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Joiners and leavers stayers and abstainers: Private health insurance choices in Australia

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Abstract

The percentage of Australians taking up Private Health Insurance (PHI) was in decline following the introduction of Medicare in 1984 (PHIAC). To arrest this decline the Australian Government introduced a suite of policies, between 1997 and 2000, to create incentives for Australians to purchase private health insurance. These policies include an increased Medicare levy for those without PHI on high incomes, introduced in 1997, a 30% rebate for private hospital cover (introduced 1998), and the Lifetime Health Cover (LHC) policy where PHI premiums are set at age of entry, increasing for each year older than 30 years (introduced 2000). In 2004 the longitudinal study on Household Income and Labour Dynamics in Australia (HILDA), included a series of questions on private health insurance and hospital use. We used the HILDA data to investigate the demographic, health and income factors related to the PHI decisions, especially around the introduction of the Lifetime Health Cover policy. Specifically we investigate who was most influenced to purchase PHI (specifically hospital cover) in 2000 as a response to the Lifetime Health Cover policy deadline. Are those who have joined PHI since the introduction of LHC different from those who joined prior to LHC? What are the characteristics of those who have dropped PHI since the introduction of LHC? We model the PHI outcomes allowing for heterogeneity of choice and correlation across alternatives. After controlling for other factors, we find that LHC prompted moderately well-off working age adults (30-49 yrs) to purchase before the 2000 deadline. Young singles or couples with no children, and the overseas born were more likely to purchase since 2000, while the relatively less well-off continue to drop PHI in spite of current policy incentives.

1. Introduction

The universal Australian public health care system, Medicare, was introduced in 1984. Subsequently the private health insurance coverage of the population fell steadily, reaching its lowest level of just over thirty percent in 1998. Commonwealth governments of both political persuasions argued that if the decline of private health insurance was to continue it would place unacceptable pressure on public hospitals in the future. In response, the Commonwealth introduced a suite of policies to create incentives for Australians to purchase private health insurance with the aim of promoting choice and relieving pressure on the public hospital system.

In 1997, the government introduced a private insurance tax rebate for low income singles and families and a tax surcharge (one percent of taxable income) for those on high incomes. The tax surcharge could be avoided by purchasing private health insurance. In 1999, the income-tested rebate for low earners was replaced with a constant thirty percent premium rebate, available to all regardless of income. In 2000, the Lifetime Health Cover policy (LHC) reform introduced an age gradient into the premium schedule. After July 15 2000, all new private insurance enrollees aged over 30 pay a premium loading for each insurance plan of two percent for each year of age over 30 at entry. The loading is capped at 70 percent. Irrespective of age, people already insured prior to the deadline who maintain their private insurance coverage are exempt from the loading. The 2000 reform was accompanied by extensive publicly-funded advertising under the theme "Run for Cover". As a result of these insurance incentives, private insurance coverage in Australia increased from 30.1 percent in 1998 to 43 percent in 2000, a jump of nearly 50 percent, most of which occurred just prior to the July deadline. There was also a change in the mix of the insured population with large fall in the percentage aged over 65.

Three policies have remained relevant since 2000:

1) the increased Medicare levy for 'high income' earners who did not purchase private hospital cover;
2) the 30% rebate for the purchase of hospital cover; and
3) the Lifetime Health Cover policy.

The Private Health Insurance Administration Council (PHIAC) is the industry regulator and part of its role is to collect statistics on trends over time. PHIAC data on membership is available quarterly in 5 year age bands showing the net change in coverage over time. Figure 1 shows the PHIAC trends in PHI coverage for working-aged adults from 1997 to 2006. The dramatic increase in coverage prior to the LHC deadline is very clear, with the largest rates of increase for those aged between 30 and 54. After 2000 however, the trends are quite different by age with generally falling coverage for the younger age bands, and increasing cover for the two oldest groups.

In this paper we explore heterogeneity of private health insurance choices taking advantage of the longitudinal HILDA dataset. Almost all of the literature on demand for private health insurance focuses on the purchase decision. This is the first Australian research, and one of very few papers internationally, to model the decision to discontinue private health insurance, as well as the purchase decision. We are particularly interested in distinguishing the factors motivating entry and exit since the LHC deadline. We investigate demographic, family, health and income factors related to respondent's private health insurance decisions in the light of the insurance

incentives. We focus on whether these policy changes attracted a different demographic to purchase private health insurance than previously and which demographic groups chose to drop their insurance cover. Since the incentives aim to reduce pressure on the public hospital system, we focus on hospital cover, whether or not the individual has ancillary cover for dental, optical and allied health services..

We identify six distinct groups: those who purchased private hospital cover before LHC; those who reported they took up private hospital cover in 2000 in response to the LHC deadline; those who took up private hospital cover after 2000 (i.e. after the LHC premiums were in place); those who dropped private hospital cover after 2000; those who had dropped private hospital cover prior to 2000 and remained uninsured; those who had never purchased private hospital cover. We model the insurance decisions using a multinomial probit model which allows for heterogeneity of choice and correlation across alternatives and use our preferred model to simulate predicted probabilities for each alternative outcome. To illustrate our results we constructed a series of hypothetical index individuals for each outcome alternative of interest, setting the levels of the explanatory variables to give a high predicted probability of choice for that alternative. We then use the index individual as a base to examine the effect of a change in the level of each explanatory variable on the probability of choice for the alternative of interest, keeping all other variables at the level of the index individual.

We focus our analysis on the three groups whose decisions would be affected by LHC: those who joined PHI because of the lifetime Health cover deadline, those who joined after the deadline and those who dropped hospital cover since the introduction of the policy.

2. Literature

Cutler and Zeckhauser (2000) review the large literature on the demand for health insurance much of which builds from the key papers of Arrow (1963) and Rothschild and Stiglitz (1976) Besley, Hall and Preston (1999) find that demand for supplementary insurance in the UK is related to waiting times for public treatment and that those with private coverage have higher income, tend to be middle-aged and be conservative voters. Propper (2000) similarly finds that richer, more conservative individuals who have less commitment to equity goals are more likely to use private services in the UK. In Ireland where the public health system is most similar to Australia, Harmon and Nolan (2001) find that large increases in insurance coverage over the last three decades is driven by perceptions about waiting time and quality in the public system, as well as the usual socioeconomic and demographic factors. Finn and Harmon (2006) estimate a dynamic model of supplementary insurance demand for Ireland and find that cover is associated with higher income and education, and better health status. In their dynamic specification they show that persistence is a major factor in insurance demand and that inclusion of insurance status in the previous period reduces the impact of socioeconomic and health factors.

The US empirical literature focuses either on employer-based insurance for the population not eligible for public health programs or the purchase of supplementary insurance (Medigap) for those aged over 65 who are eligible for the public Medicare program. For the non-Medicare population, Abraham, Vogt and Gaynor (2002), using the 1996 Medical Expenditure Panel Survey, find that health plan take-up and

switching is relatively unresponsive to price. Using the same survey, Cardon and Hendel (2001) estimate a structural model of employee-based health insurance for single individuals; they find no evidence of adverse selection and that health insurance as a fringe benefit is highly related to income. Using 1994 data on postal employees, Gruber and Ebonya (2003) similarly find a very small price effect on insurance take-up and modest movements between plans.

Using semiparametric techniques Bajari et al (2006) estimate a structural model of consumer demand for health insurance and medical utilisation using the US Health and Retirement Study which includes both working individuals and those eligible for Medicare. Their results suggest that differences in self reported health status do not vary much between different insurance plans; they conclude that the incentive to sort between plans is limited in the setting of most concern to consumers ie a severe negative health shock.

For the population eligible for Medicare, Wilcox-Gok and Rubin (1994) examine the decision to purchase supplementary private insurance. They find that the purchase decision is associated with household income, health status and functional limitations, as well as age, sex, race and education. Ettner (1997) estimates a logit model of supplementary insurance demand using the 1991 Medicare Current Beneficiary Survey and finds that the probability of insurance purchase increases strongly with wealth. A recent study by Fang, Keane and Fang (2008) finds strong evidence of advantageous selection in supplementary insurance for the US Medicare population. However, they also find that information on cognitive ability can account for this.

In France, the motivation for supplementary insurance purchase is to reduce co-payments associated with public treatment. In this setting, Buchmueller et al (2004) find that insurance cover is unrelated to health status. In Catalonia attitudes to public or private health care matter: 22% of the population state that they would never purchase private cover (Costa-Font & Font-Vilalta, 2004).

Previous Australian research on private health insurance purchase falls into three categories: analysis of insurance demand prior to the reforms of the last decade; analyses of the PHI incentives overall; and analyses of the incentives focusing on heterogeneity across individuals or families. The factors influencing the demand for private insurance coverage prior to LHC have been examined using the ABS National Health Surveys (NHS). Using the NHS surveys undertaken between 1983 and 1995, Schofield et al (1997) examines the changing composition of PHI coverage of the population. They identify a decline among middle income families compared with both upper and lower income groups and a smaller decline among families headed by a person over 55 years old than younger families. They also find that rising premiums had the greatest impact on low income families. Using the 1989 and 1995 NHS data respectively, Savage and Wright (2003) and Barrett and Conlon (2003) found a strong association between demand for insurance and income. Savage and Wright also examine the association between utilisation and insurance for private hospital length of stay. They found that insurance could more than double the average length of private hospital stay.

The introduction of the insurance incentives generated considerable research. Butler (2002) analysed the "carrots and sticks" financial incentives for PHI and found that the membership uptake that occurred was largely attributable to LHC, a policy that

had virtually no cost to government. He also examined the changing age composition of the insured pool after September 2000, and observed that the increasing average age of those insured suggests the possible reappearance of an adverse selection dynamic. He argues that the 'trick' delivered by LHC may not be maintained in the longer term. Walker et al (2005) present an historical analysis of the impacts of the different PHI incentives in terms of the proportion of Australians having hospital insurance cover by age, gender and socioeconomic status . They found that the increased cover was due mainly to the richest 20% of the population. Among the poorest 40% the impact was minimal.

Dawkins et al (2004) found strong evidence that households most affected by the PHI policy changes were those with high socio-economic standing and high income and little evidence that the policies alleviated the burden of public hospitals. Vaithianathan (2004) argued that the subsidy to health insurance should have been an effective means to increase PHI coverage, but was ineffective because community rating was ineffective. Despite community rating rules which prohibit age adjusted premiums, Household Expenditure Survey data indicate that young adults pay considerably less for their insurance than older adults. She concluded that insurers circumvented community rating through plan design, screening older consumers into more expensive plans. She also found that the penalty of 2 per cent per year for delaying insurance, introduced as part of the lifetime cover plan, is too low to be effective.

Doiron et al (2008) investigated the relationship between *ex ante* risk and private health insurance using the NHS 2001 and found a strong positive association between self-assessed health and private health cover and identify the factors responsible for favourable selection. They found that those persons who engage in risk-taking behaviours are simultaneously less likely to be in good health and less likely to buy insurance.

Palangkaraya and Yong (2005) attempted to isolate the effects of the different insurance incentives using 1995 and 2001 NHS data. Focusing on single individuals their counterfactual analysis indicates that LHC caused between 42% and 75% of the overall increase in PHI membership. Ellis and Savage (2005) used the NHS 2001 data to estimate a model of individual decisions to enroll in private health insurance in order to understand the effects of the PHI reforms on the age and income distribution of those with private cover over time. They conclude that the major impacts of the three reforms can be understood as a broad-based “Run for Cover”, a response to a deadline and an advertising blitz, rather than a pure price response. They also found that LHC would have had a larger impact on coverage for families without the 30% premium subsidy.

Lu and Savage (2006) used the 2001 NHS to examine the impact of increased private insurance coverage on use of both public and private hospital systems focusing on how behaviour varies with insurance duration. They found that those who enrolled in response to the incentives behave more like the uninsured than the long-term insured. While the insurance incentives substantially increased the proportion of the population with supplementary private insurance, the impact on the use of the public system by new entrants appears to be quite modest..

Feibig et al (2006)analysed private health insurance behaviours among respondents to the 2001 NHS to identify insurance ‘types’ according to stated reasons for buying

health insurance. They found considerable evidence of unexplained heterogeneity among the privately insured population and that insurance type is significantly associated with hospital utilisation, particularly the probability of being admitted as a public or private patient. The government's insurance incentives were more attractive to particular types of the insured population and this limits the effectiveness of the incentives in reducing pressure on the public hospital system.

There is no existing analysis of the decision to discontinue private insurance cover in Australia and internationally there are few studies that focus on this. Gruber and Madrian (1995) model the discontinuation of insurance following job loss in the US. Sommers (2005) estimates disenrollment among children eligible for the US Children's Health Insurance Program (SCHIP); over a 12 month period he finds a drop-out rate of 28%, almost half of whom remained eligible for assistance. Children of more educated parents were more likely to move to private insurance while black children and very young children were more likely to become ineligible. Lower levels of subsidy also resulted in a higher rate of drop outs.

3. Data

The Household Income and Labour Dynamics of Australia (HILDA) study is a longitudinal population survey which commenced in 2001. HILDA is a representative sample of Australian households. In the baseline 2001 survey data was collected on all members of 7,682 selected households and individuals aged 15 years and over were interviewed. Respondents have been followed over time and interviews are conducted every 12 months. New household members are included in subsequent interview waves, while ever they share a household with a baseline respondent. The survey covers questions on income, expenditures, education, occupation and other roles, demographics, health, family formation, risk behaviours, attitudes and life events. The HILDA sample and method have been described in detail elsewhere (see http://melbourneinstitute.com/hilda/).

In Wave 4 of HILDA conducted in 2004, respondents were asked a series of questions on private health insurance and hospital usage. Did respondent currently have private health insurance? If yes, did it include hospital cover? When did he/she join? And if he/she joined in 2000 was that as a response to the LHC policy? If the respondent was not currently insured, had he/she ever had hospital cover in the past and if so how long ago did he/she drop hospital cover?

Since the questions on private health insurance cover were only asked in Wave 4 of HILDA we adopt a retrospective cohort approach to model the factors related to private health insurance decisions. Our outcome variable depends on the most recent decision in relation to the purchase of private hospital cover insurance recorded in Wave 4 of HILDA. From the responses to the above questions we create six outcomes.

1. Joined prior to LHC: those who purchased private hospital cover before LHC
2. Joined because of LHC: those who stated they took up private hospital cover in 2000 because of LHC.
3. Joined after LHC: those who took up private hospital cover after the 2000 LHC deadline.
4. Left after: those who dropped private hospital cover after 2000.

5. Left prior: those who had previously had insurance cover but had dropped it before 2000, including those who still only held extras cover.
6. Never: those who had never purchased private hospital cover, including those who had only ever held ancillary cover.

Our explanatory variables are responses to questions recorded in Wave1 of HILDA. We chose Wave 1 as the baseline because that was the closest time period to the 2000 policy changes and therefore was the best available measure of the respondent's status at the time of the policy changes. In addition, differences between Waves 1 and 2 in income, financial assets and health were calculated to measure the effect of prospective changes after 2001 on more recent decisions to purchase or drop private hospital cover after the introduction of LHC.

Explanatory variables fall into five categories:

1. *Demographic variables* included age, sex, region of residence, education, occupation, country of birth and languages spoken other than English. Family formation variables included couple status, the number of respondent's resident children < 25 years and the age of the youngest resident child.
2. *Health variables* included long-term illness or disability, the Short Form Health Survey (SF-36) items and scales, alcohol consumption, smoking status and exercise.
3. *Financial variables* included individual, partners and household wages, benefits and financial assets, attitudes to financial risk and self-assessed prosperity.
4. *Retrospective life events* in the 12 months prior to 2001 included self-report of financial improvement or worsening, losing a job, being promoted, changing jobs, retiring, marriage, separation, reconciliation, becoming pregnant, a new baby, injury or illness for self or family.
5. *Prospective changes* in the 12 months from 2001 to 2002 included personal and household income and financial assets, changes in disability/illness and SF-36 self-assessed health.

In the analysis we used the balanced panel of respondents aged 18 years and over who had complete data for the relevant variables in Wave1 to Wave 4. There were 13,191 respondents 18 years and over in Wave 1 of HILDA. The balanced panel aged 18 years and over from Waves 1 to 4 comprised 9,377 respondents, 98% of whom answered the self-completion questionnaire in Wave 1. Eight respondents did not answer the questions on private health insurance in Wave 4. This gave a final sample of 9,196. Half of the sample (49.6%) held private hospital insurance in 2004. A further 336 (3.6%) held ancillary cover only. The private health insurance choice (hospital cover only) categories used in the analysis are shown in Table 1.A quarter of respondents (25.7%) had never held any private hospital cover and another 20% had dropped private hospital cover prior to 2000, the majority (1,572 of 1,857) prior to 1998. Of those who had dropped private hospital cover after 2000, half (219 of 424) had done so between 2000 and 2002. Similar numbers had joined after LHC as had dropped their cover since 2000 (448 and 424).

4. Modelling strategy

Multinomial logit

In order to examine the explanatory variables on PHI choice, we assume that each individual has an unobserved utility associated with each of six discrete outcomes. Individuals then choose the alternative with the highest utility.

With a linear random utility model this implies:

$$(1) \quad U_{ij} = x_i' \beta_j + \varepsilon_{ij}; \quad j = 1,..,6$$

where x represents the vector of control variables. Under the assumption that the disturbances are distributed as iid type I extreme value, the random utility framework motivates the use of the multinomial logit model.

While the multinomial logit model is limited by the assumption of "independence of irrelevant alternatives" (IIA) where a person's preference for one choice alternative is independent of his/her preference for another alternative, it is a useful model to use in a initial analysis to determine a parsimonious specification. A multinomial logit model was fitted with the six PHI categories as the outcome. All available explanatory variables were included in the full model in families of related variables, specifically demographics, relationship and family formation, education and occupation, health, wages, benefits and financial assets, health risk and financial risk, retrospective self-reported life changes, prospective changes in income and financial assets. Variables in the full model were reduced using backward elimination. The objective was to retain in the model those variables from each family with the greatest explanatory power, without omitting any important variables from the model. Each family was reduced in the presence of all other variables. Each variable in the family was tested in turn starting with the least significant. The variable was kept or dropped based on the likelihood ratio test (alpha = .05) and the next least significant variable was tested and so on. The next family was then reduced the same way. Age, sex, health and income have been found to be important explanatory variables for health insurance behaviour and were therefore included in the model regardless of their significance in the sample.

A likelihood ratio test compared the final model with the full model to ensure that the backward elimination procedure had not omitted any important explanatory variables. In addition the coefficients in the final model were compared with the full model to identify any substantial changes.

The variables retained in the final model were age, sex, partner status, number of children, age of youngest child, occupation, education, language, country of birth, region of residence, self-assessed health, disability or long-term illness, smoking status, weekly exercise, individual wages, benefits and financial assets, partner's wages and financial assets, total household wages, self-reported prosperity and attitude to financial risk, recent loss of job, recent illness or disability in the family, recent worsening of financial situation, recently married, prospective changes in household wages, benefits and financial assets.

The final set of variables was inspected for functional form. Age was entered as a spline with break-points at age 31, 46 and 66 to capture the age-related effects of the LHC policy. Positive financial assets and negative financial assets each predicted a greater probability of having private health insurance relative to no financial assets.

Therefore to capture this non-linear relationship, financial assets was fitted as two ordinal variables, positive financial assets with 6 categories ($0 to $9999, $10,000 to $19,999,…..,$40,000 to $49,999, $50,000 and above) and negative financial assets with 2 ordinal categories (< -$10,000, $0 to -$9999).

Smoking status that was missing for Wave 1 was imputed from later waves of the panel where possible. There were 510 observations with incomplete data that were omitted from the model (5.5% of the balanced panel). The number of complete cases in the final model was 8,686.

Multinomial probit

In a multinomial logit the error term is assumed to be due to random variation or noise, unrelated to the outcome alternatives. In many choice situations however, deviations from the expected outcome may in part be explained by individual variation in taste related to unobserved characteristics of the alternatives rather than completely due to random error. Furthermore, these variations in taste could be expected to be correlated across choice alternatives, depending on the similarity between the available alternatives. In this analysis of private health insurance choices, specific categories may be related depending on a person's preferences for or against private health insurance. If this is the case, the multinomial logit model would not pass the IIA test. This was confirmed in our analysis by conducting the Small-Hsiao test for IIA on the multinomial logit model that gave a significant test statistic with p-value less than 0.001.

Therefore we used a multinomial probit model as a way of modelling variations in taste across alternatives. The multinomial probit model is again based on equation (1) but assumes the error term for each alternative is normally distributed, but allows error terms to be heteroskedastic to accommodate taste variations and to be correlated across alternatives. The unrestricted multinomial probit model allowing the error terms to be heteroskedastic and freely correlated across alternatives was compared to a model with error terms restricted to be homoskedastic and equi-correlated across alternatives. The unrestricted multinomial probit fitted the data better than the restricted model with the associated likelihood ratio test being highly significant with $p < .0001$.

Predicted probabilities

The final unrestricted multinomial probit model was used to simulate predicted probabilities for a series of hypothetical observations created to observe the effect of changing the level of each explanatory variable on the estimated probability of the alternative outcome. A series of index individuals were created, one for each outcome alternative, as a base to examine the effects of each explanatory variable on the probability of that particular outcome. The model coefficients were used to select levels of the explanatory variables to create an individual with a high probability for a particular outcome. The explanatory variables were then varied one level at a time to estimate their effects on the probability of the alternative of interest, keeping all other variables at the level of the index individual. Index individuals were created for the three alternatives of most interest; purchasing hospital cover because of lifetime health cover, joining after 2000, and leaving after 2000. The effects of age were estimated holding all other explanatory variables at the level of the sample mean.

4. Results

A summary of the characteristics of the total sample and each choice category is shown in Table 2. Respondents with private hospital cover in 2004 were more likely in 2001 to have tertiary qualifications, to be living in a major city, to be a non-smoker and have higher average wages than those without insurance. A greater proportion of those who took up hospital cover in response to LHC policy were couples with children, compared to the other groups. Those who joined private hospital cover after 2000 had a marked increase in household wages from 2001 to 2002. In contrast those who dropped private hospital cover after 2000 had a marked decrease in household wages from 2001 to 2002.

TABLES 1 AND 2 NEAR HERE

The characteristics of the three index individuals are summarised in Table 3 along with their predicted probabilities for each choice alternative.

TABLE 3 NEAR HERE

Joined because of LHC

As shown in Table 3 the index individual for joining private health insurance because of LHC is a 40 year old with a partner and one child aged 5-14 years, who is a non-smoker with no long-term health conditions, employed in a professional occupation with tertiary qualifications, with an annual wage of $100,000 and no financial assets, whose partner is not working. The estimated probability of joining because of LHC for the index individual is 38%, much higher than the overall sample rate of 6%. The probability of joining prior to LHC is also higher for this individual than for the sample rate (55% versus 39% in sample).

TABLE 4 NEAR HERE

The effect of age on the probability of joining because of LHC, holding all other variables at the sample mean, are shown in Figure 2 and the effects of changing the levels of other variables for the index individual are shown in Table 4. To provide a comparison with those who joined prior, Table 4 also shows the changes in probability of having joined prior to LHC for each change in the level of the LHC index individual.

In summary the characteristics that describe those with the greatest predicted probability of having purchased private hospital cover in 2000 because of LHC are:

- being aged 31-45 years;
- having 1 school-aged child;
- being on a single income between $60k and $120k;
- being in a professional occupation;
- having no financial assets in 2001;
- self-reporting financial circumstances as “just getting by”;
- having had an injury or illness to a family member in the 12 months prior to 2001;
- being born in Asia/Pacific.

Being recently married, higher partner's wages and higher financial assets reduced the probability of joining because of LHC deadline relative to having already joined before the introduction of the LHC policy. Having a larger younger family also decreased the probability of joining because of the LHC deadline relative to having already joined prior.

Variables that did not affect the probability of joining because of LHC, included smoking status, having a long term disability or health problem, occupation or qualifications, reporting being financially worse in the 12 months prior to 2001, or any changes in income or financial assets following 2001.

Joined after 2000

The index individual for joining private hospital cover after the introduction of LHC (Joined after 2000) was a 29 year old male with partner and no children, a non-smoker, with no long-term health conditions, in a professional occupation. The estimated probability of having joined after 2000 for the index individual is 40%. The effect of age on the probability of joining after 2000 holding all other variables at the sample mean, are shown in Figure 3 and changes in probability for changes in the levels of the index individual are shown in Table 5.

In summary the characteristics that describe those with the greatest predicted probability of having purchased private hospital cover after 2000 are:

- turning 30 years of age after 2000;
- being single or in a couple with no children in 2001;
- having no financial assets in 2001;
- not becoming financially worse-off in the 12 months prior to 2001;
- having no increase in benefits from 2001 to 2002;
- being from a non-English speaking background and/or born overseas;
- having a long-term illness or disability.

Variables with negligible effect on joining private hospital cover after 2000 included smoking status, region of residence, having a family member with a recent illness or disability and changes in financial assets after 2001.

Left after 2000

The index individual for leaving private hospital cover after the introduction of the lifetime health cover policy is a 35 year old female, in a working couple with 3 children, the youngest under 5 years old, who is a regular smoker with no long-term illness or disability. The individual's annual income is $50,000 and her partner's income is $70,000. The estimated probability of the index individual being in the group that left private hospital cover after 2000 is 46%.

Figure 4 shows the effect of age on leaving hospital cover after 2000, with all other variables held at the sample mean. Changes in probability for changes in the levels of the index individual are shown in Table 6. In summary the characteristics that describe those with the greatest predicted probability of having left private hospital cover after 2000 were:

- having greater household debt in 2001;
- reporting becoming financially worse-off in the 12 months prior to 2001;

- having a decrease in wages and an increase in benefits from 2001 to 2002;
- reporting taking no financial risks;
- being in a non-professional occupation;
- being a regular smoker.

Variables with negligible effect on the probability of leaving private hospital cover after 2000 included having a disability or long-term health condition, number of children and self-assessed prosperity.

5. Conclusions

The policies of the last decade in Australia have aimed to change the mix of those who hold private health insurance in terms of age and other socio-demographic factors. The LHC policy in particular was aimed at attracting younger members into PHI. The effect of age on the net purchase of private health insurance since 2000 can be seen in the PHIAC statistics shown in Figure 1. However unlike the administrative data, the analysis in this paper reveals details of the family, health and financial profiles of those who are taking up private health insurance since the introduction of LHCand importantly those who are dropping it. After controlling for other factors, we find that those who took up private health insurance in 2000 as a response to LHC and who still held it in 2004, were somewhat less well-off than their peers of similar age and family structure, who had already taken up private health insurance prior to the LHC policy. Judging by their similarities to those already insured, the LHC deadline group included those who may have been intending to take up health insurance at a later stage in life but who brought their decision forward because of the LHC policy.

The major factors that affected the probability of taking up PHI after 2000 were age, number of children and country of birth. Young childless couples and those from a non-English speaking background represent a new demographic that was not inclined to purchase hospital cover prior to the introduction of the LHC policy. Like the LHC deadline group, those who purchased hospital cover after 2000 had fewer financial assets or financial commitments than those who had joined prior to the introduction of LHC.

The group who dropped PHI after 2000 may include the “reluctant insurers” who joined LHC in response to the “fear” campaign surrounding the introduction of the policy (Deeble, 2003; Ellis & Savage, 2005) or for financial reasons (Fiebig, Savage, & Viney, 2006). Whatever their motives for purchasing, it appears that declining financial circumstances was a major factor for the group that dropped PHI after 2000. For the group who were unable to maintain PHI under the current policy incentives, the LHC age premiums provide a further affordability barrier to keep them out of PHI in the future.

The analysis indicates that income is still a dominant factor in PHI decisions. Incentives to increase affordability in terms of 30% rebate and to avoid future PHI costs in terms of LHC policy have not been able to attract people on relatively low incomes nor hold onto those who experience subsequent declines in income or financial assets.

Therefore the effect of the LHC policy may have been to broaden the insured base in terms of age, but restrict access to PHI based on income. Taking advantage of the

LHC policy required a timely response to the policy, but it also requires that the family or individual have the requisite income at the age window for avoiding the future LHC penalty. Therefore families and individuals with a flatter or less certain income trajectory are penalised by the policy as those who drop out for financial reasons pay a penalty on return and those who may delay because of financial reasons also pay a penalty. The recent introduction of a sunset clause in the LHC policy which reduces the LHC premium loading after 10 years of insurance (Department of Health and Ageing, 2006) may go some way to reducing the long-term penalty to the currently uninsured but does not address the initial entry hurdle that lower income earners now face that was created by the LHC policy.

Tables

Table 1: Distribution of private hospital cover choice categories in HILDA Wave 4 (2004)

	N	Sample %
Joined prior to lifetime health cover	3,539	38.5%
Joined in 2000 in response to LHC	567	6.2%
Joined after 2000	448	4.9%
Left after 2000	424	4.6%
Left prior to 2000	1,857	20.2%
Never held private hospital cover	2,361	25.7%

Table 2: Comparison of selected demographic, financial, family and health variables in Wave1 (2001) across private hospital cover groups

HILDA WAVE1 variables	**Joined Prior**	**Joined Because of LHC**	**Joined After**	**Left After**	**Left Prior**	**Never**	**Total**
N	***3,539***	***567***	***448***	***424***	***1,857***	***2,361***	***9,196***
%	*38.5%*	*6.2%*	*4.9%*	*4.6%*	*20.2%*	*25.7%*	*100.0%*
Mean age (years)	49.3	42.4	36.7	41.8	53.0	39.8	46.2
Female (%)	55.0	50.8	55.4	55.2	54.8	51.3	53.7
Lives in major city (%)	63.7	62.3	69.2	59.2	46.0	51.9	57.1
Couple with children (%)	36.2	51.2	27.5	31.8	25.6	33.6	33.7
Single no children (%)	18.3	16.6	31.5	31.1	29.4	34.7	25.9
Tertiary qualification (%)	27.7	34.7	32.8	16.8	8.8	13.1	20.3
Smoker (%)	13.1	16.6	20.8	29.4	25.5	35.8	22.6
Long term health problem/disability (%)	18.7	13.1	17.2	24.5	35.2	23.4	23.1
Self-assessed health good or better (%)	87.9	88.9	92.1	85.6	74.9	81.2	83.7
Born in Australia	79.2	77.4	70.8	79.3	77.8	71.7	76.5
Self-reported finance worse prior 12 mths (%)	2.4	2.5	1.6	7.8	4.1	3.3	3.2
Household wages ($)	$60,130	$70,241	$61,341	$46,763	$25,717	$32,599	$46,179
Individual benefits	$1,886	$1,159	$1,995	$3,171	$5,787	$5,116	$3,523
Change in house wages 2001-02 ($)	$345	$3,183	$6,939	-$4,576	-$297	$634	$559
Change in household benefits 2001-02 ($)	$396	$307	-$553	$1,077	$628	$511	$452

Table 3: Characteristic of index individuals for "Joined 2000 because of LHC", "Joined after 2000" and "Left after 2000" and probabilities of each PHI choice

Variable	LHC index individual	Joined After index individual	Left After index individual
Age	40 years old	29 years old	35 years old
Sex	Male	Male	Female
Region	Major city	Major city	Major city
Relationship	Partner	Partner	Partner
Disability	No disability	No disability	No disability
Language	English only	English only	English only
Occupation	Professional	Professional	Service worker
Qualifications	Tertiary	Diploma	Diploma
Country of birth	Australia	Australia	Australia
Individual wages	$100,000	$60,000	$50,000
Partner's wage	Partner's wages $0	Partner's wages $60,000	Partner's wages $70,000
Individual benefit	$0	$0	$0
Individual financial assets	No financial assets	No financial assets	Positive financial assets $0-$10,000
Partner's financial assets	$0	$0	$0
Change in household wages 2001 to 2002	$20,000 increase in household wages	$25,000 increase in household wages	$40,000 decrease in household wages
Change in household benefits 2001 to 2002	No change in household benefits	No change in household benefits	$10,000 increase in household benefits
Change in household financial assets 2001 to 2002	$50,000 increase in household financial assets	$40,000 increase in household financial assets	No change in household financial assets
Married previous 12 mths	Not recently married	Not recently married	Not recently married
Family illness or injury previous 12 mths	Recent family illness	Recent family illness	Recent family illness
Lost a job previous 12 mths	Has not lost a job	Lost a job	Lost a job
Financially worse previous 12 mths	Not financially worse the last 12 mths	Not financially worse the last 12 months	Financially worse the last 12 mths
No of resident children	1 child	No children	3 children
Age of youngest resident child	Youngest child 5-14 yrs	N/A	Youngest child < 5 yrs
Regular smoker	Non-smoker	Non-smoker	Smoker
Financial risk behaviour	Takes average financial risks	Takes high financial risks	Takes no financial risk
Self-assessed prosperity	Considers self very prosperous	Considers self very prosperous	Considers self poor
Exercise	Exercises 3 times weekly	Exercises less than weekly	Exercises less than weekly
Probabilities of each private health insurance choice alternative estimated from multinomial probit			
Joined Prior	0.555	0.459	0.239
Joined because of LHC	**0.380**	0.075	0.013
Joined After	0.039	**0.401**	0.004
Left After	0.008	0.036	**0.479**
Left Prior	0.007	0.014	0.260
Never	0.010	0.016	0.015

Table 4: Change in probability of having Joined Because of LHC compared with having Joined Prior for changes in the levels of the LHC index individual.

Reference level (LHC index individual)	change in level	Change in probability for LHC	Change in probability for Joined Prior
Male	Female	-0.042	0.049
Age 40	Age 50	-0.081	0.115
	Age 32	0.026	-0.064
	Age 29#	-0.132	-0.132
1 child	No children	-0.032	-0.009
	3 children	-0.083	0.077
Youngest Child 5-14	Youngest Child < 5 yrs	-0.041	0.047
Born Australia English speaking only	Australian born Non-English speaking background	0.063	-0.079
	Born Asia/Oceania Non-English speaking background	0.094	-0.202
	Born Africa/Middle East Non-English speaking background	-0.063	-0.034
Wages $100,000	Wages $0	-0.078	-0.146
	Wages $40000	-0.024	-0.066
	Wages $80000	-0.001	-0.016
	Wages $120000	-0.002	0.012
	Wages $160,000	-0.011	0.034
Partner's wages $0	Partners wages $40,000	-0.018	0.037
	Partners wages $100,000	-0.054	0.084
	Partners wages $120,000	-0.066	0.099
	Partners wages $160,000	-0.091	0.127
No financial assets	Financial assets (neg) < -$20,000	-0.025	0.059
	Financial assets (pos) $40,000-$50,000	-0.086	0.131
Recent family illness	No family illness/disability	-0.049	0.032
Not recently married	Recently married~	-0.145	0.048
Very prosperous	Just getting by financially	0.076	-0.083
Not lost job last 12 months	Lost job last 12 months	-0.080	0.040
Exercises 3 times weekly	Exercises less than weekly	-0.070	0.050

Base = LHC index individual except with no children
~ Base = LHC index except age 32 no children

Table 5: Change in probability of having Joined After 2000 compared with having Joined Prior for changes in the levels of the Joined After index individual.

Reference level (Joined After index individual)	change in level	Change in probability Joined After	Change in probability Joined Prior
Age 29 years	Age 25 years	-0.042	0.035
	Age 40 years	-0.270	0.203
	Age 50 years	-0.347	0.326
No children	1 child	-0.128	0.118
Australian born English speaking background	Born Asia/Oceania NESB	0.240	-0.246
	Born Africa/Middle East NESB	0.119	-0.123
	Born Europe NESB	0.158	-0.158
	Australian born non-English speaking background	0.076	-0.084
No disability	Disability or long-term illness	0.052	-0.045
With partner	Single ~	0.041	-0.027
No financial assets	Financial assets (pos) > $50,000	-0.183	0.236
	Financial assets (neg) < -$20,000	-0.113	0.119
$60,000	Wages $0	-0.027	-0.083
	Wages $40,000	-0.004	-0.025
	Wages $100,000	-0.003	0.033
	Wages $140,000	-0.013	0.056
$60,000	Partner's wages $0	-0.013	-0.090
	Partner's wages $160,000	-0.037	0.095
No increase in benefits 2001 to 2002	$10,000 Increase in benefits	-0.075	0.020
Diploma	Tertiary qualification	0.037	-0.036
diploma	school only	0.081	-0.080
Professional	Trade	-0.062	0.024
	Service	-0.063	-0.002
Lost job last 12 months	Not lost job last 12 months	-0.073	0.027
Not financially worse last 12 months	Financially worse off last 12 months	-0.120	0.032
Exercises less than weekly	Does no exercise	-0.064	0.062

~ base = Index individual except partner's wages $0 and partner's financial assets $0

Table 6: Change in probability of having Left After 2000 for changes in the levels of the Left After index individual.

Reference level (Left After index individual)	change in level	Change in probability Left After
Born Australia English speaking background	Born Australia Non-English speaking background	-0.038
	Born Asia/Oceania NESB	0.006
	Born Africa/Middle East NESB	0.051
Wages $50,000	Wages $0	-0.025
	Wages $20,000	-0.010
	Wages $80,000	-0.008
	Wages $120,000	-0.036
	Wages $160,000	-0.079
Service	Professional	-0.072
Lost job	Not lost job last 12 months	-0.059
Age 35	Age 45	-0.143
Positive financial assets < $10,000	Financial assets (pos) $30,000 to $40,000	-0.068
	Financial assets $0	0.016
	Financial assets (neg)-$0 to -$10,000	-0.139
	Financial assets (neg)< -$20,000	0.119
Smoker	Non-smoker	-0.056
$10,000 increase	No change in benefits 2001 to 2002	-0.049
Financially worse last 12 months	Not financially worse	-0.162
$40,000 decrease in household wages	No change in household wages 2001 to 2002	-0.037
$10,000 increase in benefits	No change benefits 2001 to 2002	-0.053
Exercises less than weekly	Exercises 3 times weekly	-0.057
Takes no financial risks	Takes average financial risk	-0.069

Figure 1

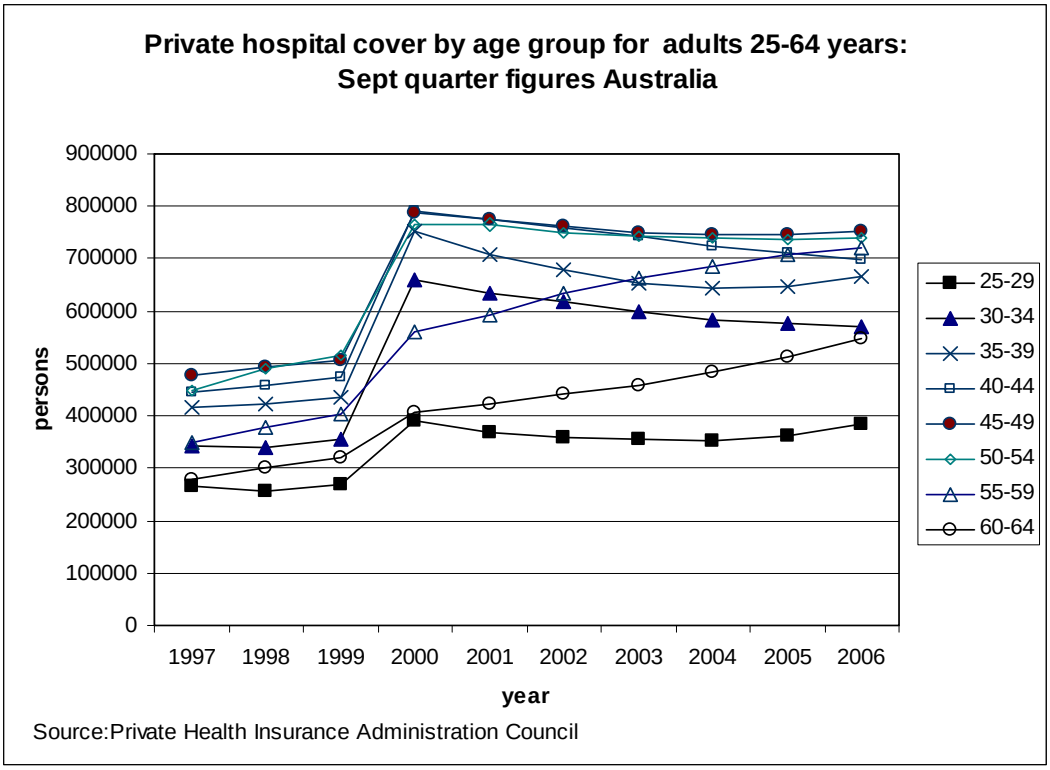

Private hospital cover by age group for adults 25-64 years:
Sept quarter figures Australia
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
persons
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
year
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
Source:Private Health Insurance Administration Council

Figure 2

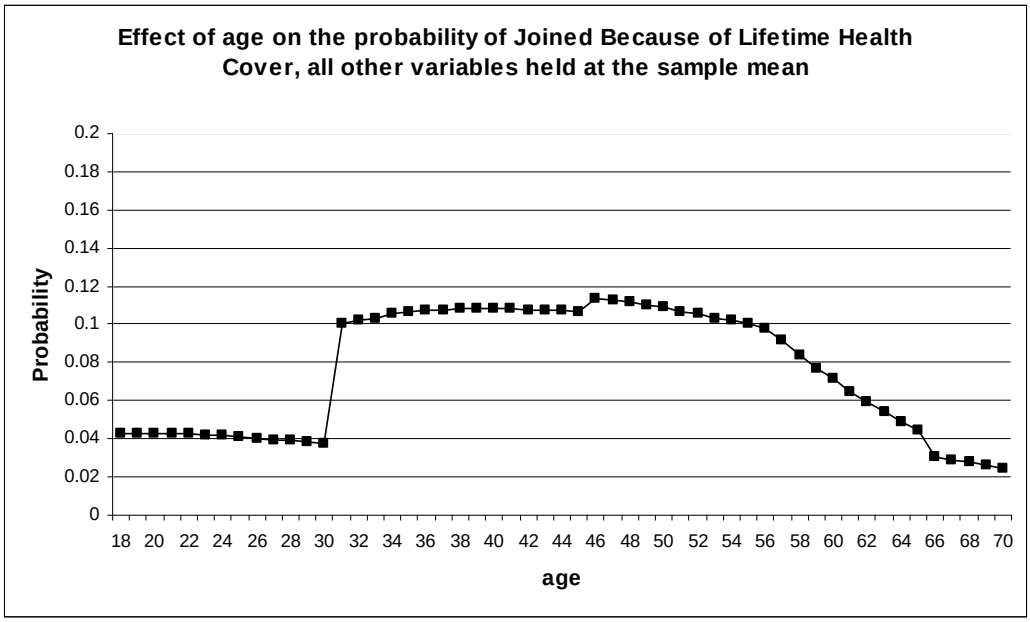

Effect of age on the probability of Joined Because of Lifetime Health Cover, all other variables held at the sample mean
Probability
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70
age

Figure 3

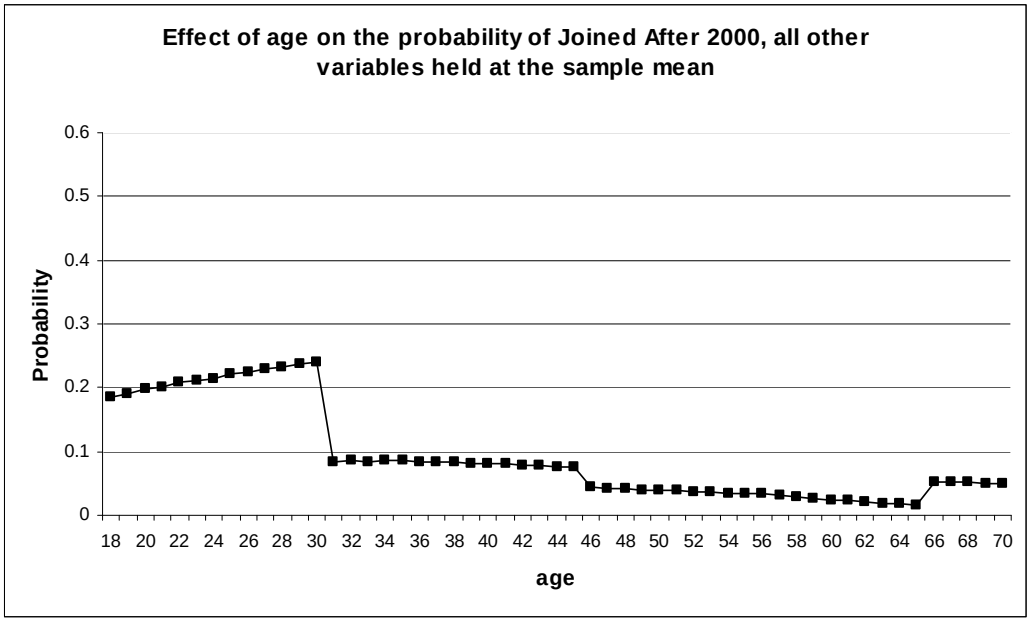
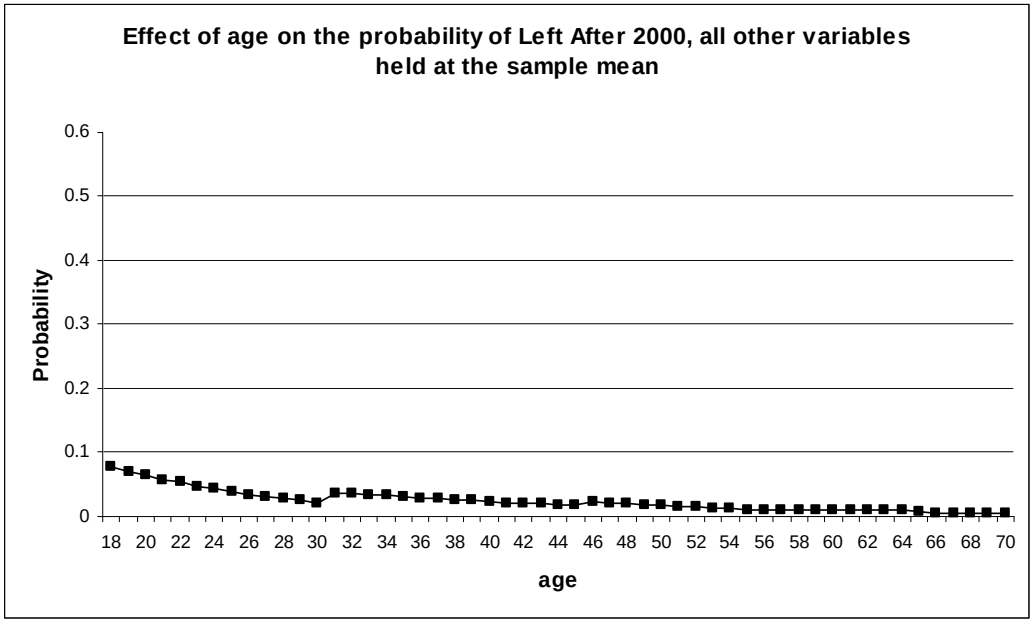

Effect of age on the probability of Joined After 2000, all other variables held at the sample mean
Probability
0.6
0.5
0.4
0.3
0.2
0.1
0
18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70
age

Figure 4


Effect of age on the probability of Left After 2000, all other variables held at the sample mean
Probability
0.6
0.5
0.4
0.3
0.2
0.1
0
18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70
age

References

Abraham, J.M., Vogt, W.B., & Gaynor, M. (2002). *Household Demand for Employer-Based Health Insurance, NBER Working paper 9144.* Cambridge MA: NBER

Arrow, K. (1963). Uncertainty and the welfare economics of medical care. *The American Economic Review*, 53(5), 941-973.

Bajari, P., Hong, H., & Khwaja, A. (2006). *Moral Hazard, Adverse Selection and Health Expenditures: A Semiparametric Analysis, NBER Working paper 12445.* Cambridge MA: NBER

Barrett, G.F., & Conlon, R. (2003). Adverse selection and the decline in private health insurance coverage in Australia: 1989-95. *Economic Record*, 79(246), 279-296.

Besley, T., Hall, J., & Preston, I. (1999). The Demand for Private Health Insurance: Do Waiting Lists Matter? *Journal of Public Economics*, 72 (2), 155-181.

Buchmueller, T.C., Couffinhal, A., Grignon, M., & Perronnin, M. (2004). Access to physician services: does supplemental insurance matter? evidence from France. *Health Economics*, 13(7), 669-687.

Butler, J.R. (2002). Policy change and private health insurance: did the cheapest policy do the trick? *Australian Health Review*, 25(6), 33-41.

Cardon, J.H., & Hendel, I. (2001). Asymmetric Information in Health Insurance: Evidence from the National Medical Expenditure Survey. *RAND Journal of Economics*, 32(3), 408-427.

Costa-Font, J., & Font-Vilalta, M. (2004). Preference for National Health Service Use and the Demand for Private Health Insurance in Spain. *The Geneva Papers on Risk and Insurance*, 29, 705-718.

Cutler, D.M., & Zeckhauser, R.J. (2000). The Anatomy of Health Insurance. In A.J. Newhouse, & J.P. Newhouse (Eds.), *Handbook of Health Economics* (pp. 563-643). New York: Elsevier.

Dawkins, P., Webster, E., Hopkins, S., Yong, J., & Palangkaraya, A. (2004). *Recent Private Health Insurance Policies in Australia: Health Resource Utilization, Distributive Implications and Policy Options* Melbourne: Melbourne Institute of Applied Economic and Social Research, The University of Melbourne

Deeble, J. (2003). The private health insurance rebate: Report to state and territory health ministers. Canberra: National Centre for Epidemiology and Population Health, The Australian National University.

Department of Health and Ageing (2006). *Private health insurance bill 2006: Guide* Canberra: Department of Health and Ageing

Doiron, D., Jones, G., & Savage, E. (2008). Healthy, wealthy and insured? The role of self-assessed health in the demand for private health insurance. *Health economics*, 17(3), 317-334.

Ellis, R.P., & Savage, E. (2005). *Run for cover now or later? The impact of premium changes on the characteristics of the privately insured in Australia. Working Paper 2005-020* Boston: Department of Economics, Boston University

Ettner, S.L. (1997). Adverse selection and the purchase of Medigap insurance by the elderly *Journal of Health Economics*, 16(5), 543-562.

Fang, H., Keane, M., & Silverman, D. (2008). Sources of Advantageous Selection: Evidence from the Medigap Insurance Market. *Journal of Political Economy* In Press.

Fiebig, D., Savage, E., & Viney, R. (2006). *Does the reason for buying health insurance influence behaviour? CHERE Working Paper 2006/1* Sydney: CHERE, UTS

Finn, C., & Harmon, C. (2006). *A Dynamic Model of Demand for Private Health Insurance in Ireland.* Bonn: IZA

Gruber, J., & Madrian, B.C. (1995). *Non-Employment and Health Insurance Coverage, NBER Working Paper No. 5228.* Cambridge MA: NBER

Gruber, J., & Ebonya, W. (2003). *Subsidies to Employee Health Insurance Premiums and the Health Insurance Market, NBER Working paper 9567.* Cambridge MA: NBER

Harmon, C., & Nolan, B. (2001). Health insurance and health services utilization in Ireland. *Health Economics*, 10(2), 135-145.

Lu, M., & Savage, E. (2006). *Do financial incentives for supplementary private health insurance reduce pressure on the public system? Evidence from Australia, CHERE Working Paper 2006/11* Sydney: CHERE, UTS

Palangkaraya, A., & Yong, J. (2005). Effects of Recent Carrot-and-Stick Policy Initiatives on Private Health Insurance Coverage in Australia. *Economic Record*, 81(254), 262-272.

Propper, C. (2000). The Demand for Private Health Care in the UK. *Journal of Health Economics*, 19(6), 855-876.

Rothschild, M., & Stiglitz, J.E. (1976). Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information. *Quarterly Journal of Economics*, 90(4), 630-649.

Savage, E., & Wright, D.J. (2003). Moral hazard and adverse selection in Australian private hospitals: 1989-1990. *Journal of Health Economics*, 22(3), 331-359.

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

Sommers, B.D. (2005). Form Medicaid to Uninsured: Drop-Out among Children in Public Insurance Programs. *Health Services Research*, 40(1), 59-78.

Vaithianathan, R. (2004). A Critique of the Private Health Insurance Regulations. *Australian Economic Review*, 37(3), 257-270.

Walker, A., Percival, R., Thurecht, L., & Pearse, J. (2005). Distributional impact of recent changes in private health insurance policies. *Australian Health Review*, 29(2), 167-177.

Wilcox-Gök, V., & Rubin, J. (1994). Health insurance coverage among the elderly. *Social Science and Medicine*, 38(11), 1521-1529.