Distributional impact of recent changes in private health insurance policies

Agnes Walker, Richard Percival, Linc Thurecht and James Pearse

Abstract

The impacts of changes to private health insurance (PHI) policies introduced since 1999 — in particular the 30% PHI rebate and the Lifetime Health Cover — have been much debated. We present historical analyses of the impacts in terms of the proportion of Australians having hospital insurance cover under different PHI policies, by age, gender and socioeconomic status, and project these to 2010 using a new Private Health Insurance coverage model.

The combined effect of the 30% rebate and Lifetime Health Cover was to increase PHI membership from just over 30% in 1998 to just under 50% by the end of 2000, due mainly to more people taking out PHI cover from among the richest 20% of the population. Among the poorest 40% the impact was minimal. Model projections suggested that, had the new PHI policies not been introduced, then the proportion of Australians with PHI would have declined to around 20% by 2010, compared with 40% if the current arrangements remained in place. Also, analysis of 2001 survey data regarding choices to use a public or a private hospital indicated that higher income groups *with or without* PHI were the more likely to have used a private hospital than lower income groups. Among those with PHI, older people were more likely to have used a private hospital than younger ones.

Aust Health Rev 2005: 29(2): 167–177

Agnes Walker, MEcon, ANU Fellow
National Centre for Epidemiology and Population Health, Australian National University, Canberra, ACT.

Richard Percival, Principal Research Fellow
Linc Thurecht, Senior Research Fellow
National Centre for Social and Economic Modelling, University of Canberra, Canberra, ACT.

James Pearse, MScHealthEcon, Associate Professor
Centre for Health Service Development, University of Wollongong, Wollongong, NSW.

Correspondence: Ms Agnes Walker, National Centre for Epidemiology and Population Health, Australian National University, Canberra, ACT 0200.
Agnes.Walker@anu.edu.au

What is known about the topic?
Recent changes in private health insurance (PHI) policies were motivated partly by concern about the continuing decline in the number of people purchasing PHI. The changes have been effective in reversing the decline in the short term and have led to strong increases in coverage among younger people.

What does this paper add?
Modelling of the impact of policy settings indicates that removal of the 30% rebate would cause a small drop in proportion covered compared to the impact of removal of life-time cover in combination with the rebate. Under all scenarios, the model indicates continuing long-term decline in the proportion of the population purchasing PHI. Under current policies, the proportion covered would decline to 40% by 2010.

What are the implications?
Removal of the 30% rebate would have a considerably lesser impact on PHI providers than removal of the lifetime cover policy.

ALTHOUGH IN RECENT DECADES the health of populations in developed countries like Australia improved considerably, the related expenditures tended to outpace economic growth. This resulted in nations searching for ways to contain costs, most typically in the hospital sector, such as the passing on of a larger share of the costs to individuals.[1,2]

Examples of this latter approach are the Federal government's recently introduced policies to increase the take-up of private health insurance (PHI). Basically, the policies are the 30% private health insurance rebate, Lifetime Health Cover and the Medicare Levy Surcharge (Appendix A). When the 30% rebate was introduced, one stated aim was to ease the burden on Medicare, in particular on public hospitals.

A recent inquiry[3] examined the issue of whether these policies had achieved their aim of easing the burden on public hospitals. While researchers

have not come up with unanimous answers to this question,[4,5] the inquiry concluded that there were not sufficient analyses and recommended "that an independent inquiry be established to assess the equity and effectiveness of the 30% private health insurance rebate, and the integral Lifetime Health Cover policy".[3] (Recommendation 11.1, p.168.)

Key aims of this paper are to assess the distributional impacts of PHI policies — a topic that has not been generally covered in PHI research published to date — and to describe a new PHI coverage model able to estimate distributional impacts. The model's capabilities are indicated through analysis of illustrative scenarios.

We first present historical analyses, and projections to 2010, of hospital insurance cover with and without the new PHI policies introduced between 1997 and 2000 — mainly for the 30% rebate and the Lifetime Health Cover (Appendix A).[6] For the projections we used a new PHI coverage model developed at the National Centre for Social and Economic Modelling (NATSEM) under a 3-year Australian Research Council (ARC) grant, with the NSW Health Department, the Health Insurance Commission and the Productivity Commission as industry partners. The research presented below is part of the larger ARC project.[7,8]

In this paper we analyse and project — by age and socioeconomic status (SES) — the PHI coverage and distributional impacts of the 30% rebate and Lifetime Health Cover policies, using illustrative scenarios.

Second, we present findings about people's actual choices of hospital types as a function of age, SES and whether they had PHI.

The private health insurance coverage model

The private health insurance model was developed to enable estimation of the proportion of the population covered by hospital insurance under different policy settings and economic circumstances, building on earlier models developed by NATSEM.[9-11] An important aspect of the model is its ability to distinguish population groups by socioeconomic status, a feature that is essential for distributional analyses.

Estimates of PHI coverage were based on Australian Bureau of Statistics (ABS) National Health Surveys and Health Insurance Surveys.[12] Although survey data are not as accurate as full population data, such as the Private Health Insurance Administration Council (PHIAC) data, only the ABS surveys contain PHI information by socioeconomic status.*

Analysis by NATSEM indicates that coverage estimates using the ABS data are somewhat higher than those obtained with PHIAC data. The difference, at an aggregate level, has averaged about 5 percentage points. The ABS suggests that a possible reason for this arises from different collection methods[13] — the ABS using a population survey, and PHIAC, membership data. Another reason may be that the ABS surveys only include people residing in private dwellings.

Modelling coverage

Trends in membership rates by age and socioeconomic status

In this study, a previous NATSEM time series spanning 1983 to 1992 (based on analysis of health insurance surveys conducted by the ABS in the years 1983, 1986, 1988, 1990 and 1992)[12] was extended to 2001. The health insurance surveys recorded information on the level and type of health insurance cover, contribution rates, and the location, family composition and incomes of contributor units. The time series was extended by adding data from the 1998 health insurance survey and the 1995 and 2001 National Health Surveys (NHS).[12] PHI membership in the model refers to people who have private hospital insurance.

Using historical data, Box 1 indicates a statistical correlation, but not causation, between the introduction of Lifetime Health Cover and the increase in PHI uptake in 2000. However, the figure shows virtually no increase in PHI uptake following the

---

*The Private Health Insurance Administration Council (PHIAC) is an independent Statutory Authority that regulates the private health insurance industry. Each quarter, PHIAC collects and disseminates industry statistics about private health insurance membership and coverage by state, sex and age, including trend data and information on benefits paid.

introduction of the 30% rebate. These patterns have also been reported by others.[6,15,16]

Premium costs

Continued real increases in health premiums have been the most commonly cited reasons for the decline in private health insurance membership.[17,18] Other reasons suggested for that decline included the availability of a publicly funded alternative (Medicare) and the impact of economic downturns.[18-20] Since 2000, with no economic downturns and no major changes to Medicare, there were further rises in real health premiums which may have caused the decline in membership coverage over the last few years.

In view of the above, it was important that the modelling include the cost of health insurance as one of the explanatory variables in the equation that estimates membership probabilities (Appendix B). Unfortunately, the collection of information on premium trends is complicated by the variety of products that are available and the fact that their costs vary across states and funds. One complicating factor is the emergence of policies with front end deductibles. These policies reduce premiums both because the beneficiary pays the first component of any claim, and because the beneficiary has a disincentive to use services. People covered by front end deductible policies increased from 32% of the insured population in September 1997 to 57% in June 2001.

Annual private health insurance premium data were collected from two sources. The first was PHIAC[14] and the second was data supplied by the Commonwealth Department of Health and Ageing on premiums for the largest health fund in each state. Two sources of data were used, as the former only covered the period 1989–90 to 2000–01 while the latter only covered the period 1983–84 to 1995–96.

Using these data sources, a series of annual PHI premiums was calculated that accounted for increases in premium costs and their relationship to changes in average household disposable incomes.

Methodology

The modelling effort involved two main steps. First, from a time series of people with PHI with hospital cover — over the period 1983–2002,[†] using data from the ABS Private Health Insurance

1 Private hospital insurance membership, Australia, 1997–2002

30% rebate

Lifetime Health Cover
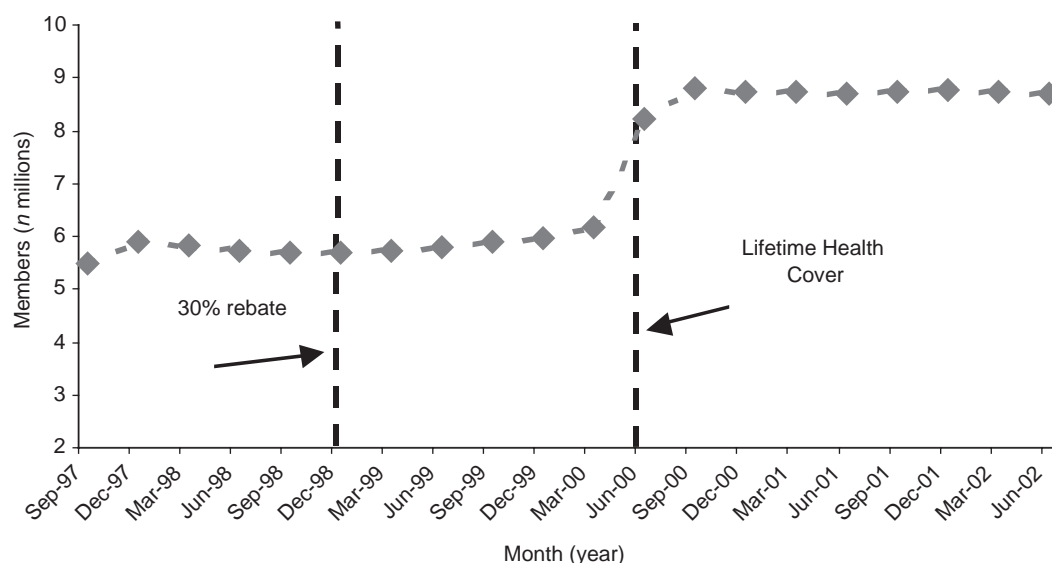
Source: PHIAC data.[14]

surveys and National Health surveys — population groups were defined by age, sex and gross income quintiles.

Second, the time series was used to derive equations to predict the probability that a person defined by the selected set of characteristics would have private health insurance.

Previous research into private health insurance in Australia has suggested that the key determinants of membership include income, age, ethnicity, location (state), family type, and health status.[21-24] However, as the purpose of this new PHI model was to link it to the NSW hospitals model, only variables that also exist in that model were included in the equation.

The PHI model

Model description
Logistic regression was used to model the probability of a person having private health insurance. Predictive variables were:

- Age (0–14 years, 15–24 years, 25–34 years, 35–54 years, 55–74 years, 75 + years)
- Sex
- Gross family (ie, income unit) income quintiles
- Year (as number of years from 1983)
- Premium costs (as a proportion of average household disposable income).

The logistic regression equation is detailed in Appendix B.

Limitations
As with all models, there are limitations as to what the current PHI model is able to cover. Important areas that are not included at present, but could be in later versions of the model, are the effects of the Medicare Levy surcharge and the possibility that apart from age there may also be a significant "birth cohort effect" impacting on PHI coverage rates.

---

†As the time series only contained a single point after the introduction of the new PHI policies (ie, data for 2001), and as there was evidence from PHIAC data of coverage changes either side of the point, two additional datasets were constructed to capture these changes. These used 2001 National Health Survey data,[12] which was re-weighted to match the age/sex coverage reported by PHIAC for 2000 and 2003.[14]

The scenarios studied
Three scenarios were modelled to simulate the effects on insurance coverage of the major PHI policy changes that have been implemented since the late 1990s. These were:

Scenario A: a *base scenario* which modelled the decline in insurance coverage that would have occurred if there had been no 30% rebate on premiums and no Lifetime Health Cover.

Scenario B: a *"current world" scenario* which modelled the decline in insurance coverage between 1983 and 1998 and the introduction and continuing impact of the 30% rebate on premiums and the Lifetime Health Cover. Under this scenario, the percentage of the population covered by PHI peaks in 2000 then gradually falls to just over 40% in 2010.

Scenario C: a *"removal of the rebate" scenario* which modelled the same circumstances as for scenario B, but included the effect of removing the rebate from 2004. This scenario took into account the historically observed responses of people to the increases in their "out-of-pocket" PHI costs due to the removal of the government subsidy associated with the rebate. It did not take into account the likely changes in premiums due to young (and healthier) people discontinuing their PHI cover as a result of the scenario C changes. Also, because the effect of this scenario is expected to be relatively small, the estimated magnitude of its impact may be less robust than that of the other scenarios.

Premium costs in all scenarios were assumed to rise at a real annual rate of 2%. This assumption was based on historical trends in real price indexes over the period 1994–2001. Because data since 2001 indicate more rapid increases in premium rates, and because there are pressures which may see these higher rates carried forward, the 2% annual rate assumed for the illustrative scenarios should probably be seen as conservative. In future work, sensitivity tests could be carried out using a range of likely annual rates.

Box 2 shows that under scenario A the percentage of the population covered by PHI is estimated to drop to just under 20% by 2010. It also shows that, with scenario B, the percentage of the population covered by PHI peaks in 2000 then gradually falls to just over 40% in 2010. Finally, under

scenario C, the percentage of the population covered by PHI peaks in 2000, then gradually falls to a little below 40% in 2010, with a drop associated with the modelled removal of the rebate in 2004.

Analyses by age and socioeconomic status

Changes in PHI membership by age, 1993–2010

Box 3 disaggregates scenarios B and A by age — the former with, and the latter without, the 30% rebate and the Lifetime Health Cover policies. It charts historical data to 2001, and presents projections with the PHI model between 2002 and 2010. It shows that, had the new PHI policies not been introduced (scenario A), only around 25% of those aged 0–34 years would have had private hospital cover in 2001. By 2010, this proportion was projected to fall below 20%, leaving a high proportion of families with young children without access to private hospital care.

Scenario B (ie, the new PHI policies introduced) had the greatest impact on people aged 25–54 years. The highest PHI coverage rates were achieved by the 35–54-year group, up from 38% in 1998 to 58% in 2001, with a projected decline to 50% by 2010. For the 25–34 year age group, PHI coverage rose dramatically from around 25% in 1998 to over 40% in 2001, with a projected decline to around 35% by 2010.

The impact of the new policies on people aged 75 years or more was minimal. For that age group, PHI cover remained virtually unchanged over the 1993 to 2010 period, at around 30%. This suggests that people aged over 75 years are considerably less responsive to PHI policy changes than other age groups (Box 3).

Changes in PHI membership by socioeconomic status, 1993–2010

Box 4 shows that the increases in PHI membership rates following the introduction of Lifetime Health Cover were very much greater among the most affluent 20% of Australians than among the rest of the population. When compared with the patterns observed in Box 3, these results suggest that high-income 25–54-year-olds were the group most responsive to the new PHI policies.

2 Proportion of Australians with private health insurance (PHI) — historical series; Scenarios A, B and C
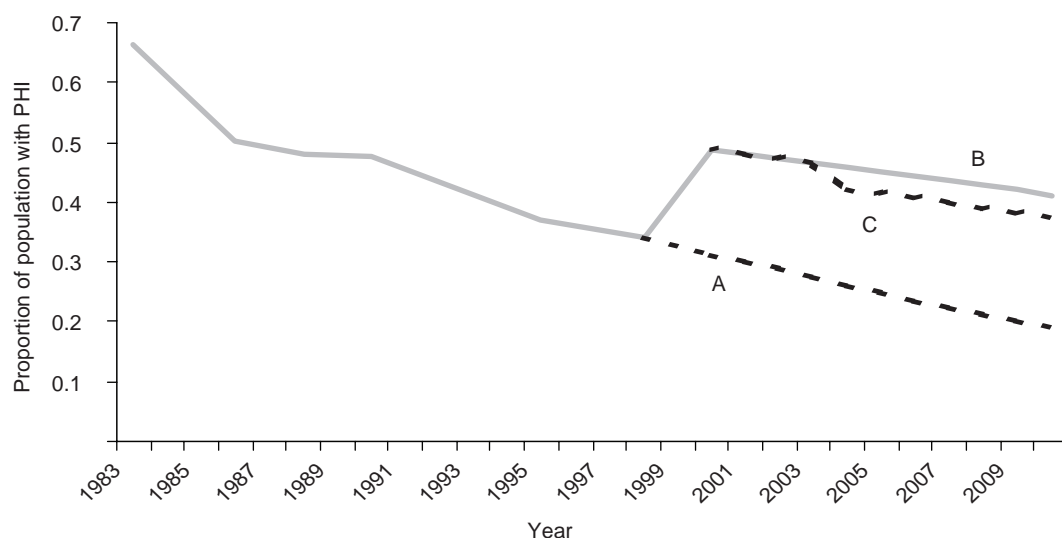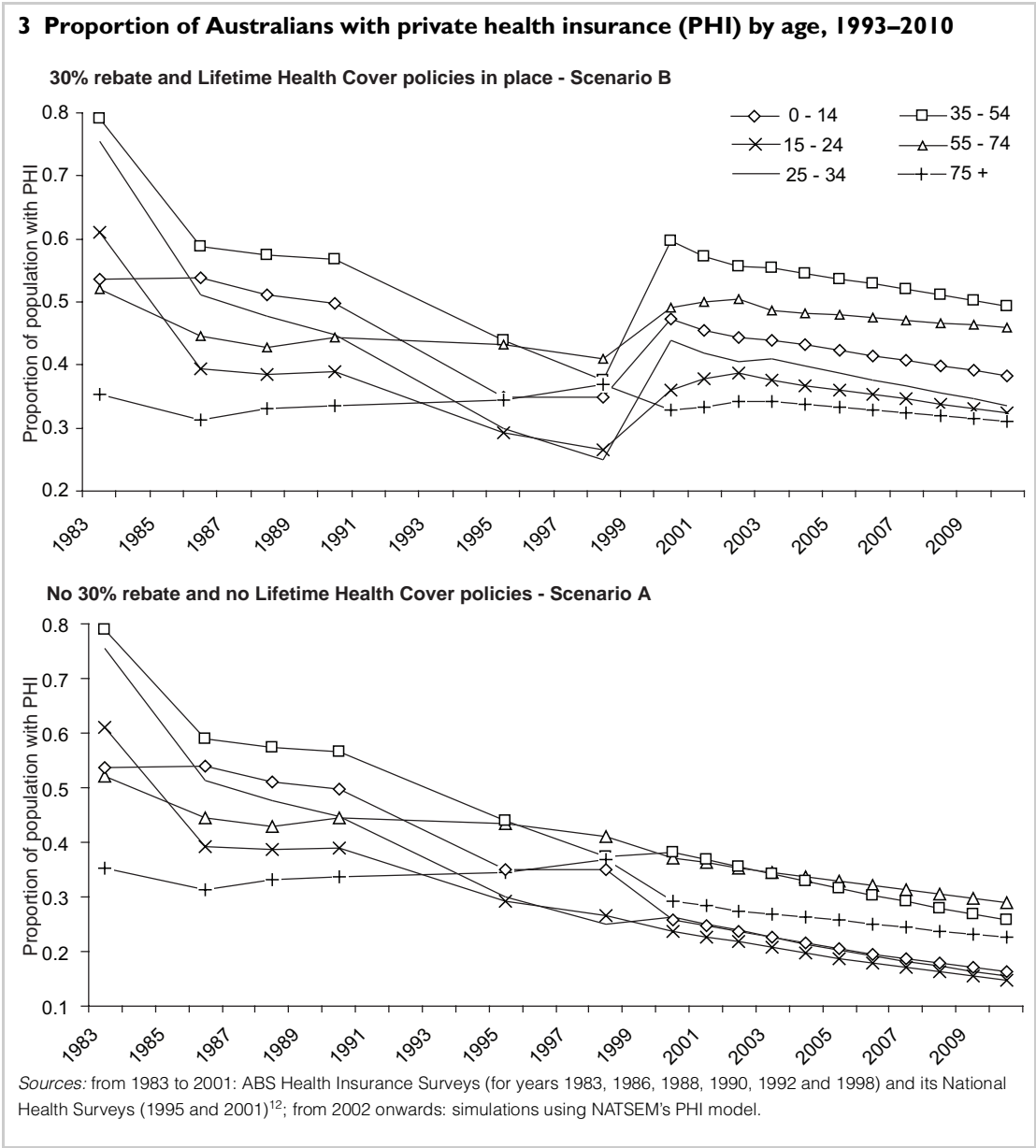

Sources: from 1983 to 2001: ABS Health Insurance Surveys (for years 1983, 1986, 1988, 1990, 1992 and 1998) and its National Health Surveys (1995 and 2001)[12]; from 2002 onwards: simulations using NATSEM's PHI model.

Box 4 also shows that PHI membership rates among the 40% least affluent in the population were very much lower than among other Australians — varying between 20% and 45% over the 1983–2010 period, compared with between 30% and 90% among other Australians.

Hospital use by people with and without PHI

To date, only scant attention has been paid in the literature to decisions made by individuals with and without PHI about their actual or intended use of a private or public hospital. One example is

3 Proportion of Australians with private health insurance (PHI) by age, 1993–2010

30% rebate and Lifetime Health Cover policies in place - Scenario B

No 30% rebate and no Lifetime Health Cover policies - Scenario A

Sources: from 1983 to 2001: ABS Health Insurance Surveys (for years 1983, 1986, 1988, 1990, 1992 and 1998) and its National Health Surveys (1995 and 2001)[12]; from 2002 onwards: simulations using NATSEM's PHI model.

Sullivan, Redpath and O'Connell who studied the choice of being a public or a private patient in a public hospital.[26]

We studied actual and intended choices of hospital type by persons with and without PHI using data from TQA Research's syndicated survey "Health care and insurance, Australia, 2001". This survey involved 5194 comprehensive telephone interviews with a random sample of insurable-unit heads from all areas of Australia. All interviews were conducted between 18 July 2001 and 17 August 2001. The sample was weighted to account for known health insurance status (effectively to match PHIAC statistics).

Survey responses

We analysed an extract from 2001 TQA survey data especially purchased for the broader ARC project. The analysis concerned the actual use of public and private hospitals by hospital insurance status, age and socioeconomic status.

We studied the behavioural responses of the 1038 people who reported using hospitals in the 12 months before interview. We first classified this group according to type of hospital used and whether respondents had hospital insurance. We were not able to disaggregate by age and SES simultaneously, due to the relatively small size of the sample. Because of this, we prepared two cross-tabulations, one by age only (Box 5) and the other by SES only (Box 6). The sample size in Box 6 is around 10% smaller than that in Box 5, due to a proportion of respondents being unable or unwilling to disclose their income. In these datasets the SES indicator is based on the combined household-income variable available in the TQA survey.

Box 5 shows that 15% of people without insurance who reported being hospitalised in the previous 12 months used a private hospital. It also shows that among patients with PHI, a high proportion used a private hospital (69%). Among patients without PHI, an even higher proportion used public hospitals (85%). Finally, Box 5 shows that, among people with PHI, younger persons were less likely to have used a private hospital than older ones (possibly an early response to the disincentive of high front end deductible cover for younger people).

4 Proportion of Australians with private health insurance (PHI) by socioeconomic status, 1993–2010

30% rebate and Lifetime Health Cover policies in place
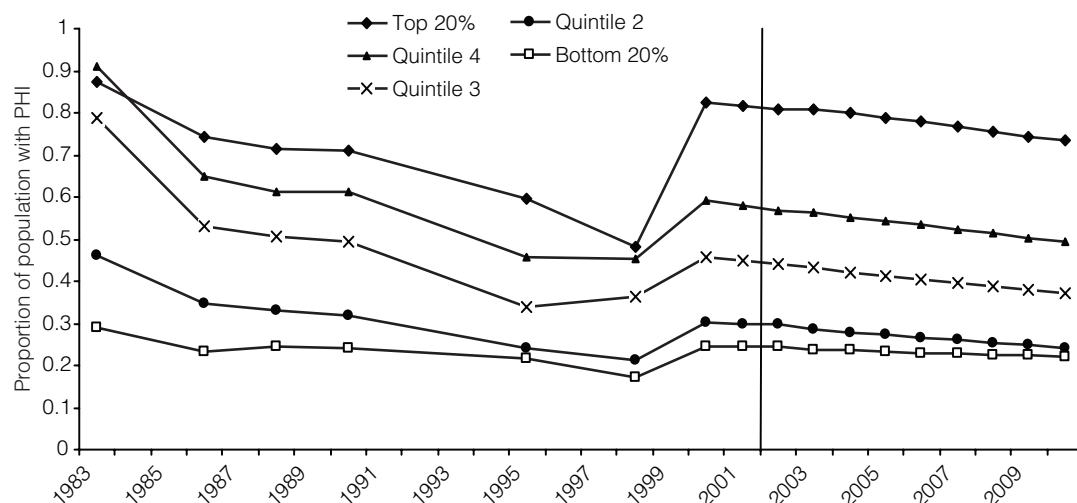
Sources: from 1983 to 2001: ABS Health Insurance Surveys (for years 1983, 1986, 1988, 1990, 1992 and 1998) and its National Health Surveys (1995 and 2001)[12]; from 2002 onwards: simulations using NATSEM's PHI model (indicated by vertical line).

Box 6 shows that 70% of people with PHI and a combined household income of over $70 000 in 2001 who reported having been hospitalised in the previous 12 months used a private hospital. This compared with only 60% of those with hospital insurance and with income of $15 000 or less using a private hospital. One explanation for this may be fear of gap payments among the latter group. Not surprisingly, Box 6 also indicates a lesser propensity for lower income groups without PHI to use a private hospital than higher income groups. Overall, the higher the socioeconomic status, the more likely were people with or without PHI to have used a private hospital in 2001.

Limitations

While the TQA data were very useful for this project, they had a number of limitations. The most important one is that the survey sample size is too small for the level of disaggregation desired. Apart from the *behavioural* question, we also examined the *intentional* question on public- or private-sector use in the event of hospitalisation. The expectation was that, with the larger number of people answering the *intentional* question, simultaneous disaggregation by both age and SES would have been possible. However, the actual sample size turned out to be smaller than expected due to 22% of respondents indicating indifference between a public or a private hospital.

Another potentially useful TQA survey question concerned the length of time covered. While this question could have been used to estimate the proportion of people who took out PHI in 2000, but were ineligible to use their cover until mid-2001, unfortunately this information had not been requested for the extract purchased from TQA.

Discussion

The research presented in this paper extends previous analyses by considering the age and SES composition of Australians with PHI cover, and the likely choices of hospital types made by people with and without PHI cover. It analyses PHI-related issues at a greater level of complexity than has been reported in most earlier publications.

Earlier researchers have reported on studies of this kind,[27,28] and there have been attempts to

5 Type of hospital usage, by age and hospital insurance status, Australia 2001

	Type of hospital used			
	Has hospital insurance		Doesn't have hospital insurance	
Age (years)	Public hospital	Private hospital	Public hospital	Private hospital
15–24	65.0%	35.0%	100%	0
25–34	35.2%	64.8%	79.5%	20.6%
35–54	28.8%	71.2%	85.1%	14.9%
55–74	21.3%	78.7%	83.3%	16.7%
75+	29.2%	70.8%	90.5%	9.5%
Total	31.2%	68.8%	85.0%	15.0%

Note: Does not include seven records where the response re hospital choice was "don't know".
Source: Data supplied by TQA Research (2001).

6 Type of hospital usage, by household income and hospital insurance status, Australia 2001

	Type of hospital used			
	Has hospital insurance		Doesn't have hospital insurance	
Income* ($)	Public hospital	Private hospital	Public hospital	Private hospital
Nil	0	0	100%	0
Up to 15 000	40.0%	60.0%	85.8%	14.2%
15 001–25 000	26.9%	73.1%	97.7%	2.3%
25 001–35 000	39.3%	60.7%	83.2%	16.8%
35 001–50 000	34.3%	65.7%	89.5%	10.5%
50 001–70 000	23.1%	76.9%	68.7%	31.3%
>70 000	29.5%	70.5%	80.0%	20.0%
Total	31.2%	68.8%	85.7%	14.3%

* Combined household annual income, with the "70 000–100 000" and "100 000+" groups aggregated.
Note: Does not include 110 records (out of 1038) where information on income was not provided
Source: Data supplied byTQA Research (2001).

account for the links between PHI coverage and public hospital utilisation in the 1998–2003 Australian Health Care Agreement.[6] In relation to analyses of such links it was noted that the assumptions chosen for the modelling exercises and the impact of the many factors external to the models needed careful consideration.[‡] Overall, because the complex interactions between the many factors impacting on the PHI–hospital-use relationship are not as yet well understood, the findings of modelling exercises published to date are unlikely to provide definitive answers.

Studying the likely impact of the 30% rebate in isolation as well as with Lifetime Health Cover is important because, unlike the rebate, Lifetime Health Cover does not involve any government subsidies. While some have studied the rebate in isolation,[31] others have assumed that the rebate and Lifetime Health Cover were an inseparable package.[28]

Regarding "inseparability", it is worth remembering that the 30% rebate was introduced 18 months earlier than Lifetime Health Cover, and the increase in PHI membership that followed the introduction of the rebate was very small (Box 1). While its withdrawal will impact on the cost of PHI to individuals, it has not yet been demonstrated that such a withdrawal would have a much greater impact than what occurred following the introduction of that policy.

Overall, more research on the equity and effectiveness of the 30% private health insurance rebate and the integral Lifetime Health Cover policy — as recommended by a recent Senate Inquiry — is likely to have considerable benefits.

[‡] *In this respect, assumptions of causality have been questioned — eg, some researchers commenting that the data used by Hanning[27] did not demonstrate a causative relationship between the increase in PHI coverage and the demand for private hospital services.[29] Assumptions by some that the new PHI policies explained most of the rapid increases that occurred in private hospital admissions are also questionable, given that much of the growth in that sector arose from the take up of new medical technologies by that sector — such as emergence of a very entrepreneurial same-day surgery sector, which focussed on providing diagnostic services, mainly scopes.[30]*

References

1 Organisation for Economic Co-operation and Development. Health at a glance: OECD indicators [media release]. Paris: OECD, 2003. Available at: http://www.oecd.org/document/34/0,2340,en_2649_201185_16077346_1_1_1_1,00.html (accessed Feb 2005).

2 Organisation for Economic Co-operation and Development. OECD countries struggle with rising demand for health spending [media release]. Paris: OECD, 2003. Available at: http://www.oecd.org/document/38/0,2340,en_2649_201185_16560422_1_1_1_1,00.html (accessed Feb 2005).

3 Senate Select Committee on Medicare. Medicare — healthcare or welfare? Canberra: Senate Printing Unit, Parliament House, 2003.

4 Segal L. Why it is time to review the role of private health insurance in Australia. *Aust Health Rev* 2004; 27(1): 3-15. Available at: http://www.aushealth-care.com.au/publications/article_details.asp?aid=714 (accessed Feb 2005).

5 McAuley, I. Stress on public hospitals — why private insurance has made it worse. Canberra: Australian Healthcare Association, 2004. Available at: http://www.aushealthcare.com.au/publications/publication_details.asp?pid=86 (accessed Feb 2005).

6 Cormack M. Private health insurance: the problem child faces adulthood. *Aust Health Rev* 2002; 25(2): 38-51. Available at: http://www.aushealth-care.com.au/publications/article_details.asp?aid=530 (accessed Feb 2005).

7 Thurecht L, Bennett D, Gibbs A, et al. A Microsimulation Model of Hospital Patients: New South Wales. Technical Paper No 29, *National Centre for Social and Economic Modelling*, University of Canberra, 2003, Canberra.

8 Walker A, Percival R, Thurecht L, Pearse J. Public policy and private health insurance: distributional impact on public and private hospital usage in New South Wales. *Refereed Proceedings, 33rd Conference of Economists;* 2004, September 27-29, Sydney (in press).

9 Percival R, Schofield D, Fischer S. Modelling the coverage of private health insurance in Australia in 1995. Canberra: National Centre for Social and Economic Modelling, University of Canberra, 1997. (Technical Paper no. 12.)

10 Percival R. Trends in private health insurance membership, 1983 to 1999. Report prepared for the Commonwealth Department of Health and Aged Care.

Canberra: National Centre for Social and Economic Modelling, University of Canberra, 1999.

11 Schofield D, Fischer S, Percival R. Behind the decline: the changing composition of private health insurance in Australia, 1983-95. Canberra: National Centre for Social and Economic Modelling, University of Canberra, 1997. (Discussion Paper No. 18.)

12 Australian Bureau of Statistics. 1995 National Health Survey: users' guide, Australia. Canberra: ABS, 1996. (Cat. no. 4363.0.)
National Health Survey 1995. Confidentialised unit record files, 1998.
National Health Survey 2001. Confidentialised unit record files, 2003.
Health Insurance Survey 1983. Customised data extract, 1983.
Health Insurance Survey 1986. Customised data extract, 1986.
Health Insurance Survey 1988. Customised data extract, 1988.
Health Insurance Survey 1990. Customised data extract, 1990.
Health Insurance Survey 1992. Customised data extract, 1992.
Health Insurance Survey 1998. Australia, customised data extract, 1998.

13 Australian Bureau of Statistics. June 1998 health insurance survey. Canberra: ABS, 1999. (Cat. no. 4335.0.)

14 Private Health Insurance Administration Council. Operations of the Registered Health Benefits Organisations annual report, financial and statistical tables, various years. Available at: http://www.phiac.gov.au/publications/ar_previous/index.htm (accessed March 2005).

15 Butler J. Policy change and private health insurance: did the cheapest policy do the trick? *Aust Health Rev* 2002; 25(6): 33-41. Available at: http://www.aushealthcare.com.au/publications/article_details.asp?aid=615 (accessed Feb 2005).

16 Pearse J, Mazevska D, Gibbs A. Private health insurance reform and population ageing. Health Services and Policy Research Conference; 2003 Nov 16-19; .Melbourne.

17 Private Health Insurance Taskforce. Reform of private health insurance (Discussion Paper). Canberra, Commonwealth Department of Health, Housing and Local Government: AGPS, 1993.

18 Industry Commission. Private health insurance. Canberra: AGPS, 1997. (Report No. 57.)

19 Australian Council of Social Service. Reforming private health insurance. Sydney: ACOSS, 1994. (Paper no. 64.)

20 Australian Institute of Health and Welfare. Australia's Health 1994. Canberra: AGPS, 1994.

21 Wilson J. An analysis of private health insurance membership in Australia. Canberra: National Centre for Social and Economic Modelling, University of Canberra, 1999. (Discussion Paper No 46.)

22 Schofield D. The distribution and determinants of private health insurance in Australia, 1990. Canberra: National Centre for Social and Economic Modelling, University of Canberra, 1997. (Discussion Paper No. 17.)

23 Australian Bureau of Statistics. Apparent determinants of private health insurance, Australia. Canberra: ABS, 1993. (Cat no. 4335.0.)

24 Hopkins S, Kidd M. The determinants of the demand for private health insurance under Medicare. Perth: Curtin Business School Public Sector Research Unit, 1993 (Discussion Paper Series no. 93.02.)

25 SAS Institute. SAS System for Regression. Cary, 1986, North Carolina, USA.

26 Sullivan N, Redpath R, O'Connell A. Public hospitals: who's looking after you? The difficulties in encouraging patients to use their private health insurance in public hospitals. *Aust Health Rev* 2002; 25(3): 6-14. Available at: http://www.aushealthcare.com.au/publications/article_details.asp?aid=551 (accessed Feb 2005).

27 Hanning B. Has the increase in private health insurance uptake affected the Victorian public hospital waiting list? *Aust Health Rev* 2002; 25(6): 64-71. Available at: http://www.aushealthcare.com.au/publications/article_details.asp?aid=619 (accessed Feb 2005).

28 Easing the pressure: the intergenerational report and private health insurance. Report prepared for Medibank Private. Canberra: Econtech, 2004.

29 Powers N, Sandararajan V, Gillett S, Marshal R. The effect of increased private health insurance coverage on Victorian public hospitals. *Aust Health Rev* 2003; 26(2): 6-10. Available at: http://www.aushealthcare.com.au/publications/article_details.asp?aid=679 (accessed Feb 2005).

30 Walker A, Thurecht L, Pearse J, Harding A Hospitalisation rates and costs by socioeconomic status, New South Wales, 1996-97 and 2000-01. Health Services and Policy Research Conference 2003, 16-19 November, Melbourne.

31 Deeble J. The Private Health Insurance Rebate – Report to State and Territory Health Ministers. *National Centre for Epidemiology and Population Health*, Australian National University, 2003, Canberra.

Appendix A: Changes in private health insurance policy, 1997–2000

1 July 1997– 31 December 1998	Incentives scheme introduced to subsidise private health insurance for low and middle income earners (single persons earning < $35 000; couples/families earning < $70 000 with $3000 threshold increase for each dependant child after the first)
1 July 1997	1% Medicare Levy Surcharge introduced to encourage high income earners (single people with taxable income > $50 000; and couples/families with taxable income > $100 000 with $1500 threshold increase for each child after the first)
1 January 1999	30% rebate provided for the purchase of private health insurance under the *Private Health Insurance Incentives Act, 1998* (Cwlth)
24 May 2000	Eligibility rules with respect to 1% Medicare Levy Surcharge introduced so that high income earners could not avoid the surcharge if they took out hospital policies with front end deductibles greater than $500 for singles or $1000 for families. This change in eligibility was not retrospective
1 July 2000	Introduction of Lifetime Health Cover, an initiative designed to encourage people to take out private health insurance earlier in life and to maintain their cover. People will pay a 2% loading on top of their premium for every year they are aged over 30 when they first take out hospital cover. People who were aged 65 years and over on 1 July 2000 are exempt. All health funds to offer members either a no gap or known gap product if they wish to continue to offer the 30% rebate as a premium reduction to their members

Appendix B: Technical details of the private health insurance model

This Appendix describes the construction and form of the logistic regression equation on which the PHI model is based.

Previous NATSEM work found that the best fit for the data up to 1995 was provided when a spline function was used to allow a change in the series to occur at 1990 (to simulate the effect of the recession in the early 1990s). The sharper fall in coverage from 1990 on has been hypothesised to have been triggered by the economic recession which occurred at the start of this period.[19] The failure of the slide in membership to halt as economic conditions improved would appear to support the suggestion put by the Australian Institute of Health and Welfare that insurance which is dropped during a recession may not be picked up when the recession ends.[20] Therefore, no attempt was made to include macroeconomic factors (such as the recession) in the model as it was expected that while changes to such factors in one direction (such as a recession worsening) would exacerbate the underlying membership decline, changes in the opposite direction would not reverse it.

Spline functions allow different functions to be fitted to different data regions in a model. They are typically used where there is an abrupt change in the data at one or more points.[25]

In NATSEM's previous study, a single spline function was used to fit different functions before and after 1990. The spline function used in that model was a variable which took the value of 0 for the years up to and including 1990 or was otherwise set equal to the number of years after 1990. For example, it would be set to 2 if the year was 1992 and 5 if it were 1995.

In this model, additional splines were used to simulate the introduction of Lifetime Health Cover in July 2000. The general form of the equation used is:

PI = f (Q, Ag, Sx, Lyr, Lpc, LyrG, LpcG, LyrAg Yr90 Yr98, Yr01) (1)
Where:
PI = probability of having private health insurance
Q = income quintile
Ag = age of person
Sx = sex of person
Lyr = log of number of years since 1983
Lpc = the log of average premium affordability costs
LyrG = log of number of years since 1983 * quintile
LpcG = the log of average premium affordability costs * quintile
LyrAg = log of number of years since 1983 * age of person
Yr 90 = spline (0 for the years up to and including 1990, otherwise the number of years since 1990)
Yr 98 = spline (0 for the years up to and including 1998, otherwise the number of years since 1998)
Yr 01 = spline (0 for the years up to and including 2001, otherwise the number of years since 2001)