EQUALITY OF SPATIAL ACCESS AND MEDICARE. AN EMPIRICAL STUDY OF THE NUMBERS OF PRIVATE FEE-FOR-SERVICE PSYCHIATRIC SERVICES IN THE AUSTRALIAN STATES AND TERRITORIES 1984-2001

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ABSTRACT: Medicare is Australia's national, compulsory and universal health insurance arrangement. The Commonwealth Government subsidises privately-produced fee-for-service (FFS) medical services. This study provides evidence about whether or not the objectives of Medicare, involving equality of spatial access, are being achieved for private FFS psychiatric services. The following question is answered: are the utilisation rates of private FFS psychiatric services spatially uniform and temporally uniform in Australia under Medicare? The data analysed are a by-product of Medicare and involve quarterly time series of numbers of services by State/Territory. The results show whether, through time and in the presence of the uniform subsidy arrangements, the total quantities of services, and the quantities per 1,000 population, have risen, fallen or remained constant, and whether statistically significant differences occurred between the regions in the utilisation of psychiatric services. In terms of the initial measure of spatial access applied here, no evidence is found of spatial uniformity in these outcomes for private psychiatric service utilisation.

1. INTRODUCTION

The economic outcomes of Australia's medical care financing arrangements (Medicare) are known to be spatially unequal for medical services and for general practitioner (GP) services. Connelly and Doessel (2000) have demonstrated this in terms of the price dimension of Australia's medical practitioner markets and, in an earlier study, Connelly and Doessel (1995) studied the presence of non-uniformity in the economic variables in general practitioner markets (*viz.*, prices of GP services, quantity of GP services, GP incomes, numbers of GPs, etc.) in Queensland for 1991-92.

This paper focuses attention on the quantity dimension of Australia's medical practitioner markets, and on one sub-group of the medical industry: private FFS

psychiatric services. Herein are empirical descriptions of the movements through time in, and the spatial variation across the States/Territories of, the numbers of services performed by private fee-for-service (FFS) psychiatrists in Australia under Medicare for the period 1984 to 2001. The paper furthers the evidence available about whether or not the objectives of Medicare are being achieved in regard to equality of access to psychiatric services. The "access" to the services under study here is only of a spatial nature, i.e. other notions of service access such as social, cultural or other economic factors are not involved.

There is a lacuna in the Australian economics literature about medical industries. By contrast, the economics literature is replete with empirical studies of the quantities bought and sold, through time, in the markets for many commodities. In the Australian literature for example, there are standard studies of a *genre* concerned with traditional areas of economic activity: primary industry [e.g. Beggs' (1988) study of beef], secondary industry [e.g. Madden's (1988) study of cars], and tertiary industry [e.g. Turner and Witt's (2001) study of tourism demand]; as well as macroeconomic variables, such as Felmingham and Zhang's (2001) study of money demand and Dixon and Shepherd's (2001) study of aggregate labour, and so forth.

Also in the Australian literature are various families of studies investigating issues that are a little "different". For example, studies exist on the following: cigarette consumption and whether anti-smoking campaigns make a difference (Bardsley and Olekalns, 1999) (over which furore erupted subsequently in the *Australian Journal of Public Health);* the behaviour of beer, wine and spirits (Clements and Johnson, 1983), issues associated with the effect of advertising on their consumption (Clements and Selvanathan, 1995), as well as cannabis, alcohol and cigarettes (and whether these are substitutes or complements)(Cameron and Williams, 2001); and so forth.

Against this backdrop of broad-ranging studies, it is a little surprising that, in Australia, general medical services are not well-served by studies like those just listed. Consider the comment made by Connelly and Doessel (2002) in regard to Australia's general practitioner (GP) market: "Generally, though, it can be said that general practice has been a 'black hole' in the Australian health landscape. For example, compare the miniscule literature on general practice to the voluminous literature on hospitals" (p. 44). While studies about some industries abound in the literature, other industries are overlooked.

The reason for the lacuna in regard to psychiatric services is not that the work of psychiatrists is undefined. Definitions of that work are found in the specialist psychiatry Items of the *Medicare Benefits Schedule* (Commonwealth Department of Health and Ageing, 2002a), and in the broad discussions of the Australian Medical Workforce Advisory Council (AMWAC)(1999, pp. 2-3). However, the economics of this service industry has not been the subject of empirical measurement and analysis in the Australian economics literature, and the spatial, and other, impacts of the role of government's financing arrangement have not been evaluated. Some descriptions exist in the health services literatures (e.g. Emmerson and Whiteford, 1995).

Of the few previous Australian studies of the temporal movement of quantities of medical services under Medicare, those studies are concerned with the market for GP services. Butler (1996) and Hynes (2000) give descriptive overviews of the prices, quantities of services and expenditures for non-specialist attendances since the introduction of Medicare. Attention was drawn above to Connelly and Doessel's (1995) study. See also Connelly and Doessel (2002). In regard to the market for psychiatric services, the prior Australian literature is of the nature of descriptive accounts provided in government reports, *viz.*, the latest being the Commonwealth Department of Health and Ageing (2002b), and earlier years.

The structure of the paper is as follows. Section 2 provides a policy context for the concerns raised in this Introduction. Section 3 discusses in more detail the notion of access. The data and the technique of analysis are described in Sections 4 and 5, respectively. Section 6 presents the results of the econometric analyses, which are discussed in Section 7. The conclusions are presented in Section 8.

2. POLICY CONTEXT

Medicare is the universal, compulsory health insurance scheme, financed from general taxation revenue and an ear-marked tax, that was introduced to Australia on 1 February 1984. It is administered by the Health Insurance Commission (HIC), and it finances the provision of hospital services at zero prices to "public patients" treated at "recognised public hospitals", and also subsidises in-hospital and out-of-hospital medical services, provided by private FFS medical practitioners. For an exposition of the relationships between the prices for medical services, the associated "*Schedule* Fees" and the subsidies/rebates paid for private FFS psychiatric services presented in algebraic and geometric form, see Doessel and Williams (2004). A third component of the financing arrangements administered by the Health Insurance Commission is the Pharmaceutical Benefits Scheme, which provides subsidies for approved pharmaceuticals. See Salkeld, Mitchell and Hill (1998).

The *raison d'être* for Medicare and its predecessor, Medibank, is to enable Australians to have "equal access" to basic medical, hospital (and optical) services. In Australia, for example, the introduction of Medicare "was designed to ensure all Australians have access to medical and hospital services on the basis of need" (Blewett, 1988, p. 106). See also the principles underlying the Health Care Agreements (the former Medicare Agreements) over public hospital services (e.g. Australian Government Solicitor, 1998). The purposes of Medicare more broadly involve: "(m)ore equitable financing arrangements, a redistribution of income to the poorer members of the community, the extension of benefits to people not previously covered, a greater measure of influence over the fees charged by doctors, more efficient administrative procedures and an improved information system for the monitoring of medical service provision" (Palmer and Short, 2000, p. 72).

The financial arrangements, existing in Australia since 1998, for publicly-provided health services, are expressed in the five-yearly Health Care

Agreements. However, the relevant document about private FFS medical services is the annual *Medicare Benefits Schedule* of the Commonwealth Department of Health and Ageing (2002a), previously the *Medicare Benefits Schedule Book* (e.g. Commonwealth Department of Human Services and Health, 1990). It is possible to gain an appreciation of the breadth, complexity and heterogeneity of the services comprising the medical industry simply by perusing the services, numbering over 2,000, contained in "the *Schedule*".

The purpose of government documentation of these services is for determining the subsidy payable by the Commonwealth Government for each type of medical service. The services in the *Schedule* are classified in an orderly fashion, in terms of the various "Parts", "Categories", "Groups", "Sub-Groups" and "Items". A complete list of psychiatric services subsidised by Medicare is available (Commonwealth Department of Health and Ageing, 2002a). Two psychiatry Items from the *Schedule* are shown here, for illustrative purposes:

Table 1. An Extract from the *Medicare Benefits Schedule (2002).*

CATEGORY 1 - PROFESSIONAL ATTENDANCES
GROUP A8 – CONSULTANT PSYCHIATRIST ATTENDANCES TO WHICH NO OTHER ITEM APPLIES
SUB-GROUP 1 - REFERRED CONSULTATIONS, CONSULTING ROOMS (PROFESSIONAL ATTENDANCE BY A CONSULTATION PHYSICIAN IN THE PRACTICE OF HIS OR HER SPECIALTY OF PSYCHIATRY WHERE THE PATIENT IS REFERRED TO HIM OR HER BY A MEDICAL PRACTITIONER) Item 306: An attendance of more than 45 minutes duration but not more than 75 minutes duration at consulting rooms, where that attendance and any other attendance to which item 300, 302, 304, 306 or 308 apply have not exceeded the sum of 50 attendances in a calendar year. **Fee**: $141.90; Benefit: 75% = $106.45 85% = $120.65
SUB-GROUP 1 - CONSULTANT PSYCHIATRIST, REFERRED CONSULTATION VIA TELEPSYCHIATRY FOR ASSESSMENT, DIAGNOSIS AND TREATMENT. A telepsychiatry consultation by a consultant physician in the practice of his or her specialty of PSYCHIATRY (not being an attendance to which items 300 to 319 apply) where - the patient is referred to him or her by a medical practitioner for assessment, diagnosis and/or treatment - that consultation and any other consultation to which items 353 to 358 apply, have not exceeded 12 consultations in a calendar year - a minimum of one face-to-face consultation (items 364 to 370) is conducted wit the patient after every fourth telepsychiatry consultation - any other attendance to which items 300 to 308 and 353 to 370 apply, have not exceeded the sum of 50 attendances in a calendar year Item 357: A telepsychiatry consultation of more than 45 minutes duration but not more than 75 minutes duration **Fee**: $163.20; Benefit 75% = $122.40; 85% = $138.75

Source: Commonwealth Department of Health and Ageing, 2002a, http://www.health.gov.au/pubs/mbs/mbs/css/mbs_book_november_2002_84.

Several features of the two consultant (i.e. "specialist") psychiatry Items (above) should be noted. They are of similar temporal duration. Both Items are subject to similar criteria concerning the maximum number of subsidised services per annum (i.e. "… where attendance, and any other attendance, to which items *xyz* to *abc* apply, have not exceeded the sum of 50 attendances in a calendar year"). Both Items are provided at differing localities and under differing circumstances: Item 306 is provided at a consulting room, has a (*Schedule*) "Fee" of $141.90, for which the two "Benefits" are indicated; and Item 357 refers to a type of service (introduced to the *Schedule* on 1 November, 2002) in which psychiatry is provided via videoconferencing technology to people living in rural and remote localities, for which the "Fee" is $163.20, and the relevant benefits are indicated. The differential in Table 1 in the benefit (subsidy) rate for the two Items relates to in-hospital provision (indicated as "Benefit 75%", i.e. 75 per cent of the Schedule fee) or out-of-hospital provision (indicated beside "85%" in Table 1).

The *Schedule* has undergone considerable alteration over the years as a result of changes in medical practice, such as innovation in diagnostic techniques (e.g. endoscopy), therapeutic procedures (e.g. nuclear medicine) or other innovation (e.g. telepsychiatry), and new Items are included. Deletions of Items occur from time to time.

Familiarity with the *Schedule* is useful. It contributes to the understanding of the significance of the subsidy arrangements for medical practice. For example, from 1984 to 96, minor changes to psychiatric Item Numbers occurred from to time (although the structure of the *Schedule* essentially stayed the same); however from 1 November 1996, an important change occurred in the *Schedule,* effectively defining and constraining the Commonwealth subsidy for high levels of psychiatric service provision for individual patients. The source of all the changes during the 1990s in the Group A8 psychiatric Items largely has been the changes in government policy over the eligibility of services for subsidy. Items are now classified more finely. That is, the reason is administrative, being associated with reimbursement issues arising in the business of psychiatry.

It should be noted that the number of psychiatry Items in the *Schedule* has expanded over time. The 1991 *Schedule* listed 18 consultant psychiatrist Items; eleven years later, the *Schedule* of 1 November 2002 listed 30 psychiatry items. Prior to 1 November 1996, the *Schedule* was, in large part, a simplified version of the current Schedule.

The main concepts underlying the bureaucratically-based classifications of the services that are subject to subsidy arrangements are associated with political reasons, involving four dimensions: the duration of the service; the location of the service; single *versus* group consultations; and the number of services per calendar year. Electro-Convulsive Therapy (E.C.T.) is also included.

3. "ACCESS"

"Access" is a word that is in increasing use in political discourse over government produced and/or financed products, and is especially in popular use

in the health sector (Donabedian, 1973; Aday and Andersen, 1974). Economists seldom employ "access" as an economic construct because in the conventional tools of economic study, efficiency and equity are conceptually separate phenomena for exploring the quantity outcomes of markets. However, it is not inappropriate for economists also to examine the popular constructs used in political discourse and so the present study is concerned with measuring some dimensions of "access".

Various approaches to measuring the performance of a health system in terms of "access" exist [such as those based on severity and waiting time (Simon, Reisman, Javad and Sachs, 1979), the probability of entering the health system, given need (e.g. Salkever, 1975), and hospital utilisation data for various groups (McDermott, Plant and Mooney, 1996)]. Donabedian (1973) and Andersen (1995) regard utilisation to be another measure of access. All such measures can be useful for various applied purposes. Given that the present study is concerned with the broad impact of Medicare at a regional level, utilisation is one relevant measure for the purpose here.

The access described here is spatial access. Other notions about access to medical services, involving social, cultural or other economic factors, "potential access" and so forth are not measured.

4. THE DATA

The Health Insurance Commission collects data, which they make available to the Commonwealth Department of Health and Ageing (CDHA)(2002c), on quantities of private psychiatric services (and all medical services) in Australia as a by-product of the funding arrangements of Medicare. These data, *viz.* the quantities of services produced and consumed by State/Territory (as well as the prices of those services, although the prices of these services are the subject of a separate study), are aggregated across the relevant Item Numbers in the *Medicare Benefits Schedule* (*viz.* Group A8 and E.C.T.). They are time-series in nature, at the level of quarter, for the period 1984 to 2001. Although Medicare data are available from 1 February 1984, the early data (for the March and June quarters of 1984) are not included; the March quarter of 1984 [denoted 1984(1)] are incomplete, while the 1984(2) data appear to be subject to an implementation lag. Thus, the data reported here are for 1984(3) to 2001(3), giving 69 observations in total. Due to confidentiality conditions applicable to CDHA data, the CDHA aggregated the 'small cells' generated by some Items. This aggregation provided six cross-sections of Australia, i.e. each of the Territories being aggregated with a State. The six cross-sections are: New South Wales (and the Australian Capital Territory)(NSW/ACT), Victoria (Vic.), Queensland (Qld), South Australia (and the Northern Territory)(SA/NT), Western Australia (WA) and Tasmania (Tas.). And there is a seventh, i.e. the total for Australia.

This paper seeks to answer these questions: "Are there statistically significant differences over time in the utilisation of psychiatric services per 1,000 population between the States/Territories under Medicare?" and "Have the quantities of services per 1,000 population risen, fallen or remained constant through time?"

Consider the context of these data by examining Table 2. The Table indicates that 32,757,227 psychiatric services were consumed under Medicare between 1984(1) and 2001(3). It also shows that 15,401,695 services (or 47.0 per cent of the total) were for consultations of 46-75 minutes duration; 6,802,651 services (or 20.8 per cent of the total) lasted for 31-45 minutes duration; and 6,115,787 services (or 18.7 per cent of the total) were of 16-30 minutes duration. Attention focuses here now on total services per year and on the underlying temporal and spatial variations in that total. Thus, this is not a disaggregated study.

Table 2. Total Numbers (and Percentages) of Psychiatric Services Aggregated in an Eightfold Classification of Medicare Items, 1984(1) to 2001(3), Australia

Service Category by Groups of Items	No. of Services	Percentage	Service Category by Groups of Items	No. of Services	Percentage
1-15 mins duration[(i)]	1,884,004	5.75	Group Psychotherapy[(vi)]	1,341,216	4.09
16-30 mins duration[(ii)]	6,115,787	18.67	Other than Patient[(vii)]	76,177	0.23
31-45 mins duration[(iii)]	6,802,651	20.77	E.C.T.[(viii)]	180,027	0.55
46-75 mins duration[(iv)]	15,401,695	47.02	Suppressed Details[(ix)]	6,994	0.02
> 75 mins duration[(v)]	948,676	2.90	Total Services	32,757,227	100.00

Notes: (i) Items 134, 300, 310, 320 and 330. (ii) Items 138, 304, 314, 324 and 334. (iii) Items 136, 302, 312, 322 and 332. (iv) Items 140, 306, 316, 326 and 336. (v) Items 142, 308, 318, 328 and 338. (vi) Items 342, 344 and 346. (vii) Items 348, 350 and 352. (viii) Item 14224. (ix) "Suppressed Details" refer to the number of services subject to confidentiality restrictions on data supplied by the CDHA.

Source: Calculated from data supplied by the Commonwealth Department of Health and Ageing (2002c).

Table 3 illustrates the main characteristics of the data concerning quantities of total (FFS) psychiatric services, and quantities per 1,000 population, for the six regions and for Australia. The data in the Table are listed for seven selected quarters, including 1984(3) and 2001(3), which are the first and final observations in the time-series data. This exercise in casual empiricism indicates that the data on total quantities, shown as the first line of each cell in the Table, are subject to temporal, and to geographic, variation. For all the States/Territories, the data broadly suggest increasing numbers of services. However, in 1996(3) there is a peak for all regions, and a subsequent fall. For two regions, the total number of services rose again by 2001(3), in NSW/ACT and in Western Australia. Note also that geographic variability is apparent within the temporal trends. The rate of increase in total services does not appear

to be identical across the States/Territories: the total number of services more than doubled in Queensland and Western Australia between 1984(3) and 1996(3), but less than doubled for the other regions.

Table 3. Quantities of Psychiatric Services, and Quantities of Psychiatric Services per 1,000 Persons, Selected Quarters, 1984(3) to 2001(3)

		1984(3)	1987(3)	1990(3)	1993(3)	1996(3)	1999(3)	2001(3)
AUST	Total Qty	318,074	383,037	456,041	549,101	585,701	555,866	556,324
	(per 1000)	(20.35)	(23.46)	(26.59)	(30.99)	(31.89)	(29.26)	(28.62)
NSW / ACT	Total Qty	117,824	139,053	160,702	190,260	192,524	184,941	187,933
	(per 1,000)	(20.81)	(23.57)	(26.21)	(30.10)	(29.48)	(27.51)	(27.39)
VICT	Total Qty	98,039	119,271	144,409	172,314	194,433	181,355	178,731
	(per 1,000)	(23.99)	(28.26)	(32.87)	(38.50)	(42.54)	(38.40)	(36.90)
QLD	Total Qty	46,130	61,715	66,933	89,651	95,201	93,177	92,985
	per 1,000	(18.19)	(22.95)	(22.91)	(28.63)	(28.37)	(26.47)	(25.53)
SA / NT	Total Qty	32,857	37,586	48,527	56,210	58,344	55,831	53,521
	(per 1,000)	(21.81)	(24.18)	(30.31)	(34.39)	(35.16)	(33.08)	(31.45)
WA	Total Qty	16,401	18,854	25,752	29,538	33,451	28,887	31,875
	(per 1,000)	(11.73)	(12.49)	(15.68)	(17.54)	(18.86)	(15.48)	(16.63)
TAS	Total Qty	6,798	6,534	9,632	10,915	11,648	11,527	11,078
	(per 1,000)	(15.49)	(14.59)	(21.05)	(23.12)	(24.55)	(24.48)	(23.56)

Notes: (i) The notation 1984(3) refers to the third (September) quarter of 1984, and so on. (ii) The psychiatric services referred to here relate to the aggregate of the Item Numbers listed in the Notes to Table 3.

Sources: Commonwealth Department of Health and Ageing (2002c) and Australian Bureau of Statistics, *Estimated Resident Population* (various).

Further insight into these trends is gained by studying population-adjusted These data show that the turning point occurred at, or around, 1993(3) for NSW/ACT with 30.10 services per 1,000 and for Queensland with 28.63 services per 1,000, and at, or around, 1996(3) for all other States/Territories. However, the turning point for the trends for Tasmania is indeterminate in this Table.

Another important characteristic of the data is that the growth rates in numbers of services per 1,000 persons are not constant over time, and are not geographically similar.

The Table also indicates marked variations, between the six regions, in the utilisation rates per 1,000 persons. For example, in 1984(3), the quantity of (FFS) psychiatric services per 1,000 persons in Victoria was 23.99 and in Western Australia in that same quarter, 11.73 services per 1,000 population were consumed; in 2001(3) in Victoria, 36.90 psychiatric services per 1,000 population, and in Western Australia, the number of services was 16.63 per 1,000 persons.

Additional detail about the variation across the regions is provided in Table 4, which provides summary statistics for the dataset under analysis. These descriptive statistics are calculated on the entire 69 observations, so that the means refer to the average of total services between 1984(3) and 2001(3) for each State/Territory, printed in regular font style, and for services per 1,000 persons, see the data in parentheses. The standard deviations are a summary measure of the variation in this sample, i.e. for the entire 69 observations.

Table 4. Summary Statistics on Total Quantities, and Total Quantities per 1,000 Persons, of Psychiatric Services, 1984(3) to 2001(3)

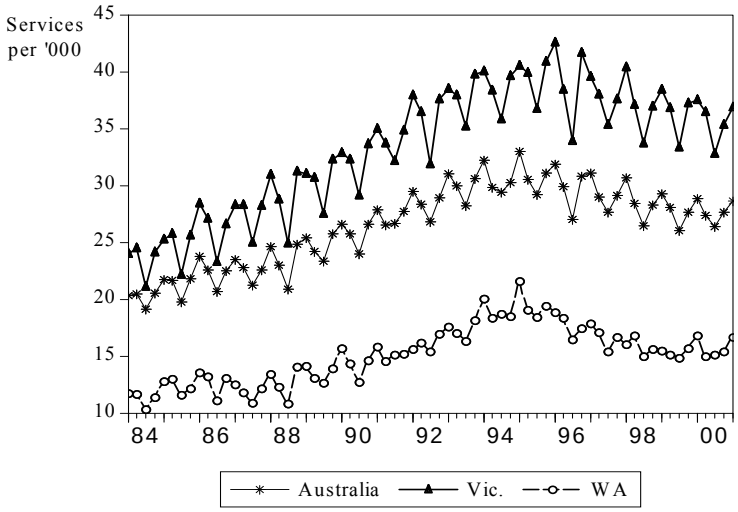
	NSW/ACT Total Qty (per 1,000)	Victoria Total Qty (per 1,000)	Queensland Total Qty (per 1,000)
Mean	162,476 (26.4)	149,114 (33.8)	76,065 (24.7)
S.D.	24,011 (2.8)	29,938 (5.6)	15,763 (2.9)
Range	116,093 - 206,332 (20.37 - 31.97)	86,710 - 94,443 (21.1 - 42.5)	46,130 - 98,919 (18.2 - 30.1)
	SA/NT Total Qty (per 1,000)	Western Australia Total Qty (per 1,000)	Tasmania Total Qty (per 1,000)
Mean	46,311 (28.4)	25,594 (15.1)	9,219 (19.8)
S.D.	9,177 (4.8)	5,857 (2.5)	2,047(4.0)
Range	28,612 - 61,162 (18.7 - 36.6)	14,523 - 37,572 (10.3 - 21.6)	5,467 - 12,257 (12.3 - 25.9)

Notes: As for Table 3.
Source: As for Table 3.

The means for total quantities of services indicate broad patterns of spatial variation between the regions. Not surprisingly, the maximum mean occurs in NSW/ACT (162,476 services) and the minimum mean quantity of services provided in Tasmania (9,219 services). The large variation between the means of total quantities of services for the regions is due to the large variations in populations between the regions. When the summary statistics for the population-adjusted data are examined, the variations in the means for the quantities of services per 1,000 are also marked. Victoria's mean utilisation (33.3 services per 1,000) is much greater than that for the next three States/Territories [SA/NT (28.4 services per 1,000), NSW/ACT (25.8 services

per 1,000) and Qld (24.4 services per 1,000)]. However, the standard deviation for Victoria of 5.6 services per 1,000 (and also SA/NT, with a standard deviation of 4.8 services per 1,000) is relatively large. The mean of 19.8 services per 1,000 in Tasmania is associated with a relatively large standard deviation of 4.0 services per 1,000, while in WA, the relatively low mean of 15.1 services per 1,000 persons is associated with a markedly low standard deviation compared with other regions.

Table 4 also provides the ranges, which gives some perspective on the variability in the temporal variations in FFS psychiatric services under Medicare. The temporal range for Qld in terms of services per 1,000 is very small, with a minimum mean number of services per 1,000 of 18.2, and a maximum mean number of services per 1,000 of 20.1. For Victoria, SA/NT, WA and Tasmania, the maximum means for the number of services per 1,000 are large, approximately double the minimum means. However, for NSW/ACT, the range differs from the ranges of the four regions, just mentioned. It is relatively smaller.



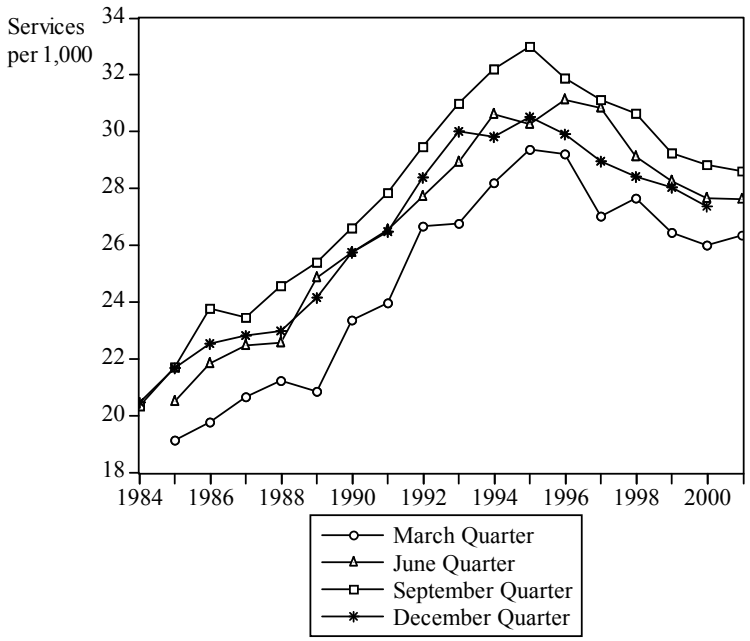
Notes: As for Table 3. **Source**: As for Table 3.

Figure 1. Quantities of Psychiatric Services per 1,000 Persons, Australia and Selected States, 1984(3) to 2001(3)

Figures 1 to 4 provide a further, comprehensive account of the data. In Figure 1, the "middle" line, or graph, presents the temporal behaviour, using quarterly data, of the numbers of services per 1,000 for Australia. Note the secular increase apparent in the services produced and consumed from 1984(3) to approximately 1995 or 1996; after that time, a qualitatively different pattern of service production and consumption is suggested. Note also that the inclusion in Figure

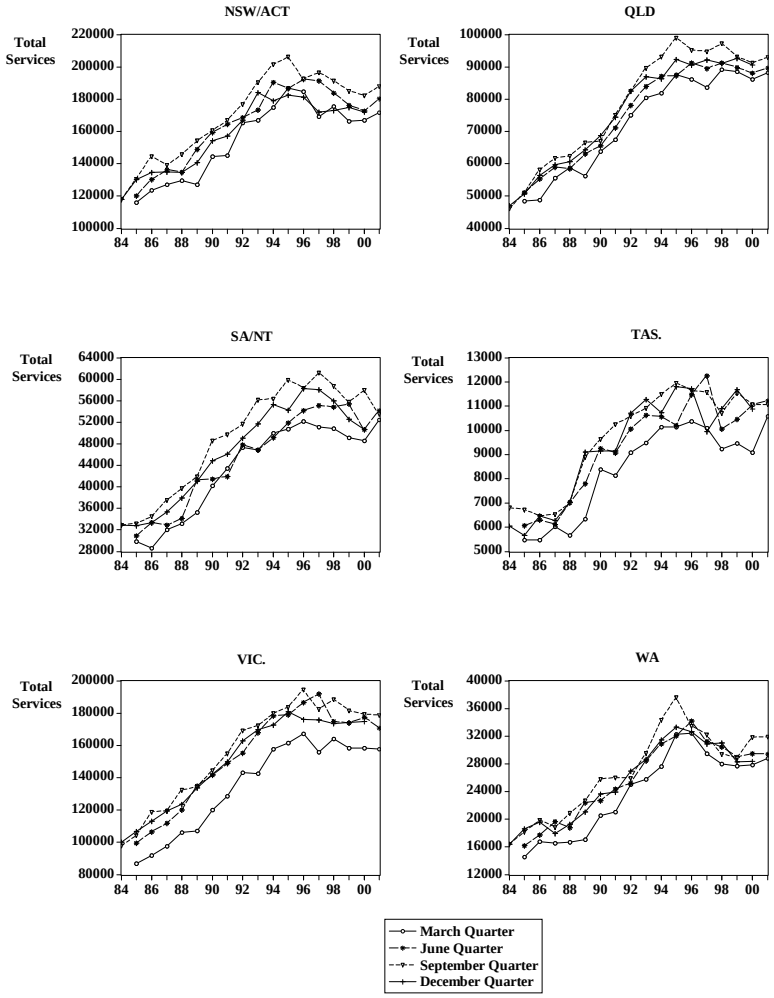
1 of Victoria, which is the region with the highest number of services per 1,000, and Western Australia, which is the region with the lowest number of services per 1,000 persons, indicates the spatial range in the quantities per 1,000 population in Australia.

The "saw-tooth" pattern characterising Figure 1 is illustrated further in Figure 2, in which systematic differences in the production and consumption of psychiatric services are shown. (Recall that the dataset being analysed here are quarterly.) In Figure 2, seasonal split line graphs (i.e. lines linking quarterly observations) for Australia for the period 1984(3) to 2001(3) reveal quantities of services for the March quarter being always less than those for the other three (June, September and December) quarters. This casual empiricism indicates that linear time trends would not provide good fits for the Australian data, and that seasonal dummy variables are the appropriate approach to modelling these seasonal movements.



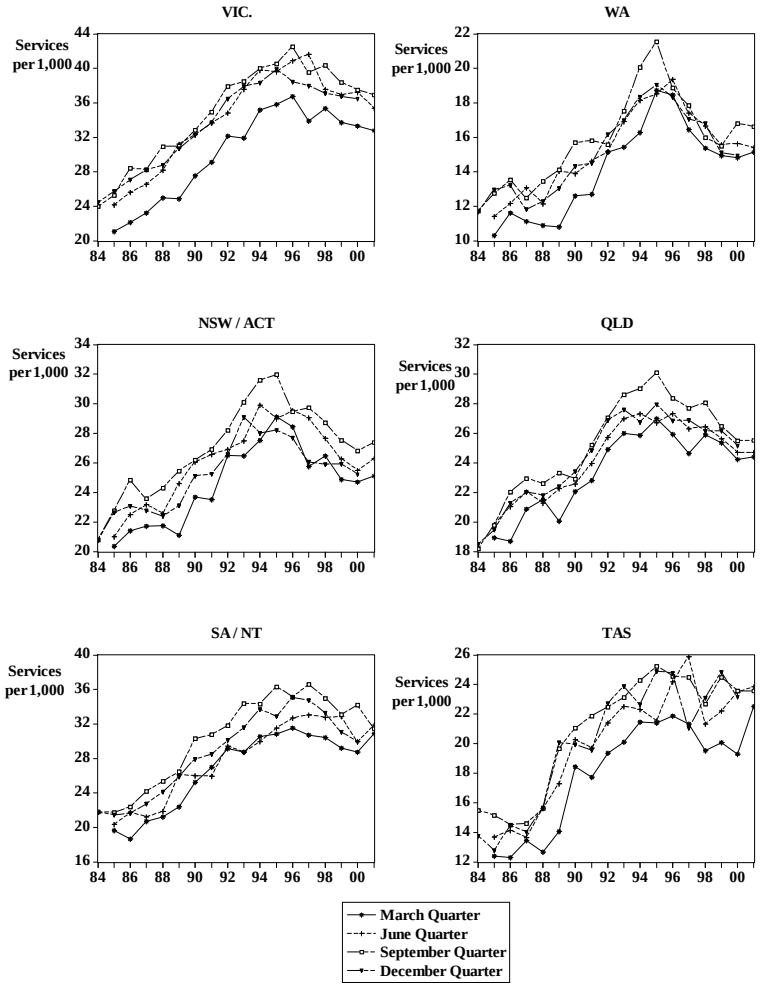
Notes: As for Table 3. **Source**: As for Table 3.

Figure 2. Quantities of Psychiatric Services per 1,000 Persons, by Quarters, Australia, 1984(3) to 2001(3)



Notes: As for Table 2. **Source**: As for Table 2.

Figure 3. Total Quantities of Psychiatric Services, 1984(3) to 2001(3)



Notes: As for Table 3. **Source**: As for Table 3.

Figure 4. Quantities of Psychiatric Services per 1,000 Persons, 1984(3) to 2001(3)

Figures 3 and 4 provide additional seasonal split line graphs of quantities of services, one for each of the six regions under study, in order to demonstrate further the quarterly pattern across the regions. The differing vertical scales in these Figures should be kept in mind, but they should not distract the reader from noting that varying quarterly patterns exist across the regions. Figure 3 involves

graphs of the total quantities of services for each of the six regions, and Figure 4 presents graphs of the numbers of services per 1,000 for these regions. The graphs in Figures 3 and 4 indicate the same general temporal pattern of the previous Figures, i.e. growth through time to approximately 1995 or 1996, and then a "levelling off", or a temporal decline (which is particularly marked for services per 1,000 in Western Australia). Essentially, these Figures suggest that overall differences in temporal variations exist between the regions, as well as the temporal similarities between the regions.

Figures 3 and 4 indicate the seasonality in the production and consumption of psychiatric services present in the regional data. In all six regions (with the exception of NSW/ACT between 1994-98), the data for the March (first) quarter are always less than the data for the other quarters. Lastly, these Figures suggest that systematic differences between some of the quarterly observations are evident in these Figures. Hence, the use of statistical analysis to illustrate and account for these variations is appropriate.

It should be noted that the temporal pattern indicated in these seasonal split line graphs of service utilisation have been detected in other data. In 1998, the Commonwealth's *National Mental Heath Report 1997* first reported that the numbers of services provided by consultant psychiatrists fell "for the first time since the introduction of Medicare" (Commonwealth Department of Health and Aged Care, 1998, p. 108). See Figures 74 to 78 for details. Subsequently, the *National Mental Health Report* 2000 made the following observation: "The [Medicare Benefits Schedule] data for 1997-98 confirm the changing pattern of growth in the private psychiatry sector" (Commonwealth Department of Health and Aged Care, 2000, p. 110).

In this Section, summary statistics and plots of the data provide broad familiarity with the behaviour of the total quantities of psychiatric services, and quantities per 1,000, under Medicare. However, the accounts herein are limited, by nature of the exercise. Attention will turn now to detailed accounts of the data, through the application of statistical analyses of movements in the quantities, and the quantities per 1,000, of FFS psychiatric services over time and place.

5. METHOD

It is important to understand that the research questions are concerned with description: trends are being observed and described statistically. It would be the task of a separate research project to explain such observed trends. The remainder of this paper is concerned with estimating and testing models of the quantities of psychiatric services, and quantities of psychiatric services per 1,000 population, or utilisation rates, through time and across the Australian regions.

5.1 Trends though Time

Have the quantities of services, and the quantities of services per 1,000 population, risen, fallen or remained constant through time. Let us consider, for the moment, the following linear model, equation [1].

$$Q_{psych\ t} = \alpha_1 + \alpha_2 t + \alpha_k \boldsymbol{X}_k + \mu_t \quad [1]$$

where $Q_{psych\ t}$ is the total quantity of psychiatric services, irrespective of region, in period t; t is time; $\boldsymbol{X}_k$ is a vector of seasonal and institutional variables that may affect $Q_{psych\ t}$, and μ is a "well-behaved" error term; and α_1, α_2, α_k are the parameters to be estimated.

The objective is to investigate whether, or not, the quantities are characterised by growth through time. (A second objective, to determine whether evidence of equality of utilisation of services at the regional level exists, is reserved for Sub-section 5.2.) The slope coefficient of the "best fit" equation for the region will be the focus of attention, e.g. α_2 in the six regions. If α_2 is, say, positive and statistically significant in region *i*, then an "upward trend" (or "growth trend") in the quantities of psychiatric services through time has occurred in that region. On the other hand, if α_2 is negative and statistically significant, then there is a "downward trend" in the quantities of psychiatric services through time. Alternatively, if α_2 is numerically zero, or statistically zero, then there is no trend in temporal quantities, i.e., the quantities of psychiatric services are constant through time. Similar interpretations of α_2 apply to region *j*, region *k*, and so forth.

With Figures 1 to 4 indicating that, for many of the States/Territories, more than one turning point (i.e. apart from the quarterly saw-tooth pattern) exists in the data trends, and that polynomial equations of quadratic, cubic or quartic forms are the likely models, then equations like [2] and [3] are likely to produce better fits:

$$Q_{psych\ t} = \alpha_1 + \alpha_2 t + \alpha_3 t^2 + \ldots + \alpha_k \boldsymbol{X}_k + \mu_t \quad [2]$$

$$Q_{psych\ t} = \alpha_1 + \alpha_2 t + \alpha_3 t^2 + \alpha_4 t^3 + \ldots + \alpha_k \boldsymbol{X}_k + \varepsilon_t \quad [3]$$

where ε is white noise (another "well-behaved" error term).

Polynomial equations, one for total psychiatric services and another for total psychiatric services per 1,000 population, for each of the six regions, will also be fitted, i.e. two equations for each of the six States/Territories, providing 12 estimated equations for the regions, and then two additional equations for the total for Australia.

5.2 Regional Differences in Utilisation Rates

The estimation of equations such as [2] and [3] also enables answers to the second research question, "Is there a statistically significant difference in the utilisation rates in private psychiatric services provided in regions *i* and *j*?" This question implies testing whether the equation describing the time-series of rates in a particular State/Territory is different from an equation describing a time-series in another State/Territory? If the equations are the same, or similar, in terms of intercept and slope coefficients (subject to the relevant statistical testing), then it can be concluded with reasonable confidence that equality of utilisation (as a broad measure of access) is being achieved under Medicare.

To answer the question, Wald coefficient restriction tests, described in Hall, Lilien and Sueyoshi *et al.* (2000, pp. 352-56), are applied to each of the equations, involving tests of statistical significance on α_1 (the intercept coefficient, irrespective of region), and on α_2 (the slope coefficients, irrespective of region). The hypothesis to be tested is that the coefficient on the intercept in the equation for one region is equal to that for another region, and that the slope coefficient in the equation for one region is equal to that for another region

If a linear functional form proves to fit the data well for each region, then the task of regional comparisons is straightforward. But linearity is unlikely: various polynomial functional forms are more to fit the data for each of the regions, and this complicates the comparison process. This problem is approached as follows. Using the best fit polynomial equation on the utilisation data, i.e. psychiatric services per 1,000, for each region, that equation is re-estimated with time parameters generated from re-scaled trends. This re-scaling involves setting time (the variable on the X-axis) at zero for each quarter of each year in the 17 year period from 1984(3) and 2001(3). Thus, for each quarter, an equation is estimated for each of the seven regions, *viz.* six States/Territories and Australia (i.e. a total of 476 equations), where the time parameters for each year are estimated on the re-scaled time data relevant to that year.

By this process, it is then possible to apply Wald coefficient restriction tests to the series of estimated intercept coefficients, by comparing the estimated intercept of the equation for a particular State/Territory for one quarter in a particular year with that for another State/Territory in that year, thus involving 15 pair-wise comparisons per quarter. The results will indicate the presence of statistically significant differences (or similarities) between utilisation rates between the States/Territories, and will give an initial indication of whether, or not, the achievement of equal outcomes in terms of access, as measured by utilisation, is occurring under Medicare.

6. RESULTS

6.1 Trends Though Time

Attention will turn now to a discussion of the descriptive equations estimated on the quarterly data for quantities of psychiatric services, and on quantities per 1,000 population, by State/Territory from 1984(3) to 2001(3).

The estimation of linear time trends using ordinary least squares (OLS) on these data confirmed that the time-series for each region are not linear. Very low adjusted-R^2 values indicated that a non-linear equation might provide a better fit. Polynomial equations were found to be the more appropriate functional form, with quadratic, cubic and quartic terms on time producing better results under non-linear least squares. However, the diagnostic tests indicated serial correlation was still present. The insertion of autoregressive (AR) terms improved the functional form. In regard to the $\boldsymbol{X}_k$ variables, the inclusion of seasonal dummy variables (*DVJUNE*, *DVSEPT* and *DVDEC*) addressed the systematic differences associated with the temporal (quarterly) recording of the data. It was thought that the insertion of a dummy variable, *DVUSF*, for the

movement in 1986 to a nationally uniform system of Schedule Fees in the (then) *Medicare Benefits Schedule Book* may also be necessary, in case that policy had an impact on quantities of services in some regions. Other institutional factors may affect utilisation but these are unknown. Their influence was captured by the error term of each equation.

The results of the 14 estimated equations for the seven geographical regions under study here are presented in the Appendix in Tables A1 and A2. Non-linear equations on total psychiatric services for the six States/Territories and for Australia are summarised in Table A1, and the non-linear equations on psychiatric services per 1,000 population for each of the six regions and for Australia are given in Table A2. All 14 equations performed well in terms of adjusted-R^2 and all passed the *F*-test. The data for all the regions except SA/NT were subject to autoregressive processes up to the third order. *AR(1)*, *AR(2)* and *AR(3)* coefficients were statistically significant in the NSW/ACT and the Australian equations, as reported in both Tables. The *AR(1) a*nd *AR(2)* coefficients were statistically significant at the 10 percent level in the WA and Tas. equations, an *AR(3)* co-efficient was statistically significant in the Vic. data and, in the Qld equation, an *AR(1)*co-efficient was statistically significant. These are reported in both Tables. The Augmented-Dickey Fuller (ADF) test was applied to the residuals of each equation, and the results indicate that the residuals are integrated of order zero [I(0)], i.e. the residuals are stationary. All other diagnostic tests indicated that the equations perform well.

The good performance of the equations under these diagnostic tests gives credibility to the regression results in Tables A1 and A2, i.e. some confidence can be placed in the reported equations.

The results of the seasonal and institutional dummy variables are also noteworthy. The seasonality in the data is indicated also in the results that are presented in the Appendix. The seasonal dummy variables (*DVJUNE*, *DVSEPT*, *DVDEC*) were statistically significant at the ten per cent level, and the value of the *DVSEPT* coefficient was consistently greater than the *DVJUNE* and *DVDEC* coefficients in all equations. The dummy variable *DVUSF* for the 1986 revision to the *Schedule* (about the Uniform Schedule Fee) was included only in the SA/NT equation, in which it was positive and statistically significant at the five per cent level.

Consider now the estimated coefficients on time in the Tables in the Appendix. The functional forms of the equations for all regions were quite varied. Quadratic equations provided the best fit for the data, both on total psychiatric services and on psychiatric services per 1,000 population, *viz.* for NSW/ACT, WA and Tas., and for Australia. Cubic equations provided the best fit in both cases for Vic. and SA/NT; and in Qld, quartic equations were the best fit in both cases.

The relevant coefficients for Time, $Time^2$, $Time^3$ and $Time^4$ in each of these equations were statistically significant in almost every case at the one per cent level. It was also observed that the linear coefficient on Time in each equation was positive. That is, an upward trend was present in the data for all regions, both on total quantities of psychiatric services and on quantities of psychiatric

services per 1,000 population. The negative coefficients on $Time^2$ was as expected; the small and negative coefficients on $Time^3$ and $Time^4$ were also as expected. These results are consistent with the functional forms evident previously in the line graphs, i.e. a rising trend during most of the study period, with a turning point.

6.2 Regional Differences in Utilisation Rates

The best fit polynomial equation on psychiatric services per 1,000 for each region reported in Table A2 was re-estimated with time parameters generated from re-scaled time data, as discussed in Section 5. Seventeen equations were estimated for each region for each quarter in each of the 17 years between 1985(2) and 2001(2). In this exercise, the regions are, once again, the six States/Territories and Australia.

In this manner, estimated (i.e. fitted) intercepts were calculated. Table 4 presents these estimated intercept coefficient values. In 1985(2) these values varied between the regions from the lowest of 11.65 psychiatric services per 1,000 population in WA to the highest of 23.63 psychiatric services per 1,000 population in Vic. In 2001(2) those values varied from the lowest of 15.64 psychiatric services per 1,000 population in WA to the highest of 35.65 psychiatric services per 1,000 population in Vic. There was an upward trend for all States/Territories, with a turning point in these (estimated or fitted) coefficients occurring at, or shortly after, 1996. These estimated intercept values were also presented graphically in Figure 5, which includes only the States/Territories. Table 4, which summarises the results for the June quarter each year, and Figure 5, for all quarters, together suggest that there are differences, rather than similarities, in service utilisation levels.

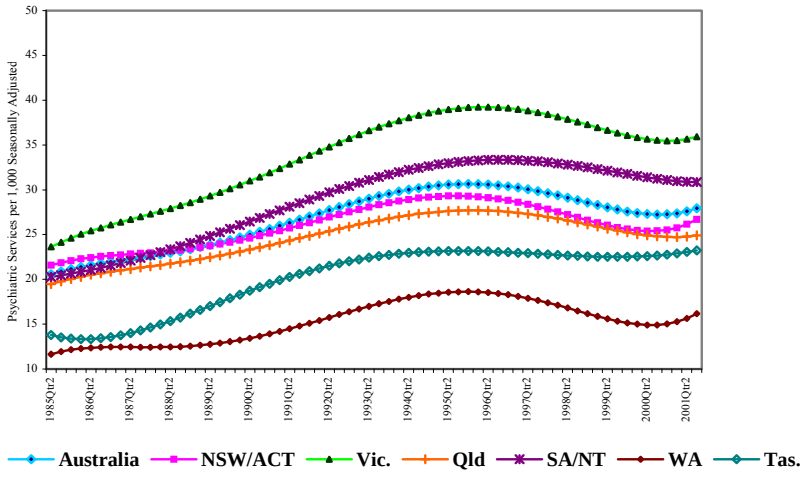


Figure 5. Estimated Intercept Coefficients on Numbers of Psychiatric Services per 1,000 Population, Quarterly, 1985(2)-2001(2)

Wald coefficient restriction tests, applied to the estimated intercept coefficients, tested statistically the hypothesis that a single estimated intercept coefficient from one equation is equal to another estimated intercept. The estimated coefficient, *viz.* the coefficient on the intercept term of the equation for a particular State/Territory in a particular year, was tested against that for another State-Territory in that year, i.e. 15 pair-wise comparisons per year were undertaken. Statistically significant differences in utilisation rates, in most cases at the one per cent level of significance, occurred in 249 of these 255 pair-wise comparisons between the States/Territories. These results are presented in Table 5, and Table 6 summarises the results of the Wald tests given in Table 5. Table 6 indicates for each comparison, the proportion of years in which a statistically significant difference was detected. The years in which statistically significant differences were found are also summarised in Table 6. Statistically significant differences in the estimated coefficient values increased slightly in number throughout throughout the period from 1985(2) to 2001(2), while sameness occurred consistently in **no** pair-wise comparison through time.

Table 5. Estimated Intercept Coefficients on Numbers of Psychiatric Services per 1,000 Population, June Quarter, 1985-2001

Year	NSW/ACT	Vic.	Qld	SA/NT	WA	Tas.	Aust.
1986	22.43	25.41	20.50	21.06	12.36	13.32	21.59
1987	22.81	26.69	21.16	22.09	12.44	14.01	22.26
1988	23.16	27.91	21.75	23.36	12.46	15.36	22.94
1989	23.73	29.32	22.46	24.84	12.75	17.02	23.83
1990	24.60	31.00	23.32	26.46	13.44	18.72	24.98
1991	25.72	32.86	24.33	28.11	14.49	20.26	26.32
1992	26.94	34.79	25.39	29.70	15.74	21.51	29.01
1993	28.08	36.59	26.38	31.10	16.99	22.42	30.01
1994	28.92	38.04	27.16	32.22	18.00	22.96	30.57
1995	29.30	38.96	27.62	32.98	18.56	23.17	30.58
1996	29.11	39.23	27.68	33.33	18.53	23.12	30.05
1997	28.36	38.83	27.30	33.25	17.90	22.91	29.11
1998	27.22	37.86	26.57	32.82	16.80	22.67	28.02
1999	26.04	36.64	25.67	32.13	15.60	22.52	27.29
2000	25.39	35.64	24.92	31.39	14.91	22.60	27.60
2001	26.14	35.65	24.78	30.88	15.64	23.05	21.86

Source: Calculated from Table 6.

7. DISCUSSION

This paper is concerned with empirical descriptions of data on numbers of services in a sub-group within the private FFS medical services industry. The data are collected as a result of the period of operation of Australia's nationally uniform scheme for funding medical services. By studying the private FFS psychiatric services industry, the understanding gained here of the relationship between government policy and the market for psychiatric services is particularly

informative, in terms of the economic forces underlying the outcomes of this relationship.

Are the numbers of private fee-for-service psychiatric services spatially and temporally uniform in Australia under Medicare? This study has shown that the numbers of private fee-for-service psychiatric services are not spatially and temporally uniform in Australia under Medicare. That is, an upward trend from 1984 until the period 1994 to1996 in total psychiatric services and those services per 1,000 population, which is noted in government reports (e.g. CDHA, 2002b) is found in these quarterly data, with a variation in the timing and spatial pattern of this turning point across the States/Territories.

Table 6. Summary of Results of Wald Coefficient Restriction Tests on Estimated Intercept Parameters for Quantities of Psychiatric Services per 1,000 Population, June Quarter, 1985(2) to 2001(2)

State /Territory	with	Percent of Years with Statistically Significant Coefficients
NSW/ ACT	Vic.	100% (1985-2001)
	Qld	82% (1985-97; 2001)
	SA/NT	94% (1985-87; 1989-2001)
	WA	100% (1985-2001)
	Tas.	100% (1985-2001)
Vic.	Qld	100% (1985-2001)
	SA/NT	100% (1985-2001)
	WA	100% (1985-2001)
	Tas.	100% (1985-2001)
QLD	SA/NT	88% (1987-2001)
	WA	100% (1985-2001)
	Tas.	100% (1985-2001)
SA/NT	WA	100% (1985-2001)
	Tas.	100% (1985-2001)
WA	Tas.	100% (1985-2001)

Notes: (i) Statistics reported in this table are Wald χ^2-statistics. Statistics in parentheses are probabilities. (ii) One, two and three asterisks indicate statistical significance at the ten, five and one per cent levels, respectively. (iii) The services here relate to the Item Numbers listed in the Notes to Table 3.

Source: Calculated from Table 7.

Medicare is a government policy that intervenes in the market/s for private FFS medical services in a spatially uniform manner. It operates on medical services through the implementation of spatially uniform subsidies, in accordance with the *Medicare Benefits Schedule*. Yet, the empirical results provided in Section 6 reveal that, in regard to Australian psychiatric services, there is not a single, uniform outcome for these services. Hence, the operation of Medicare in the market/s for Australian FFS psychiatric services is not likely to

achieve the outcome of uniformity in service utilisation (a measure of access). Indeed, the outcome of uniformity is not found: there is no evidence in this study of psychiatric services that Medicare is achieving equality of access to these services.

This paper does not seek to explain variation in the rates of utilisation in private FFS psychiatric services; however, it is relevant to observe that mental illnesses are, generally, quite uniform in Australia in terms of their geographical or spatial prevalence. This has been clearly demonstrated from the analysis of prevalence (Australian Bureau of Statistics, 1997) undertaken by Burgess, ***et al.*** (2002). They report grouped prevalence rates for two case types, i.e. groupings in terms of two broad illness categories, showing the range in the prevalence rates for each Case Type across the regions under study to be subject to little variation. That is, for Case Type 1, mental illness prevalence rates for the 76 Australian regions ranged between 19.8 per cent and 23.5 per cent of the population; and for Case Type 2, mental illness prevalence rates also ranged between 19.8 per cent and 23.5 per cent of the population. See also their Figures 13 to 15 and Appendix 5. Similar patterns are reported in studies in the United States. (Blazer, ***et al.*** (1985) and Kendler, ***et al.*** (1996)).

In other words, the spatial variation in the rate of use of psychiatric services, described in this paper, is not likely to be due to spatial variation in the underlying patterns of the illnesses. Rather, the explanation can be expected in factors such as economic variables (including demand variables such as price, income, and supply variables such as the number of psychiatrists), the socio-economic characteristics of the populations and in remoteness. Given that the prevalence of mental illnesses across populations and cultures is relatively uniform in Australia, an industry study of private FFS psychiatric services in Australia provides an ideal window of insight into the possible effect of Medicare on medical services generally.

This study is partial in two respects. First, it does not encompass the services of the public sector, or system, of psychiatric practice. Results pertaining to fee-for-service psychiatric practice are informative for the administration of public psychiatric services. The two systems may mesh together well, one sector complementing the other; but they may operate as substitutes in the delivery of services. The results here do not inform public sector administrators whether the two systems are related or unrelated, in terms of possible complementary or substitutive services. However, the results do inform the administrators of public sector psychiatric services in each State/Territory of the magnitudes and patterns of services over time and across space in private sector psychiatry.

Secondly, this study is only partial in its measurement and examination of the extent of inequality of access to psychiatric services under Medicare. For example, the results presented in Table 5 can be interpreted from more than one perspective on equality. As noted in the previous Section, in 1985(2) the estimated intercept coefficient values vary between the regions from the lowest of 11.65 private FFS psychiatric services per 1,000 population in WA to the highest of 23.63 services per 1,000 population in Vic. Note that the difference is twofold, i.e. between the highest and lowest value in that year. During the

1990s, that difference increased, to slightly greater than double. In 2001(3), for example, the values varied from the lowest of 15.64 private FFS psychiatric services per 1,000 population in WA to the highest of 35.65 services per 1,000 population in Vic., a ratio of 2.28.

Since there is almost no similarity in the values in Table 5 in the period 1985-2001, it could be argued that no equality exists between the States/Territories in utilisation of private FFS psychiatric services. However, if the magnitude of the difference between the rates is compared, then it could be argued that the dispersion amongst the regions during the period under Medicare is greater. Further study of this inequality is required.

8. CONCLUSION

The answer to the question posed by this study is that the utilisation rates of private fee-for-service psychiatric services are not spatially, and not temporally, uniform in Australia under Medicare. There has been a general increase in the numbers of private FFS medical services across all the States/Territories between 1984 and 2001, which is a temporal pattern of increase marked by differences between the regions.

Although private FFS medical services comprise a well-defined industry, it has been overlooked in the Australian economic literature. The analyses undertaken here of the private FFS psychiatric services industry are policy-relevant, and because quarterly State/Territory data are employed, the descriptions here enable a finer level of study of the outcomes of Medicare than a study of national annual data would provide.

The policy implications of this study are associated with the achievement of Medicare's objectives. While Medicare has enabled universal medical insurance that is available to low-income households across Australia, and despite its administrative successes, the results of this initial study do not suggest that the objective of spatial equality of access is being achieved, at least in terms of psychiatric services. This is not a surprising result, since it would be unlikely that the spatially uniform subsidy policies applied to medical services by the Commonwealth Government would achieve that outcome. Regionally based (non-uniform) subsidies may be an alternative approach, but such a policy is not likely to be politically and administratively appealing.

Further studies that are concerned with other aspects and measures of the accessibility of private FFS psychiatric services will provide additional policy-relevant information. For example, the measurement of inequality in the numbers of services per 1,000 population are required. Studies of the behaviour over time and space of prices (gross and net) of private FFS psychiatric services under Medicare are relevant too. Also, the factors that explain the spatially non-uniform utilisation rates in Australia that have been shown to exist here are not yet known.

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APPENDIX: REGRESSION RESULTS

Table A1 Non-Linear Time Trends of Total Psychiatric Services, 1984(3) – 2001(3)

	NSW/ACT	Victoria	QLD	SA/NT	WA	Tasmania	Australia
(Centred) Intercept	163,772.00	146,103.90	78,651.32	44,831.85	25,680.79	9,287.11	460,119.60
	(26.22)***	(99.30)***	(77.94)***	(44.31)***	(13.42)***	(32.75)***	(16.04)***
Time	1,346.81	1,732.65	1,038.54	536.58	357.71	98.76	5,766.39
	(3.22)***	(16.49)***	(15.64)***	(15.97)***	(2.65)**	(8.50)***	(3.13)***
$Time^2$	-35.28	-28.72	-21.15	-7.04	-8.49	-2.55	138.12
	(-3.00)***	(-8.79)***	(-4.12)***	(-9.12)***	(-2.26)**	(-4.40)***	(-3.66)***
$Time^3$		-0.52	-0.47	-0.24			
		(-3.07)***	(-4.89)***	(-7.18)***			
$Time^4$			0.01				
			(2.13)**				
DV JUNE	9,251.76	17,826.54	2,543.67	1,757.68	1,748.04	895.73	34,146.34
	(6.46)***	(15.79)***	(4.47)***	(3.04)***	(4.41)***	(6.29)***	(11.89)***
DV SEPT	16,694.25	22,360.03	6,181.85	6,088.66	3,054.45	1,327.38	55,828.12
	(11.84)***	(17.69)***	(9.54)***	(10.69)***	(10.94)***	(10.02)***	(19.65)***
DV DEC	3,777.40	15,384.00	3,106.63	3,116.93	1,537.29	975.29	28,310.87
	(2.60)**	(13.54)***	(5.46)***	(5.40)***	(3.83)***	(6.76)***	(9.73)***
DVUSF				2129.81			
				(2.15)**			
AR1	0.26		0.50		0.37	0.41	0.28
	(2.06)**		(4.73)***		(3.31)***	(3.24)***	(2.25)**
AR2	0.29				0.49	0.26	0.29
	(2.32)**				(4.38)***	(2.14)**	(2.40)**
AR3	0.28	0.43					0.28
	(2.26)**	(3.45)***					(2.40)**

Table A1 (continued)

	NSW/ACT	Victoria	QLD	SA/NT	WA	TAS	ACT
Goodness of Fit							
Adjusted R^2	0.95	0.98	0.98	0.97	0.95	0.94	0.98
F	144.80***	466.57***	446.99***	280.40***	189.45***	139.43***	471.54***
Diagnostic Tests							
Order of Integral of Residuals	I(0)**	I(0)**	I(0)***	I(0)***	I(0)**	I(0)***	I(0)**
B-G Serial Correlation (*F*)	0.24	0.69	2.51	0.88	0.24	0.31	0.52
	(p=0.81)	(p=0.41)	(p=0.12)	(p=0.35)	(p=0.79)	(p=0.73)	(p=0.67)
ARCH (*F*)	0.70	2.86	0.03	0.74	1.21	0.67	1.03
	(p=0.55)	(p=0.96)	(p=0.86)	(p=0.39)	(p=0.32)	(p=0.51)	(p=0.38)
Jaque-Bera χ^2	1.54	1.88	5.07*	0.98	1.14	4.29	1.20
	(p=0.46)	(p=0.39)	(p=0.08)	(p=0.61)	(p=0.57)	(p=0.12)	(p=0.55)
Ramsay RESET(*F*)	1.17	1.86	2.57*	1.52	0.30	0.95	1.26
	(p=0.32)	(p=0.15)	(p=0.05)	(p=0.22)	(p=0.75)	(p=0.39)	(p=0.29)

Notes: (i) The psychiatric services referred to here relate to the Medicare Item Numbers listed in Tables 2 and 3. (ii) One, two and three asterisks indicate statistical significance at the ten, five and one per cent levels, respectively. (iii) Data in parentheses are *t*-statistics. For the diagnostic tests, the p-values are in parentheses. (iv) *AR1, AR2* and *AR3* are the first-, second- and third-order coefficients of autocorrelation. (v) *DVJUNE*, *DVSEPT* and *DVDEC* are quarterly intercept dummy variables. (vi) VU*SF* is a dummy variable = 0 for the period 1984(3) to 1989(3); and =1 for the period 1989(4) to 2001(3) to take account of the introduction of uniform Schedule Fees between the Australian States/Territories. (vii) I(0) indicates that the residuals are "integrated of order zero". Asterisks attached to I(0) indicate that the Augmented Dickey-Fuller (ADF) test statistic is statistically significant at the one, five and ten per cent levels respectively. (viii) B-G serial correlation is an *F*-test of the hypothesis that the residuals of the regression are serially correlated. (ix) ARCH is an *F*-test of the hypothesis that autoregressive conditional heteroscedasticity is absent from the residuals. (x) Jacque-Bera is a χ^2 -test of the hypothesis that the distribution of the residuals is normal. (xi) Ramsay RESET is an *F*-test of the hypothesis that the specification of the equation is correct.

Source: Calculated from data supplied by CDHAC (2002c)

Table A2 Non-Linear Time Trends of Total Psychiatric Services per 1000, 1984(3) – 2001(3)

	NSW/ACT	Victoria	QLD	SA/NT	WA	Tasmania	Australia
(Centred)	25.92	32.72	25.34	27.56	15.16	19.80	25.84
Intercept	(24.48)***	(95.48)***	(72.72)***	(44.84)***	(12.71)***	(35.44)***	(12.66)***
Time	0.15	0.33	0.19	0.28	0.15	0.19	0.25
	(2.05)**	(13.24)***	(7.81)***	(13.93)***	(1.82)*	(8.69)***	(2.14)**
$Time^2$	-0.11	-0.01	-0.01	-0.004	-0.01	-0.005	-0.028
	(-2.86)***	(-8.54)***	(-3.97)***	(-9.16)***	(-2.21)**	(-4.37)***	(-3.51)***
$Time^3$		-0.13E-03	-0.01E-04	-0.01E-02			
		(-3.29)***	(-4.27)***	(-7.15)***			
$Time^4$			0.37E-05				
			(2.00)**				
DV JUNE	1.47	3.99	0.84	1.08	1.06	1.93	1.19
	(6.54)***	(15.94)***	(4.79)***	(3.09)***	(4.63)***	(6.43)***	(12.01)***
DV SEPT	2.65	5.00	1.97	3.75	1.84	2.85	3.16
	(1.97)*	(17.83)***	(9.86)***	(10.84)***	(10.79)***	(10.07)***	(20.61)***
DV DEC	0.62	3.48	1.00	1.93	0.96	2.09	1.62
	(2.72)***	(13.79)***	(5.72)***	(5.64)***	(4.11)***	(6.86)***	(9.95)***
DVUSF				1.26			
				(2.0*)**			
AR1	0.26		0.55		0.40	0.40	0.26
	(2.10)**		(5.55)***		(3.52)***	(3.14)***	(2.12)**
AR2	0.29				0.46	0.24	0.33
	(2.34)**				(4.09)***	(1.99)***	(2.70)***
AR3	0.28	0.46					0.27
	(2.27)**	(3.69)***					(2.29)**

Table A2 (Continued)

	NSW/ACT	Victoria	QLD	SA/NT	WA	TAS	ACT
Goodness of Fit							
Adjusted R^2	0.90	0.94	0.98	0.96	0.92	0.93	0.97
F	77.00***	342.53***	142.47***	210.22***	95.52***	120.38***	261.63***
Diagnostic Tests							
Order of Integral of Residuals	I(0)**	I(0)**	I(0)***	I(0)***	I(0)**	I(0)***	I(0)**
B-G Serial Correlation (*F*)	0.39 (p=0.76)	0.68 (p=0.41)	3.16* (p=0.08)	0.77 (p=0.38)	0.17 (p=0.85)	0.21 (p=0.81)	0.73 (p=0.54)
ARCH (*F*)	0.96 (p=0.42)	1.48 (p=0.29)	0.00 (p=0.95)	0.62 (p=0.43)	0.94 (p=0.40)	0.69 (p=0.52)	1.06 (p=0.37)
Jaque-Bera χ^2	1.74 (p=0.42)	1.97 (p=0.37)	2.01 (p=0.37)	1.09 (p=0.58)	0.97 (p=0.61)	3.77 (p=0.15)	1.06 (p=0.59)
Ramsay RESET(*F*)	2.13 (p=0.13)	1.21 (p=0.32)	2.27* (p=0.07)	1.40 (p=0.25)	0.05 (p=0.95)	0.95 (p=0.39)	2.33 (p=0.11)

Notes: As per Table A1.

Source:*Calculated from data supplied by CDHAC (2002c) and ABS (various).*