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Does the reason for buying health insurance influence behaviour?

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Abstract
The inter-relationship between private health insurance cover and hospital utilisation is complex. The current policy approach in Australia appears to rely on relatively simple models of the relationships between health insurance coverage, and public and private hospital use. There is considerable evidence of unexplained heterogeneity among the privately insured population. Heterogeneity of preferences is likely to be important not just in determining the uptake of private health insurance, but also the impact of changes in private health insurance on the use of private treatment. A number of studies have used attitudinal variables to model heterogeneity of preferences in other contexts. This study uses the 2001 ABS National Health Survey to identify 'types' among the insured population using their stated reasons for purchasing private health insurance. We find that insurance type is significantly associated with hospital utilisation, particularly the probability of being admitted as a public or private patient. We also find that the government's insurance incentives were more attractive to particular types of the insured population. This has implications for the effectiveness of the insurance incentives and for the design of policies that aim to reduce pressure on the public hospital system.

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Introduction

In the past decade, Australia has undergone a series of policy changes in relation to private health insurance, aimed at increasing the level of private health insurance coverage. These policy changes have been widely documented (Hall et al., 1999; Hall and Savage, 2005; Butler, 2002;). They were introduced in response to a progressive decline in private health insurance over the period since the introduction of Medicare, and at least in part, because of a perception that this decline placed additional pressure on the public hospital system. Their overall impact has been to increase the level of private health insurance from just over 30% of the population in December 1998 to 43% of the population in December 2000 and to change the composition of the insured population (Butler, 2002).

The inter-relationship between private health insurance cover and hospital utilisation and expenditure is complex. Under Medicare, all Australian residents are entitled to free public hospital treatment, regardless of whether they have private health insurance. Private health insurance covers treatment in a private hospital or as a private patient in a public hospital, allowing choice of doctor and potentially shorter waiting times for some procedures. There are generally significant out-of-pocket costs associated with private treatment, creating disincentives to use private treatment even for those with private health insurance. The policy changes introduced in the last decade have made this even more complex. The initial policy, introduced in 1997, which involved a combination of tax penalties for higher income individuals without private health insurance and tax subsidies for low income individuals who purchased private health insurance, was replaced in 1998 by a non-means tested 30% rebate on private health insurance. The tax penalties to higher income individuals remained, and in fact were extended to cover new policies with high front end deductibles in 2000. The combined effect of the tax penalties and subsidies means that for high income individuals the net premium can be negative. Thus, private health insurance purchase may not be related to expectations of use of hospital services, particularly private hospital services.

The final policy change was the introduction of age based risk rating or ‘lifetime health cover’, requiring firms to vary premiums with age at entry. It was accompanied by an extensive government advertising campaign and appeared to have the most significant impact on cover, although it is difficult to disentangle the effect of the different policy changes within aggregate data. Identifying the impact of the policy changes on private health insurance cover is made more complex by the fact that there is significant churning in the market, in terms of individuals who enter and exit the private health insurance market in response to incentives they face at particular points in time.

The current policy approach appears to rely on relatively simple models of the relationships between health insurance coverage, public and private hospital utilisation and health expenditure, which do not capture the complexity of the choices facing individuals. For example, after the introduction of Medicare, private hospital usage grew more rapidly than public hospital usage. In the ten years to 1995-96, there was an 81% increase in private hospital usage compared to a 46% rise for public hospitals. Although the rate of insurance coverage fell from 50% in 1984 to just over 30% in 1998, the share of hospital expenditure covered by private health insurance remained relatively constant.

While a link exists between private health insurance coverage and the demand for health services, the health insurance premium, which has been the focus of government policy, is a relatively small component of the overall price. The choice of whether to insure depends as well on the probability distribution over health states, the 'net' prices of the various hospital options, the waiting time for free treatment in a public hospital, and other socio-economic variables. The insurance choice must be made before the health state is realised. The choice of type of hospital, patient status and the quantity of hospital services consumed are subsequent decisions that do not depend solely on insurance status.

Further, heterogeneity of preferences is likely to be important not just in determining the uptake of private health insurance, but also the impact of changes in private health insurance on the use of private treatment. To develop a better understanding of the relationship between health insurance cover and health care utilization and expenditure in Australia, it is important to model not just the complexity of incentives facing individuals (see for example Ellis and Savage, 2005), but also to capture heterogeneity of preferences. Studies in other countries provide support for the use of attitudinal variables to explain demand for health insurance and hospital utilization (Propper, 1989, 1993; Harmon and Nolan, 2001). However, it is rarely possible to combine attitudinal data with other relevant socio-demographic variables at the individual level.

While not directly asking respondents about their attitudes to public and private treatment or to private health insurance, data from the 2001 ABS National Health Survey provide the opportunity to examine this issue in the Australian setting, in the context of the substantial changes to private health insurance policy that have taken place over the last decade. Within the survey, respondents aged 15 or over were asked to indicate their reasons for purchasing or not purchasing private health insurance. This study uses these data to identify different categories (types) of consumer in terms of their reasons for having health insurance. We investigate whether identification of type (in terms of reasons for purchasing insurance) improves the modeling of unexplained heterogeneity in preferences for private health insurance, and whether insurance type influences use of the health system and timing of insurance purchase.

1 Heterogeneity in the insured population

The decision to purchase health insurance is based on expected utility gain. A simple model would predict that the probability of purchase, or difference between the utility of buying versus not buying, would increase with income and decrease with higher premiums. Also we expect individuals with higher expected need for health services and individuals who are more risk averse to be more likely to purchase health insurance. Individuals are also likely to vary in their evaluation of the expected benefits from having private health insurance. Some individuals may prefer private treatment because of the ability to choose their doctor, or because of perceived higher quality of service offered by private hospitals, or to avoid long waiting times associated with many elective procedures in the public system. Other individuals, who would otherwise have little interest in private health insurance, may choose to purchase insurance purely because of the financial incentives that have been imposed

by government policies. Specifically, for many high income people the net premium may be negative.

Thus there is a range of motivations for why different individuals might choose to purchase private health insurance. There is considerable evidence of unexplained heterogeneity of preferences among the privately insured population. For example, a robust finding in empirical studies of the demand for private health insurance is that individuals with higher self-assessed health status are more likely to have private health insurance, controlling for other covariates such as income, education, age and the existence of co-morbidities (Doiron et al 2006; Barrett and Conlon, 2003; Shmueli, 2001; Harmon and Nolan, 2001). Moreover, while a higher probability of having private health insurance is positively associated with variables such as income, education and health status, a number of studies have found that variables such as voting preferences and attitudes to public/private cover are also significantly correlated with insurance cover (Propper, 1993, 2000; Burchardt and Propper, 1999; Harmon and Nolan, 2001).

A key premise of our analysis is that this heterogeneity is likely to be important not just in determining the uptake of private health insurance, but also on the impact of having private health insurance on the use of private treatment. This is most clearly illustrated if we consider two 'types' of individual with private health insurance who will later be referred to as 'choice' and 'financial' types. Choice types are those who value the attributes that distinguish the private and public systems such as choice of doctor. On the other hand financial types are those individuals whose primary motivation for purchasing private health insurance is to avoid penalties imposed by the government.

How might we expect these two types to behave should they need to be admitted to hospital? For choice types it seems clear. They have a preference for private care and have insurance in order to better afford the costs associated with being a private patient should they need to be admitted to hospital. The situation for the financial types is not nearly as clear. On one hand many of these individuals might very well be quite satisfied with the public system and the services it provides and hence simply not use their private coverage when admitted to hospital. On the other hand, Vaithianathan (2002) stressed the importance of individuals who have historically self-insured. In other words they have a preference for private care but have felt private health insurance has not offered them good value presumably because they tend to be younger, healthier and wealthier than average. For these individuals they have been enticed into purchasing private health insurance by the policy changes but would have used the private health system even without their change of insurance status.

A number of studies have used attitudinal variables to model heterogeneity of preferences. Harris and Keane (1999) found that inclusion of attitudinal variables (stated preferences expressed as responses to attitudinal questions about the importance of particular attributes) substantially improved model fit in an analysis of choice of health care plans in the United States. Ahn et al. (1999) found that the probability of finding a job was significantly higher among unemployed workers with positive migration attitudes, but that duration of unemployment was not a significant determinant of migration attitude, even after controlling for unobserved fixed

individual heterogeneity. Hersch and Pickton (1995) found that proxy variables for risk attitude (smoking and seat-belt use) were significant in explaining the compensating differential in the wage-risk trade-off for risky jobs. Darnhofer, et al. (2005) examined willingness of farmers in Austria to convert to organic farming. They identified five types of farmers, characterised by their farming strategies and values, the "committed conventional", "pragmatic conventional", "environment conscious but not organic", "pragmatic organic" and "committed organic". This study illustrates the importance of taking into account heterogeneity in farmers' attitudes, preferences and goals in understanding choice of farming method.

We are able to explore these issues by exploiting a question in the 2001 ABS National Health Survey that asked respondents: "What are all the reasons you are covered by insurance?". Typical empirical studies rely on standard socio-demographics to capture the types of heterogeneity that we have identified. Here responses to this question are used to more directly segment the insured population into different types according to their stated motivation for having private health insurance.

2 National Health Survey Data and Identification of Types

The 2001 ABS National Health Survey is part of a series of national surveys of the health status and health care utilization of the Australian population (previous studies were conducted in 1977-78; 1983; 1989-90 and 1995). It involved a representative sample of 17,918 private dwellings across Australia, with information collected on one adult from each household, all children aged 0-6 years and one child aged 7-17 years, including data on health status, health related behaviours, use of health services and demographic and socio-demographic characteristics (26,862 respondents in total). The sample was restricted to respondents over the age of 18, giving 17,694 observations.

All respondents in our sample who indicated they had private health insurance cover were asked the question "What are all the reasons you are covered by insurance?". Respondents could indicate more than one reason. A corresponding question was asked of respondents who indicated they did not currently have private health insurance cover. Table 1 summarises the overall frequency of reasons for having insurance cover among the 8,328 respondents who had private hospital cover.

These data provide valuable information about reasons for purchasing private health insurance. Our approach is to use the reasons to identify types, that is a set of mutually exclusive categories of reasons for purchasing insurance, such that each respondent could be assigned to one category of reason (a preference type). The average number of reasons per respondent is 1.9. Therefore single reasons do not in themselves identify types. Table 2 provides a summary of responses in terms of the number of reasons given per respondent. Thus, the identification of types was based on two stages. The first stage involved forming judgements about which reasons are related in terms of preferences. The second stage was to determine empirically which reasons are associated.

A complexity that arises when individuals are asked to answer all the reasons for making a particular consumption decision is that it is not possible to determine

whether the respondent sees each reason he/she ticks as a separate reason for the decision (relating to a different objective) or whether he/she ticks all reasons that are close approximations to the underlying reason. Further, it is not possible to identify whether there is a primary reason and others are secondary. For example, although reasons B and H relate to different aspects of the financial cost of private health insurance, a respondent who is motivated by financial factors may tick both of these, and it is not possible to determine whether both are equally important, or whether there is one primary reason. Therefore in the first stage we attempted to group the reasons into related categories, that is, identify which reasons appear to relate to similar potential objectives in the respondent's utility function. We grouped the reasons into five types as summarised in Table 3.

Reasons C, D and F were judged to relate to choice of private treatment (choice type). Reasons B, E, H and I were judged to relate to reducing the financial costs of health insurance or health care (financial type). Reasons J and K were judged to relate to concerns about health status and the role of private health insurance in facilitating access to care (health type). Reasons A and G were judged to relate to underlying risk aversion (security type). A small group of respondents selected only 'Other reason' (other type). Clearly these categories are based on subjective assessments.

For respondents who give only one reason for purchasing health insurance (46%), allocation of reason to type is straightforward. Just over 44% of respondents gave two or three reasons, with a small minority giving more than 3 reasons. In the second stage we focused on respondents who had identified up to 3 reasons (90% of the sample), and for each reason we calculated frequencies with which that reason was combined with each one or two other reasons. Examples are presented in Appendix A.

Two features emerged. First, there is empirical support for the categories identified in stage 1. For example, of the 2,557 respondents who gave two reasons, almost half gave 'Security/protection/peace of mind' as one reason and, of these, the highest other frequency is for "Always had it". The next most common selection by those with two reasons (about 20%) is "Choice of doctor" and it is most commonly associated with "Allow treatment as private patient in hospital" and "Shorter wait for treatment".

The second feature to emerge is that there is a spread of responses, and that it is not empirically supportable to identify only 5 unique types of consumer. For example, respondents often give both a security reason and a financial reason. We examined the co-occurrence of reasons to assign each respondent to a 'single' type or a 'combination' type. A 'single' type respondent gives one or more reason that belong to the same type (Security, Choice, Financial, Health). A 'combination' type respondent gives reasons that belong to two or more types.

Respondents giving reason L (other) were assigned to a type based on their other reasons. The exception to this was respondents who ticked only reason L.

Table 4 summarises the final set of types identified. More than half of the sample (56.1%) is grouped into a single type, with the majority of these being security types (24.6%). Large proportions identified only financial reasons (15%) or only choice reasons (13.5%). Relatively few identified only health reasons (3%). Single type and two-type respondents cover 87.4% of the sample. Choice/Security types comprise

12% of the sample; Choice/Financial types comprise 6.6% of the sample and Financial/Security types comprise 6.5%. Perhaps the most striking feature is that those giving health reasons for insurance purchase are a small group.

3 Models and Results

Modeling admission to hospital

We examine the impact of private health insurance on probability of admission to hospital. Assume that each individual has an unobserved utility associated with each of three discrete outcomes; not admitted, admitted as a Medicare patient and admitted as a private patient. The utility index is assumed to depend on personal characteristics in addition to private health insurance status. Individuals then choose the alternative with the highest utility. With a linear random utility model this implies:

$$(1) \quad U_{ij} = x_i'\beta_j + h_i\gamma_j + \varepsilon_{ij};\ j = 0,1,2$$

where x represents a vector of socio-demographic control variables and h is a dummy variable for private health (hospital) insurance status. Under the assumption that the disturbances are distributed as iid type I extreme value, this random utility framework motivates the use of the multinomial logit model.

Under this model specification, the probability that the i^{th} individual falls into the j^{th} category is given by:

$$(2) \quad P_{ij} = \frac{\exp(x_i'\beta_j + h_i\gamma_j)}{\sum_{k=0}^{2}\exp(x_i'\beta_k + h_i\gamma_k)}, \quad i = 1,\cdots,n, \quad j = 0,1,2.$$

The base category is taken to be "not admitted" so that β_0 and γ_0 are normalized to zero. The interpretation of the remaining coefficients is facilitated by considering the relative risk or odds ratio defined by:

$$(3) \quad \left(\frac{P_{ij}}{P_{i0}}\right) = \exp(x_i'\beta_j + h_i\gamma_j), \quad j = 1,2.$$

Thus, the exponentiated value of a coefficient is the relative risk ratio for a one unit change in the corresponding variable where risk is measured as the probability of the individual choosing category j relative to the base category.

Three models are estimated with Model 1 being the specification represented in equation (1). Implicit in this specification is the assumption that the impact of private health insurance status on hospital admission does not vary over individuals. Using our categorization of types this assumption is relaxed. In Models 2 and 3 the insured are decomposed by creating dummies for insurance types. In Model 2 there are 6 dummies for insurance status: a dummy for each of the 'single' types (choice, financial, security and health), a dummy for the 'other' category (those who ticked only 'other') and a dummy for all 'combination' types. In Model 3, the 'combination types' are further decomposed into separate dummies for each type, thus creating an

additional 10 insurance dummies. These are nested models, with Models 2 and 3 collapsing to the Model 1 specification given in (1) only if the impact of private health insurance status on hospital admission does not vary over types.

For estimation, the sample was further restricted by dropping 31 individuals for whom admission status (Medicare or private) is not known. Descriptive statistics for the socio-demographic controls are presented in Table 5. Table 6 presents the likelihood ratio tests comparing Models 1-3. From comparison of the models it is evident that inclusion of 'single' types significantly improves the fit of the model. Comparison of Models 2 and 3 shows that when the remaining insured group (those who could not be grouped into a single type) are further broken down according to their combination types, the fit of the model is again improved. This suggests that identification of the reasons for insurance adds to our understanding of the choice between public and private admission, by allowing us to model better the underlying heterogeneity in the insured population. There is clear statistical evidence that the impact of private health insurance status on admission choice varies by types.

Table 7 presents the results for Model 3. Coefficient estimates are reported as relative risk ratios, that is the impact of each variable on the odds ratio. From Table 7 it can be seen that the socio-demographic variables have expected signs. The omitted categories are uninsured, male, aged less than 30, born in Australia, no post-school qualifications, single, unemployed, gross income unit income less than $400, and with excellent self assessed health. The socio-demographic controls are robust across the different specifications of the model.

The addition of the type variables provides valuable information about the underlying heterogeneity among the insured. In Model 1 which included private insurance cover and socio-demographic controls, the relative risk ratio (relative to not admitted) was 0.36 (p=0.000) for admission as a Medicare patient and 8.35 (p=0.000) for admission as a private patient. Thus, as would be expected, having private hospital insurance significantly increases the probability of being admitted as a private patient rather than a public patient. However, when the insured are further decomposed into types in Models 2 and 3, while the underlying pattern that those with insurance are more likely to be admitted as private patients remains, it is evident that there is considerable variation in probability of admission across the types. Those who were classified as a "choice" type, either singly or in combination with another type, typically have much higher probabilities of admission as a private patient than other types. The probability of admission as a private patient is lowest among those who were classified as "financial", "financial/health" and "financial/security". This suggests that there is a group of consumers whose underlying reasons for having private health insurance relate to factors other than preference for treatment as a private patient, and that their choice behaviour in relation to hospital admission is related to this.

Figure 1 depicts the relative risk ratios by type graphically, and Figure 2 presents the average predicted probability of admission by types. For example, consider the three types that account for the largest proportions of the insured: choice (13.5%), financial (15.0%) and security (24.6%). For those classified as financial, they have a low predicted probability of hospital admission, but importantly, if admitted, there is little difference in the average predicted probability of admission as a Medicare or a private patient. By contrast for those who are either choice or security types, the difference

between their probability of admission as a private patient and as a public patient is much larger.

Figure 3 presents simulated admission probabilities by patient status for each type. The simulations are generated by assigning the type to each observation, while retaining the individual values for all other variables. Thus, if all those with private health insurance were a financial type, there would be little difference between the probabilities of being admitted to hospital as a Medicare or a private patient.

Modeling insurance choice and admission to hospital

Private health insurance choice and utilisation of health services, such as hospital admission, would often be modeled jointly. The argument is that the insurance dummy in equation (1) is endogenous because there are unobserved factors that affect insurance choice and also utilisation. In order to counter this endogeneity problem and hence to produce consistent estimates, an instrumental variable approach is recommended. In studies such as Meer and Rosen (2004) and Deb et al., (2006), employment characteristics are used as instruments for insurance status. While such instrument choices may be reasonable in these US studies, although this is not without dispute; see Joyce (2004), it is not a viable choice in Australia where private health insurance is rarely provided by employers.

Model 1 depicted in equation (1) is likely to suffer from the problem of endogeneity. The problem arises because of the presence of common unobservables in both the insurance choice and utilisation equations. These unobservables are typically assumed to be factors such as preferences for the services provided by the private system, degree of risk aversion and expected future need for the health system. It is difficult to find appropriate instruments for insurance status in standard data sets. The types variables contained in our data capture variations in factors mentioned above and hence can be used to ameliorate the problem of endogeneity. Models 2 and 3 include interactions of type dummy variables with the insurance dummy. Their inclusion in this manner means that they serve as proxies helping control for the missing variables and thus reducing the impact of any unobservables associated with utilisation.

While we recognize that endogeneity bias remains a potential problem, as the type variables do not span the whole distribution of common unobservables, we argue that our approach is less susceptible than usual to this criticism. What's more the impact of the endogeneity bias would have to be considerable in order to eliminate the differences in effects that have been documented.

Modeling time in cover for the insured

Given that the inclusion of information about the reasons for insurance significantly improves the modeling of probability of admission to hospital, it is of interest to identify whether the underlying differences between the insurance types can be explained. The major changes to policy in relation to health insurance have changed the incentives for uptake of private health insurance, such that for some individuals, the price of private health insurance is negative. The introduction of lifetime health cover may also have changed the threshold in relation to risk aversion as an underlying reason for private health insurance. Some evidence in relation to these factors is found by examining the distribution of duration of private health insurance cover across the insurance types, as presented in Figure 4. As would be expected, the

majority of the insured have been insured for more than 5 years. However, this varies considerably across the types. In particular, those who indicated choice reasons (either singly or in combination) have generally had insurance for more than 5 years, suggesting an underlying preference for access to private treatment (or underlying risk aversion). By contrast, those who indicated financial reasons (either singly or in combination) are much more likely to have been insured for less than 2 years, which corresponds in these data with the timing of the introduction of the private health insurance rebate. The exception is when financial reasons are combined with choice reasons.

We examine the impact of type on time in health insurance cover, for the insured subsample. Multinomial logit models are estimated, where the dependent variable is time in cover, with four categories: less than one year, one to less than two years, two to less than five years and five or more years. The base category is five or more years. Models are estimated with and without controls. Table 8 presents the relative risk ratios for the model including controls, and Figure 5 summarises the results for each type, for the models with and without controls. It can be seen that insurance duration varies with type. In particular, financial types (single and combination) have a significantly higher probability of shorter insurance durations (less than 2 years).

4 Conclusions

While government measures to increase private health insurance coverage in Australia increased cover by around 50%, it is less clear what they have achieved in terms of changing the mix of public and private utilisation. This paper demonstrates that there is not a simple relationship between insurance status and private hospital utilisation and that the insured population cannot be assumed to behave homogeneously in response to policy measures. We identify four main types of consumers (choice, financial, security and health) who cover 57% of the insured population and a number of combination types. We find that the mix of types varies across insurance durations. For example, those with shorter durations of insurance cover are far more likely to have joined for financial reasons; and financial types are less likely to choose the private system when admitted to hospital than choice types who are more likely to have joined before the recent insurance incentives.

It cannot be assumed that those who were attracted to insurance by the government's incentives will have the same pattern of utilisation as long term enrollees. Predictions of hospital utilisation based on the behaviour of those who were insured before the incentives are misleading and marginal changes in insurance coverage are unlikely to be good indicators of changes in the use of the private system. When we do not distinguish between types, the insured have relative risks of being admitted as a Medicare and private patient of 0.4 and 8.4 respectively. When the insured are decomposed into types, there are large and significant differences in these relative risks across types. While choice types are about four times more likely to be admitted as a private patient than a Medicare patient, financial types have almost equal probabilities of admission as a private or a Medicare patient.

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Table 1: Frequency of reasons for private health insurance cover among respondents with private hospital cover

Rank	Reason for private health insurance cover	Frequency	Percentage	Cumulative percentage
1	Security / protection peace of mind	3859	21.8	21.8
2	Allow treatment as private patient in hospital	2132	12.1	33.9
3	Choice of doctor	2117	12.0	45.8
4	Always had it / parent pay it / condition of job	1891	10.7	56.5
5	Shorter wait for treatment / concern over public hospital waiting lists	1880	10.6	67.1
6	Provides benefits for ancillary services / extras	1461	8.3	75.4
7	To gain government benefits / avoid extra Medicare levy	933	5.3	80.7
8	Lifetime cover / avoid age surcharge	916	5.2	85.9
9	Other reason	780	4.4	90.3
10	Elderly / getting older / likely to need treatment	631	3.6	93.8
11	Other financial reasons	555	3.1	97.0
12	Has other conditions that requires treatment	537	3.0	100.0
	Total	**17692**	**100**	

Table 2: Number of reasons for private health insurance cover among respondents with private hospital cover

Number of reasons	Number of observations	Percentage of the population	Cumulative percentage
1	3641	43.7	43.7
2	2557	30.7	74.4
3	1261	15.1	89.6
4	535	6.4	96.0
5	209	2.5	98.5
6	77	0.9	99.4
7	32	0.4	99.8
8	13	0.2	100
9 or more	4	0.0	100
Total	**8328**	**100**	

Table 3: Allocation of reasons for purchasing private health insurance to insurance types

Type	Reason for private health insurance cover	Label
Choice	Choice of doctor	C
	Allow treatment as private patient in hospital	D
	Shorter wait for treatment /concern over public hospital waiting lists	F
Financial	Lifetime cover / avoid age surcharge	B
	Provides benefits for ancillary services / extras	E
	To gain government benefits / avoid extra Medicare levy	H
	Other financial reasons	I
Health	Has other conditions that requires treatment	J
	Elderly / getting older / likely to need treatment	K
Security	Security / protection peace of mind	A
	Always had it / parent pay it / condition of job	G
Other	Other reason	L

Table 4: Types identified by reasons

Type		Frequency	Percentage
Single Type	Choice	1124	13.5
	Financial	1247	15.0
	Health	254	3.0
	Security	2048	24.6
Combination Type	Choice/Financial	547	6.6
(2 categories)	Choice/Health	139	1.7
	Choice/Security	997	12.0
	Financial/Health	125	1.5
	Financial/Security	538	6.5
	Health/Security	251	3.0
Combination Type	Choice/Financial/Health	65	0.8
(3 categories)	Choice/Financial/Security	507	6.1
	Choice/Health/Security	106	1.3
	Financial/Health/Security	68	0.8
Other Types	All reasons	77	0.9
	Other reason	235	2.8
Total		8328	100

Table 5: Means of Socio-demographic Controls

Variable	Mean	Standard deviation
private insurance	0.47	0.50
age30s	0.22	0.41
age40s	0.21	0.41
age50s	0.15	0.36
age60s	0.11	0.31
age70over	0.14	0.34
female	0.55	0.50
bornOther	0.27	0.44
diploma	0.37	0.48
degree	0.16	0.37
couple	0.29	0.46
sole parent	0.06	0.24
couple with deps	0.26	0.44
full time emp	0.43	0.50
part time emp	0.17	0.37
not in LF	0.37	0.48
$400 to 599	0.11	0.32
$600 to 799	0.10	0.30
$800 to 999	0.08	0.28
$1000 to 1499	0.14	0.35
$1500 to 1999	0.07	0.26
$2000 to 2499	0.03	0.16
$2500+	0.03	0.17
income not stated	0.18	0.38
Very Good	0.32	0.47
Good	0.31	0.46
Fair	0.15	0.35
Poor	0.05	0.22
Number LTC	2.81	1.71

Table 6: Likelihood ratio tests for Models 1-3

Model	Description	LogL	LR test statistic	Number explanatory variables	DF	5% Critical chi-sq
1	Insurance + controls	-7869.69	1065.91	60	.	.
2	Single types + controls	-7837.53	64.33	70	10	18.31
3	All types + controls	-7820.37	34.32	90	20	31.41

Table 7: Multinomial Logit Estimates for Probability of Admission (Model 3)

		Medicare				Private		
Variable		Relative risk ratio	Std. Err.	P>|z|		Relative risk ratio	Std. Err.	P>|z|
Choice		**0.319**	0.060	0.000		**12.088**	1.472	0.000
Financial		**0.585**	0.086	0.000		**4.104**	0.670	0.000
Health		**0.395**	0.125	0.003		**8.050**	1.640	0.000
Security		**0.286**	0.042	0.000		**7.532**	0.860	0.000
ch_fin		**0.377**	0.096	0.000		**8.085**	1.403	0.000
ch_hlth		**0.373**	0.173	0.034		**14.252**	3.295	0.000
ch_sec		**0.310**	0.062	0.000		**10.016**	1.295	0.000
fin_hlth		0.493	0.211	0.099		**4.675**	1.712	0.000
fin_sec		**0.205**	0.067	0.000		**5.402**	1.037	0.000
hlth_sec		**0.386**	0.122	0.003		**6.603**	1.405	0.000
ch_fin_hlth		0.306	0.223	0.104		**12.917**	4.337	0.000
ch_fin_sec		**0.301**	0.087	0.000		**8.756**	1.504	0.000
ch_hlth_sec		0.478	0.224	0.115		**13.746**	3.561	0.000
fin_hlth_sec		0.421	0.253	0.149		**8.119**	3.088	0.000
all types		0.728	0.321	0.471		**11.529**	3.625	0.000
only other		**0.490**	0.143	0.014		**5.968**	1.502	0.000
age30s		**0.596**	0.055	0.000		0.924	0.122	0.548
age40s		**0.396**	0.040	0.000		**0.596**	0.082	0.000
age50s		**0.408**	0.047	0.000		**0.673**	0.094	0.005
age60s		**0.478**	0.059	0.000		0.867	0.135	0.361
age70over		**0.493**	0.058	0.000		**1.363**	0.208	0.043
Female		**1.181**	0.076	0.010		1.043	0.077	0.565
bornOther		0.999	0.066	0.982		**0.810**	0.064	0.008
Diploma		**1.221**	0.078	0.002		1.084	0.081	0.283
Degree		1.046	0.110	0.669		0.993	0.099	0.945
Couple		0.961	0.077	0.620		0.918	0.079	0.321
sole parent		1.213	0.150	0.119		1.108	0.219	0.606
couple with deps		**1.738**	0.163	0.000		1.186	0.130	0.120
full time emp		0.852	0.139	0.326		0.748	0.198	0.274
part time emp		0.854	0.144	0.351		0.952	0.258	0.855
not in LF		**1.635**	0.258	0.002		1.181	0.317	0.535
$400 to 599		1.119	0.109	0.250		**1.357**	0.171	0.015
$600 to 799		1.173	0.134	0.161		**1.463**	0.198	0.005
$800 to 999		1.034	0.141	0.806		**1.337**	0.197	0.048
$1000 to 1499		0.938	0.122	0.625		**1.412**	0.194	0.012
$1500 to 1999		1.007	0.177	0.971		**1.533**	0.244	0.007
$2000 to 2499		0.796	0.237	0.445		1.188	0.269	0.446
$2500+		0.677	0.223	0.236		**1.693**	0.335	0.008
income not stated		0.855	0.081	0.097		1.237	0.139	0.059
Very Good		1.239	0.136	0.052		0.917	0.100	0.427
Good		**1.666**	0.180	0.000		**1.275**	0.138	0.025
Fair		**2.439**	0.288	0.000		**2.057**	0.253	0.000
Poor		**4.819**	0.648	0.000		**3.776**	0.595	0.000
Number LTC		**1.131**	0.024	0.000		**1.152**	0.029	0.000

Figure 1: Relative risk ratio by patient status

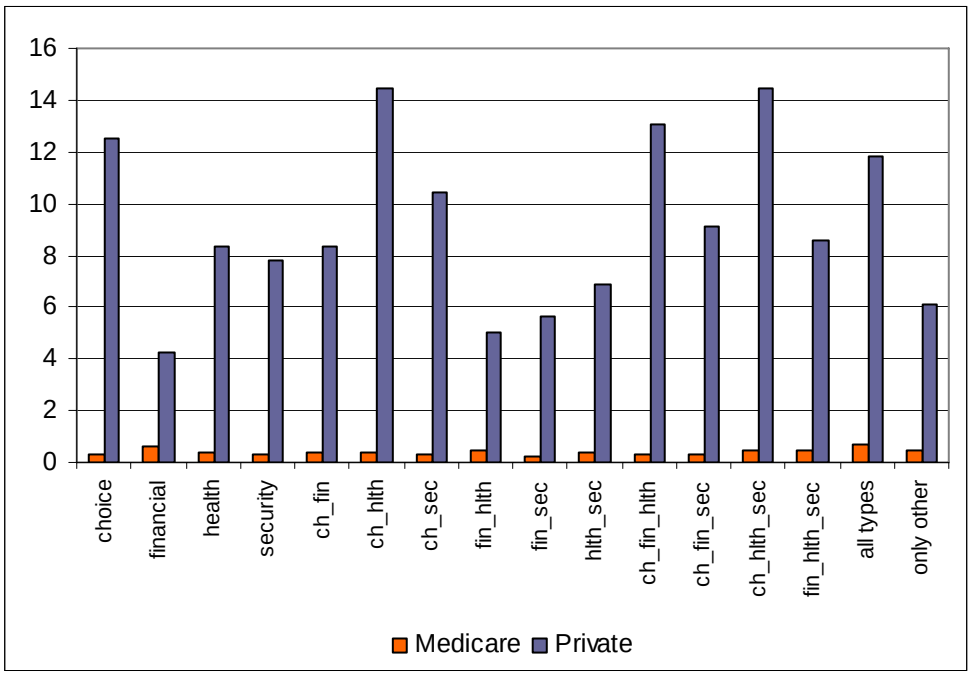


Figure 2: Average predicted probability of admission by type

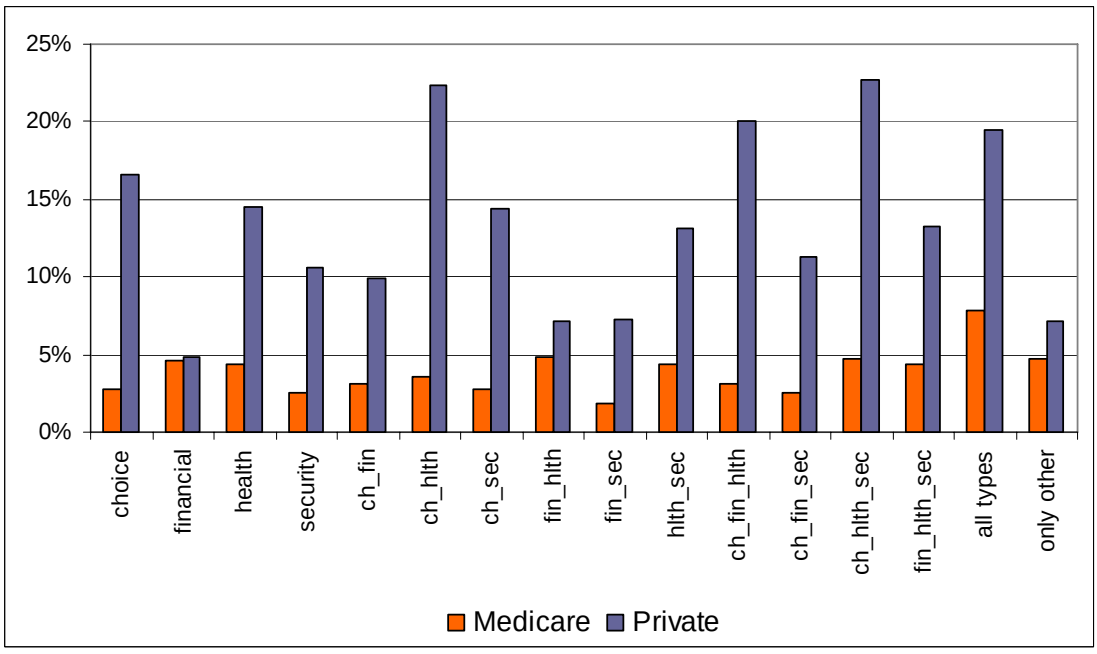


Figure 3: Simulated probability of admission by type and patient status

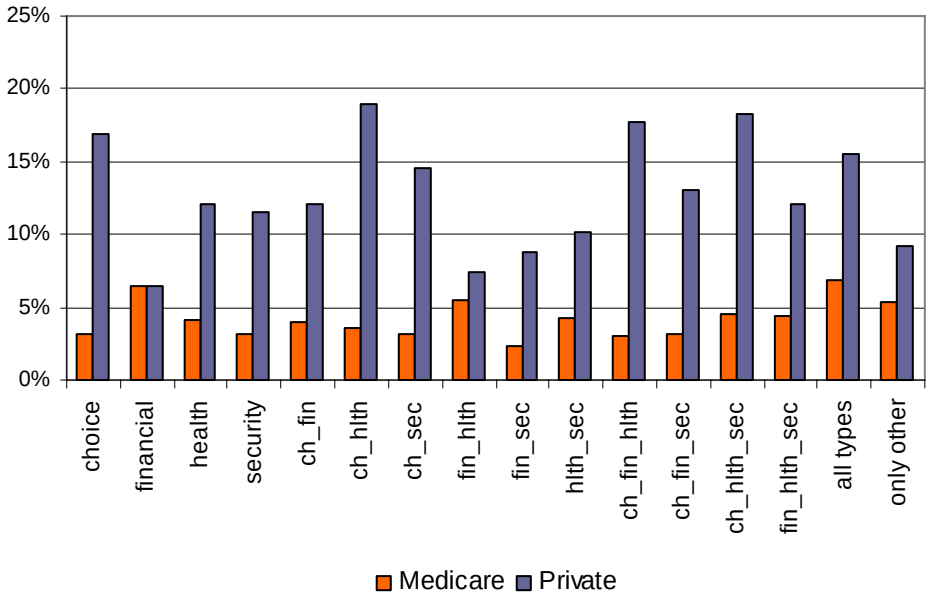


Figure 4: Distribution of duration of health insurance cover across insurance types

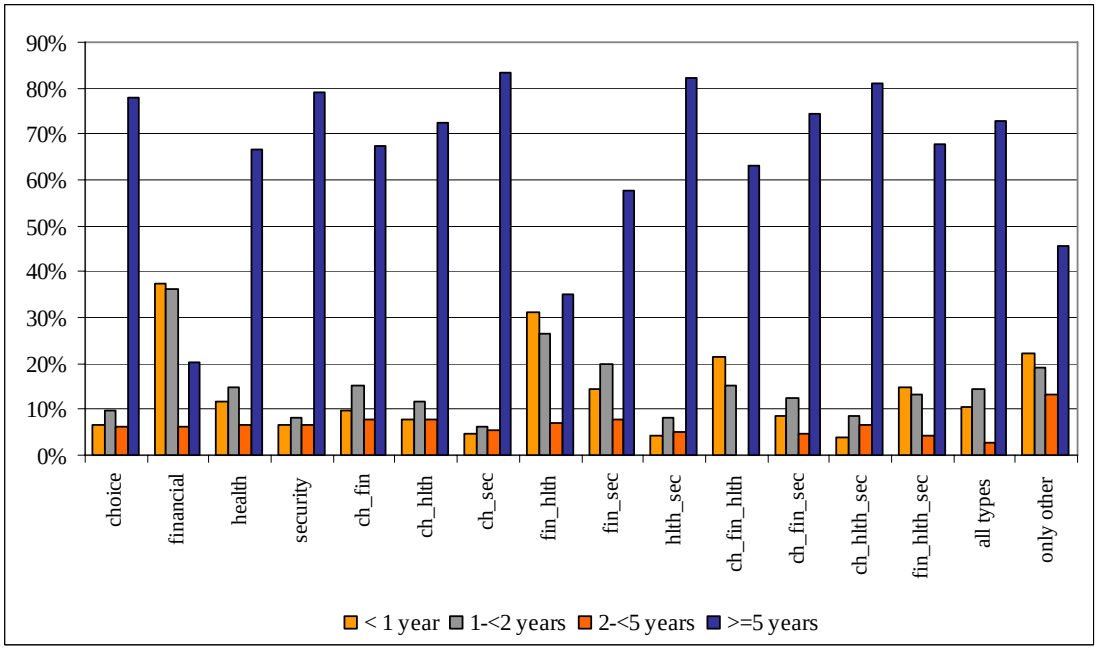
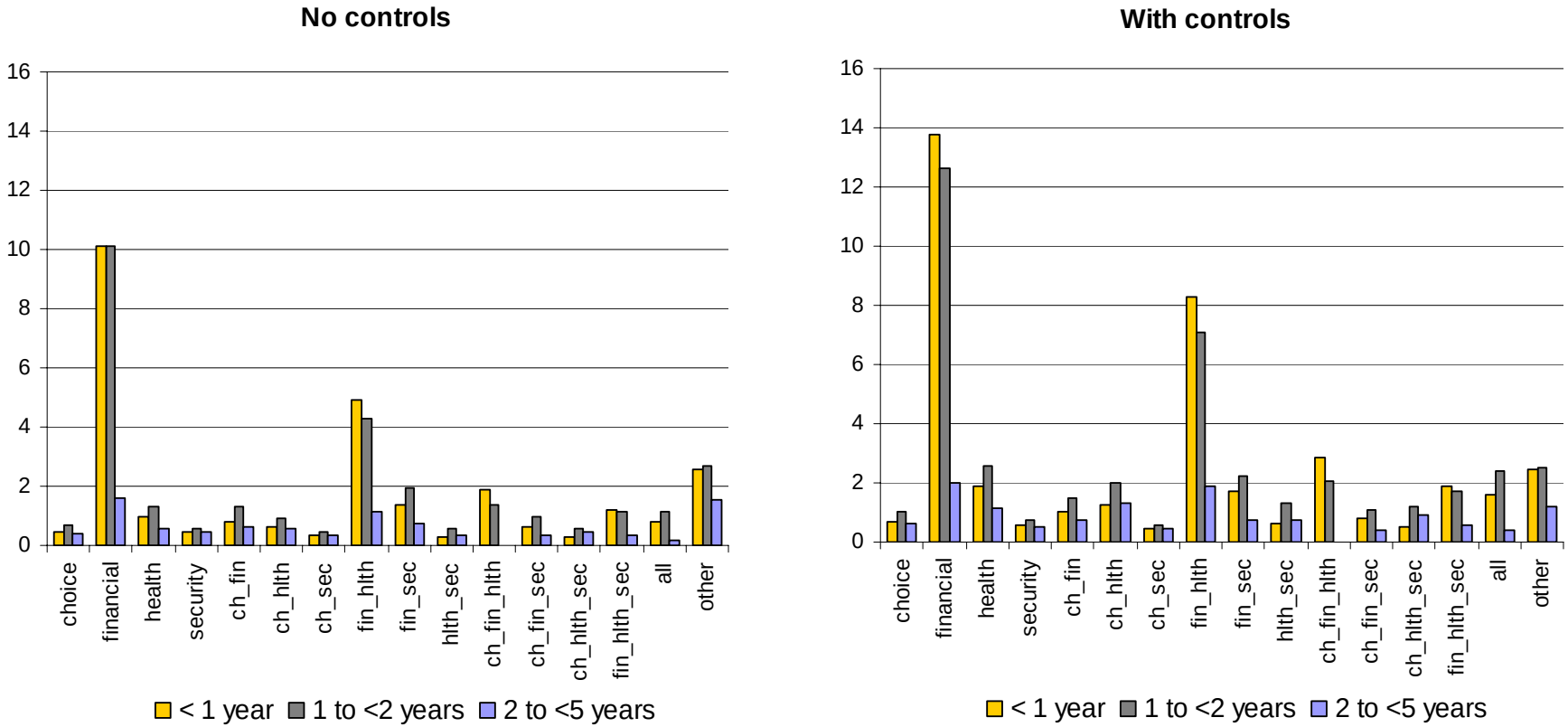


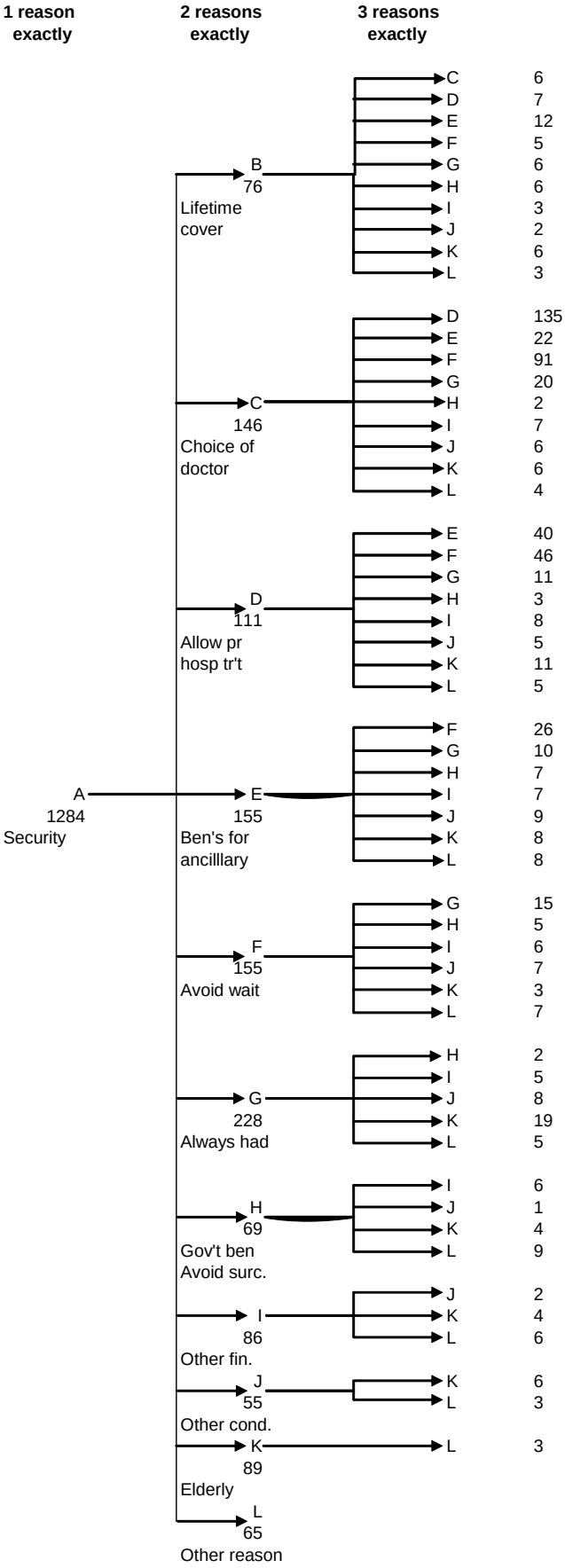
Table 8: Multinomial Logit Estimates for Time in Cover (Insured only)

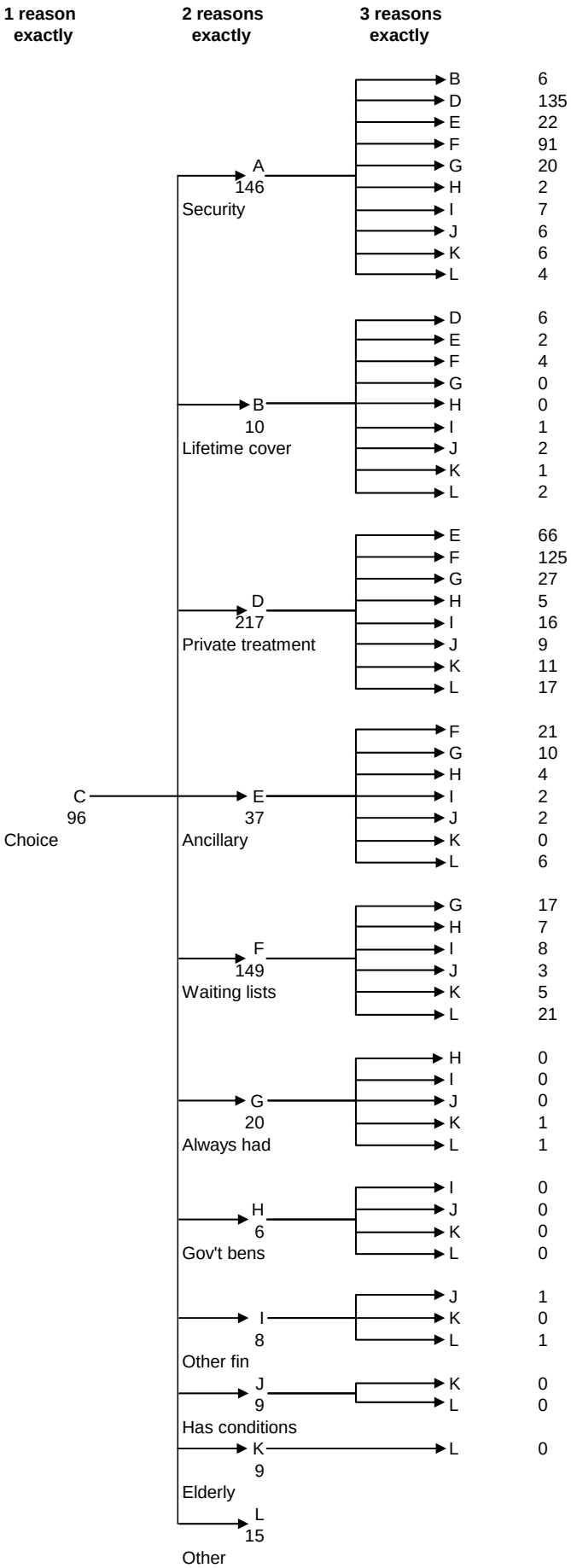
	Less than 1 year		1 to less than 2 years		2 to less than 5 years	
Variable	RRR	P>|z|	RRR	P>|z|	RRR	P>|z|
Choice	**0.697**	0.055	1.037	0.839	**0.646**	0.024
Financial	**13.792**	0.000	**12.618**	0.000	**2.012**	0.000
Health	**1.895**	0.011	**2.568**	0.000	1.121	0.704
Security	**0.599**	0.002	**0.741**	0.070	**0.511**	0.000
ch_fin	1.001	0.998	**1.483**	0.039	0.729	0.153
ch_hlth	1.255	0.527	**2.027**	0.026	1.301	0.465
ch_sec	**0.468**	0.000	**0.598**	0.009	**0.472**	0.000
fin_hlth	**8.275**	0.000	**7.084**	0.000	1.894	0.112
fin_sec	**1.721**	0.005	**2.229**	0.000	0.754	0.205
hlth_sec	0.626	0.177	1.307	0.336	0.736	0.350
ch_fin_hlth	**2.878**	0.003	2.030	0.073	0.000	1.000
ch_fin_sec	0.795	0.293	1.107	0.612	**0.392**	0.000
ch_hlth_sec	0.515	0.219	1.211	0.625	0.935	0.876
fin_hlth_sec	1.864	0.109	1.740	0.169	0.556	0.347
all types	1.605	0.255	**2.387**	0.020	0.401	0.220
only other	**2.484**	0.000	**2.488**	0.000	1.186	0.488
age30s	0.986	0.913	1.107	0.383	**0.644**	0.001
age40s	**0.535**	0.000	**0.586**	0.000	**0.270**	0.000
age50s	**0.394**	0.000	**0.382**	0.000	**0.168**	0.000
age60s	**0.180**	0.000	**0.161**	0.000	**0.130**	0.000
age70over	**0.047**	0.000	**0.050**	0.000	**0.115**	0.000
Female	**1.186**	0.038	1.161	0.053	0.921	0.404
bornOther	**1.620**	0.000	**1.599**	0.000	**2.073**	0.000
Diploma	0.875	0.115	0.992	0.916	1.048	0.660
Degree	**0.719**	0.001	**0.772**	0.007	0.913	0.465
Couple	1.013	0.905	1.107	0.302	0.816	0.113
sole parent	1.278	0.212	1.193	0.355	1.478	0.121
couple with deps	0.820	0.066	**0.819**	0.049	**0.686**	0.005
full time emp	1.076	0.776	1.581	0.097	1.232	0.514
part time emp	1.019	0.942	1.434	0.200	0.741	0.374
not in LF	0.880	0.631	1.295	0.363	1.004	0.989
$400 to 599	0.801	0.194	0.838	0.288	0.773	0.224
$600 to 799	**0.709**	0.043	0.729	0.053	0.675	0.068
$800 to 999	0.750	0.089	**0.684**	0.021	0.799	0.290
$1000 to 1499	**0.570**	0.000	**0.709**	0.023	0.846	0.391
$1500 to 1999	**0.501**	0.000	**0.604**	0.003	1.023	0.914
$2000 to 2499	**0.436**	0.000	**0.476**	0.000	**0.530**	0.032
$2500+	**0.286**	0.000	**0.306**	0.000	0.709	0.188
income not stated	**0.660**	0.005	**0.697**	0.012	0.747	0.099
Very Good	1.217	0.058	1.105	0.287	0.851	0.172
Good	1.218	0.074	1.085	0.420	0.812	0.108
Fair	**1.586**	0.001	1.291	0.062	0.857	0.402
Poor	1.029	0.915	1.170	0.521	1.283	0.358
Number LTC	**0.905**	0.000	**0.872**	0.000	**0.926**	0.015

Figure 5: Relative Risk Ratios of Time in Cover by Type (relative to insured more than 5 years)



Appendix: Frequencies of combinations of Reasons




1 reason exactly
2 reasons exactly
3 reasons exactly
C
96
Choice
A
146
Security
B
10
Lifetime cover
D
217
Private treatment
E
37
Ancillary
F
149
Waiting lists
G
20
Always had
H
6
Gov't bens
I
8
Other fin
J
9
Has conditions
K
9
Elderly
L
15
Other
B 6
D 135
E 22
F 91
G 20
H 2
I 7
J 6
K 6
L 4
D 6
E 2
F 4
G 0
H 0
I 1
J 2
K 1
L 2
E 66
F 125
G 27
H 5
I 16
J 9
K 11
L 17
F 21
G 10
H 4
I 2
J 2
K 0
L 6
G 17
H 7
I 8
J 3
K 5
L 21
H 0
I 0
J 0
K 1
L 1
I 0
J 0
K 0
L 0
J 1
K 0
L 1
K 0
L 0
L 0