

Copyright notice

© Copyright Monash University and the author 2002

Within the limits laid down by the Fair Dealing provisions of the Australian Copyright Act 1968 as amended, you may download, save and print article files for the purpose of research or study and for the purposes of criticism or review, and reporting news, provided that a sufficient acknowledgment of the work is made. If you are obtaining an article on behalf of someone else, you may forward a printed copy but not an electronic copy of the article to them. Other than this limited use, you may not redistribute, republish, or repost the article on the Internet or other locations, nor may you create extensive or systematic archives of these articles without prior written permission of the copyright owner.

For further information contact:
Centre for Population and Urban Research
P.O. Box 11A
Monash University
Clayton, Victoria, 3800
Australia.
Phone: 61 3 9905 2965
Fax: 61 3 9905 2993
peopleandplace@arts.monash.edu.au

EXPLAINING THE PRIVATE HEALTH INSURANCE COVERAGE OF OLDER AUSTRALIANS

Jeromey Temple

This article examines older Australians' decision to purchase health insurance. It does so in the context of recent reforms to the Australian health insurance market. Findings suggest that economic, demographic and health factors are associated with an older household's decision to purchase health insurance. Specifically, persons with low levels of income and education, and those living alone or born overseas are least likely to hold health insurance in old age. The author suggests that it is this group of older Australians who may experience difficulties accessing elective surgery in a timely fashion. The author concludes by suggesting that the age-component of 'Life Time Health Cover' may disadvantage future cohorts of the aged.

INTRODUCTION

The ageing of the population poses important implications for the medium- and long-term funding of health care in Australia. Following the release of the Intergenerational Report in the 2002-03 budget, considerable attention has been given to the relationship between population ageing and public health expenditure. One way that the government has attempted to control future health costs is by increasing the private health insurance coverage of all Australians. As will be shown, these reforms have had a mixed effect in improving the health insurance coverage of older persons.

Following these important reforms, an analysis of the determinants of demand for health insurance is a timely research issue. Using recent data from the 2001 National Health Survey, I examine the factors associated with the private health insurance decision of older Australians who are no longer in the formal labour market. Findings are offered on older Australians' decisions to purchase basic hospital cover, comprehensive cover or no insurance at all. Basic hospital cover enables treatment as a private patient in the public hospital sector or in private hospitals. Comprehensive cover offers both basic hospital insurance along with

ancillary services such as dental, optical and chiropractic services. Significantly, it is found that key economic, demographic and health factors are strongly associated with the purchase of insurance. These findings lend some support to the hypotheses offered by the Industry Commission's¹ (1997) key into health insurance in Australia. Prior to presenting these hypotheses, an overview is given of recent health insurance reforms in Australia.

POLICY BACKGROUND

Since 1997, the Coalition government has implemented policy reforms that have increased the private health insurance coverage of Australians. Among the more significant are: the Private Health Insurance Incentives Scheme, the 30 per cent insurance rebate, and Lifetime Health Cover.

Introduced in July 1997, the Private Health Insurance Incentives Scheme (PHIIS) provided membership incentives through reduced premiums and/or payments as taxation rebates to those who purchased health insurance. Single individuals with annual incomes higher than \$50,000 and couples with an income in excess of \$100,000 were required to pay the Medicare levy if they did not

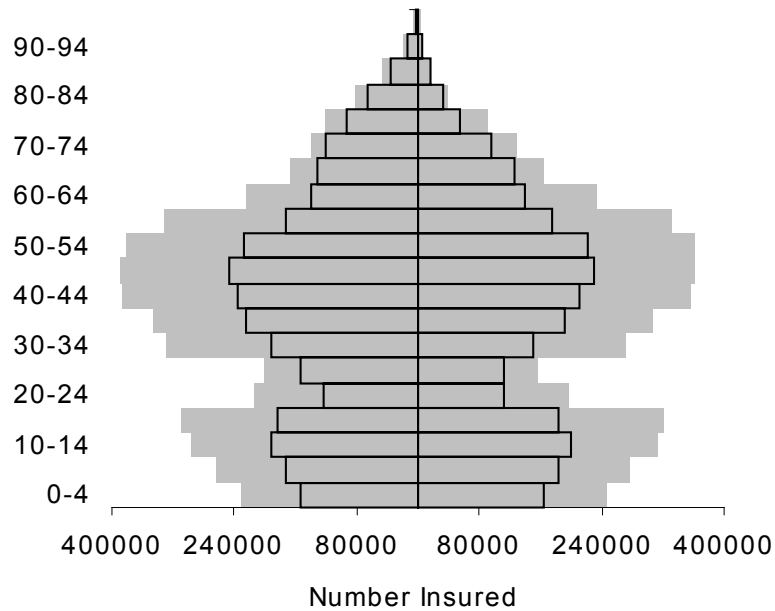
purchase private health insurance. Contrastingly, single individuals with incomes less than \$35,000 and couples with an income lower than \$70,000 were eligible for a series of insurance premium subsidies.

Following these early reforms, from January 1999 the 30 per cent private health insurance rebate replaced the PHII-S, offering a 30 per cent subsidy on the cost of premiums for hospital cover, ancillary cover or a combination of both. More recently (2000), Lifetime Health Cover offered low premiums to people who invested in health insurance prior to turning 30, and guaranteed the maintenance of these low premiums throughout their lifetime. Further, between July 1999 and July 2000, persons of any age could join a health insurance fund and benefit from lower premiums. From July 2000,

those who do not purchase health insurance before age 30 pay a two per cent surcharge on their future premiums for each year that they remain uncovered. Persons born before 1934, however, were exempt from the two per cent surcharge.

Referring to Figure 1, the effect of these reforms is apparent. The number of persons covered by hospital insurance increased dramatically between 1997 and 2003, particularly between ages 30 and 55. The corresponding increase in the number of children insured is due to the increase in the coverage of their parents. However, the true uptake of insurance based on these data may be misleading due to the changing population age structure. To account for the changing age structure over this period, the above data were combined with Australian Bureau of Statistics (ABS) estimated resident population data to

Figure 1: Persons with hospital insurance, by age group, 1997 and 2003 (shaded)



Source: Private Health Insurance Administrative Council, *Statistical Trends — Membership and Benefits, 2003*, <<http://www.phiac.gov.au/statistics/trends/index.htm>> accessed 01/04

estimate the change in the proportion of the population covered by hospital insurance between 1997 and 2003, as shown in Figure 2.

As shown by the horizontal line in Figure 2, the average rate of increase in hospital insurance over the period 1997 to 2003 was approximately 15 per cent for those aged 0-54. For comparative purposes we can divide older Australians into three groups: young-old (aged 55 to 64) old (aged 65 to 84), and oldest (85 plus). For these Australians, the growth in insurance uptake is above average for the young-old. For the old, the growth in the proportion of those insured is still positive, but nonetheless below that of the average growth for those aged 0-54. Interestingly, it is those aged over 85 who experienced a decline in the proportion insured between the two periods. That is, although the insurance incentive certainly had a strong effect for the young-old, and some effect

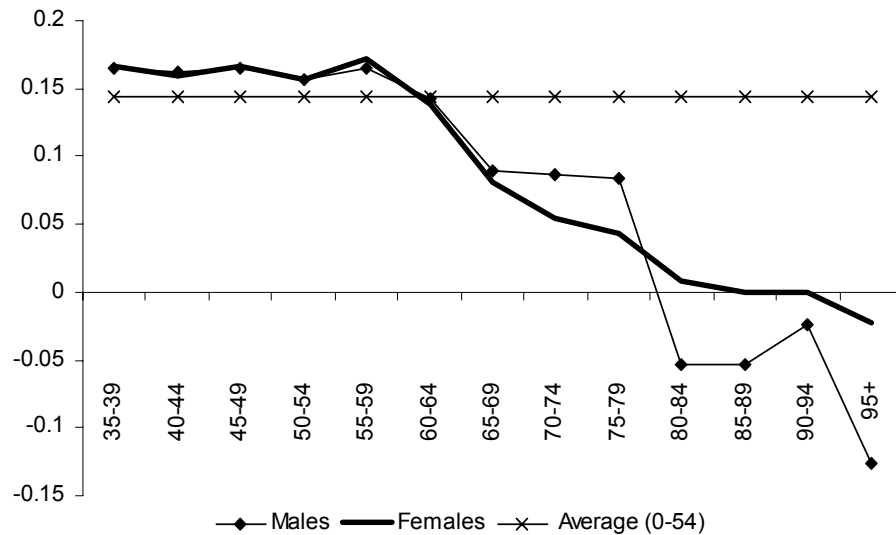
for the old, its effect for the oldest Australians has been negligible. Indeed a smaller proportion of those aged 80 plus were covered by private health insurance in 2003, than had been covered in 1997.

Given the mixed response of the aged to these policy changes, an important research question is: what factors determine the purchase of health insurance by older Australians?

FACTORS INFLUENCING HEALTH INSURANCE — A REVIEW OF FINDINGS

Although no Australian study has explicitly studied the factors related to the insurance decision of older Australians, several have considered insurance coverage for the overall population. Among the more important findings from these studies is that adverse selection, risk aversion and constellations of economic and demographic factors are related to the

Figure 2: Differences in the proportion of persons with hospital insurance, by age group, 1997 to 2003



Source: Private Health Insurance Administrative Council, *Statistical Trends — Membership and Benefits, 2003*, <<http://www.phiac.gov.au/statistics/trends/index.htm>> accessed 01/04 and *Estimated Resident Population by single year of age, Australia*, Cat. no. 3201.0, Australian Bureau of Statistics, Canberra, 2003. Author's calculations.

decision to purchase private health insurance.

Two theoretical notions that have guided prior research are 'adverse selection' and 'risk averse preferences'. These concepts help explain the existence of both bad and good health risks in health insurance markets. Adverse selection is the process by which less healthy individuals ('bad risks') are over-represented in many health insurance markets. Theoretically, as the number of bad health risks increase, insurance premiums rise, thereby forcing those with good health risks out of private health insurance. Within the empirical literature, the number of long-term conditions is often used as a proxy for adverse selection. For example, Hopkins and Kidd² (among others) find that in the Australian health care market, as the number of long term conditions increase so too does the likelihood of holding insurance. Contrastingly, the concept of 'risk averse preferences' is based on the notion that an individual is willing to pay insurance companies a premium to cover uncertainty in the future. That is, those individuals who are more risk averse will be more likely to purchase private health insurance. Within the empirical literature, smoking status and risky alcohol consumption are often used as proxies for identifying those who are not risk averse. For example, Barrett and Conlon³ found that Australians who are heavy smokers were less likely to purchase private health insurance. Indeed, these authors find that, at any point in time, the health insurance market '... is very heterogeneous comprising a mix of bad health risks (indicating adverse selection) and good health risks (consistent with risk averse preferences)'.

Apart from these key theoretical concepts, demographic and economic variables have also been found to be associated with the purchase of health

insurance. In all studies considered here, as income rises, so too does the probability of insurance purchase. Wilson⁴ argues that, since insurance policies, require an upfront payment, the wealthier are more likely to be insured. Further, receipt of a Health Care Card has also been found to be associated with not holding private health insurance. This may be due to the combination of Medicare and Health Care Card concessions acting as a partial substitute for health insurance.

Demographic factors too are important. For instance, those born overseas have consistently been found to have a lower likelihood of private health insurance coverage.⁵ Living arrangements also have been found to be associated with the purchase of health insurance. For instance, coupled households generally are more likely to hold private health insurance, when compared to their single counterparts. Hopkins and Kidd⁶ suggest that having a spouse or a dependent person in the household raises risk aversion, therefore increasing the probability of insurance purchase. Those with higher education are also more likely to hold private health insurance than those with only secondary education. Once again, Hopkins and Kidd hypothesise that the better educated are more informed of the benefits of private health insurance, increasing the probability of purchase.

OLDER AUSTRALIANS AND HEALTH INSURANCE

Several of the aforementioned studies make reference to the Industry Commission's (1997)⁷ comprehensive inquiry into private health insurance in Australia. This inquiry sought to examine the factors related to falling health insurance memberships in Australia. This research confirmed previous findings of the determinants of health insurance, showing income,

age, ethnicity, health status and habits, family type and location⁸ to be associated with holding private health insurance. Importantly, the report hypothesises that several key factors are associated with the health insurance choices of older Australians.⁹

- First, low income is an important factor associated with being uninsured in old age.
- Second, access to the Health Care Card reduces the incentive to purchase health insurance.
- Finally, changing living arrangements in old age, for instance when a spouse dies, can make insurance less attractive.

The hypotheses proposed by the Industry Commission are directly tested in the following analysis. The method used enables these unresolved questions to be answered after controlling for a wide range of economic, demographic and health factors.

DATA AND METHOD

Data for this study are from the 2001 National Health Survey (NHS). The purpose of the NHS is to collect information about the health status, health service utilisation and other related aspects of health and wellbeing in the Australian population.¹⁰ A total of 26,862 individuals responded to the survey, none of whom resided in non-private dwellings.¹¹

This paper examines a sub-sample of 4218 Australians¹² aged 55 years and over who are no longer in the labour force. Neither the spouse nor the partner is in the labour force.

To examine the factors associated with three distinct types of insurance states, I employ a multinomial logistic regression model.¹³ Heretofore, empirical strategies have relied on binary probit or binary logit regression models to examine the determinants of health insurance. The

multinomial logit model has the advantage over the binary probit as it enables the probability of belonging to one of multiple insurance types to be estimated. More specifically, I model older Australian's decisions to:

- not purchase private health insurance
- purchase hospital insurance only (referred to as basic hospital cover), and
- purchase a combination of hospital and ancillary insurance, referred to as comprehensive cover.¹⁴

Of the sample of 4,218 older Australians, 58 per cent are uninsured, 13 per cent hold basic hospital cover and a further 29 per cent hold comprehensive cover. The three most prevalent living arrangements are coupled without children (43 per cent), lone females (31 per cent) and lone males (13 per cent). Approximately 89 per cent of individuals hold a government concession card. This variable provided in the NHS is an aggregation of the Department of Veterans Affairs card, Health Concession Card, Pensioners Concession Card and the Commonwealth Seniors Card. For the purposes of the following discussion, these combined benefits are referred to as a health card.¹⁵

FACTORS ASSOCIATED WITH HOLDING ANY INSURANCE

Table 1 shows results from fitting a multinomial logistic regression model that estimates the likelihood of purchasing hospital insurance or comprehensive health insurance, relative to no health insurance. Multinomial logistic regression enables the effect of each factor to be measured after controlling for all other factors in the model. For both forms of insurance, economic, demographic and health factors were found to be important predictors of health

Table 1: Multinomial Logit Model predicting health insurance purchase, Australians aged 55 years and over and no longer in the labour force, 2001

	Insurance Type	
	Basic Hospital	Comprehensive
Economic Factors		
Equivalent Household Income (\$)	1.010***	1.010***
Government Health Care Card	0.275***	0.164***
Demographic Factors		
Couples — no children	-	-
Lone Males	0.370***	-
Lone Females	0.554**	-
Single Parent	0.490**	0.605**
Couple with children	1.6	1.359
Mixed	0.418**	0.328***
Age 55-59	-	-
Age 60-64	1.209	1.357**
Age 65-69	1.797**	1.650***
Age 70-74	2.242***	1.627***
Age 75 +	1.494**	1.163
No Post Secondary	-	-
Skilled Training	1.166	1.606***
University Educated	1.620**	2.783***
Major City	-	-
Inner Regional	0.776**	0.775**
Other Region	0.423***	0.678***
Country Of Birth	0.600***	0.702***
Household Size	-0.174	0.716**
Health Factors		
Current Smoker	-	-
Past Smoker	1.769***	2.107***
Never Smoked	2.853***	3.384***
High Alcohol Risk	1.308	1.462
Number of Long Term Conditions	0.074*	0.054*
Doctor visit in last 2 weeks	0.87	0.957
Specialist visit in last 2 weeks	1.234	1.295**
Dentist visit in last 2 weeks	1.183	1.764***
No Hospital Stay in last 12 months	-	-
Hospital Stay - 1 Day	1.232	1.417***
Hospital Stay - 2 or more Days	1.525**	1.288*
-2* Log Likelihood =	-3550.044	
Maximum Likelihood R square	0.172	
N =	4218	

Notes: *** p<0.000 **p<0.05 *p<0.10 ; - reference category. For continuous variables — income, household size and number of long term conditions, multinomial logistic regression coefficients (b) are reported. For all categorical variables, relative risk ratios (rrr) are reported. The interpretation of relative risk ratios (rrr) is similar to the interpretation of odds ratios in binary logistic regression. The difference is that the ratios express the odds between each polytomous category and the base category only.

Source: ABS National Health Survey, 2001

insurance membership. In the following analysis these factors are discussed according to the decision to:

- Hold basic hospital rather than no insurance, and
- Hold comprehensive relative to no insurance.

ECONOMIC FACTORS ASSOCIATED WITH PURCHASING PRIVATE HEALTH INSURANCE

Of the economic factors, both income and health card status were found to be highly significant. For both hospital and comprehensive cover, a positive relationship was found between income and insurance, such that more affluent older Australians have a higher likelihood of insurance cover.¹⁶ It was expected, and found, that possessing a government health care card would be negatively related to insurance membership. Older Australians with a health card were over 70 per cent less likely (rrr=0.275) to hold hospital cover when compared with older Australians who are not eligible for health care cards. The effect is stronger still for predicting comprehensive insurance membership. Older Australians with a health care card are almost 85 per cent less likely than non-health care cardholders (rrr=0.164) to have comprehensive cover.

DEMOGRAPHIC FACTORS ASSOCIATED WITH PURCHASING PRIVATE HEALTH INSURANCE

As well as economic factors,

demographic factors appear to contribute to the health insurance membership of older Australians. The estimated coefficients for different living arrangements show that individuals in couple relationships are more likely to hold private health insurance.¹⁷ For example, an older male living alone is about 63 percent less likely ($rrr=0.370$) than a coupled person to hold hospital cover. Similarly, an older female living alone is 45 percent less likely ($rrr=0.554$) than a partnered person to hold private hospital cover. This lends some support to Hopkins and Kidds¹⁸ postulation that having a spouse or child in the household raises the level of risk aversion, thereby influencing the propensity to purchase insurance. Both single parents and those in mixed living arrangements are also less likely to hold basic hospital insurance when compared with couples ($rrr=0.490$, $rrr=-0.418$).

Interestingly, couple families that still have dependent children living with them in old age have a similar likelihood of health insurance purchase as couples with no other children in the household. The results for living arrangements are repeated for predicting membership in comprehensive cover. That is no significant difference in the likelihood of holding comprehensive cover between couples with children and couple only households. For lone, mixed and single parent households, they are all less likely to hold comprehensive cover when compared with couple only families.

Age is also found to be significant in determining the probability of health insurance membership. Older Australians aged 65 and over are more likely to hold basic hospital insurance than those aged 55-59. The effect for age is strongest for those aged 70-74 ($rrr=2.242$). Nonetheless, those aged 75 and over are one and

a half times more likely ($rrr=0.494$) to hold basic hospital insurance than those in the youngest age group. All older Australians are more likely to be covered by comprehensive insurance, when compared with those aged 55-64. Although not directly testable here, it may be that in advanced old age, people are moving from comprehensive cover to basic cover, or indeed no cover at all.

Consistent with prior findings, education was found to be an important predictor of insurance membership. Those older Australians who gained post secondary education, through either skilled training or tertiary education were more likely to hold any type of insurance, rather than rely only on the public system, when compared to their less educated counterparts. Those with some form of skilled post secondary training were far more likely to hold comprehensive ($rrr=1.606$) cover than those with no post secondary education. The effect for the university educated was stronger still. Those who earned a bachelors degree were over one and a half times more likely ($rrr=1.620$) to hold hospital cover and almost three times as likely ($rrr=2.783$) to hold comprehensive insurance when compared to their less educated peers.

Consistent with prior findings, the findings from this research suggest that older Australians who were born overseas are far less likely to hold any form of health insurance when compared with their Australian born peers. Immigrants were 40 per cent less likely ($rrr=0.600$) to hold basic hospital cover, and 30 per cent less likely ($rrr=0.702$) to hold comprehensive cover than the Australian born. This is indeed expected given the research on the ethnic aged in Australia that generally highlights their economically and socially disadvantaged

position.¹⁹

HEALTH FACTORS ASSOCIATED WITH PURCHASING PRIVATE HEALTH INSURANCE

The results discussed above are robust, having controlled for several important health indicators. These indicators also were found to be important factors associated with an older person's decision to be insured. Consistent with the notion of risk averse preferences, smoking status is an important factor. Former regular smokers were about 75 per cent more likely ($rrr=1.769$) to hold basic hospital cover than those who currently smoke. Similarly, older Australians who have never smoked tobacco were almost three times more likely ($rrr=2.853$) to hold hospital cover when compared with their smoking peers. As with the prior results for education and health care card status, the results are stronger for comprehensive insurance, such that the group who had never smoked were almost three and a half times more likely ($rrr=3.384$) to hold this form of insurance than current smokers. This finding that those who do not smoke are more likely to hold insurance lends support to the risk averse preferences hypothesis. Interestingly, risky alcohol consumption had no effect. Although unexpected, this result is consistent with others.²⁰

As a proxy for adverse selection, the number of long-term health conditions also explains the likelihood of health insurance membership. A positive relationship was found between the number of long-term conditions and the likelihood of health insurance membership. For both hospital and comprehensive cover, this result was found to be significant. The effect was once more strongest for comprehensive insurance ($b=0.074$ and $b=0.054$ respectively).

Combined with the results for smoking status, these findings lend support to Barrett and Conlon²¹ who find elements of both good and bad health risks in the Australian health insurance market. Interestingly, their conclusions are found to be consistent even in old age where a predominance of bad health risks can be expected.

Although results presented so far have showed remarkable consistency in the direction and significance of coefficients for both hospital and comprehensive cover, results for the use of health services are more mixed. This is naturally to be expected due to the different services offered by basic hospital and comprehensive cover. For example, older Australians who had had an extended hospital stay in the last 12 months were more likely to hold any form of insurance than not ($rrr=1.525$ and $rrr=1.288$ for basic and comprehensive cover respectively). As expected, those who had visited either a specialist or dentist in the prior 12 months were more likely to hold comprehensive cover. For instance, those who had visited a specialist were almost 30 per cent more likely ($rrr=1.295$) to hold comprehensive cover. There was no significant association between visiting a specialist or dentist and holding basic hospital insurance. The different types of services offered by basic hospital cover may explain this result.

CONCLUSION

Key policy changes since the mid 1990s have increased the health insurance coverage of the Australian population. Interestingly, the effects of these reforms have not been uniform among the older population. This paper has sought to

examine the economic, demographic and health factors associated with older Australian's private health insurance coverage, following these important reforms. Further, this research has tested several key hypotheses offered by the Industry Commission's 1997 report on private health insurance in Australia.

The first hypothesis offered by the Industry Commission, that low income is an important determinant of private health insurance membership of older Australians, has been confirmed. The equivalent income coefficients in this study were highly significant, suggesting that as household incomes rise, so too does the propensity to purchase insurance

Lending further support to the Industry Commission's hypothesis, holding a health care card was also found to reduce the attractiveness of private health insurance. Older Australians with a health care card were far less likely to hold either basic hospital or comprehensive health insurance, and more likely to hold no insurance at all. This result was highly significant, even after controlling for a comprehensive set of financial, demographic and health factors.

Results from this model provide partial support for the Industry Commission's final hypothesis that changing living arrangements in old age influence the insurance decision. That is, as one partner dies, and the surviving spouse becomes single, the probability of having health insurance also decreases. Results from the multinomial logit suggest that living arrangements are highly significant in the health insurance decision. Both single males and single females are less likely to take out private health insurance, when compared to their coupled counterparts. However, due to the level of confidentialisation in the NHS, it is not possible to test the effect of widowhood

with these data.

The importance of these economic factors is significant in the context of Birrell, Hawthorne and Rapson's²² report on surgical services in Australia. These authors find an increasing trend towards elective surgical procedures being performed in the private, rather than public, system. Indeed, these authors find that the situation in the public hospital system has reached a point where it is 'becoming a residual system which caters for acute conditions which cannot be dealt with in the private hospitals and for all other surgical needs for the non-insured section of the community'.

Given the shift in elective surgical procedures to the private sector, results from this study suggest — those with low income, low education, born overseas and living alone — who will have difficulty in accessing elective surgical procedures, at least in a timely fashion. The options open to this group are not appealing. They may choose to spend less money on other necessities to afford health insurance, pay for the procedures up front, or queue for long periods of time in a public system that is already under resourced.

Birrell and colleagues also found that the situation is particularly dire for people living in regional areas. This is due to the lack of private hospitals, and problems attracting and keeping surgeons in regional areas. Results from the present study suggest that older people living outside of major metropolitan regions are less likely to hold any form of health insurance when compared to their city peers. Access to adequate, timely surgical procedures will continue to be problematic for older people living in regional areas unless appropriate policies are implemented.

Finally, Lifetime Health Cover may

also present problems for people born before 1934. Whereas those born after 1934 are exempt from the two per cent insurance premium surcharge, people beyond this cut-off may pay up to a 70 per cent surcharge. This rule is particularly problematic as, if a family cannot currently afford health insurance, the problem is compounding later in life as health insurance becomes increasingly expensive due to the surcharge. Compared to the younger population,

older people are more likely to require surgery and, given the drop in income that accompanies retirement, the affordability of health insurance will be increasingly problematic for future cohorts of the aged.

Acknowledgments

The author wishes to thank Peter McDonald, Don Rowland, Bob Birrell and an anonymous reviewer whose comments greatly improved the original manuscript.

References

- ¹ Now known as the Productivity Commission
- ² S. Hopkins and M. Kidd, 'The determinants of the demand for private health insurance under medicare' *Applied Economics*, vol. 28, 1996, pp. 1623-1632
- ³ G. Barrett and R. Conlon, 'Adverse Selection and the decline in private health insurance coverage in Australia: 1989-95', *The Economic Record*, vol. 79, no. 246, 2003, pp. 279-296
- ⁴ For example, see J. Wilson, *An Analysis of Private Health Insurance Membership in Australia, 1995*, National Centre for Social and Economic Modelling, University of Canberra, Canberra, 1999.
- ⁵ For example, see D. Schofield, 'The distribution and determinants of private health insurance in Australia, 1990' in A. Harris (Ed.), *Economics and Health: 1996, Proceedings of the Eighteenth Australian Conference of Health Economists, School of Health Services Management, University of New South Wales, Sydney, 1996*.
- ⁶ For example see Hopkins and Kidd, op. cit., 1996.
- ⁷ *Private Health Insurance*, Report No. 57, Industry Commission, Canberra, 1997
- ⁸ Although other studies have included 'State of residence', this measure is unavailable due to confidentialisation in the National Health Survey (NHS). An alternate approach, employed here, is to include dummy variables for living in a major city, inner regional area or outer regional area.
- ⁹ Industry Commission, op. cit., 1997, p. 182
- ¹⁰ *Information Paper — National Health Survey, Australia, 2001*, Cat. no., 43240, Australian Bureau of Statistics (ABS), Canberra, 2003
- ¹¹ The ABS's definition of a non-private dwelling is hospitals, motels, hotels, nursing and convalescent homes and short-stay caravan parks. The sample used here includes older persons living in public housing.
- ¹² Within the literature analysis is conducted at several different levels. For examples, see D. Schofield, op. cit., 1999; C. Burrows et al. op. cit., 1993; A. Cameron and P. Trivedi, op. cit., 1991. Although it is household reference persons under consideration, it is the household characteristics such as equivalent household income, household insurance and household type used as independent variables, as used in the aforementioned studies.
- ¹³ I assume that a multinomial logistic model generates the observations and that the probability of observing an older person in one insurance state relative to another is associated with variations in the independent variables of interest. The model, as described by Greene, for the multinomial logit is:

$$\Pr(Y_i = k) = \frac{\exp(\sum_{j=0}^P x_{ij} \beta_{jm})}{\sum_{m=1}^r \exp(\sum_{j=0}^P x_{ij} \beta_{jm})}$$

W. Greene, *Econometric Analysis*, Prentice Hall International, Upper Saddle River, 2000, p. 859

- ¹⁴ The final category consists of the combined ancillary only and hospital/ancillary cover due to the very low proportion of ancillary cover only among the aged, and the wider Australian population more generally. For example, of all Australians insured, 21 per cent hold hospital only, 73 per cent hospital and ancillary and six per cent hold ancillary only. *Private Health Insurance*, Cat. no, 4815.0.55.001, ABS, Canberra, 2003
- ¹⁵ Unfortunately, it is not possible to separate this category due to confidentialisation in the NHS.
- ¹⁶ One disadvantage of the NHS is that income is provided only as an ordinal variable. As such the interpretation of this coefficient is that income has a strong, positive effect on purchasing health insurance.
- ¹⁷ An alternate model was estimated using living arrangements and sex as different independent variables. That is, lone males and lone females were collapsed into lone persons, and a sex dummy variable introduced. The results were highly similar to the results presented here.
- ¹⁸ Hopkins and Kidd, op. cit., 1996
- ¹⁹ See for example, Australian Institute of Multicultural Affairs, 'Papers on the Ethnic Aged, November 1983' Australian Institute of Multicultural Affairs, Melbourne, 1983.
- ²⁰ Barrett and Conlon, op. cit., 2003, p. 289
- ²¹ ibid. 2003, p. 294
- ²² B. Birrell, L. Hawthorne and V. Rapson, *The Outlook for Surgical Services in Australasia*, <<http://www.racs.edu.au/news/birrellsreport.pdf>> accessed 5 March 2004