CENTRE of POLICY STUDIES and the IMPACT PROJECT

Eleventh Floor
Menzies Building
Monash University Wellington Road
CLAYTON Vic 3168 AUSTRALIA

Telephone:
(03) 9905 2398, (03) 9905 5112 from overseas: 61 3 9905 5112

Fax numbers:
(03) 9905 2426, (03) 61 3 9905 2426 or from overseas: 61 3 9905 5486

e-mail impact@vaxc.cc.monash.edu.au

Measuring Output of Government Administration, Defence, and Property and Business Services: Some Estimates for Australia

by

George VERIKIOS

Centre of Policy Studies
Monash University

General Paper No. G-127 January 1998

ISSN 1 031 9034 ISBN 0 7326 0750 7

The Centre of Policy Studies (COPS) is a research centre at Monash University devoted to quantitative analysis of issues relevant to Australian economic policy. The Impact Project is a cooperative venture between the Australian Federal Government, Monash University and La Trobe University. COPS and Impact are operating as a single unit at Monash University with the task of constructing a new economy-wide policy model to be known as *MONASH*. This initiative is supported by the Industry Commission on behalf of the Commonwealth Government, and by several other sponsors. The views expressed herein do not necessarily represent those of any sponsor or government.

ABSTRACT

This paper examines the current national accounts measure of real output for three major service industries in Australia. It finds that real output measures for government administration services; defence services; and property and business services are unsatisfactory. Alternative estimates are presented for government administration services and defence services for the period 1986/87-1993/94. The estimates for government administration services compare well with the current national accounts measure, whereas for defence services they indicate that real output has grown less quickly than previously thought. No estimates for property and business services are presented due to lack of data.

Keywords: government administration services, defence services, property and business services, service industries, real output measures for service industries, input-output industries.

J.E.L. Classification numbers: H50, H56, L80, L84

CONTENTS

Tables

Measuring Output of Government Administration, Defence, and Property and Business Services: Some Estimates for Australia

by

George VERIKIOS[1]

Centre of Policy Studies, Monash University

Introduction

This paper is concerned with measuring the output of three major service industries in Australia. These are (i) government administration services, (ii) defence services; and (iii) property and business services. Collectively these industries comprise 21.42 per cent of gross domestic product (GDP) in 1996/97[2]. This study is a continuation of a project to provide measures of output at a detailed industry level for the Australian economy (see Verikios 1997). 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 two major sections. Section I examines government administration and defence services, while Section II looks at property and business services. Each section follows a similar pattern by (i) describing the ABS approach to measuring nominal and real output for each industry; (ii) describing alternative methods of estimating the real output for each industry; (iii) discussing published and unpublished data on each industry; and (iv) implementing the alternative methodologies and, where possible, re-estimating the change in real output for each industry over the period 1986/87-1993/94.

[1] The author thanks Peter Dixon, Daina McDonald, Shiji Zhao and Don Fisk for helpful comments and advice. Also the Australian Bureau of Statistics (ABS) for making available unpublished data.

[2] This is the sum of the value of GDP at average 1989/90 prices for the national accounts divisions *Property and Business Services (Australian and New Zealand Standard Industry Classification (ANZSIC) L)*, and *Government Administration and Defence (ANZSIC M)* (ABS 1997c, Table 56, p.87).

I GOVERNMENT ADMINISTRATION AND DEFENCE SERVICES

I.1 ABS Measurement of Output for Government Administration and Defence Services

The ABS includes *Government Administration and Defence (ANZSIC M)* as a single division in the national accounts. This division is made up of the subdivisions *Government Administration (ANZSIC 81)* and *Defence (ANZSIC 82)* (ABS 1996d, Appendix 2, Table AP2.1). This division includes:

- all Federal, State and Local Government units mainly engaged in government administration and regulatory activities;
- judicial authorities and commissions;
- representatives of overseas governments;
- the Army, Navy and Air Defence forces; and
- civilian units mainly engaged in defence administration[3] (ABS 1996d, Appendix 2, para 26).

I.1.1 Nominal Output

Nominal output (or output at current prices) is a concept which refers to the *value* of output. Government output is, generally, non-marketed. This includes the case of government administration services and defence services. The non-marketability of these services eliminates the possibility of using market prices to measure nominal output. In these instances the national accounting convention is that output be valued as the total cost of providing the services (see System of National Accounts 1993). In the specific case of *Government Administration and Defence (ANZSIC M)* nominal output is derived by adding wages, salaries and supplements to current price estimates of consumption of fixed capital (ABS 1996d, Chapter 4, para 4.28). However, it is ABS convention to completely write off defence equipment at the time of purchase. Thus for the subdivision *Defence (ANZSIC 82)*, nominal output effectively consists only of wages, salaries and supplements. This definition basically measures the sum of the nominal wage bill (wages, salaries and supplements) and the nominal capital bill (current price estimates of consumption of fixed capital) for *Government Administration (ANZSIC 81)*, and the nominal wage bill for *Defence (ANZSIC 82)*. Using this measure of nominal output the ABS estimates that nominal output for *Government*

[3] The subdivision *Defence (ANZSIC 82)* does not include units mainly engaged in manufacturing activities (*eg*, munitions factories), or units mainly engaged in operating educational institutions for the defence forces (ABS 1996b, Appendix 2, para 27).

Administration and Defence (ANZSIC M) has increased 60.91 per cent between 1986/87 and 1993/94 (ABS 1996b, Table 22, p.29).

I.1.2 Input-Output Tables

The equivalent input-output (IO) commodity groups to *Government Administration and Defence (ANZSIC M)* are *Government Administration (IOCC[4] 8101)* and *Defence (IOCC 8201)* (ABS 1997a, Table 1, p.43-4). In the IO tables the output of these industries represents the production of goods and services by general government units included as part of these industries. Output of these industries essentially captures the relevant current final expenditures of general government in addition to revenue from the sales of goods and services (ABS 1996d, Chapter 19, para 19.99). Table I.1 lists the commodity details of these two IO industries as well as the share of each item in the value of total domestic production.

The output of both *Government Administration (IOCC 8101)* and *Defence (IOCC 8201)* is defined as equal to the sum of the value of:

- intermediate inputs (including the imputed bank service charge);
- wages, salaries and supplements;
- general government consumption of fixed capital; and
- indirect taxes (ABS 1996d, Chapter 19, para 19.99).

Table I.1:

IOCC Group and Items for *Government Administration (IOCC 8101)* and *Defence (IOCC 8201)*: Shares in the Value of Domestic Production

Input-Output Group and Items	Share in the Value of Domestic Production, 1993/94
Government Administration (IOCC 8101)	
Federal government administrative services	0.4377
State government administrative services	0.3144
Local government administrative services	0.1530
Judicial services	0.0449
General government consumption of fixed capital	0.0501
Defence (IOCC 8201)	
Defence services	1

Source: ABS (1997a), Table 1, pp.43-4.

[4] Input-output commodity classification.

The second term in the bulleted list is the nominal wage bill and the third term is a measure of depreciation. The first and last terms do not require any explanation. In sum, these terms are a good measure of the *value* of output. This section is primarily concerned with measuring the *quantity* of output for these two IO groups. This issue will be discussed in the next section.

I.1.3 Real Output

Real output (or output at constant prices) is a concept which is concerned with the *quantity* of output. The ABS definition of real output for *Government Administration and Defence (ANZSIC M)* is analogous to its definition of nominal output. That is, real output is derived by revaluing wages, salaries and supplements using fixed-weighted wage rate indexes and adding this to constant price estimates of consumption of fixed capital (ABS 1996d, Chapter 4, para 4.28). The ABS's measure of real output is basically the sum of the real labour bill (revalued wages, salaries and supplements using fixed-weighted wage rate indexes) for *Government Administration (ANZSIC 81)* and *Defence (ANZSIC 82)*, and the real capital bill (constant price estimates of consumption of fixed capital) for *Government Administration (ANZSIC 81)* only[5]. Thus, this definition is a good measure of the quantity of total *inputs* for *Government Administration (ANZSIC 81)* and labour inputs for *Defence (ANZSIC 82).* As such, it cannot be considered a good proxy for real output.

Using inputs as a proxy for measuring real output ensures, for all practical purposes, that little factor productivity growth can be observed (Henderson 1986; Johnson & O'Dea 1996). Changes in factor productivity and capital/labour ratios can significantly affect real output. Changes in real output due to changes in factor productivity and intensity will not be captured by measuring inputs.

There is much anecdotal evidence which suggests that both factor intensities and factor productivity have changed significantly in this division, particularly *Government Administration (ANZSIC 81)*, since the mid-1980s. At the same time there has been substitution of capital for labour *ie*, substitution of the relatively cheap factor for the relatively expensive factor. This is significant in the case of *Government Administration (ANZSIC 81)* as labour costs are the major costs in the provision of these services. Thus it is highly probable that the capital/labour ratio has increased. The capital substituted has most probably been in the form of the increased use of computers, as has occurred in other service sectors. Attempts by governments to improve productivity in these sectors make it necessary to reduce real unit labour costs. This may done by increasing outputs with a less than equivalent increase in labour, or by reducing labour while keeping output constant

[5] It has already been mentioned that it is ABS procedure to fully write off defence equipment at the time of purchase.

(Johnson & O'Dea 1996)[6]. Under these circumstances labour productivity is likely to have improved, most likely through labour shedding, and capital productivity is likely to have stayed constant or decreased due to the increased use of computerised equipment.

These changes in factor intensities and factor productivity are likely to have impacted on real output in significant ways. The current ABS measure of real output cannot, by definition, capture these types of changes, especially with respect to productivity. The ABS estimates that real output for *Government Administration and Defence (ANZSIC M)* has increased by 23.76 per cent between 1986/87 and 1993/94 (ABS 1996e, Table 1.3, p.6).

I.2 Alternative Measures of Real Output for Defence Services

It is important and relevant to identify what service the defence forces (Air Force, Navy and Army) provide. In essence, this sector provides a deterrent effect against countries, groups of countries, or other groups, who may emerge as would be attackers or raiders on Australia. Thus, the *quantity* or size of this deterrent effect depends crucially on the existence and probability of would be attackers. It is not difficult to imagine that would be attackers exist. It is much more difficult to imagine that there is any sort of significant probability of Australia being attacked[7]. If little or no probability of attack exists, then there is little requirement to provide a deterrent against would be attackers[8]. If one was to accept this line of reasoning then it seems that the size of the deterrent effect is small or close to zero. Conversely, if one believed that the probability of an attack was significant then the size of the deterrent effect of the defence forces is also significant. In this scenario the real output of the defence forces is positive and significant.

A further line of argument is that the existence of a well-equipped, albeit small, defence force such as Australia's deters would be attackers by its very existence. In this case it is even more difficult to come to a sensible conclusion regarding output of the defence sector.

---

[6] Johnson & O'Dea (1996) give the example of Victoria which reduced government employment by 20 per cent over three years. It was government policy to maintain or even increase the provision of services while these reduction in employment were occurring. This was to be achieved by adopting more efficient work practices.

[7] Since the turn of the century Australia has been attacked once. This was by the Japanese during World War II.

[8] This does not imply that there are not other reasons why some minimum level defence force is always required. This would include the possibility of a totally unexpected and unforeseen attack and/or overseas deployment in aid of a defence ally. Under this scenario it is difficult to create a significant and capable defence and/or deployment force in quick time from a low or zero level. Thus, some minimum level defence force is always required which allows a quick and significant rearming in a short space of time for these types of circumstances.

Under the type of risk analysis explored above (however limited), the estimated risk of an attack would measure the size of the deterrent effect and thus real output of the defence forces. Given that such risk analysis will not be undertaken here, what other options are there for measuring real output of the defence forces? A number of different output indicators have been used to measure the output of defence services.

The United State's (US) Bureau of Labor Statistics (BLS) has probably undertaken the most extensive output measurement of government provided services anywhere in the world. They employed a `functional' approach to measuring government outputs. This involved classifying all government provided services under 24 different functions. For the fiscal year 1994 defence services were measured under 11 of these 24 functions. Table I.2 lists these 11 functions and a sample of the corresponding output indicators used to measure defence services.

Table I.2:

Functional Categorisation and Output Indicators Used in BLS (1996) to Measure US Defence Services Output

Government Functions	Sample of Output Indicators
1. Audit of operations	Audits completed
2. Buildings, grounds and equipment maintenance	Items repaired
3. Education & training	Student-years trained
4. Finance & accounting	Military pay accounts maintained
5. Information services	Data inquires answered
6. Medical services	Health care units performed at hospitals and clinics*
7. Personnel investigations	Security investigations completed
8. Personnel management	Accessions completed
9. Specialized manufacturing	Total unit production^
10.Supply and inventory control	Receipts/issues processed
11.Transportation and traffic management	Tons shipped; fleet, ship, force days at sea

* A health care unit was defined as a weighted composite of inpatient dispositions, occupied bed days and outpatient visits.

^ This included maps, charts and graphs.

Table I.2 only includes a small sample of the output indicators used by the BLS in their study. This data was collected through extensive survey work. Such an approach is very resource intensive and, thus, requires a loose budget constraint.

Another, more simple, example of the measurement of defence services is that completed by Murray (1992) for Sweden. This study used only two output indicators. These were (i) hours of attendance at flight training, and (ii) days of training of conscripts. This study took the view that in times of peace a good proxy for defence services is the amount of training completed. It is likely that fighting ability (*ie*, the ability of the defence forces to defend the State from any attack that actually materialised) is a positive function of the amount of training completed. Hence, such a proxy provides a simpler alternative to the comprehensive approach taken in BLS (1996). Unfortunately this type of data is not readily available for Australia.

One (practical) option for Australia is to attempt to measure raw labour and capital inputs to defence *ie*, personnel and equipment, as an indirect measure of fighting ability. This type of proxy would be different from the current ABS measure of real output as it would capture changes in capital as well as labour. As mentioned in Section I.1.1, the ABS convention in calculating depreciation for defence equipment is to write it off completely at the time of acquisition. It is not written off slowly over the life of the asset as is the convention with other sectors. Thus the ABS measure of real output for *Defence (IOCC 8201)* only measures movements in revalued wages, salaries and supplements[9]. Thus a measure of personnel and equipment would be an improvement in the sense that it would capture movements in capital as well as labour.

Data on defence personnel is available between 1986/87 and 1993/94. However data on defence equipment is not available in compatible format for this time period. Thus, it is not possible to construct a proxy for real output based on these indexes. Thus, it seems that with the absence of a clearly recognisable output unit for defence services it is not possible to improve on the current ABS real output measure for this sector.

Nevertheless, one marginal improvement on the current ABS method would be a break-up of the *Government Administration and Defence (ANZSIC M)* division estimates into separate estimates. While it is not possible to calculate separate estimates for real output as currently defined by the ABS, the ABS does make available a breakdown of nominal output for *Government Administration and Defence (ANZSIC M)*. For the subdivision *Defence (ANZSIC 82)* this consists only of wages, salaries and supplements at current prices. Deflating the change in these estimates between 1986/87 and 1993/94 by the change in the consumer price index (CPI) over the same period gives an estimate of a change in real output for *defence* of -3.98 per cent. This represents average annual growth of -0.57 per cent. This contrasts greatly with the ABS's estimate for *Government Administration and Defence (ANZSIC M)* of 23.76 per cent over the same time period. However, this re-estimate compares well with the earlier discussion in this section which

[9] Wages, salaries and supplements are re-valued using fixed-weighted wage rate indexes.

suggested that real output of the defence sector has not grown much since the mid-1980s.

I.3 Alternative Measures of Real Output for Government Administration Services

The IO commodity group *Government Administration (IOCC 8101)* encompasses administrative services provided by all levels of government plus judicial services. Table I.1 shows that the Federal government provides the largest share of services for this commodity group, with the sum of the State and Local government shares almost equal to the Federal share. In order explore the concept of measuring real output for this sector it is necessary to discuss the various economic activities that government(s) undertake.

At the very basic level, governments provide a legal framework that defines property rights which allows an economic system based upon mainly private ownership, as is the case in Australia, to operate efficiently. This is the judicial system. Although this role is small in its use of resources (see Table I.1, row 5, column 2), it is of crucial importance within an economic system such as Australia's and is subject to large positive externalities. Another small but important role is the regulatory supervision that governments provide which set the constraints of market behaviour. This includes issues of entry barriers, pricing, anti-competitive behaviour *etc*. Besides these two small but important roles, the large bulk of government activities can be classed as transferring resources between different groups in society. Resources are largely collected in the form of various taxes. These resources are then distributed via two main methods. One method is a straight cash payment through some form of allowance or pension. Different types of allowances include those for families, single parents, the unemployed *etc*. Pensions are paid to retired workers, disabled workers, widows, *etc*. The other main method of distributing resources is in the form of goods and services. These may be provided in kind *eg*, health services under Medicare, or through varying degrees of `user pays' rationing *eg*, Pharmaceutical Benefits Scheme.

Examples of output indicators used for measuring these types of government services can be drawn from the sources cited in Section I.2. Namely BLS (1996) and Murray (1992). Some of the output proxies used by these two studies are contained in Table I.3. It is clear from Table I.3 that both BLS (1996) and Murray (1992) use a `transactions' approach to measuring output for individual government functions and/or agencies. Both studies also conducted extensive surveys in order to collect their data. As noted in Section I.2, such an approach is very resource intensive and would be difficult to implement in Australia. In attempt to estimate the change in *Government Administration (IOCC 8101)* here and alternative approach will be taken.

Table I.3:

A Sample of the Functional Categorisation and Output Indicators Used by BLS (1996) and Murray (1992) in Measuring Government Administration Output

Government Functions^	**Output Indicators: BLS (1996)**	**Output Indicators: Murray (1992)**
1. Finance & accounting/Tax administration	Pay accounts maintained	Income tax returns processed
2. Legal and judicial activities/Courts	Cases terminated	Sentencing of offenders
3. Regulation (compliance & enforcement)/ Enforcement service	Enforcement investigations completed	Proceedings
4. Social services & benefits/ social welfare	Claims processed, medical payments made	Number of recipients of benefits, bed days
5. Labor market board	na	Job applicants, hours of attendance at training
6. Regulation (rulemaking & licensing)	Licenses processed, applications reviewed	na

^ The function descriptions used here are those used in the original studies with the first description being that used in BLS (1996) and second that used in Murray (1992).

* Health care unit was defined as a weighted composite of inpatient dispositions, occupied bed days and outpatient visits.

Table I.4 lists the 14 categories of spending, current and capital, by all governments in Australia, as well as each category's share of total (combined) government spending. It would be expected that the size of the government administrative service required for each of these government provided goods and services would vary with the actual size of the national provision of these services. For example, the government administrative service required to maintain the education system (which is largely government provided) is probably proportional to the actual size of the education sector *ie*, real output of the education sector. Thus, one way to indirectly measure the output of this administrative service is to measure the output of the education sector itself, in total. Even in sectors where there is a large private component, administering the regulatory framework for that particular sector would probably be accurately reflected by using the output of the whole sector in question.

Consequently one method of constructing an alternative proxy for real government administration output is as follows:

Table I.4:

Share of Outlays by Purpose, of Commonwealth, State, & Local Governments Combined

Purpose	Share of Total Outlays		
	1986/87	**1993/94**	**Average**
1. General public services	0.0728	0.0848	0.0788
2. Defence	0.0613	0.0559	0.0586
3. Public order & safety	0.0318	0.0351	0.0334
4. Education	0.1244	0.1336	0.1290
5. Health	0.1251	0.1425	0.1338
6. Social security & welfare	0.1981	0.2687	0.2334
7. Housing & community amenities	0.0394	0.0231	0.0313
8. Recreation & culture	0.0282	0.0236	0.0259
9. Fuel & energy	0.0329	0.0101	0.0215
10.Agriculture, forestry & fishing	0.0155	0.0150	0.0153
11.Mining, manufacturing & construction	0.0082	0.0033	0.0058
12.Transport & communications	0.1052	0.0715	0.0884
13.Other economic affairs	0.0208	0.0295	0.0252
14.Other purposes	0.1361	0.1032	0.1196

Sources: ABS (1997d); (1996c) Table 4, p.20.

1) gather estimates of real output for each of the categories listed in Table I.4;
2) estimate the contribution to growth of total real government output by multiplying each category's share of total spending by the change in real output for that category; and
3) sum the contributions to arrive at an estimate for the change in real output.

This will be done for the period 1986/87-1993/94.

I.3.1 Results

The methodology described in the previous section requires estimates of real output for all the categories of spending listed in Table I.4, column 1. These estimates will be taken from the following sources.

- For the categories `health'; `recreation and culture'; `fuel and energy'; 'agriculture, forestry and fishing'; 'mining, manufacturing and construction'; and 'transport and communications', ABS estimates of the change in real output for equivalent national accounts divisions will be used[10].
- For the category `defence' the estimate calculated in Section I.2 will be used, and for the category `education' the change in real output will be assumed to equal the estimate for education services reported in Verikios (1997).
- For the category `housing and community amenities' the change in real output will be assumed to equal the change in the real value of the stock of government dwellings between 1986/87 and 1993/94[11].
- For the category `social security and welfare' the change in real output will be assumed to equal the change in the total number of recipients of pensions, allowances and other benefits from the Department of Social Security (DSS), between 1986/87 and 1993/94 (see DSS 1987; 1994).
- For the remaining four categories of `general public service'; `public order and safety'; `other economic affairs'; and `other purposes', the change in real output will be assumed to equal the change in real GDP over the period 1986/87-1993/94 *ie*, 21.99 per cent[12].

Table I.5 contains the estimates, shares and contribution to growth of total government output for each category, as well as the estimated change in real output for *Government Administration (IOCC 8101)* for the period 1986/87-1993/94.

---

[10] For the category `health' the change in real output for the ABS national accounts division *Health and Community Services (ANZSIC O)* will be used. For the category `recreation and culture' the change in real output for the *Cultural and Recreational Services (ANZSIC P)* division will be used. For the category `fuel and energy' the change in real output of the *Electricity, Gas and Water Supply (ANZSIC D)* division will be used. For the category `agriculture, forestry and fishing' the change in real output of the *Agriculture, Forestry and Fishing (ANZSIC A)* division will be used. For the category `mining, manufacturing and construction' the change in real output of the share weighted average for the three divisions *Mining (ANZSIC B)*, *Manufacturing (ANZSIC C)* and *Construction (ANZSIC E)* will used. For the category `transport and communications' the change in real output of the share weighted average for the divisions *Transport and Storage (ANZSIC I)* and *Communication Services (ANZSIC J)* will be used (ABS 1996e, Table 1.3, p.6; 1996f Table 1.3, p.5-6).

[11] This was calculated using ABS data on dwellings held by general government at average 1989/90 prices (see ABS 1997b, Table 8, p.18). 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 capital stock for the years 1986/87 and 1993/94 a three-quarter weight and one-quarter weight was applied to each of these indexes, respectively.

[12] The general nature of these services suggests that the administration service required for each would move in line with general economic activity. Thus the use of the change in real GDP as an estimate for the change in real output for these categories seems appropriate.

Table I.5:

Estimates of the Change in Real Output for Government Administration Categories and Total Government Administration Output *(Government Administration IOCC 8101)* between 1986/87 and 1993/94

Categories of Government Administration	1. Estimated Change in Real Output (%)	2. Average Share of Total Outlays*	3. Contribution to Change in Real Output of Total Government Administration (%)
1. Defence	-3.98	0.0586	-0.23
2. Education	14.59	0.1290	1.88
3. Health	31.47	0.1338	4.21
4. Social security & welfare	19.30	0.2334	4.51
5. Housing & community amenities	39.87	0.0313	1.25
6. Recreation & culture	20.75	0.0259	0.54
7. Fuel & energy	23.90	0.0215	0.51
8. Agriculture, forestry & fishing	13.81	0.0153	0.21
9. Mining, manufacturing & construction	20.80	0.0058	0.12
10. Transport & communications	46.73	0.0884	4.13
Sub-total	**na**	**0.7430**	**17.13**
11. General public services	21.99^	0.0788	1.73
12. Public order & safety	21.99	0.0334	0.74
13. Other economic affairs	21.99	0.0252	0.55
14. Other purposes	21.99	0.1196	2.63
Sub-total	**na**	**0.2570**	**5.65**
TOTAL	**na**	**1**	**22.78**

* See Table I.2, column 4.

^ This is equal to the change in GDP(I) at average 1989-90 prices between 1986/87 and 1993/94 (ABS 1996f, Table 1.2, p.3).

This methodology gives an estimate of the change in real output for *Government Administration (IOCC 8101)* between 1986/87 and 1993/94 of 22.78 per cent *ie*, 3.25 per cent annual average growth. The ABS's corresponding estimate for *Government Administration and Defence (ANZSIC M)* for the same period is 23.76 per cent *ie*, 3.39 per cent annual average growth. The estimate calculated here compares well with the ABS's estimate. However, it has a number of advantages:

(1) it pertains to the change in real output for *Government Administration (ANZSIC 81; IOCC 8101)* only - it does not sum the *Government Administration (ANZSIC 81; IOCC 8101)* and *Defence (ANZSIC 82; IOCC 8201)* sectors. Thus the movement in real output for these two sectors are extricated here. Further, Section I.2 suggests that real output for these two sectors have differed markedly over the period 1986/87-1993/94 *ie*, 22.78 per cent versus -3.98 per cent;

(2) the estimate presented here is based more directly upon output proxies. That is, it attempts to account, albeit indirectly, for the expected demands on administrative services provided by governments. It does this by measuring changes in real output of those sectors they (governments) are responsible for in the provision of administrative services. These sectors include those where the government is involved in direct provision *eg*, education, and also where the administrative service almost exclusively involves regulatory supervision *eg*, agriculture, forestry & fishing; and mining, manufacturing and construction.

This output estimation method is a significant improvement on the current ABS method of revaluing wages, salaries and supplements using fixed-weighted wage rate indexes and adding this to constant price estimates of consumption of fixed capital. Despite these advantages, both the ABS method and the method presented here suggest that *Government Administration (ANZSIC 81; IOCC 8101)* has grown by around 23 per cent between 1986/87 and 1993/94.

Besides the conclusions drawn above regarding the behaviour in real output for *Government Administration (ANZSIC 81; IOCC 8101)*, it is possible to make some sensible comments with respect to the behaviour of total factor productivity in this sector. Section I.1.3 recognised that the ABS's measure of real output for the division *Government Administration and Defence (ANZSIC M)* was a good proxy for the quantity of inputs. Interpreted in this way, it seems that real inputs have grown by around 23 per cent between 1986/87 and 1993/94. Section I.2 estimated that real labour inputs to the subdivision *Defence (ANZSIC 82)* has decreased marginally over the same period (*ie*, -3.98 per cent). Thus it seems reasonable to conclude that almost all of the growth in real inputs to *Government Administration and Defence (ANZSIC M)* was in *Government Administration (ANZSIC 81)* only. The re-estimate of real output for *Government Administration (ANZSIC 81)* suggests that it grew by around 23 per cent between 1986/87 and 1993/94. If these conclusions and estimates are accepted then they suggest real

inputs for *Government Administration (ANZSIC 81)* have grown by around 23 per cent, as has real output. Thus, total factor productivity seems to have remained constant. Section I.3 argued that labour productivity in *Government Administration (ANZSIC 81)* had improved and capital productivity had most probably decreased. If this premise is accepted, then it appears that any improvements in labour productivity have been completely offset by falls in capital productivity. This is an interesting result.

II PROPERTY AND BUSINESS SERVICES

II.1 ABS Measurement of Output of Property and Business Services

The *Property and Business Services (ANZSIC L)* division is comprised of the subdivisions *Property Services (ANZSIC 77)* and *Business Services (ANZSIC 78)* (ABS 1996d, Appendix 2, Table AP2.1). This division includes all units predominantly engaged in renting and leasing assets and all units engaged in providing a wide range of business services. Specifically it includes:

1) establishments of holding companies if they are mainly engaged in holding shares in their subsidiary company (or companies);
2) establishments mainly engaged in the provision of business services such as
    - architectural services,
    - surveying and other technical services,
    - legal and accountancy services,
    - data processing and other office services,
    - advertising services,
    - management consultancy services,
    - market research services,
    - credit assessing and reporting services,
    - pest control services,
    - cleaning services,
    - caretaking services,
    - protection services,
    - contract packing of goods[13];
3) establishments mainly engaged in leasing, renting or hiring industrial machinery, plant or equipment (except transport equipment) without operators

[13] This does not include packing of agricultural produce, food, beverages and tobacco, or crating or packaging goods for transport.

for periods of less than one year, from stocks physically held for this purpose; and

4) establishments mainly engaged in leasing machinery, plant or equipment on a financial service basis (ABS 1996d, Appendix 2, para 24-5).

II.1.1 Nominal Output

Nominal output for *Property and Business Services (ANZSIC L)* is defined by the ABS as the sum of

- gross operating surplus;
- wages, salaries and supplements; and
- net indirect taxes (J. Jeffrey, ABS, 7/8/97).

This definition is a good measure of the *value* of output and, thus, of nominal output. The ABS estimates that nominal output for *Property and Business Services (ANZSIC L)* increased by 83.64 per cent between 1986/87 and 1993/94 (ABS 1996b, Table 22, p.29).

II.1.2 Input-Output Tables

In the IO tables *Property and Business Services (ANZSIC L)* covers four different IOCC commodity groups. These are

1. *Other Property Services (IOCC 7702)*;
2. *Scientific Research, Technical and Computer Services (IOCC 7801)*;
3. *Legal, Accounting, Marketing and Business Management Services (IOCC 7802)*; and
4. *Other Business Services (IOCC 7803)* (ABS 1997a, Table 1, pp.42-3).

Table II.1 lists the IOCC items contained in each of these IO groups.

Output for these commodity groups consists, mainly, of estimates of primary inputs and the usage of commodities primary to these industries (ABS 1996d, Chapter 19, para 19.98). This estimation method is a good measure of the value of output.

Table II.1:
Item Descriptions for Various IO Commodity Groups

1. Other Property Services (IOCC 7702)	
Property operator and developer services	(IOCC 77120010)
Real estate agent services	(IOCC 77200020)
Agricultural or pastoral property broking, leasing, renting or valuing	(IOCC 77300020)
Non-financial asset investors	(IOCC 77300010)
Motor vehicle hire	(IOCC 77410010)
Ship and boat leasing or hire	(IOCC 77420010)
Caravan, car trailer, box trailer or horse trailer hire	(IOCC 77420020)
Transport container leasing or hire	(IOCC 77420030)
Transport equipment leasing nec	(IOCC 77420040)
Plant leasing, hiring and renting services nec	(IOCC 77430010)
General government consumption of fixed capital	(IOCC 77431980)
2. Scientific Research, Technical and Computer Services (IOCC 7801)	
Research services	(IOCC 78100011)
Architectural services	(IOCC 78210010)
Surveying services	(IOCC 78220010)
Consulting engineering services	(IOCC 78230010)
Quantity surveying services	(IOCC 78230020)
Meteorology services	(IOCC 78290005)
Technical services nec	(IOCC 78290010)
Data processing services	(IOCC 78310010)
Information storage and retrieval	(IOCC 78320010)
Computer maintenance services	(IOCC 78330010)
Computer consultancy services	(IOCC 78340010)
General government consumption of fixed capital	(IOCC 78341980)
3. Legal, Accounting, Marketing and Business Management Services (IOCC 7802)	
Legal services	(IOCC 78410010)
Accounting services	(IOCC 78420020)
Advertising services	(IOCC 78510010)
Commercial art and display services	(IOCC 78520010)
Market research services	(IOCC 78530010)
Business administrative services	(IOCC 78540010)
Business management services	(IOCC 78550010)
Other income	(IOCC 78551920)
Increase in stocks—work-in-progress	(IOCC 78551950)
General government consumption of fixed capital	(IOCC 78551980)
4. Other Business Services (IOCC 7803)	
Employment placement and contract staff services	(IOCC 78610010)
Typing, mailing and copying services	(IOCC 78630010)
Security and investigative services	(IOCC 78640010)
Pest control services	(IOCC 78650010)
Cleaning services	(IOCC 78660010)
Contract parking services nec	(IOCC 78670010)
Collecting and credit reporting services	(IOCC 78690010)
Business services nec	(IOCC 78690020)
General government consumption of fixed capital	(IOCC 78691980)

Source: ABS (1997a), Table 1, pp.42-3.

II.1.3 Real Output

Annual real output for *Property and Business Services (ANZSIC L)* is the sum of the quarterly real output estimates. Quarterly real output is calculated by extrapolating base year gross product using quarterly estimates of hours worked. These quarterly estimates are derived by multiplying average hours worked by employment data (ABS 1996d, Chapter 18, Table 18.12). This estimation method assumes that there is no change in gross product at constant prices per hour worked (ABS 1996d, Chapter 4, para 4.27).

This definition of real output is a good measure of labour *inputs* to property and business services - not real *output*. Further, the assumption of a fixed level of gross product at constant prices per hour worked effectively fixes the change in labour productivity to zero. Thus, this measure of real output, by assumption, cannot measure changes in labour productivity. It is reasonable to argue that labour productivity in all service sectors has improved markedly in the last ten years with the adoption of computers. However, this improvement in labour productivity is completely ignored by a real output measure such as this. Further, this definition of real output entirely ignores the measurement of capital productivity and its effects on real output.

Another important issue which is ignored by the current measure is changes in factor intensities. Anecdotal evidence suggests that the high relative cost of labour has seen a shift towards greater use of capital (*eg*, computers) in most industries and property and business services has not been exempted from this. Thus, changes in both capital and labour intensities and their effects on real output cannot be captured by the current measure of real output. This is also true of the adoption of new technology (*eg*, computers) and its effects on output. The ABS estimates that real output for *Property and Business Services (ANZSIC L)* increased by 34.60 per cent between 1986/87 and 1993/94 (ABS 1996e, Table 1.3, p.6). This figure indicates that labour inputs into these services have grown by around 35 per cent for the period 1986/87-1993/94. This figure seems reasonable as *Property and Business Services (ANZSIC L)* has enjoyed strong employment growth over this period.

II.2 Alternative Measures of Real Output of Property and Business Services

This section is concerned with developing more appropriate measures of real output for the commodity groups listed in Table II.1. Measuring the *quantity* of output for these types of services is difficult. It is possible to identify useful output indicators for particular business services. For example, the number of tax returns filed and, the number of cases taken on would be appropriate output indicators for Legal Services (IOCC 78410010) and Accounting Services (IOCC 78420020) respectively. However, the amount and different types of data that

would be required to estimate real output for all the items in these IO groups precludes any sensible attempt to estimate real output. Thus, these commodity groups will be left unchanged despite the unsatisfactory nature of the output estimation method currently used.

Conclusion

This paper has examined the current national accounts method of estimating real output for three major service industries *ie*, government administration services, defence services, and property and business services. It found these methods to be unsatisfactory for all three industries. The change in real output for government administration services and defence services is re-estimated using more appropriate output indicators for the period 1986/87-1993/94. Real output for government administration services is found to have grown at the same rate as estimated by the ABS. Defence services, however, are found to have contracted slightly whereas previous estimates suggested significant positive growth over the period in question. Despite the unsatisfactory nature of the output indicators currently used for property and business services lack of appropriate data does not allow re-estimation of real output for this industry.

References

ABS (1996a) *1994-95 Australian National Accounts: Capital Stock,* Cat. No. 5221.0, ABS, Canberra.

_____ (1996b) *1994-95 Australian National Accounts: National Income, Expenditure and Product,* Cat. No. 5204.0, ABS, Canberra.

_____ (1996c) *1996-97 Government Financial Estimates, Australia,* Cat. No. 5501.0, ABS, Canberra

_____ (1996d) *Australian National Accounts: Concepts Sources and Methods,* Cat. No. 5216.0 in Statistical Concepts Reference Library on CD-ROM, Cat. No. 1361.0, ABS, Canberra.

_____ (1996e) *July 1996 Australian Economic Indicators,* Cat. No. 1350.0, ABS, Canberra.

_____ (1996f) *August 1996 Australian Economic Indicators,* Cat. No. 1350.0, ABS, Canberra.

_____ (1997a) *1993-94 Australian National Accounts: Input-Output Tables Commodity Details,* Cat. No. 5215.0, ABS, Canberra.

_____ (1997b) *1995-96 Australian National Accounts: Capital Stock,* Cat. No. 5221.0, ABS, Canberra.

_____ (1997c) *National Income, Expenditure and Product,* Cat. No. 5206.0, June Quarter, ABS, Canberra.

_____ (1997d) Public Sector Accounts Section, Canberra.

_____; & Department of Statistics, New Zealand (1993) *Australian and New Zealand Standard Industrial Classification, 1993 edition,* ABS, Canberra; & Department of Statistics, Wellington.

BLS (1996) Description of output indicators by function for the federal government, fiscal year 1994, Washington, DC.

Department of Defence (1994) *Defending Australia: Defence White Paper 1994,* AGPS, Canberra.

DSS (1987) *Annual Report 1986/87,* Australian Government Publishing Service (AGPS), Canberra.

DSS (1994) *Annual Report 1993/94,* AGPS, Canberra.

Eurostat; International Monetary Fund; OECD; Statistical Division, Department for Economic and Social Information and Policy Analysis, & regional commissions of the United Nations Secretariat; & the World Bank (1993) *System of National Accounts 1993,* Commission of the European Communities, Brussels/Luxembourg; International Monetary Fund, Washington, D.C.; OECD, Paris; United Nations, New York; & World Bank, Washington, D.C..

Johnson, T. & O'Dea, D. (1996) Measuring general government output and Productivity: Issues and a workplan for Australia, Joint UN ECE / Eurostat / OECD Meeting on National Accounts, Geneva, 30 April - 3 May, 1996, ABS, Canberra.

Murray, R. (1992) `Measuring public-sector output: The Swedish report', in *Output Measurement in the Service Sectors*, ed., Z. Griliches, National Bureau of Economic Research Studies in Income and Wealth, vol.56, The University of Chicago Press, Chicago, pp.517-42.

Verikios, G. (1997) Re-estimating real output for service industries in Australia, *Centre of Policy Studies and the Impact Project General Paper,* No. G-124, Monash University, 107pp., November.