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RE-ESTIMATING REAL OUTPUT FOR SERVICE INDUSTRIES IN AUSTRALIA

by

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ABSTRACT

This paper examines the current national accounts measure of real output for five major service industries in Australia. It finds that real output measures for insurance services; banking services; non-bank financial services; and education services are unsatisfactory. Alternative estimates based on acceptable output proxies are presented for these industries for the period 1986/87-1993/94. The estimates indicate that insurance, banking and non-bank financial services have grown more quickly than previously thought, while education services have grown less quickly than earlier estimates suggested. The effect on GDP of these estimates is also presented.

Keywords: insurance services, financial services, education services, communication services, service industries, real output measures, input-output industries.

J.E.L. Classification numbers: G21, G22, I20, L80, L96

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Re-estimating Real Output for Service Industries in Australia

by

George Verikios[1]

Introduction

This paper is concerned with measuring the output of five major input-output (IO) service industries in Australia. These are insurance, banking, non-bank finance (NBF), education and communication. Collectively, these industries comprise 14.62 per cent of gross domestic product (GDP) in 1994/952. This study is part of a project to provide measures of output at a detailed industry level for the Australian economy. Improved measures of real output are a key ingredient in estimates of changes in technology and consumer preferences in Australia since the mid-1980s. These estimates will be key ingredients in analyses of recent structural changes and in forecasts of structural changes in Australia over the next decade. The paper is organised into four major sections. Each section examines one service industry except for section II which includes banking and NBF. Each section follows a similar pattern by (i) describing the ABS approach to measuring nominal and real output of each industry, (ii) describing alternative methods of estimating real output for each industry, (iii) discussing published data on each industry, and (iv) implementing the alternative methodologies and re-estimating the change in

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real output for each industry over the period 1986/87-1993/94. Section V presents a recalculation of real GDP using the re-estimated values for each industry. Concluding remarks are in Section VI.

I The Insurance Services Industry

I.1 The Measurement of Insurance Output by the ABS

In its formulation of the national accounts, the ABS includes the insurance industry under Finance and Insurance (ANZSIC K). That is, division K in the Australian and New Zealand Standard Industry Classification. Insurance services are captured by subdivision 74 of this division ie, Insurance (ANZSIC 74). The ABS then divides Insurance (ANZSIC 74) into two categories, Life Insurance and Superannuation Funds (ANZSIC 741) and non-life insurance (Other Insurance ANZSIC 742 and General Insurance ANZSIC 7422). In 1992/93 each accounted for about half of total insurance output ie, 46 and 54 per cent respectively (ABS 1996a, Table 1, p.16).

Life Insurance and Superannuation Funds (ANZSIC 741) consists of (i) life insurance companies and (ii) superannuation and pension funds. Non-life insurance includes all other forms of general insurance such as fire, motor vehicle and home insurance etc, as well as health insurance.

I.1.1 Nominal Output

Conceptually, nominal output (or output at current prices) attempts to measure the *value* of output. Nominal output for life insurance is defined by the ABS as equal to the sum of:

- administrative costs (*ie*, wages, salaries and supplements; intermediate inputs; and indirect taxes nec (net)), and
- gross operating surplus (ABS 1990c, para 19.96, p.147).

This is basically the sum of all costs for these enterprises. It is also equal to the value of sales for these enterprises.

The ABS currently compiles the national accounts according to the 1968 System of National Accounts (SNA68). The SNA68 recommends that nominal output for non-life insurance be defined as the difference between premiums received and claims paid (P. Lichtwark, 8/10/97). There is no theoretical difference between these two measures. Both of these definitions appear to be good measures of the *value* of output. However, this is not true

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[2] This is the sum of the value of GDP at current prices for the communication, finance and insurance, and education industries (see ABS 1996c, Table 22, p.29).

of the nominal output measure for non-life insurance. The 1993 System of National Accounts (SNA93) states that "for example, an insurance corporation determines the premiums charged for vehicle insurance by relating them to the amount of claims it expects to pay on vehicles insurance in the same year" (SNA93, p.569). In the event that actual claims diverge from expected claims in a given year, as they usually do to a greater or lesser degree, this measure can be misleading. This divergence includes circumstances where the value of claims exceeds the value of premiums leading to a negative output value[3]. This outcome is intuitively and theoretically unsatisfactory.

In the next 12 months the ABS plans to adopt the SNA93. The SNA93 definition for the nominal output of non-life insurance differsfrom the SNA68. It recommends an accruals as opposed to a cash flow basis. Thus, the calculation of nominal output is based on premiums earned and claims incurred rather than premiums received and claims paid. This principle was adopted by the ABS when the SNA68 was originally implemented. This produces a more stable measure of nominal output and also makes a negative output value more unlikely.

As already mentioned, the ABS does not produce separate output estimates for insurance services in its national accounts. Thus, the only indicator available for the change in nominal output in insurance services is the change in output at current prices for the *Finance and Insurance (ANZSIC K).* This has grown by 161.83 per cent between 1986/87 and 1993/94 (ABS 1996c, Table 22, p.29).

I.1.1.1 What is the ABS Doing in the Future?

Another difference between the SNA68 and the SNA93 is the recommendation that *premium supplements* be included in the nominal output measure. Premium supplements constitute income earned on the insurance companies technical reserves. In its developmental work on implementing this principle, the ABS has found that technical reserves for non-life insurance companies typically amount to around two years premium income in value. The income earned on those reserves will significantly increase the value of output (by around 20 per cent). This will produce a more stable measure and also make a negative output value more unlikely. This change is scheduled to be implemented in the September quarter, 1998 national accounts (P. Lichtwark, 8/10/97).

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[3] This has happened in the past, most commonly with motor vehicle insurance.

I.1.2 Real Output

Conceptually, real output (or output at constant prices) is a measure of the *quantity* of output. According to the ABS there is no internationally recommended method of measuring real output of the insurance industry. Each country seems to have examined its data availability and structured its methodology around this constraint. This is confirmed by an Organisation for Economic Co-operation and Development (OECD) review of the method by which members measure real annual value added in service industries (OECD 1996).

Up until the March quarter, 1997 national accounts, changes in real output for *Finance and Insurance (ANZSIC K)* were estimated by movements in hours worked. The ABS firstly estimated quarterly changes in real output by extrapolating base year gross product using quarterly estimates of hours worked. These were derived by multiplying average hours worked by employment data. Employment estimates were based on the numbers of employees and the numbers of non-wage and salary earners. All these data are published by the ABS. Annual changes in real output was the sum of quarterly constant price estimates (ABS 1996d, Chapter 18, Table 18.11). This procedure assumed that there was no change in gross product at constant prices per hour worked (ABS 1996d, para 4.27).

This estimation method was unsatisfactory as it could not reflect the impact on output of the adoption of more capital intensive technology (*eg*, the widespread adoption of computers), of increased labour productivity (*eg*, labour shedding) or increased capital productivity (*eg*, the increased use of computers). There is a large amount of anecdotal evidence that all these things have occurred in the insurance industry since the mid-1980s, suggesting a large increase in real output since that time. Further, using inputs as a proxy for measuring real output ensures, for all practical purposes, that little productivity growth can be observed (Henderson 1986). The ABS's estimate of the change in nominal output for the period 1986/87-1993/94 of 161.83 per cent reflects these types of changes. Conversely, (using the pre-June quarter, 1997 methodology) the estimate of the change in real output over the same period suggested that there had been little, if any, change in capital intensive technology, labour productivity or capital productivity over the same period *ie*, 2.18 per cent (ABS 1996f, Table 1.3, p.6). This was the ABS's estimate of the change in output at constant prices for *Finance and Insurance (ANZSIC K)*. As was mentioned earlier, separate estimates for the insurance sector only are not available within the ABS's published national accounts.

These estimates were, in effect, proposing that the real price of insurance had increased by around 160 per cent (*ie*, 161.83 less 2.18). There is no evidence of such a massive increase in the price of insurance over the

period in question. In fact, the price of some categories of insurance has fallen in real terms. This suggested the need for a measure that more accurately reflected changes in real output of insurance services.

The ABS has been acutely aware of the shortcomings of this input based measure of real output for the reasons discussed above. Thus, as of the June quarter, 1997 the ABS implemented new methods for estimating real output for life and non-life insurance.

I.1.2.1 New ABS Methods for Measuring Real Output for Insurance Services[4]

Previous to the June quarter, 1997 national accounts the ABS calculated GDP for *Finance and Insurance (ANZSIC K)* by taking the base year (currently 1989/90) value of the industry's contribution to GDP(I)[5] and extrapolated it using hours worked. This has now been replaced with the assumption that constant price gross product is a fixed proportion of constant price gross output. Thus, constant price estimates of gross product are now derived by extrapolating base year current price estimates of gross product with constant price estimates of gross output.

As the new method assumes constant price gross product is a fixed proportion of gross output, quantity measures of gross output can be used to extrapolate current price estimates of gross product in the base period to derive constant price estimates of gross product. A five stage process is used to do this.

Stage 1. Annual constant price estimates of output are derived by extrapolating base year current price estimates by estimates of quantity indicators.

Stage 2. These estimates are summed within four industry groups: banking, non-bank finance, insurance & share broking.

Stage 3. Aggregate annual constant price estimates of output for each of these groups is used to extrapolate the base year current price estimate of gross product for that group. These are taken from 1989/90 IO tables.

Stage 4. The group estimates are summed for each year and used to extrapolate the base year current price estimate of gross product for the entire industry in the national accounts.

Stage 5. Quarterly movements are calculated[6].

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4 This section is largely based on the technical notes contained in ABS (1997c), pp.117-20.

5 This the ABS's income based GDP aggregate.

6 See the technical notes contained in ABS (1997c), pp.117-20 for how this is done.

I.1.2.2 Output Proxies

Life Insurance & Superannuation Funds (ANZSIC 741) Constant price estimates of the output of the life insurance industry are derived by extrapolating the current price estimate in the base year by the number of policies in force. Due to a lack of historical data on superannuation policies, it is assumed that the output of the superannuation funds industry changes at the same rate as the output of the life insurance industry.

Other Insurance (ANZSIC 742). The general approach here is to extrapolate the current price estimates of output in the base year by constant price estimates of premiums paid. For non-life insurance separate estimates of private and public sectors are derived. The ABS's preferred output proxy is policies. However, the lack of historical data on policies for general insurance meant that the ABS was not able to test this approach over a reasonable time period. This option may be re-examined in the future when more historical data is available. The ABS assumed that (general) insurance companies would attempt to maintain their margins over the medium term, and that the insurance service charge could therefore be assumed to be a constant proportion of premiums. The ABS considers this approach preferable to the use of other quantity indicators such as housing and motor vehicle stocks. This is because they believe that although stock data on the items insured may be correlated with the level of insurance services, the lack of a direct link introduces an additional source of error. This is a valid criticism.

Health Insurance (ANZSIC 7421). The constant price value of health premiums is calculated by deflating premiums paid with the consumer price index (CPI) for health/personal care insurance.

General Insurance (ANZSIC 7422). For all other forms of non-life insurance premiums paid are deflated with price indexes relating to the items insured.

Services to Finance & Investment (ANZSIC 751) For this ANZSIC group current price estimates of output of share brokers is deflated with the All Ordinaries Share Price Index.

Services to Finance & Insurance (ANZSIC 75) The ABS assumes that constant price gross product for this ANZSIC subdivision grows at the same rate as the rest of *Finance and Insurance (ANZSIC K).*

I.1.2.3 A Comparison

These changes represent a more satisfactory approach to measuring movements in real output for both life and non-life insurance. These new measures at least have the potential to measure changes in productivity and technical innovation, whereas this possibility is ruled out in the case of an

input based measure such as hours worked. The ABS has applied this new methodology to produce new historical estimates of real output for *Finance and Insurance (ANZSIC K)*. The ABS calculates that these new estimates imply growth of around 43 per cent in labour productivity over last decade as compared to zero per cent with the old method. The differences in the estimates using the old and new methods is illustrated in Table I.1.

Table I.1:

Comparison of Old and New ABS Methods of Estimating Real Output for *Finance and Insurance (ANZSIC K)* between 1986/87 and 1995/96

Method	Change in Real Output between 1986/87 and 1995/96 (%)	Annual Average Change (%)
Old (hours worked)	8.89[#]	0.99
New (output proxies)	69.34[@]	6.93

[#] ABS (1997d) Table 1.3, p.6; 1996f, Table 1.3, p.6.

[@] ABS (1997c), Table 56, p.86.

Table I.1 indicates the extreme contrast in estimates produced by the different methods. Over the period 1987/88-1995/96 the (old) input based method estimates very little change in real output *ie*, 8.89 per cent, while the (new) output based method estimates real output has grown by 69.34 per cent. Thus, the new method indicates much higher growth than was previously thought.

As this section is concerned with the behaviour of insurance output only, unpublished ABS data was obtained showing the breakdown of the new estimates for *Finance and Insurance (ANZSIC K)*, between the two subdivisions *Finance (ANZSIC 73)* and *Insurance (ANZSIC 74)*. The change in real output for *Insurance (ANZSIC 74)* is presented in Table I.2 for two time periods which are of particular interest.

Table I.2:

ABS Estimates of Change in Real Output for *Insurance (ANZSIC 74)* Using New Methods

Period	Change Over Whole Period (%)	Annual Average Change (%)
1. 1986/87-1993/94	56.71	7.09
2. 1986/87-1996/97	75.63	6.88

Source: Unpublished ABS national accounts data.

Table I.2 indicates that using its new real output methods, the ABS estimates that insurance output has grown by 75.63 per cent over the last 11 years (1986/87-1996/97). That is, average annual growth of nearly seven per cent.

This paper is concerned with estimating changes in technology and consumer preferences in the Australian insurance industry since the mid-1980s. This is now possible at an aggregate level with the availability of the data presented in Table I.2. These new ABS methods capture the effects of changes in factor productivity and factor ratios on real output for total insurance services. Further, the unpublished data presented in Table I.2 provide disaggregated (between *Finance ANZSIC 73* and *Insurance ANZSIC 74*) estimates which measure the change in real output for insurance services exclusively. This data has only been available since the release of the June quarter, 1997 national accounts *ie*, 3 September, 1997. Previous to this, the only real output estimates relating to insurance services available were those based on measuring inputs (*ie*, hours worked), and were only available in aggregated form *ie*, *Finance and Insurance (ANZSIC K)*. In order to estimate changes in technology and consumer preferences between different types of insurance requires even more disaggregated estimates. These types of estimates are currently not available. Sections I.2 and I.3 discuss a method and present results where these type of estimates are produced. These results will be subsequently compared to the ABS's new estimates presented above.

I.2 Options for Estimating the Change in Real Output of the Insurance Industry Since the mid-1980s

One option recommended by the ABS for estimating the change in real output of the insurance industry since the mid-1980s is to deflate current price estimates of premiums collected using the GDP deflator (or

some sector specific deflator). Is this satisfactory? The value of premiums collected (appropriately deflated) do not reflect changes in real output in the following sense. Consider house insurance. If there are twice as many houses insured in one year as compared with the previous year, then the output of house insurance sector has doubled. The value of premiums paid, appropriately deflated, will not strictly reflect this unless the real price per policy remains constant. This is probably true in the short run but not in the long run. What other output measures would be more appropriate? In the example above it is the actual number of houses insured or some proxy of the number of houses insured, subject to data availability. Failing this, a good proxy is the *value* of houses insured deflated by a measure reflecting movements in house prices. Are these data available? This question is addressed in Section I.2.1.

Continuing with the example of house insurance another possible proxy for changes in real output is the housing stock. Houses which are under mortgage are contractually obligated to be insured. Further, it is likely that a high proportion of the remaining housing stock is also insured. If this is so then movements in the housing stock would be a good proxy for movements in real output of housing insurance. This represents another option for estimating real output for categories of insurance which relate to stocks of goods *eg*, house and motor vehicle insurance, and for which data on stocks are available. It is not necessary to assume that all houses and/or cars are insured, so long as a constant percentage is insured then movements in the stocks of these variables would accurately reflect movements in the insurance of these stocks.

I.2.1 Data on the Value of the Sum Insured

The ABS does not publish data on the value of the sums insured for either life or non-life insurance. Neither does the Insurance and Superannuation Commission (ISC) publish or collect this type of data. But the ISC does publish a multitude of other data on the insurance industry which may be good proxies for the value of sums insured.

I.2.2 ISC Data

The ISC presently publishes yearly data on life insurance and 21 categories of non-life insurance. This includes measures of the value of premiums collected and number of existing policies. These two measures seem to be the most useful with regard to accurately estimating changes in real output.

One option for estimating changes in real output is to use the number of existing policies. It seems reasonable to argue that there is usually one policy per house, car, *etc*, insured. If this is true, then a good proxy of the

number of houses, cars, *etc* currently insured is the number of existing policies. Therefore, if there were twice as many houses insured there would be twice as many policies held in a given time period. There is a problem with using this data alone for estimating changes in real output from the mid-1980s onwards as the ISC only began collecting data on policies in 1992/93. An alternative methodology is outlined below.

I.2.3 Methodology

Given the discussion above, one possible method for estimating changes in real output of the non-life insurance is to use the limited data on policies in conjunction with the data on premiums in the following manner:

- `direct premiums'[7] would first be deflated by either the GDP deflator or some sector specific deflator to give `real' direct premiums,
- a linear trend line would then be fitted to the data on policies (only available from 1992/93) and real direct premiums over the period 1992/93-1994/95,
- the equation produced would subsequently be fitted to the data on real direct premiums in 1986/87 to give an estimate for policies in that year, and
- lastly, the estimate for policies in 1986/87 would be compared with the data on policies in 1993/94 to calculate the change in real output over the period 1986/87-1993/94.

Where this method does not produce intuitively plausible results for certain categories of insurance then movements in the value of stocks could be used as a secondary measure, where this is feasible. For example, motor vehicles and housing.

I.2.4 Limitations of ISC Data

The ISC collects data on both private and public non-life insurers. Private insurers are subject to the *Insurance Act.* Public insurers are not. In terms of data quality this means that the private insurers are audited and the public insurers are not. For this reason the ISC believes that the data provided to them by the public insurers is not reliable and thus should not be used for estimating changes in real output. A quick perusal of the yearly behaviour of the public sector data, such as direct premiums or current policies, indicate counter intuitive movements. For this reason the ISC recommends that any estimation of real output of the insurance industry

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7 Direct premiums is the amount consumers have paid or owe to underwriters for insurance cover (ISC 1996, p.166). The ISC recommends that any use of premiums in the calculation of output for the insurance industry should be limited to this premium index.

using ISC data should be limited to the data collected from private insurers only. This can be problematic, though, as in some categories of insurance *eg*, health and motor vehicles, public insurers constitute a large proportion of the industry. Ignoring the public sector insurers in these sub-categories may lead to distorted estimates of the change in real output.

Also, in 1991/92 the ISC increased the number of categories of (non-life) insurance on which it collected data, from nine to 21. As the period for which estimates are required (*ie*, mid-1980s onwards) includes 1991/92, any attempt to estimate changes in real output in insurance of a disaggregated form requires the original nine ISC categories to be used instead of the present 21 categories.

The ABS collects raw data from the ISC on premiums collected and claims paid for the purpose of calculating nominal output for total private non-life insurance and total public non-life insurance. They adjust the ISC data for known deficiencies. The ABS regard the ISC's data (both public and private sector) as unreliable for use in output estimation. A close examination of the ISC data confirms the ABS's criticisms. Despite this, the ISC data gives credible estimates for changes in premiums and policies for some sub-categories of insurance and in the absence of any alternatives these data will be used here. The ISC data will be used to estimate changes in real output for most of the items in the IO commodity group *Insurance (Input-Output Commodity Classification (IOCC) code 7401)* over the period 1986/87-1993/94 (ABS 1996a, Table 1, p.16). These items are listed in Table I.3 along with their share of the value of domestic production in the 1992/93 IO tables (ABS 1996a, Table 1, p.16).

I.3 Results

Ideally the change in real output should be estimated directly (*ie*, from data collected specifically for each item) for all the items listed in *Insurance (IOCC 7401)* group. However, due to data limitations it will only be possible to derive direct estimates for seven of the 12 items of insurance listed in Table I.3. These are

- life insurance and superannuation fund services (IOCC 74110010);
- health insurance services (IOCC 74210010);
- fire insurance services (IOCC 74220010);
- houseowner and household insurance services (IOCC 74220020);

Table I.3:

IO Commodity Group *Insurance (IOCC 7401)* and Value of Domestic Production Shares for 1992/93

Item Description	Share in the Value of Domestic Production
1. Life insurance and superannuation fund services (IOCC 74110010)	0.4635
2. Health insurance services (IOCC 74210010)	0.0898
3. Fire insurance services (IOCC 74220010)	0.0230
4. Houseowner and household insurance services (IOCC 74220020)	0.0843
5. Crops (including hailstone damage) and livestock insurance services (IOCC 74220030)	0.0049
6. Motor vehicle comprehensive and compulsory third party insurance services (IOCC 74220040)	0.0972
7. Public and product liability insurance services (IOCC 74220050)	0.0224
8. Burglary and plate glass insurance services (IOCC 74220060)	0.0084
9. All risk and baggage insurance services (IOCC 74220070)	0.0065
10. Margin–marine insurance services (IOCC 74220080)	0.0087
11. Non-margin–marine insurance services; aviation hull/cargo insurance (IOCC 74220090)	0.0216
12. Insurance services nec (IOCC 74220100)	0.1697

Source: ABS (1996a), Table 1, p.16.

- motor vehicle comprehensive and compulsory third party insurance services (IOCC 74220040);
- public and product liability insurance services (IOCC 74220050); and
- margin–marine insurance services (IOCC 74220080).

These items constitute over three-quarters of the value of total domestic production of insurance services in 1992/93 *ie*, 78.89 per cent (see Table I.3). Thus the major share of insurance services will be estimated

directly. The change in real output for the remainder of the items will be derived indirectly (*ie*, through the use of a simplifying assumptions rather than the use of data directly relating to each item). These items comprise less than a quarter of the value of total domestic production of insurance (*ie*, 21.11 per cent). A discussion of the specific methodology used and the results for each item follow in the sections below.

I.3.1 Life Insurance and Superannuation Fund Services (IOCC 74110010)

This item includes annuity services as well as life insurance and superannuation fund services. The ISC collects data on new policies for life insurance and superannuation funds and also for annuities. The service provided by underwriters of this item can be viewed as the gamble (bet) they make with the policyholder regarding the length of their life. Ideally, the size of the of gamble (*ie*, the value of the policy) for every new policy can be used as a measure of real output for this item.

The ISC also collects data on the value of the sum insured for life insurance and superannuation fund services but not for annuity services. Consequently, this data cannot be used to estimate the change in real output for life insurance and superannuation fund services.

A close proxy to the value of the sum insured for new policies is the value of premiums for new policies. This data is available for life insurance and superannuation fund services and for annuity services. These data could then be deflated by some price index. The change in real premiums[8] for new business for the period 1986/87-1993/94 was 114.93 per cent. The anecdotal evidence of very high growth in life insurance and superannuation fund services in the last decade or so supports this estimate. This estimate represents an annual average growth rate of 14.37 per cent[9].

I.3.2 Health Insurance Services (IOCC 74210010)

This item includes public and private health insurance. That is, Medicare, (publicly owned) Medibank Private and all private health insurers. Medicare is a compulsory national health insurance scheme for all Australians. There is an issue with respect to whether Medicare contains the normal features of insurance *ie*, an attempt to set the premium by reference to the actuarial risk. Medicare does not operate in this way. It is more aptly described as the social provision of medical services at zero or low cost to

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[8] Nominal premiums were deflated by the GDP deflator (expenditure) (ABS 1996c, Table 3).

[9] The point made in Section I.2.4 regarding the use of private sector data only from the ISC does not apply for this item as the ISC aggregates private and public sector data on life insurance, superannuation funds and annuities.

the user, by the expenditure of subsidies financed by taxes - including the Medicare levy. Thus, if the service provided by health insurers is considered to be the gamble that they make with the policyholder regarding the likelihood that they will incur health expenditures in the future, then Medicare is irrelevant for this item. The focus will instead be on estimating the change in real output of Medibank Private and private health insurers.

No data on policies for Medibank Private and private insurers were available. Thus the method outlined in Section I.2.3 could not be used here. Unpublished ABS data was gathered on premiums, at current prices, collected by Medibank Private and all private insurers for the period 1986/87-1993/94. In the calculation of real output for health insurance services this current price series of premiums received was deflated by an appropriate price index. Deflating these by IPD - Health[10] gave an estimate of the change in real output of 72.39 per cent. This represents an annual average growth rate of 9.05 per cent.

I.3.3 Fire Insurance Services (IOCC 74220010)

This item includes fire insurance for all buildings - residential and commercial, private and public. Thus, it is possible to use capital stock data on dwellings and non-dwelling construction to calculate the change in real output for this item. This was done by summing capital stock data on dwellings and non-dwelling construction for all sectors at average 1989/90 prices, with non-dwelling construction on roads by the general government sector subtracted. This was done for the years 1986/87 and 1993/94 and the difference between these two years acted as the estimate for the change in real output for the period 1986/87-1993/94[11] (See ABS 1996b, Table 5, p.12; Table 8, p.18). The change in the capital stock, as defined above, was 23.18 per cent (*ie*, 2.90 per cent average annual growth).

I.3.4 Houseowner and Household Insurance Services (IOCC 74220020)

This item includes insurance for all privately-owned houses. As with fire insurance services this item can be estimated using movements in stocks. ABS capital stock data on dwellings held by private enterprises at average 1989/90 prices (see ABS 1996b, Table 5, p.12), gives an estimate of a 25.47 per cent increase in real output for houseowner and household

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[10] 'IPD - Health' is defined as private final consumption expenditure on health at current prices divided by private final consumption expenditure on health at average 1989/90 prices (ABS 1996c, Tables 53, 54, pp.50-1).

[11] The capital stock indexes used for these calculations were end-year gross capital stock and end-year net capital stock. To calculate a value for the total capital stock for any given year a three-quarter weight and one-quarter weight was applied to each of these indexes, respectively.

insurance services between 1986/87-1993/94[12] (*ie*, 3.18 per cent average annual growth).

This estimate can be compared against the ABS's estimate of the change in the price of house insurance and house contents insurance. Using the weighted average change in the CPI for the eight capital cities, between 1986/87 and 1993/94, house insurance increased by 58.03 per cent, and house contents insurance by 47.68 per cent (see ABS 1993c; 1994d). When deflated by the difference between private final consumption expenditure on total rent and total household durables, respectively, at constant and current prices (see ABS 1996c, Tables 53-4), the change in the price of house insurance and house contents insurance falls to 12.33 and 26.37 per cent, respectively. This compares well with the estimate of the change in real output, over the same period, of 25.47 per cent. It suggests that the estimate of the change in real output is in line with the ABS's estimates of the change in the price of house insurance and house contents insurance.

I.3.5 Motor Vehicle Comprehensive and Compulsory Third Party Insurance Services (IOCC 74220040)

This is another item where the use of stocks is possible in order to estimate the change in real output. Data on the car stock was gathered from ABS publications (see ABS 1987a, Table 22, p.16; 1993a, Table 1, p.5). The car stock was defined as all motor vehicles registered in Australia. This included

- passenger vehicles;
- light commercial vehicles;
- rigid trucks;
- articulated trucks;
- non-freight carrying trucks;
- buses; and
- motor cycles.

The change in the car stock defined in this way, between 1986/87 and 1993/94, was 13.08 per cent. That is, annual average growth of 1.64 per cent.

This estimate can be checked against the ABS's estimate of the change in the price of vehicle insurance. Using the weighted average change in the CPI for the eight capital cities, between 1986/87 and 1993/94, vehicle insurance increased by 46.36 per cent (see ABS 1993c; 1994d). Deflating these prices by the difference between private final consumption expenditure on the sum of the purchase and operation of motor vehicles at constant and current prices (see ABS 1996c, Tables 53-4), the change in the

price of vehicle insurance falls to 6.47 per cent. This compares well with the estimate of the change in real output over the same period*ie*, 13.08 per cent.

I.3.6 Public and Product Liability Insurance Services (IOCC 74220050)

Employing the methodology described in Section I.2.3 gives an estimate of a negative change in real output for this insurance sub-category. This estimate is the result of an implausibly high figure for existing policies in 1992/93. As there is no evidence of a contraction in the size of this sub-category this estimate seems misleading. For this reason the change in real output was re-estimated using data for the years 1993/94 and 1994/95 only. This yielded an estimate of 87.60 per cent. This represents an annual average growth rate of 10.95 per cent. The average yearly ratio of private sector nominal direct premiums to total nominal direct premiums for the period 1986/87-1993/94 was 81.08 per cent. Therefore this estimate is probably largely representative of the movement in real output for this item as a whole, despite the use of private sector data only.

I.3.7 Margin–Marine Insurance Services (IOCC 74220080)

This item is made up of insurance on goods freighted by sea around Australia. To estimate the change in real output for this category, for the period 1986/87-1993/94, data from the ISC's *Marine* category for the period 1986/87-1990/91 and the aggregate of the ISC's *Marine Hull* and *Marine Cargo* categories for the period 1991/92-1993/94 was used. The estimation method described in Section I.2.3 was applied. The estimate obtained was -11.41 per cent (*ie*, -1.43 per cent average annual growth). The average yearly ratio of private sector nominal direct premiums to total nominal direct premiums for the period 1986/87-1993/94 for this item was 94.35 per cent. Thus, this estimate is probably quite indicative of the movements in real output for this type of insurance as a whole, despite the use of private sector data only. This estimate suggests that this item is facing shrinking or stagnant demand, and/or increased competition from foreign insurers.

I.3.8 Non-Margin–Marine Insurance Services; Aviation Hull/Cargo Insurance, Crops and Livestock Insurance Services, Burglary and Plate Glass Insurance Services, All Risk and Baggage Insurance Services and Insurance Services nec

Non-margin–marine insurance services; aviation hull/cargo insurance (IOCC 74220090) is made up of two types of insurance. The first part is for insurance on goods freighted by sea outside Australia for which there is no data readily available. The second part is aviation hull and cargo insurance. The ISC does have data on aviation insurance but only began collecting it

from 1991/92 onwards. Thus, it is not useful for estimating over the period 1986/87-1993/94.

Besides the non-margin–marine insurance services; aviation hull/cargo insurance (IOCC 74220090), there are four other items for which data constraints do not allow any direct estimation of the change in real output. These are crops and livestock insurance services (IOCC 74220030); burglary and plate glass insurance services (IOCC 74220060); all risk and baggage insurance services (IOCC 74220070); and insurance services nec (IOCC 74220100). This last item includes miscellaneous types of insurance. Rather than assuming zero growth for all these categories it is more satisfactory to make some simplifying assumptions which allow some estimate of the change in real output for these categories to be used. It will be assumed that the change in real output over the period 1986/87-1993/94 for these sub-categories is equal to the weighted average of the total growth of all the sub-categories discussed in Sections I.3.1-I.3.7. That is, 83.14 per cent. This figure then becomes the preferred estimate of the change in real output for these sub-categories. The contribution of each of these sub-categories to the change in real output of the whole insurance industry is this assumed growth figure (*ie*, 83.14 per cent) multiplied by each sub-category's share of the value of domestic production.

I.3.9 Output for Total Insurance Services

By taking the preferred estimates of the change in real output for each of the IOCC items for *Insurance (IOCC 7401)* and applying the respective shares of each item in the value of total domestic production of insurance for 1992/93 (see ABS 1996a, Table 1, p.16), the contribution of each item to total growth in the whole insurance sector can be estimated.

Given that the period of interest is 1986/87-1993/94, is it appropriate to use the value of domestic production shares from the 1992/93 IO tables? Other options include using the shares from the 1986/87 and 1989/90 IO tables. These shares were examined but their use would be inappropriate as they contain either negative values for some insurance sub-categories (*eg*, motor vehicles in 1986/87) (ABS 1990a, Table 1, p.43) or improbably low shares (*eg*, fire in 1989/90) (ABS 1994a, Table 1, p.43). Thus only the 1992/93 IO shares were regarded as acceptable. These shares and the contribution of each sub-category to the change in real output are presented in Table I.4, columns 2 and 3.

Summing the figures for the contribution of each sub-category to the change in real output of the whole insurance industry, an estimate of the change in real output for the insurance sector as a whole is derived (Table I.4, last row). This happens to be equal to the assumed growth of the sub-categories listed in Section I.3.8 *ie*, 83.14 per cent. This is a characteristic of

the method by which the preferred estimate for these sub-categories was calculated *ie*, taking the total of the weighted average growth of all the sub-categories listed in Sections I.3.1-I.3.7 and assuming that the sub-categories listed in Section I.3.8 grow at this rate. The estimate of the change in real output of the whole insurance sector over the period 1986/87-1993/94 represents an annual average growth rate of 10.39 per cent.

I.3.10 A Comparison

Keeping in mind the anecdotal evidence of high growth in capital intensive technology, labour productivity and capital productivity for this sector, the estimates presented above are much more plausible than the ABS's old (input based) estimates of the change in real output for the insurance industry over the same period *ie*, 2.18 per cent (for the whole period) and 0.27 per cent (average annual growth)[12]. How do these estimates compare to the ABS's new (output based) estimates for insurance. Table I.2 showed that over the period 1986/87-1993/94 the ABS estimates (using its new output methods) that real output in insurance has grown by 56.71 per cent *ie*, annual average growth of 7.09 per cent. That is, the estimates presented in Section I.3.9 estimate growth in total insurance output of around three percentage points greater, per annum, than the ABS's new methods. Both estimates are plausible in the sense that they both indicate high growth, as is commonly believed, in this sector. Thus, in this sense, they are both compatible and reconcilable.

[12] It should be noted that even though the various proxies used here to estimate the change in real output may be superior to hours worked, they assume that the original base level of output is correct. This may or may not be true. Hours worked may have been a accurate proxy for real output in the ABS's base year, in which case the proxies used above present more accurate estimates of the change in real output from the base year. If hours worked was not an accurate estimator of real output in the base year then the estimates presented above are limited in their accuracy. In this case there is little that can be done to correct this problem.

Table I.4:

Preferred Estimates of the Change in Real Output for *Insurance (IOCC 7401)* and Shares in the Value of Domestic Production

Item Description	1. Preferred Estimate of Change in Real Output (%)	2. Share in the Value of Domestic Production*	3. Contribution to Change in Real Output for Total Insurance Services# (%)
1. Life insurance and superannuation fund services	114.93	0.4635	53.27
2. Health insurance services	72.39	0.0898	6.50
3. Fire insurance services	23.18	0.0230	0.53
4. Houseowner and household insurance services	25.47	0.0843	2.15
5. Motor vehicle comprehensive and compulsory third party insurance services	13.08	0.0972	1.27
6. Public and product liability insurance services	87.60	0.0224	1.96
7. Margin–marine insurance services	-11.41	0.0087	-0.10
Sub-total	*na*	*0.7889*	*65.58*
8. Crops (including hailstone damage) and livestock insurance services	83.14	0.0049	0.41
9. Burglary and plate glass insurance services	83.14	0.0084	0.70
10. All risk and baggage insurance services	83.14	0.0065	0.54
11. Non-margin–marine insurance services; aviation hull/cargo insurance	83.14	0.0216	1.80
12. Insurance services nec	83.14	0.1697	14.11
Sub-total	*na*	*0.2111*	*17.55*
Total	*na*	*1*	*83.14@*

* Calculated from ABS 1996a, Table 1, p.16.

\# These figures have been calculated by multiplying the preferred estimate of the change in real output by the share of total domestic production for each item.

@ The column sub-totals do not sum exactly to 83.14 due to rounding.

In order to estimate changes in technology and consumer preferences between insurance services, since the mid-1980s, disaggregated estimates of the change in real output for various types of insurance are required. The results in Table I.4 represent a first pass at achieving this and are a precursor to a study based on more and better data.

II The Financial Services Industry

The financial services industry is defined here as consisting of both the banking and NBF sectors. Thus, financial services in the context of this paper refer to services provided by banks and NBF corporations.

II.1 Financial Services Output and its Measurement by the ABS

Banks (and NBF corporations) act as middlemen between those who want to lend and those who want to borrow money. Hence, they provide a safe haven and a return on deposits, and they provide loans. The ABS includes the output of banks and NBF corporations as part of *Finance and Insurance (ANZSIC K)* in the national accounts. Although Section I described how the ABS measures nominal output for this division, the measurement method for banks and NBF institutions differs from that used for insurance companies. This will be discussed in the next section.

II.1.1 Nominal Output

The activities of financial services corporations are largely financed by the excess of interest received over interest paid out. As already mentioned in Section I, the ABS currently compiles its national accounts statistics according to the recommendations of the SNA68[13]. The SNA68 does not recommend that interest received by financial institutions be defined as part of income and, similarly, interest paid is not to be deemed as part of the expenses incurred in deriving that income (ABS 1996d, Chapter 11, para 11.43). Under this internationally accepted convention, interest payments and interest receipts are considered transfers. So, for instance, the payment of interest by a home borrower, or the receipt of interest by a home lender, is not defined as a productive activity. Consequently, such an activity is not considered to contribute to national output. For this reason the ABS does not define nominal output as the excess of interest received over interest paid out.

With the SNA68 excluding the above option, another option is to define nominal output as equal to bank's and non-bank's explicit charges (as is the case with trading enterprises). But this definition would produce a

[13] The ABS plans to adopt the SNA93 in the September quarter, 1998.

negative result for nominal output as bank's explicit charges, although increasing as a proportion of total income, are not large enough to cover the cost of inputs. Therefore, this definition would not produce an operating surplus. Consequently, the ABS adopts a different definition of outputfrom that used for trading enterprises (ABS 1996d, Chapter 19, para 19.96). The (SNA68 recommended) convention adopted for bank and NBF output, in both the national accounts and in the IO tables (for *Banking (IOCC 7301)* and *Non-Bank Finance (IOCC 7302)*), is that a proportion of the interest received is considered a service charge and thus part of their output. This is known as the *imputed bank service charge* (IBSC).

In principle, the IBSC is the difference between interest received on loans made from deposits and the interest paid on these deposits. In practice, the IBSC is calculated by multiplying the value of average loans outstanding by the average difference between interest rates charged on loans and those paid to depositors (ABS 1996d, Chapter 11, para 11.44). In addition to the IBSC, the nominal output of banks and non-banks includes explicit charges paid by customers, and rent and leasing revenue (ABS 1996d, Chapter 19, para 19.96). This convention is required in order to increase revenue to be greater than costs. Otherwise nominal output would be calculated as negative. The ABS does not produce disaggregated estimates for banks and NBF institutions. Thus, the only indicator available on the change in nominal output for these enterprises is the change in current price output for *Finance and Insurance (ANZSIC K)*. As already indicated in Section I, between 1986/87 and 1993/94 current price output for this division increased by 161.83 per cent (ABS 1996c, Table 22, p.29).

II.1.2 Real Output

Section I.1.2 explained that the ABS method of measuring real output for *Finance and Insurance (ANZSIC K)* has recently been modified. Previous to the June quarter, 1997, the ABS measured changes in real output by movements in hours worked and was subject to the assumptions already discussed earlier (see Section I.1.2).

This type of estimation method is a good measure of the quantity of labour input. It cannot, by definition, say anything useful about output, let alone real output. As a consequence, this type of output measure cannot reflect the impact on real output of the adoption of more capital intensive technology (*eg*, the widespread computerisation of banking transactions such as the introduction of automatic teller machines), of increased labour productivity (*eg*, labour shedding by banks due to mergers *etc*) or increased capital productivity (*eg*, the increased use of computers). This suggested the need for an estimation method that more accurately reflects these types of changes which can impact on real output in significant ways.

Recognising this, the ABS as of the June quarter, 1997 adopted a new method of measuring real output for *Finance and Insurance (ANZSIC K)*. Section I.1.2 has already described the different assumptions related to this new method and, thus, these will not be repeated here. This section will concentrate on the new output proxies adopted by the ABS as they relate to measuring real output for corporations providing financial services.

II.1.2.1 New ABS Methods for Measuring Real Output of Financial Services

Central Bank (ANZSIC 731) and Deposit Taking Financiers (ANZSIC 732). The bulk of financial services output is captured within the *Central Bank (ANZSIC 731)* and *Deposit Taking Financiers (ANZSIC 732)* groups. For these two groups real output is made up of two components.

1. Interest Receipts less Interest Payments. It is assumed that half of the interest rate margin is charged to borrowers and half to depositors. Constant price estimates of this component are derived by multiplying the borrowers' margin in the base year by a real measure of loans outstanding, and multiplying the depositors' margin in the base year by a real measure of deposits. The resulting estimates of real interest paid by borrowers and lenders are summed. Real estimates of loans are derived by deflating current price values with the implicit price deflator (IPD) of domestic final demand. This is essentially a measure of the movement in real loans and real deposits with a 0.5 weight for each.

2. Income Earned from Direct Charges. Constant price estimates of direct charges are constructed by deflating current price values by an IPD derived from a sample of direct charge products for which explicit fees are charged.

Other Financiers (ANZSIC 733) and Financial Asset Investors (ANZSIC 734). It is assumed that GDP for these groups grows at the same rate as the rest of the NBF industry group. This is due to the lack of satisfactory output indicators presently.

Imputed Bank Service Charge. Current price values of the IBSC are deflated with the IPD of the indirectly charged (interest margin) output of the finance industry[14].

II.1.2.2 A Comparison

Section I.1.2.3 discussed the advantages of these new methods in estimating real output for insurance services as they related to the use of output proxies. The same argument also applies to financial services. These

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[14] The ABS adoption of output proxies for measuring Finance (ANZSIC 73) abolishes the need to continue estimating the IBSC. However, the use of the SNA68 requires that the IBSC continue to be estimated and included in the national accounts to ensure consistency and reconciliation with the rest of the national account statistics.

new measures at least have the potential to measure changes in productivity and technical innovation, whereas this possibility is ruled out in the case of an input based measure such as hours worked. The ABS has applied this new methodology to produce new historical estimates of real output for *Finance and Insurance (ANZSIC K)*. The ABS calculates that these new estimates imply growth of around 43 per cent in labour productivity over last decade as compared to zero per cent with the old method. The differences in the estimates were presented in Table I.1 and discussed in Section I.1.2.3.

Following the approach in Section I, unpublished ABS data was obtained showing the breakdown of the new estimates for *Finance and Insurance (ANZSIC K)*, between the subdivisions *Finance (ANZSIC 73)* and *Insurance (ANZSIC 74)*. The change in real output for *Finance (ANZSIC 73)* is presented in Table II.1 for two particular time periods.

Table II.1:

ABS Estimates of Change in Real Output for *Finance (ANZSIC 73)* Using New Output Measurement Methods

Period	Change Over Whole Period (%)	Annual Average Change (%)
1. 1986/87-1993/94	33.65	4.21
2. 1986/87-1996/97	56.27	5.12

Source: Unpublished ABS national accounts data.

Table II.1 indicates that, using its new real output methods, the ABS estimates that financial services output has grown by 56.27 per cent over the last 11 years (1986/87-1996/97). That is, average annual growth of around five per cent.

This paper is concerned with estimating changes in technology and consumer preferences in the Australian financial services since the mid-1980s. This not only requires estimates of the change in real output for total financial services, but also in disaggregated form. That is, for the banking and NBF sectors. Sections II.2 and II.3 attempt to calculate such estimates, and also to reconcile these results with the ABS's new methods of estimating real output for financial services.

II.2 Alternative Measures of Financial Services Output

There are a number of alternative approaches which can be taken in measuring financial services output. Triplett (1991) adopts a *production*

function approach. He classifies bank activities as either inputs or outputs (see Hancock 1985; Fixler & Zieschang 1990; Hancock 1991). This classification is determined by the sign of the derivative in a bank profit function which is estimated empirically. In the empirical results movements in loans are considered as tracking movements in output. Time deposits[15] are considered a measure of inputs and demand deposits are considered a measure of outputs.

Berger & Humphrey (1990) argue that the *value added* approach to measuring financial services outputs is best for accurately estimating changes in bank technology and efficiency over time. Their argument is based on the fact that the *value added* approach allows liabilities and assets to be classified as both inputs and outputs in a non-mutually exclusive way. Application of the *value added* approach in Berger & Humphrey (1990) and elsewhere (see Berger, Hanweck & Humphrey 1987) identifies demand deposits, time deposits, savings deposits and loans as important outputs.

What other measures could be used to measure real bank output? Although the ABS does not consider interest received to be part of income, nor interest paid as part of the expenses incurred in deriving that income, there may be other, more compelling, reasons why the interest differential may not be a good measure of real bank output. Imagine that the financial services sector was highly inefficient and therefore required a large interest differential to cover their costs. Now imagine that, for whatever reason, the banking and NBF sectors become more inefficient and thus require an even larger interest differential to cover their costs. In this scenario real output has not increased. However, using the change in the interest differential as a proxy for real output would suggest that real output *has* increased. For this reason, the change in the interest differential is likely to be good measure of *nominal* bank output but not *real* bank output.

It has already been mentioned that banks and non-banks act as middlemen between those who want to lend and those who want to borrow money and, thus, provide a safe haven and a return on deposits and they provide loans. Given this primary role it seems appropriate that a good proxy for the real output of banks and non-banks would be the real value of loans and deposits. Loans and deposits have been used elsewhere as a proxy for the change in bank output. For his study of productivity in Australian banking from 1975 to 1994 Ritzmann (1995) used a *total factor productivity* approach. He employed two measures of banking productivity. With both

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[15] Time deposits refer to the equivalent of what are known in Australia as `fixed term deposits'. That is, where money is deposited in an account for a specified minimum period and no withdrawals can be made during this period. These accounts usually attract a higher interest rate than demand deposit accounts as an incentive to invest in such an account.

methods the change in loans and the change in demand deposits and savings deposits were used as a proxy for the change in real bank output. Henderson (1986) also includes loans and deposits, among other things, as part of the output of banks.

The Ritzmann study used data from Reserve Bank of Australia (RBA) Bulletins and deflated by a gross domestic product deflator. These two proxies have the potential to reflect changes in real output, whereas there is no possibility of this with a measure such as movements in hours worked - especially when real output has been affected by changes in factor productivity and factor intensities. If changes in deposits and loans are to be used to estimate the change in real output of banks and non-banks it would be informative to observe the empirical relationship between these two variables over the period in question *ie*, 1986/87-1993/94. This will be done in the next section.

II.3 Estimating the Change in Real Output for Banking and NBF

II.3.1 Real Bank Output

An estimate of the change in real output is required for an equivalent IO industry. The IO commodity group *Banking (IOCC 7301)* includes two items

- bank services–imputed charge (IOCC 73100010); and
- bank services nec (IOCC 73100020) (ABS 1996a, Table 1, p.15)[16].

The first item listed above is equivalent to the IBSC calculated for nominal bank output in the national income, expenditure and product accounts. As discussed in Section II.1, this convention is not considered appropriate for the estimation of banking output in either nominal or real terms. Thus, a different approach will be taken here, which is similar to the ABS's new methods, in order to estimate the change in real output for *Banking (IOCC 7301)* between 1986/87 and 1993/94. This is outlined below.

Following Ritzmann (1995) data was obtained on the nominal value of loans and deposits of all Australian banks between 1986/87 and 1993/94. *Deposits* were calculated as demand deposits plus savings deposits. *Loans* were calculated as total assets less cash and premises. Monthly data was used to obtain yearly averages. The yearly averages of deposits and loans were divided by each other to give an indication of the relationship between

[16] It should be noted that even though IO data is calculated in nominal prices, to estimate changes in technology and consumer preferences requires the estimation of the change in real output.

the two variables over the relevant time period. The results are presented in Table II.2.

The loans data used in Table II.2 is all loans by Australian banks to both overseas and domestic borrowers. The data on deposits used in Table II.2 are deposits only repayable in Australia and do not include deposits made in overseas branches of Australian banks*eg*, a Commonwealth Bank

Table II.2:

Ratio of Nominal Deposits to Nominal Loans in Australia for the Period 1986/87-1993/94

Year	Ratio of Deposits to Loans
1986/87	0.65
1987/88	0.60
1988/89	0.56
1989/90	0.57
1990/91	0.57
1991/92	0.57
1992/93	0.59
1993/94	0.59

Sources: RBA, *Bulletin Dec 1988*, Tables C.1, C.2, E.1, E.2, F.1, F.2; *Dec 1990*, Tables B.1, B.2; *June 1993*, Tables B.1, B.2; *June 1995*, Tables B.1, B.2.

branch in Hong Kong. It is clear from Table II.2 that although nominal deposits and nominal loans broadly move together the ratio has been as low as 0.56 in 1988/89 and as high as 0.65 in 1986/87.

The slight downward trend in the ratio of deposits to loans in Table II.2 is consistent with a growing non deposit source of loanable funds. With the advent of financial deregulation in the 1980s there was a proliferation of what is known as `off balance sheet financing'. This includes activities such as commitments, guarantees, trading positions, letters of credit, options, futures, swaps and other banking products. These activities expose banks to (lending) risks but are not visible on their balance sheets as are deposits and loans (Stevenson 1987). This is one possible source of non deposit loanable funds.

The yearly averages for nominal deposits and loans between 1986/87 and 1993/94 were deflated by the change in the IPD (GDP(E))[17] (ABS 1995c, Table 61) to give estimates of real changes. Table II.3 shows that over this period the sum of real loans and real deposits increased by 76.23 per cent (*ie*, average annual growth of 9.53 per cent).

Table II.3:

Change in Selected Bank Variables for Australia between 1986/87 and 1993/94

Variable	Total Change (%)	Average Annual Change (%)
1. Real loans	82.45	10.31
2. Real deposits	66.61	8.33
3. Real deposits plus real loans	76.23	9.53

It is widely believed that the Australian banking industry expanded at a very high rate after its deregulation in the early 1980s (for example, the granting of 16 new bank licenses), thus estimates of annual average growth of around 10 per cent for the period 1986/87-93/94 seem quite reasonable.

II.3.2 Real NBF Output

Table II.4 contains a description of *Non-Bank Finance (IOCC 7302)*. A number of the items listed require explanation.

Australian Industry Development Corporation and Victorian Development Corporation services (IOCC 73290010) The Australian Industry Development Corporation (AIDC) is a Federal government body which provides finance to, or buys shares in, Australian companies. Its purpose is to promote industry development and assist towards more Australian ownership and control of Australian corporations, resources and industries (AIDC 1996). The Victorian Development Corporation is a Victorian State government body which undertakes a similar role for Victoria.

[17] This is the ABS's expenditure based GDP aggregate.

Table II.4:

IO Group *Non-Bank Finance (IOCC 7302)* and Item Descriptions

1. Building society services nec — imputed charge (IOCC 73220010)
2. Building society services nec (IOCC 73220020)
3. Credit union services — imputed charge (IOCC 73230010)
4. Credit union services nec (IOCC 73230020)
5. Authorised money market dealers — imputed charge (IOCC 73240010)
6. Money market corporations — IBSC (IOCC 73240020)
7. Money market corporations — explicit charge (IOCC 73240030)
8. Australian Industry Development Corporation and Victorian Development Corporation services (IOCC 73290010)
9. Finance services — imputed charge (IOCC 73300020)
10. Finance services nec (IOCC 73300030)

Source: ABS (1996a), Table 1, p.15.

Finance Services imputed charge (IOCC 73300020) and Finance Services nec (IOCC 73300030). These two items refer to all other non-bank financiers not captured in the other items such as the output of finance companies.

Analogous to the *Banking (IOCC 7301)*, an IBSC is calculated for the purpose of determining output for almost all NBF corporations listed in Table II.4. As discussed in Section II.1.1 the IBSC method is not considered satisfactory in estimating changes in output. Thus, as in the previous section real output will be assumed to be move with the value of the sum of real loans and deposits held by all Australian NBF corporations.

Data on loans by and deposits with NBF corporations was drawn from RBA bulletins (see RBA Bulletins, Dec 1988 - 1989, Tables G.1, G.2, G.8; Dec 1990 - 1995, Tables C.1, C.2, C.8; Dec 1996, Tables C.1, C.2, C.7). Loans were calculated as total assets less cash and bank deposits for all NBF corporations. This included permanent building societies, credit co-operatives, authorised money market dealers, money market corporations, pastoral finance companies, finance companies, and general financiers. Deposits were calculated as deposits held with permanent building societies and credit co-operatives as only these two NBF corporations accept deposits. Following the method applied for banking, monthly data was used to obtain yearly averages for the period 1986/87-1993/94. The yearly averages for nominal deposits and loans were deflated by the change in the

IPD (GDP(E)) (ABS 1995c, Table 61) to give estimates of real changes. The results are presented in Table II.5.

Table II.5:

Change in Selected NBF Variables for Australia between 1986/87 and 1993/94

Variable	Total Change (%)	Average Annual Change (%)
1. Real loans	-20.42	-2.55
2. Real deposits	-33.65	-4.21
3. Real deposits plus real loans	-22.96	-2.87

Table II.5 suggests that there has been a large contraction in the NBF sector over the period 1986/87-1993/94. Specifically, the sum of real loans and deposits has decreased by 22.96 per cent, or 2.87 per cent per annum. These results seem quite plausible. While the change in real bank loans and deposits indicated large growth, it was matched by a large contraction in the NBF sector. Thus, it seems that while financial deregulation allowed the bank sector to expand rapidly it came at the expense of the NBF sector. This was, of course, one of the objectives of financial deregulation - to allow traditional lenders such as banks, who were subject to extensive qualitative and quantitative lending controls, to compete on a more equal footing with the non-traditional lenders *ie*, building societies, credit unions *etc*, who were subject to very little in the way of lending controls. This is further evidenced by the observation that since financial deregulation many NBF corporations have either (i) been absorbed by banks, (ii) converted to being banks, or (iii) simply shutdown altogether.

II.3.3 Real Output for Total Financial Services

To place the above estimates in the context of all financial services it is interesting to derive an estimate for total financial services for the period 1986/87-1993/94. Further, such an estimate can be used for the purpose of comparison with the ABS's new estimates of the change in real output for *Finance (ANZSIC 73).* Such an estimate can be derived by adding the value of real loans and deposits for both the banking and non-bank sectors. This exercise produces an estimate of real output for the whole financial services industry of 44.20 per cent, or 5.53 per cent, per annum between 1986/87 and 1993/94. This compares well with the ABS's new estimate of the change in real output over this same period for *Finance (ANZSIC 73) ie*, 33.65 per cent

for the whole period and 4.21 per cent per annum. This is not surprising given that the two methods use the same basic output proxy *ie*, movements in real deposits and real loans. With the only difference being that the ABS's method also measures changes in explicit charges. The difference between the two estimates is most probably entirely due to this distinction. In conclusion, the disaggregated estimates of the banking and NBF sectors indicate a general shift in consumer preference of away from the NBF sector and towards the banking sector. This is not inconsistent with the observation that since financial deregulation many NBF corporations have either (i) been absorbed by banks, (ii) converted to being banks, or (iii) simply shutdown altogether.

III The Education Services Industry

III.1 Education Output and its Measurement by the ABS

Education services are measured by the ABS within *Education (ANZSIC 84)* in the national accounts. This industry comprises all units mainly engaged in providing education. This includes:

- preschool education;
- primary education;
- secondary education;
- special school education;
- higher education;
- technical and further education (TAFE); and
- other education (ABS 1996d, Appendix 2, para 28).

The output of these units can be regarded as providing an education service in the form of a formal qualification.

III.1.1 Nominal Output and Input-Output Estimates

The ABS's output estimation method both for nominal output and in the IO tables consists of three components.

1. The first is production of goods and services by general government units, which represents the sum of intermediate inputs; wages, salaries and supplements; and indirect taxes (by ABS convention, general government gross operating surplus equals consumption of fixed capital *ie*, depreciation).

2. The second is production by trading enterprises which represents revenue from services provided. These estimates are derived using either data on

inputs (*eg*, wages, salaries and supplements) or business income from taxation statistics supplied by the Australian Taxation Office.

3. The last is production by the producers of private non-profit services to households, such as schools, which is measured as the sum of intermediate inputs; wages, salaries and supplements; and indirect taxes. By ABS convention, there is no operating surplus.

These estimates are based mainly on public accounts (ABS 1996d, Chapter 19, para 19.100). This estimation method is a hybrid of (i) the nominal cost of inputs; and (ii) the value of sales. The ABS's estimate of the change in nominal output for *education* between 1986/87 and 1993/94 is 68.07 per cent (ABS 1996c, Table 22, p.29).

III.1.2 Real Output

The ABS measures annual changes in real output by extrapolating base year gross product by the sum of

- deflated estimates of wages, salaries and supplements; and
- constant price estimates of consumption of fixed capital *ie*, depreciation.

Quarterly changes in real output are derived by interpolating the annual estimates with estimates of hours worked (ABS 1996d, Chapter 18, Table 18.14). These are derived by multiplying average hours worked by employment data. Employment estimates are derived from the numbers of employees and the numbers of non-wage and salary earners published by the ABS (ABS 1996d, Chapter 18, Table 18.11).

As this paper is concerned with annual changes in real output it is this estimation method which is relevant here. This measure is essentially the sum of the real wage bill (deflated estimates of wages, salaries and supplements) and the real capital bill (constant price estimates of consumption of fixed capital). Thus, it basically measures the real value of inputs into the education industry and, as such, it does not necessarily reflect changes in real output. Further, it does not allow for any improvements in factor productivity *ie*, it implicitly assumes total factor productivity (TFP) growth is zero.

Consequently this output measure cannot reflect the impact on real output of the adoption of more capital intensive technology (*eg*, the introduction of the use of computers in education services), of increased labour productivity (*eg*, increased teaching loads) or increased capital productivity (*eg*, reducing excess capacity of physical capital such as buildings by increasing enrolments). This suggests the need for an estimation method that more accurately reflects these types of changes which are likely to significantly impact on real output. The ABS's estimate

of the change in real output over this period for *Education (ANZSIC 84)* is 30.67 per cent (ABS 1996f, Table 1.3, p.6).

III.1.3 What is the ABS doing in the Future [18]

The ABS recognises that it is inappropriate to try and measure output using an inputs based measure (Johnson & O'Dea 1996) for the reasons discussed above. They recognise that this is also an issue for other service industries *eg*, *Government Administration and Defence (ANZSIC M)*. For this reason the ABS is undertaking a series of ongoing projects with the aim of improving the output measurement of the non-market service sector in the national accounts. In the case of education services, this project is still in the research and experimental stage. The ideas presented in this section are subject to experimentation and testing by the ABS. Further, the ABS is consulting with users of the national accounts in order to ensure they are involved in this experimentation and testing process. This project is scheduled to finish by July 1998[19].

With respect to education services, the ABS believes student enrolments is a good direct output measure for pre-schools, primary/secondary schools, and undergraduate courses provided by universities. There is also the issue of how best to measure the research output of universities. Clearly student enrolments have no role to play here. The number of publications may be a good proxy for this university function and the ABS is considering their use in this context. Further, it is widely believed that student enrolments for the TAFE sector are unreliable. This stems from the large number of part time students in this sector and also the varied length of courses. The ABS believes it can circumvent this problem by using `module hours' here instead of enrolments[20]. However, in order to make such a measure more credible and reliable there are a number of other issues that need to be addressed as well.

III.1.3.1 Weighted Enrolments

The ABS is also considering applying different weights for different levels of education and also for different courses at university. These weights would be based upon differences in expenditure per student. Thus the relative costs of (pre-, primary and secondary) school, university, and TAFE education, would be used to weight the different primary output

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[18] This section is partly based on discussions with Shiji Zhao from the ABS.

[19] The ABS welcomes any comments and suggestions on the measurement of educational productivity and any inquiries can be directed to the principal investigator, Shiji Zhao, ABS, Canberra.

[20] Modules (also known as subjects) make up TAFE courses. These can range from a single day to one semester (National Centre for Vocational Education Research Ltd website). They effectively measure student contact hours.

proxies (*ie*, enrolments for schools and university, and student contact hours for TAFE) for each sector. Within the university sector the relative differences in the cost of educating different students could also be used students undertaking different courses. For instance, the cost of educating a medical student is greater than educating an arts student. Thus, medical students would receive a greater weight. The same is true for graduate students versus undergraduate students as graduates usually cost more.

III.1.3.2 Quality

The ABS feels it is reasonable to assume that quality is likely to change in the long term. This is a sensible assumption. Consequently, it seems necessary to make some adjustment for changes in the quality of output over time. There is much anecdotal evidence that quality at the primary, secondary and university levels of education has decreased by varying degrees in the last 10 to 15 years. Addressing the problem of quality is an important issue for the ABS. International experience is a case in point. Recent attempts by some countries to switch to an education output measure based on enrolments were unable to be implemented due to concerns from clients that these numbers were not properly adjusted for quality.

The ABS has cited examination results and/or student retention rates as possible adjustors for quality. The assumption here is that there is a positive relationship between exam results and retention rates on the one hand, and quality on the other. The critical issue here is whether the education services are compulsory or not. For instance, all of primary and most of secondary education is compulsory in Australia. In this case retention rates are irrelevant as there is no volition in the decision by the student to remain at school - it is required by law. Exam results are more appropriate in this scenario. However, this requires an independent and standard examination between schools in different States. This is not the case in Australia and the ABS recognises this.

In the case of universities and TAFE there is volition for the student whether he attends or not. Here, *a priori*, it seems reasonable to argue that low retention rates are probably a good indicator of low quality and vice versa, in the Australian context. However, this depends on why retention rates have increased or decreased. If retention rates increase because standards are being lowered and it is becoming easier for students to pass, then there is an inverse relationship between retention rates and quality. Conversely, if retention rates are falling due to poorer teaching then there is a positive relationship between retention rates and quality. Clearly more information is needed besides just what is happening to retention rates. A similar problem exists with exam results. Exam results, it can be (strongly) argued, are endogenous to the quality of the student intake. That is, it is unlikely that the distribution of exam results of a first year economics

course at a highly regarded university is much different from the distribution at a less well regarded university - even though the student intake at the highly regarded university is most probably of much higher standard than the intake at the less well regarded university. This is because standards are (usually) not independent of the quality of students. Whereas, if exam results were based on an independent and standard test then a clear positive relationship would probably hold. Thus, any use of exam results as an adjustor for quality should be approached with this point in mind.

Despite these concerns, the ABS prefers the use of exam results over retention rates as an adjustor for quality. The ABS recognises that using exam results for quality adjustment is very difficult in the Australian context. Mainly because exam results are not comparable across different States and Territories and also over time (Johnson & O'Dea 1996). But in an effort to avoid a repeat of the Swedish experience the ABS feels that there has to be some adjustment to enrolments for quality in order to deflect criticism of taking a `narrow view' of the output of the education sector.

One other, possibly more reliable, adjustor for quality, at all levels of education, is the ratio of students to staff per class. For pre-school, primary and secondary education this is just the mean class size. At the higher education level the relevant proxy is the mean class size of `tutorials'[21]. At the TAFE level there is a range of different teaching methods employed. The relevant proxy here is tutorial sizes where these are employed, and normal class sizes where these are not. It seems clear that increasing class sizes (at the pre-tertiary level) and increasing tutorial sizes (at the post-secondary level) indicate a reduced ability to teach per student - less time can be spent by the teacher per student per class. That is, lower quality teaching. This argument also seems to hold in reverse. As a result, this proxy does not require any additional information as is the case with retention rates and exam results and thus seems like a more reliable indicator of quality.

III.1.3.3 Non-Conventional Inputs

Inclusion of non-labour and non-capital inputs into the production function is also being considered by the ABS. These refer to non-conventional inputs such as community inputs and influence, peer group influence and family inputs. All these have been identified as important inputs in the economics of education literature (see Hanushek 1986; Lau

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[21] At university two types of teaching take place. Lectures and tutorials. The main difference between the two being that in lectures only one way communication occurs. Whereas in tutorials, students are expected to participate and the communication is two way. Larger lecture class sizes are therefore possible with no change in the ability to teach. This is not true for tutorial settings.

1979). The ABS is unsure to what extent it will be able to incorporate these types of non-conventional inputs into the production function, if at all, but it is exploring this as an option.

III.1.3.4 Non-Educational Outputs

Lastly, anecdotal evidence suggests that around only 60 per cent of resources used by schools is spent on education output. The balance being expended on other objectives. Thus the ABS is considering incorporating major non-learning outputs into the production function for education in order to capture these non-educational (social) activities. These non-learning outputs could be used either as independent output variables or as adjustors for quality of output (see Hanushek 1986; Lau 1979).

Due to data and methodological problems, the ABS concedes that in the final analysis it may not be able to do much more than use expenditure-weighted student enrolments, with no adjustment for quality or other factors, as a proxy for changes in real output of education services.

III.2 Alternative Measures of Education Output

Burke (1986) identifies `consequential' output, such as the impact of prolonged schooling on cognitive learning; on skills; on attitudes; on employability; and on lifetime earnings, as the first best way of measuring real education output. Given the lack of data on these outputs a `secondary' or `direct output' objective of education is participation. Participation has been used as one of a number of output proxies in studies attempting to estimate the efficiency and productivity of education services (see Bonesrønning & Rattsø 1994; Färe *et al* 1997; Heshmati 1997; Heshmati & Kumbhakar 1997). Data on this objective is readily available. It is this measure of education output which will be used in this paper.

In considering an appropriate student proxy two immediately come to mind. Namely, the number of students enrolled or the number of students graduating. As a service is provided to *all* students whether they graduate or not, a more accurate measure of output would be the number of students enrolled.

Using student enrolments as a proxy for estimating real output will not allow for any change in quality of the services provided over time. For instance, where student enrolments have increased due to increasing class sizes, productivity will be judged to have improved. However, in this example the quality of teaching has most probably fallen. Section III.1.3.2 discussed how the ABS is exploring the possibility of adjusting for quality using data on test scores and retention rates, and how both of these proxies have limitations with respect to their use as quality adjustors. This is one reason why this study will not attempt to adjust for changes in quality.

Another is that this study is only intended as good first approximation of the change in real output for education based upon a direct output indicator*ie*, weighted student enrolments. Despite this, the absence of an adjustor for quality should be borne in mind when interpreting the estimates presented here.

Section III.1.3 discussed the use of publications as an output proxy for the research output of universities. This data is collected by the Australian Vice-Chancellors' Committee (AVCC). The AVCC has been collecting this data from 1992 onwards. As this study is concerned with estimating real output between 1986/87 and 1993/94 it is not possible to estimate the research output of universities using the data collected by the AVCC.

Data on student numbers at the primary, secondary, special, higher and TAFE levels of education was obtained from ABS publications (see ABS 1987b; 1988b; 1989; 1990b; 1991; 1992b; 1992c; 1993b; 1994c; 1995b; 1996e). This data was for calendar years. As an estimate for the change in real output is required in financial years (*ie*, 1986/87-1993/94) the data was converted to financial years in the following way. For the financial year 1986/87 total enrolments was defined as the average total enrolments for the years 1986 and 1987. For the financial year 1987/88 total enrolments was defined as the average total enrolments for the years 1987 and 1988, and so on.

III.3 Estimating the Change in Real Output for Education Services between 1986/87 and 1993/94

III.3.1 The Data

Table III.1 lists the change in student enrolments for the School (defined here as the sum of the primary, secondary and special education sectors), Higher Education (defined here as universities) and TAFE sectors, between 1986/87 and 1993/94. It also lists the share of enrolments of each sector in total enrolments (*ie*, the sum of School, Higher Education and TAFE enrolments) in 1986/87.

III.3.1.1 Schools

Table III.1 indicates that student enrolments in Schools grew by only 3.19 per cent between 1986/87 and 1993/94. It would be expected that student enrolments in this sector would be influenced by a number of factors. Population growth should be a major determining factor on enrolments for this sector due to the fact that all children must (legally) attend school until the age of 16. In practical terms, this means that all

children must complete primary school (all grades) and secondary school up to Year 10 (fourth grade).

In the period 1986/87-1993/94 Australia's population grew by 11.36 per cent (ABS 1997b, Table 2). During this period there was a deliberate government policy to increase retention rates beyond the fourth grade of secondary school with a view towards decreasing the amount of teenagers registered as unemployed. This was quite successful with apparent retention rates of secondary school students to Year 12 rising from 48.7 per cent in 1986 to 74.6 per cent in 1994 (ABS 1991, Table 14; ABS 1994c, Table 16). This would be expected to increase the growth of student enrolments in this sector above what growth would have been in the absence of such a policy. The fact that student enrolments in the School sector grew at about one-third of the rate of population growth indicates that other factors influenced the rate of growth of this sector.

One factor may have been the age profile of Australia's large immigration intakes during this period. Immigrants over the age of 16 are not legally obliged to attend school and therefore would not contribute to the growth of this sector but would contribute to the growth in population. Also the ageing of Australia's population would be expected to reduce the rate of growth of student enrolments in this sector below the rate of growth of the population over this time period, by adding to the growth in the population and making no contribution to the growth of the School sector.

Table III.1:

Student Enrolments and Shares in Total Enrolments for the Schools, Higher Education and TAFE Sectors

Sector	Change in Enrolments between 1986/87 and 1993/94 (%)	Share of Total Enrolments*
1. *School*	3.19	0.6973
2. *Higher Education*	48.19	0.0910
3. *TAFE*	23.52	0.2117

* Total enrolments is the sum of enrolments for schools, higher education and TAFE for 1986/87.

Sources: ABS 1987b, Table 1; ABS 1988b, Table 1; ABS 1989, Table 1; ABS 1990b, Table 1; ABS 1991, Table 1; ABS 1992b, Table 1; ABS 1992c, Table A1.7; ABS 1993b, Table 1; ABS 1994c, Table 1; ABS 1995b, Table 1; ABS 1996e, Tables 5.7, 5.22, A5.10, A5.11, A5.22, A5.24.

It seems that despite government policy to increase retention rates to Year 12, the combined effects of the ageing of the population and the age profile of the immigration intake has been to lower growth of the School sector to around one-third of the rate of growth of the population over the same period.

III.3.1.2 Higher Education and TAFE

By contrast, the Higher Education and TAFE sectors have grown at much higher rates than the School sector *ie*, 48.19 and 23.52 per cent respectively, versus 3.19 per cent. A number of factors has probably influenced this high relative growth. The already discussed government policy of increasing retention rates to Year 12 would have the effect of increasing the proportion of secondary students who qualify for entry into the Higher Education sector. Secondly, the high relative growth, since the mid-1980s, of (Commonwealth) government spending on Higher Education and TAFE places would have had the effect of increasing access into these sectors. Lastly, the business cycle also affects the proportion of the labour force who undertake training as opposed to employment. When the business cycle is in a boom phase employment is usually high and training is usually low. The reverse is true in a bust phase. Low employment growth since the beginning of the 1990s has probably pushed a greater proportion of the work force into training (such as Higher Education and TAFE) and out of employment.

III.3.2 Results

The education sector is measured separately in the IO tables within *Education (IOCC 8401).* It is this IO commodity group for which an estimate of the change in real output is required over the period 1986/87-1993/94.

This commodity group currently includes two items

- school, post-school and educational services nec; and
- general government consumption of fixed capital (ABS 1996a, Table 1, p.18).

The first item relates to current production of the whole education sector. This will be re-estimated using the combined change in student enrolments in the School, Higher Education and TAFE sectors. The second item is a measure of depreciation of government capital used in the provision of education services. This is a measure of the costs of providing education services and thus it does not relate to real output directly. Consequently, it will be ignored in the re-estimation.

The change in real output will be calculated using the data presented in Table III.1. An important issue with respect to this calculation is the additivity of student enrolments for the three sectors. Should a student enrolled in the School sector be given the same weight, in terms of estimating the change in real output for this item, as a student enrolled in the Higher Education sector? There may be justification for differential weights if the cost per student in different sectors is also highly differential. To check whether this is the case data on total expenditure for each sector in a given year is required.

Data on final consumption expenditure for education by all governments (*ie*, Commonwealth, State and Local), and by the private sector, on all levels of education was obtained from various ABS publications (see ABS 1988a; 1992a; 1994b; and 1995a). The cost per student per sector in 1986/87 and 1993/94 was calculated by dividing total expenditures by student enrolments in each sector in these years. These dollar costs were subsequently converted to relative costs per sector. This was done by choosing the School sector as the numeraire (equal to one) and the relative costs for the Higher Education and TAFE sectors were calculated accordingly. These relative costs are presented in Table III.2.

The relative costs in Table III.2 suggest that the higher education sector is between 1.5 to two times as expensive as the School sector. This is probably explained by two factors. Firstly, the cost of labour in the Higher

Table III.2:

Relative Costs Per Student Per Sector for 1986/87 and 1993/94

Sector	1. 1986/87	2. 1993/94	3. Average
1. Schools	1.0	1.0	1.0
2. Higher Education	1.9471	1.5797	1.7634
3. TAFE	0.4421	0.4620	0.4521

Education sector is much greater than for the School sector. University lecturers are paid a premium for the high level of their qualifications *eg*, Masters and Doctor of Philosophy degrees, relative to primary and high school teachers who usually only have an undergraduate degree plus a postgraduate teaching diploma. Secondly, the Higher Education sector contains a significant proportion of non-teaching staff *ie*, researchers,

whereas the proportion of non-teaching staff in the schools sector *ie*, administrators, is much smaller[22].

Table III.2 also suggests that the TAFE sector is half as expensive as the School sector. The cost of labour (and capital) is roughly equal in these two sectors. But around 85 per cent of TAFE students are part time (Burke 1996) and this underestimates the cost per TAFE student to around half that of the School sector, which only had full time students over this period. It is possible to adjust the TAFE student numbers to account for this phenomenon. It will be assumed that the average part time TAFE student takes on half the number of course subjects of a full time TAFE student. Thus 85 per cent of total TAFE enrolments will be given a weight of a half while the balance will be given a weight of one. The results of these adjustments are presented in Table III.3.

Table III.3:

Relative Costs Per Student Per Sector for 1986/87 and 1993/94, with TAFE Enrolments Adjusted for Part Time Students

Sector	1. 1986/87	2. 1993/94	3. Average
1. Schools	1.0	1.0	1.0
2. Higher Education	1.9471	1.5797	1.7634
3. TAFE	0.7689	0.8035	0.7862

Table III.3 indicates that adjusting for the high proportion of part time students in the TAFE sector increases the relative cost per TAFE student to the point where it approaches the relative cost per School student. This result is more in line with what is expected about the relative costs per student of these two sectors.

The concerns expressed above regarding the high proportion of part time students in the TAFE sector and how this distorts enrolments extends to their use as an output indicator (Burke 1996). For this reason `module hours' will be used instead, as it is believed that these data are more reliable in indicating the movements in students over time. Total annual module hours for TAFE courses between 1986 and 1994 were obtained from the National Centre for Vocational Education Research Ltd. As per the

[22] As a general rule, almost all academic university staff are required to spend approximately half of their working hours doing research. However, this condition is not strictly enforced and/or is adhered to in varying degrees at different universities. Thus, it is not possible to adjust the data on the cost per student for the Higher Education sector to account for this fact, with any degree of confidence.

convention for student enrolments, module hours for the financial year 1986/87 is calculated as the average total module hours for the years 1986 and 1987. For the financial year 1987/88 total module hours is calculated as the average total module hours for the years 1987 and 1988, and so on. Using this methodology the change in module hours between 1986/87 and 1993/94 is 29.98 per cent. This compares to the change in TAFE student enrolments over the same period of 23.52 per cent. Using module hours as an output proxy for the TAFE sector indicates slightly higher growth than using enrolments.

The marked difference in costs per student between the three sectors presents a strong case for using the relative costs per student as fixed weights for the change in student numbers in each sector. As fixed weights are required, the average of the weights for 1986/87 and 1993/94 will be used. The weights to be used are those listed in Table III.3, column 3. Table III.4 presents an estimate of the change in real output using these average fixed weights. These weights are applied to the actual number of students in 1986/87. For 1993/94 the weights are applied to the actual number of students for the School and Higher Education sectors. Whereas for the TAFE sector the number of students is extrapolated from 1986/87 by the change in module hours over this time period *ie*, 29.98 per cent. Once this is done, the weights are then applied to give *weighted students*. The change in the total number of weighted students between 1986/87 and 1993/94 gives an estimate of the change in real output for this period of 14.59 per cent. This is equivalent to annual average growth of 1.82 per cent. This estimate is only slightly higher than the change in total student numbers over this period *ie*, 11.59 per cent, which is presented in brackets in Table III.4, column 1, row 9. Despite this, the former number has two important advantages. One, it takes account of the differences in relative costs between the three sectors and two, it uses a more reliable output proxy for theTAFE sector *ie*, module hours versus student enrolments. Thus it is more theoretically sound.

The ABS's estimate of the change in real output over this period for *Education (ANZSIC 84)* is 30.67 per cent (ABS 1996f, Table 1.3, p.6). That is, annual average growth of 3.83 per cent. The estimate presented above suggests that real output has increased by around half this amount (*ie*, 14.59 per cent). Are these two estimates directly comparable? A more insightful

Table III.4:

Two Estimates of the Change in Real Output for *Education (IOCC 8401)*

Sector	1. Students^	2. Weights*	3. Weighted Students
	19867/87		
1. Schools	3,003,136	1.0	3,003,136
2. Higher Education	391,734	1.7634	690,781
3. TAFE	911,927	0.7862	716,963
4. Total	4,306,797	na	4,410,880
	1993/94		
5. Schools	3,098,878	1.0	3,098,878
6. Higher Education	580,507	1.7634	1,023,661
7. TAFE	1,185,351 (1,126,454)#	0.7862	931,931
8. Total	4,864,735 (4,805,838)#	na	5,054,469
9. Per Cent Change	**12.95 (11.59)#**	na	**14.59**

^ These numbers are taken from the ABS publications listed under *Sources* in Table III.1, row 4.

* These are the weights listed in Table III.2, column 4.

The bracketed numbers are the actual number of TAFE students in 1993/94 (row 7), the total number of students in 1993/94 using the actual number of TAFE students in that year (row 8), and the per cent change in students between 1986/87 and 1993/94 using the actual number of TAFE students in 1993/94 (row 9).

way of interpreting these two sets of numbers is to remember that the ABS number is, in effect, a measure of the change in real inputs. Whereas the smaller number is an (imperfect) measure of output. Thus, on the face of it seems that TFP has fallen by around 16 per cent. This seems a more useful way to compare these two estimates. However, it is appropriate to ask whether quality has remained constant during this period.

There is much anecdotal evidence that the quality of teaching has fallen in the School and Higher Education sectors over the period 1986/87-1993/94. Johnson & O'Dea (1996) present data on mean class size and the student-teaching staff ratio for government primary education in Victoria over this period. They show that mean class size has increased by around four per cent and the student-teaching staff ratio has increased by around six

per cent. If the premise that the average quality of all sectors has fallen is accepted, how would the estimate presented here for real output be affected?

If quality is lower then the amount of education service delivered is also smaller. In this scenario the estimate of the change in real output would be revised downwards. Starting from the benign premise that there has been no change in quality, would imply that, at the very least, TFP has fallen by around 16 per cent. Assuming a conservative 10 per cent average reduction in quality across all sectors, the change in real output is revised down to 4.59 per cent[23]. This suggests that TFP has fallen by around 26 per cent.

Taking an overly optimistic view, what level of average quality improvement is required in order for there to be no change in productivity over this period? A 16.08 per cent *increase* in average quality will satisfy this constraint. That is, average quality would have to improve equal to the estimated reduction in TFP in order to reduce the difference between the change in outputs and inputs to zero. A 16 per cent improvement in quality seems unrealistic as it is unlikely that any observers would support the notion that average quality has increased at all. Nor is there any evidence of quality improvements in any sectors. Consequently, it can be strongly argued that, as a minimum, productivity has fallen by 16 per cent. Assuming a pessimistic 10 per cent reduction in average quality across all sectors indicates an upper limit of the fall in productivity of around 26 per cent. It is likely that the true change in productivity over this period lies somewhere between these two bounds. Further, this sensitivity analysis suggests that real output over this period has grown by between 4.59 and 14.59 per cent.

Given the discussion above it seems clear that the estimate presented in this paper is based on much sounder theoretical principles than those currently employed by the ABS, in the context of measuring real output. The proxy that has been used here is *directly* related to the output of the education industry *ie,* the number of students enrolled in educational institutions, and adjusts for differences in relative costs between sectors. Whereas the ABS uses a proxy which only attempts to measure the inputs into the provision of education services *ie*, the sum of the real wage bill and capital bill. Consequently, this estimate should prove important in estimating changes in technology and consumer preferences in Australia since the mid-1980s for the education industry.

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[23] This assumes a 10 per cent reduction in quality leads to an equal 10 per cent reduction in real output.

IV The Communication Services Industry

IV.1 How the ABS Measures the Output of the Communication Industry

Communication services are measured by the ABS within *Communication Services (ANZSIC 71)* in the national accounts. This division includes all units mainly engaged in providing

- postal;
- courier; and
- telecommunication services (ABS 1996d, Appendix 2, para 22).

IV.1.1 Nominal Output

Nominal output for these units is defined as equal to the value of sales by all units listed above. Thus, there is no difference between this definition and that used to estimate nominal output for trading enterprises. The ABS's estimate of the change in nominal output for communication services between 1986/87 and 1993/94 is 95.14 per cent (ABS 1996c, Table 22, p.29).

VI.1.2 Input-Output Tables

The ABS's equivalent IO industry for communication is its *Communication Services (IOCC 7101).* This commodity group includes Australia Post, Telstra and, since 1992, private sector companies. The ABS's estimate of output is based on the published accounts of, and unpublished information made available by, these enterprises. The output of this industry consists of

- postal, telegraph, telephone and telex revenue;
- commission earned on agency services (such as conduct of savings bank agencies);
- technical services provided to national broadcasting and television stations;
- international communication services and telecommunications satellites; and
- the coastal radio services (ABS 1996d, Chapter 19, para 19.95).

IV.1.3 Real Output

Annual constant price estimates of gross product for *Communication Services (ANZSIC 71)* is derived by aggregating the quarterly constant price estimates. The quarterly estimates are derived from the sum of constant price revenues of OPTUS, Australia Post and Telstra. These data are obtained directly from these enterprises as outlined in Appendix 1 (ABS 1996d, Chapter 18, Table 18.10).

Despite communication being a service industry, the ABS defines its real output in much the same way as it does for trading enterprises. This definition combines average prices and units of output (*ie*, the number of paid minutes of telephone service, the number of customers, the amount of equipment sold *etc*, see Appendix 1) to estimate real output. This type of measure is quite satisfactory in attempting to capture changes which are likely to affect real output. This includes the adoption of more capital intensive technology (*eg*, the widespread adoption of computers), of increased labour productivity (*eg*, labour shedding) or increased capital productivity (*eg*, the increased use of computerised billing services). Thus, this definition and the estimate that it provides seems acceptable for the purpose of estimating changes in technology and consumer preferences between 1986/87 and 1993/94.

The ABS's estimate of the change in real output over this period for *Communication Services (ANZSIC 71)* is 84.04 per cent (ABS 1996f, Table 1.4, p.7). That is, annual average growth of 10.51 per cent. This estimate is consistent with the large growth in telecommunication services and products that has been observed over this period *ie*, mobile phones, fax machines, demand for internet services, and the entry of new players into the market since deregulation.

V Re-estimating the Change in Real GDP Between 1986/87 and 1993/94

In Sections I to III the change in real output for the insurance, financial services (*ie*, banking and NBF) and education sectors have been re-estimated for the period 1986/87-1993/94. All these estimates differ from the ABS's own estimates of the change in real output for each of these industries over the same period. How should the ABS's estimate of the change in real output for GDP over this period be revised given these different estimates in insurance, financial services and education?

Data was gathered on GDP at constant prices by industry (see ABS 1996f, Table 1.3, pp.5-6). Gross output for the insurance, financial services and education sectors was reworked for 1993/94 using the estimates derived in Sections I-III[24]. The reworked change in real GDP between 1986/87 and 1993/94 was 25.27 per cent. The ABS's estimate of the change in real GDP

[24] Insurance and financial services are included together under Finance and Insurance (ANZSIC K). Thus, the change in real output for this division was calculated as the respective changes in real output estimated for insurance (Section I) and financial services (Section II), multiplied by their respective average shares in constant price gross product for Finance and Insurance (ANZSIC K), for the years 1986/87 and 1993/94 ie, 55.38 per cent. These shares were calculated using unpublished data supplied by the ABS.

over this period is 23.30 per cent[25]. The difference between these two estimates is 1.97 per cent. In terms of annual growth the reworked estimate suggests the ABS has under-estimated the change in real GDP by 0.25 per cent per annum. These estimates further underline the need to ensure that the methods employed to estimate sectoral changes in real output are based on sound theoretical principles that capture the effects of changes in factor intensities and factor productivity upon real output.

VI Conclusion

This paper examines the change in real output of four major service industries *ie*, insurance, financial services, education and communication, over the period 1986/87-1993/94. It re-estimates the change in real output for three of these industries and examines the impact this has on estimated real GDP over this period. A number of different proxies have been used to this end, both within and between the different industries. In the case of insurance and financial services, the reworked estimates suggest much higher growth than previously thought and are much more plausible than ABS's pre-June, 1997 estimates. The reworked estimate for education services suggests that this sector has not grown as quickly as the ABS's estimates suggest. The ABS's estimation method for real output in communication services is considered appropriate and is, therefore, left unchanged.

[25] This is the change in real GDP before the implementation of the new methods for estimating real output for Finance and Insurance (ANZSIC K).

Appendix 1

This appendix outlines how the ABS compiles the data for estimating constant price output for *Communication Services (ANZSIC 71)*. Output is equal to the sum of constant price revenues of OPTUS, Australia Post and Telstra. These are defined below.

Output of OPTUS - Domestic and International

Telephone call revenue. The number of paid minutes of telephone service is multiplied by the base year unit price.

Telephone rental revenue. The number of customers is multiplied by the base year unit price.

Equipment sales. The amount of equipment sold is multiplied by the base year unit price.

Leased services and other income. Current price values are deflated by the implicit price deflator for domestic final demand.

Output of Australia Post

Domestic mail revenue. Base year revenue is extrapolated by the number of articles handled.

Overseas mail revenue. Base year revenue is extrapolated by the sum of the number of articles posted in Australia for places abroad and the number of articles received from abroad.

Postal money order revenue. Base year revenue is extrapolated by the number of postal money orders issued.

Revenue from agency services. Current price values are deflated by a Commonwealth wages and salaries index.

Other Australia Post revenue. Current price values are deflated by the implicitprice deflator of all the above Australia Post items combined.

Output of Telecom Australia - Domestic

Telephone rental revenue. Base year revenue is extrapolated by the number of telephones in service.

Telephone call revenue. Current price values are deflated by a consumer price index telephone calls price index.

Telephone connection revenue. Base year revenue is extrapolated by the number of telephone connections.

Other domestic revenue. Current price values are deflated by the implicitprice deflator of all the above Telecom items combined.

Output of Telecom Australia - International

Telephone call revenue. Base year revenue is extrapolated by the number of paid minutes.

Leased and other services revenue. Current price values are deflated by the implicit price deflator of telephone calls (ABS 1996d, Chapter 18, Table 18.10).

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