)							
Net external liabilities	276	290	303	335	370	375	395	410
Australian investment abroad	-164	-188	-234	-260	-281	-306	-299	...
Foreign investment in Australia	440	477	535	594	649	678	692	...
Direct investment	74	69	60	62	87	78	81	...
Direct investment abroad	-66	-78	-94	-110	-100	-117	-118	...
Equity capital and reinvested earnings	-67	-77	-94	-109	-102	-119	-121	...
Other capital	2	-1	-1	-1	2	2	2	...
Direct investment in Australia	140	147	155	172	188	194	199	...
Equity capital and reinvested earnings	117	126	133	150	166	174	175	...
Other capital	22	20	21	21	22	21	24	...
Portfolio investment	195	221	244	261	269	276	292	...
Assets	-48	-53	-65	-75	-94	-103	-98	...
Equity securities	-36	-40	-50	-59	-76	-84	-79	...
Debt securities	-12	-13	-15	-17	-19	-19	-19	...
Liabilities	243	274	309	337	364	380	390	...
Equity securities	69	77	91	118	140	146	151	...
Debt securities	174	197	218	219	223	234	239	...
Of which: Financial derivatives	10	10	15	16	19	21	22	...
Other investment	27	20	22	36	44	46	47	...
Assets	-30	-36	-49	-50	-53	-58	-56	...
Liabilities	57	56	71	86	98	104	103	...
Reserve assets	-20	-22	-26	-25	-34	-27	-28	-29
	(In percent of GDP)							
Net external liabilities	56.4	55.8	55.3	57.9	60.5	60.5	62.6	63.4
Australian investment abroad	-33.5	-36.2	-42.7	-44.9	-46.0	-49.2	-47.3	...
Foreign investment in Australia	90.0	91.7	97.6	102.6	106.1	109.3	109.4	...
Direct investment	15.2	13.3	11.0	10.7	14.3	12.5	12.8	...
Portfolio investment	39.9	42.6	44.6	45.1	44.1	44.5	46.2	...
Other investment	5.5	3.8	4.0	6.2	7.2	7.4	7.5	...
Reserve assets	-4.1	-4.2	-4.8	-4.3	-5.5	-4.4	-4.4	-4.5
Memorandum items:								
Net equity liabilities	16.9	16.7	14.7	17.4	21.0	18.8	20.1	17.8
Net debt liabilities	39.5	39.2	40.6	40.5	39.5	41.6	42.5	45.6

Source: Australian Bureau of Statistics.

Table 27. Australia: Gross Official Reserve Assets, 1996–2000

(In billions of Australian dollars; end of period)

	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr. 2000	Sep. Qtr. 2000	Dec. Qtr. 2000
Gross reserves	21.8	26.2	25.0	33.6	27.3	27.9	29.2	34.0
Foreign exchange	17.5	23.9	21.8	29.8	23.4	24.3	25.4	30.3
SDRs	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Reserve position in IMF	0.6	1.1	2.0	2.5	2.6	2.2	2.3	2.2
Gold 1/	3.7	1.1	1.2	1.1	1.2	1.2	1.3	1.3
Change from end of preceding year/quarter	1.8	6.8	-1.2	8.5	-6.3	0.7	1.2	...
Due to:								
Balance of payments transactions 2/	3.1	3.9	-3.1	10.4	-8.0	1.3	-0.7	...
Valuation and other changes	-1.3	2.9	2.0	-1.9	1.7	-0.7	2.0	-1.5
Memorandum item:								
RBA, outstanding forward obligations	3.1	5.6	10.1	22.6	15.1	17.7	17.6	24.9
Reserves, net of forward obligations	18.7	20.6	14.9	10.9	12.2	10.3	11.5	9.1

Sources: Reserve Bank of Australia, *Bulletin;* and Fund staff estimates.

1/ Gold is valued at the average London gold price for the month, converted to Australian dollars at the market rate of exchange applying on the last day of the month.

2/ Includes sales and purchases of, and earnings on, foreign exchange by the Reserve Bank and certain transactions with official institutions overseas.

Table 28. Australia: Period Average Exchange Rates, 1996–2001

	US$/$A		Yen/$A		Effective Exchange Rates (1990=100)			
					Nominal		Real 1/	
	Level	Percent Change 2/	Level	Percent Change 2/	Level	Percent Change 2/	Level	Percent Change 2/
1996	0.783	5.6	85.20	22.0	111.70	9.7	93.72	10.0
1997	0.744	-5.0	89.95	5.6	113.16	1.3	93.25	-0.5
1998	0.629	-15.4	82.31	-8.5	100.84	-10.9	82.60	-11.4
1999	0.646	2.6	73.55	-10.6	101.90	1.0	84.08	1.8
2000	0.582	-9.8	62.89	-14.5	95.39	-6.4	80.94	-3.7
1998								
Mar. qtr.	0.666	-3.9	85.26	-1.7	107.21	-0.6	87.59	-0.6
Jun. qtr.	0.629	-5.5	85.32	0.1	101.95	-4.9	83.46	-4.7
Sep. qtr.	0.599	-4.8	83.89	-1.7	97.73	-4.1	80.19	-3.9
Dec. qtr.	0.624	4.1	74.76	-10.9	96.48	-1.3	79.18	-1.3
1999								
Mar. qtr.	0.634	1.7	73.94	-1.1	99.11	2.7	81.48	2.9
Jun. qtr.	0.653	3.0	79.01	6.9	104.65	5.6	86.11	5.7
Sep. qtr.	0.651	-0.4	73.94	-6.4	103.26	-1.3	85.37	-0.9
Dec. qtr.	0.644	-1.0	67.31	-9.0	100.57	-2.6	83.35	-2.4
2000								
Mar. qtr.	0.632	-1.8	67.66	0.5	100.38	-0.2	83.59	0.3
Jun. qtr.	0.590	-6.7	62.87	-7.1	95.52	-4.8	80.10	-4.2
Sep. qtr.	0.575	-2.5	61.85	-1.6	94.66	-0.9	81.37	1.6
Dec. qtr.	0.532	-7.4	59.18	-4.3	88.80	-6.2	77.56	-4.7
2000								
Jan.	0.658	2.7	69.16	5.2	103.08	2.7	85.77	3.0
Feb.	0.629	-4.3	68.77	-0.6	100.54	-2.5	83.76	-2.4
Mar	0.610	-3.1	65.05	-5.4	97.53	-3.0	81.26	-3.0
Apr.	0.597	-2.0	63.00	-3.1	95.77	-1.8	80.00	-1.5
May	0.578	-3.1	62.54	-0.7	94.93	-0.9	79.41	-0.7
Jun.	0.594	2.6	63.08	0.9	95.85	1.0	80.90	1.9
Jul.	0.589	-0.9	63.52	0.7	95.68	-0.2	81.52	0.8
Aug.	0.582	-1.2	62.87	-1.0	95.77	0.1	82.55	1.3
Sep	0.554	-4.7	59.15	-5.9	92.53	-3.4	80.06	-3.0
Oct.	0.528	-4.6	57.26	-3.2	89.06	-3.8	77.58	-3.1
Nov.	0.521	-1.5	57.36	0.2	88.55	-0.6	77.54	0.0
Dec.	0.548	5.2	62.93	9.7	...	...	...	...
2001								
Jan.	0.556	1.5	64.86	3.1	...	...	...	...

Sources: IMF, *International Financial Statistics*; and Information Notice System.

1/ Based on relative consumer prices.
2/ From the preceding period.

Table 29. Australia: Residual Maturity Currency Decomposition of Foreign Debt, 1996–2000 1/

(At end period)

	1996	1997	1998	1999	Mar. Qtr. 2000	Jun. Qtr.
			(As a percentage of the total)			
One year or less						
Australian dollars	31.3	29.5	26.0	27.6	28.7	27.1
U.S. dollars	53.4	52.6	51.0	50.4	47.1	49.9
Japanese yen	5.0	6.0	8.8	8.2	8.1	7.6
Pounds sterling	2.4	2.2	3.7	2.9	2.2	2.4
Euros	0.0	0.0	0.0	3.8	5.5	5.6
Swiss francs	1.2	1.2	1.5	0.7	0.9	0.6
Other	6.7	8.4	8.9	6.4	7.4	6.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Greater than one year						
Australian dollars	40.1	40.1	39.9	51.3	50.8	48.2
U.S. dollars	27.7	38.7	39.4	31.5	30.3	33.8
Japanese yen	12.8	10.7	10.9	7.5	7.4	7.1
Pounds sterling	2.2	3.7	2.8	3.6	4.0	3.4
Euros	0.0	0.0	0.0	3.8	4.0	4.4
Swiss francs	1.5	0.9	0.8	0.6	0.7	0.6
Other	15.7	5.8	6.2	1.6	2.7	2.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total debt						
Australian dollars	44.7	41.6	37.6	36.7	37.0	35.1
U.S. dollars	33.7	38.0	39.2	39.5	37.2	40.0
Japanese yen	6.7	6.7	8.2	7.5	7.4	7.0
Pounds sterling	1.9	2.4	2.8	3.1	2.9	2.7
Euros	0.0	0.0	0.0	3.6	4.6	4.8
Swiss francs	1.1	0.9	1.0	0.6	0.7	0.6
Other	8.4	5.9	6.6	4.0	4.9	4.5
Reserve assets and derivatives	3.6	4.5	4.5	5.0	5.3	5.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Unallocated						
Australian dollars	82.5	74.8	70.1	0.0	0.0	0.0
Other	17.5	25.2	29.9	100.0	100.0	100.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
			(In billions of Australian dollars)			
Total	130.6	138.9	133.5	138.3	146.2	141.6
One year or less	41.4	44.2	45.6	52.6	57.2	54.7
Greater than one year	40.4	49.8	50.2	85.7	89.1	87.0
Unallocated	48.9	44.9	37.7	0.0	0.0	0.0

Source: Australia Bureau of Statistics.

1/ Data on this basis on this basis available from September 1996 onward.