CHOOSING HEALTH INSURANCE IN A DUAL HEALTH CARE SYSTEM: THE CHILEAN CASE

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In Chile there is a public insurance system where people contribute a fixed percentage of their income, and also a private system where people pay a premium based on their personal characteristics. Using a large survey for 1996, we study the determinants of the decision to buy a private health plan. We find that the probability of buying a private health plan is positively correlated with income and living in areas with private health services providers. This probability decreases as families become older, and with a larger proportion of fertile age females. We also find that people who are more likely to demand health services prefer to buy a private health plan, and that people enrolled in a private health plan increase their use of health services. The segmentation observed in the health sector relates with the way private insurers and the public insurance system set their premiums.

JEL classification codes: D81, I11
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I. Introduction

The Chilean health insurance system has a dual character. On the one hand, there is a public insurance system where people contribute with a fixed

percentage of their work income and receive health care services when needed.[1] On the other hand, there is a private health insurance system which works as a traditional private insurance scheme.[2] A set of health plans, with different coverage levels, deductibles, and caps on expenses, is offered. People pay a premium which is proportional to the expected cost of the health care services demanded. Workers have to allocate a fixed percentage of their work income to enroll themselves and their dependents into one of the health insurance systems. If they opt for a private health plan, they can supplement this minimum payment to have access to a more comprehensive health plan. People who are not working can voluntarily buy private insurance, if they are unable to do so they are covered by the public health system.

These two health insurance schemes are parts of a health care sector that as a whole has a dual character. While people enrolled in the private health insurance scheme have access to a wider range of health care providers, and particularly to private providers offering services of higher quality, people enrolled in the public security system are in general constrained to the public providers, and have access to services of a lower quality allocated on a non – price basis.

Although most workers are enrolled in the public system, after more than 15 years of development, the private system has become more mature and consolidated. The private insurance system, which in its origin was only able to enroll a small segment of upper-middle and high income households, has experienced a significant expansion toward lower-middle income segments.

[1] The public health insurance system is the Fondo Nacional de Salud, FONASA.

[2] The private insurance companies offering health plans are called Institutos de Salud Previsional, ISAPRE.

This expansion has been the result of a growing commercial effort by private insurers, who have developed more competitive products based on managed care practices. These innovations have been introduced by the growing difficulty private insurers were experiencing in transferring people from the public system to the private system.

The major attraction of the private system is that it allows to a larger extent access to providers offering medical services of a higher quality. Although some of those enrolled in the public security scheme can opt for a fee for service modality, its high cost forces the great majority of the beneficiaries to use public providers. Cheaper private health plans entail significant co-payments, and private health plans are usually not a convenient alternative for low income people. On the other hand, the institutional design of the private insurance system has led to practice risk selection. In order to be competitive, private insurers have an incentive to exclude people with severe medical conditions, or elderly people belonging to a higher risk class. Finally, the attractiveness of private health plans are seriously impaired when, given the geographical location of beneficiaries, there is not a network of private health care providers.

In this context, it is interesting to understand the determinants of people's enrollment decision into both health insurance alternatives. This would allow a better understanding of the determinants of access to private health plans, as well as the magnitude of the selection biases faced by the public system and private insurers. This paper has four objectives; to study the determinants of the decision to enroll into a private health plan; to characterize people enrolled in both health insurance schemes from a social and economic standpoint; to analyze if people who are more likely to demand health services are also more likely to choose a private health plan, and to evaluate if having a private health increases the demand for health services associated with non –catastrophic medical conditions.[3]

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[3] By catastrophic medical conditions we mean illness entailing a relatively large expenditure considering the person's income, or chronic medical conditions leading to large and periodic medical expenses.

Some of these issues have been studied by Sapelli and Torche (1998). Using data from the Casen 1990 and 1994 surveys, the authors study the determinants of the decision to contribute to the public system or to buy a private health plan. This work introduces a methodological innovation. Sapelli and Torche (1998) use too simple a framework to study how health status affects people's decision between the alternatives, and their results are likely to be biased because they did not control for endogeneity. To overcome this shortcoming, we use a simultaneous equations model which enables us to identify the extend private providers select risk based on public information, the selection bias faced by private insurers due to people having private information on their health status, and the extend health services demanded increases when people have a private health plan. We also use a more recent survey from 1996 in our study.

The paper is organized as follows. Section II briefly surveys the recent literature on the demand for health insurance. Section III discusses what determines the choice of a private health plan by households, and the data used for these determinants. In section IV, using the data, we characterize people enrolled in the private and public insurance system. Section V presents a simple model of health insurance choice and discusses its estimation. Section VI discusses the results and analysis the economic importance of the determinants for different types of households. Section VII concludes with some final remarks on our findings and relating them with some aspects of the actual debate on the policy arena.

II. The Choice and Demand of Health Insurance

The choice of a health insurance plan is driven by two sets of determinants which are closely related, but are analytically separable –the characteristics of the health plan itself, and the personal characteristics of the individual making the choice.

A series of works have highlighted the importance of the characteristics of the health plans offered. For example, Feldman et al. (1987) studied the

determinants of the individuals' choice among health plans for employees of a group of firms. They found that the choice among different health plans were strongly sensitive to the prospective payments the individual would have to make when demanding medical services. In a similar work, Short and Taylor (1989) found that the prices of the different health plans, as well as the existence of coverage for hospital expenses and catastrophic illnesses, constitute relevant dimensions in the choice among alternative health plans. Both determinants also appeared to be important in the work by Ellis (1989). Mechanic et al. (1990) studied the importance of the degree of freedom in choosing a health care provider on the choice among different health plans. They found that, in the United States, people with a higher level of education, Caucasian, older, and with a smaller number of children, preferred health plans that allowed a larger freedom to choose the provider.

With respect to the personal characteristics of the individual choosing health insurance, an important determinant is the level of income. People with very low income, or those who are unemployed, usually do not have access to health insurance when it is not mandatory and publicly provided. This has been shown in the works by Swartz and McBridge (1990), Diehr et al. (1991), and Swartz, Marcotte and McBride (1993). Income level does not only influence the decision of having health insurance but also the type of health plan that is acquired. At low income levels people demand cheaper insurance, that is to say with a lower coverage. This relationship has been shown in several works, among them Cameron at al. (1988), Cameron and Trivedi (1991), Feldman et al. (1987) and Short and Taylor (1989).

The demand for health insurance is intimately related to the demand for medical services. People with private information on their health status, who think that their probability of generating medical expenses is high, will buy health insurance with larger coverage than those with a better health status, who do not expect to generate large medical expenses. This adverse selection effect has been discussed among others by Hsiao (1995) and Cutler and Zeckhauser (1997), and has been empirically studied by Mc Call et al. (1991), Marquis (1992), and Browne and Doerpinhaus (1993). Another way the

demand for health insurance is linked to the demand for health insurance is that people who already have a health insurance face a lower cost of demanding health care services, and therefore they will demand services to a larger extent that they would have if uninsured. This moral hazard effect has been considered in the work of Cameron et al. (1988), who analyzed the combined determination of the demand for medical services and health insurance.

The literature studying the demand for health insurance and its determinants refers for the most part to the reality of the United States, where there is a system of private health insurance closely connected to the workplace. However, the Chilean health care sector has a dual character where a public sector coexists with private insurers and providers. For that matter, the Chilean health sector resembles to a larger extent some European mixed systems, where a significant public sector exists in parallel with a private sector providing health insurance and medical services. The demand for health insurance in this context has been studied by Zweifel (1982), van de Ven and van de Praag (1981a and 1981b), and Propper (1989 and 1993). This last author explores the determinants of the decision of acquiring private health insurance in England, where a public health insurance financed by means of taxes is mandatory, and coexists with private insurers who offer supplementary health insurance allowing access to higher quality health care providers.

III. The Determinants of Households' Choice of Health Insurance System and the Data

In general, studies focusing on the choice among alternative health insurance options consider both the characteristics of the health plans offered, and the personal characteristics of the individuals making the choice. Nevertheless, given the characteristics of the Chilean private health insurance system and the available data, it is impossible to consider the characteristics of the health plans offered. The level of co-payments for different medical services, the degree of freedom to choose providers, the coverage for hospital expenses, and the maximum level of reimbursement, are largely heterogeneous

among private health plans, and they are not easily comparable with the one offered by the public insurance system. Moreover, there is no data set available containing information on the characteristics of private health plans held by people. The available data set comes from the Chilean National Characterization Survey (CASEN) for 1996. This survey describes the social and economic characteristics of Chilean families, including information on income, housing, education, health, and labor. Therefore, following Propper (1989 and 1993), we circumscribe our analysis to study the effect of households' characteristics on the choice between a private and a public health insurance.

Our unit of study corresponds to individuals working under a contract deciding whether to contribute to the public insurance system or getting a private health plan. Within each household, we consider as a decision maker the head of the household. If the spouse also works under a contract it is considered as an independent decision maker. By the same token, any of the offspring, older than 25, or older than 18 and not studying or handicapped, working under a contract is also considered as an independent decision maker. Other members of the household, who legally qualify as dependent, were considered as being dependent on the head of the household.[4] We have 20,181 observations in our sample (representing 2,475,282 individuals[5]), and 50.21% of the people deciding which health insurance scheme to enroll have chosen a private health plan.

The determinants of the choice between both health insurance systems considered in the study are: age, income, health status, and an observable risk index of the individual and his or her dependents. These independent variables are constructed as follows, and the descriptive statistics of the variables are shown in Table 1.

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[4] We eliminated from the sample those households who were enrolled in special health insurance plans such as those of the Armed Forces, student health services, etc. Those households did not represent more than a 5% of the total number of observations.

[5] Chilean population is about 15 millions.

Income: We use as income the total disposable income of the individual deciding whether to contribute to the public insurance system or buy a private health plan. The average income in our sample is $242,373, but it shows a large variance and its standard deviation is $335,040.

Age: We directly used the age of the individual choosing a health insurance as an independent variable. The average age of the decision maker in our sample is 36.7 years, with a standard deviation of 11.1 years.

Risk index: While the contribution to the public security system is proportional to work income, private health plans discriminate among different age and gender groups. Elderly people and women of fertile age pay a higher premium than young people and men when enrolling the private system, because they are expected to generate higher medical expenses. On the other hand, in order to be competitive, insurers have incentives to perform risk selection when pooling risk by excluding from their health plans those people belonging to a high risk class. Therefore, the gender and age composition of the household affects the possibilities to get a private health plan. Based on the actual relative price structure of one of the main private insurers, we construct an index of perceived risk using the age and gender of the individual choosing health insurance and his dependents. The value of the index corresponds to the sum of the corresponding score assigned to each member based on his/her gender and age as shown in the Appendix. The value of the index for our sample ranges from 1 (corresponding to a young male) to 9.24. The average value of the index is 2.46, with a high standard deviation (4.72).

Health status: Although the premium charged in a private health plan in Chile is proportional to the perceived risk based on age and gender, the likelihood of generating medical expenses depends to a greater extent on people's health status, which is private information not known by the private insurer.[6] Those people with poor health conditions, but who do not have a pre

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[6] As shown by Van de Ven and van Vliet (1994), when only age and sex are used to differentiate risk among different individuals a very small proportion of the total variation among individual risks is explained. In Chile, private insurer can only set prices based on age and gender and can not deny coverage. Pre screening medical conditions is not allowed.

existing severe illness which has to be declared when signing for a private health plan, knowing that they face a larger probability of generating medical expenses, will be more likely to get a private health plan offering larger coverage and access to better health care providers. The information in our database is limited to the actual demand of different health services during the last period. Therefore, we need to assume that people who have demanded more health services in the past are more likely to be sick in the future. Following Sapelli and Torche (1998), we construct an index of health status for the individual and his dependents based on different indicators. The first indicator is the number of medical visits during the last 3 months. The second indicator is the number of surgeries or hospitalization of the members of the household during the last 3 months. We also include three dummy variables indicating; whether the members of the household had an accident during the last 3 months, whether one of the members had a child, and whether they buy medicine. To reduce the dimensionality of this multivariate data, we construct the index using the first principal components.

This strategy to create a proxy for peoples' health status has two shortcomings. First, there may be some people demanding medical services who suffered a long term severe medical condition. This people are required to declare it at the moment of applying to a private health plan, and private insurer can deny covering the expenses associated to those conditions. Therefore, the existence of long term severe medical conditions may hinder the possibility of getting a private health plan, rather than make it more likely. A second problem is that past demand of health services relates to the decision to enroll a private plan beyond the selection bias we already referred to. People who already have a private plan with larger coverage than the one offered by the public insurer face a lower pocket cost when demanding medical services, and are more likely use them more intensively. In our estimations, we have to take into account explicitly the endogeneity of this variable. The average value of the health status index in our sample is 2.71, but it shows a large standard deviation of 4.72.

Access to private providers: The benefits of buying a private health plan are intimately related to the access to higher quality health care providers. Therefore, the availability of a network of private providers in the area an individual lives is an important determinant on the choice of a private health plan. Hence, people living in rural areas, or in low density urban areas, where this network of higher quality health care providers does not exist, are less likely to buy a private health plan. We classified the different districts into high density urban areas, and the rest. Therefore, if the individual lives in a district which had more than 70,000 people living in its urban area by 1992 a dummy takes the value of 1, and zero otherwise. In our sample, 74.6% of people deciding which insurance system to choose lived in an area with private providers.

Table 1. Descriptive Statistics

Continuous variables	Mean	Std. dev.	Minimum	Maximum
Income	242,372	335,040	1	5,707,828
Age	36.7	11.1	17	95
Risk	2.46	1.27	1	9.24
Health status	2.71	4.72	0	82.99

Categorical variables	% of observations
Private health plan	50.21
Private providers	74.60

Number observations	20,181

IV. Characterizing People Enrolled on both Systems

In this section, we characterize people enrolling in both health security schemes based on their income, age, perceived risk, health status, and whether they live in an area with private providers. In Table 2, we show the percentage of people who enrolled each insurance system for 5 quintiles ordered from lower to higher income.

Table 2. Stratified Analysis of Enrollment

Variable	Private plan	Public insurance	Mean test
1st income quintile (%)	17.30	82.70	0.00
2nd income quintile (%)	30.50	69.50	0.00
3rd income quintile (%)	41.80	58.20	0.00
4th income quintile (%)	59.40	40.60	0.00
5th income quintile (%)	82.90	17.10	0.00
Mean health status	2.75	2.69	0.28
Mean age	36.13	37.30	0.00
Mean risk	2.34	2.59	0.00
Private providers (%)	85.00	64.00	0.00

The percentage of people in the lower quintile enrolled in a private health plan is only 17.3%, and this percentage increases steadily as income rises. In the upper income quintile almost 83% of people are enrolled in a private health plan. This suggests that income is a mayor determinant in the decision of which insurance system to enroll.

Table 2 also shows that people enrolled in a private health plan is in average slightly younger than people enrolled in the public insurance system. Although the difference on the average age is small, the difference is statistically significant as implied by the mean test that lead us to reject the null hypothesis that the average age of the two groups are equal.

With respect to the insurer perceived risk index, the average risk of people enrolled in a private health plan is 2.34, and is lower than the average risk of those enrolled in the public insurance system, which is 2.59. This difference is statically significant, and suggests that private insurer enroll better risk than the public insurance system based on publicly available information.

The statistics also show that a large percentage of people enrolled in a private health plan, 85%, lived in an area where there were private providers. This percentage is lower for those choosing the public insurance system. This indicates that the availability of private providers is also important in choosing the insurance system.

With respect to the health status of the people enrolled in both systems there is not a significant statistical difference. The average value of our index is similar for people enrolled in a private plan and people enrolled in the public system.

This descriptive analysis of peoples enrolled in private health plans and the public system lead us to estimate a model of health insurance choice based on these characteristics.

V. A Simple Model of Health Insurance Choice

Building on the framework offered by Besley (1989), and used by Selden (1993), we present a simple model of health insurance choice. Consider a consumer who faces ex-ante uncertainty with respect to an illness severity parameter θ with distribution $F(\theta)$ with $\theta \lfloor [\theta_0, \theta_1]$. The consumer's utility function is strictly increasing and concave,

$$U = U\big[C(\theta), y(\theta)\big] \tag{1}$$

where, C denotes consumption of non-health goods, and y denotes health.

The individual is assumed to produce health through a well-behaved concave production function,

$$y(\theta) = g(X(\theta),\theta,P) \tag{2}$$

where X denotes health services, P is a vector of personal characteristics, and $fg / fX > 0$ and $fg / f\theta < 0$. Thus given θ, the individual can improve his or her health by purchasing health services.

The individual has two possibilities of getting health insurance. Whether to contribute a fraction Ω of his income to the public security system and to get a state specific lump-sum compensation $S(\theta)$. Otherwise, he can buy a private health plan, where he pays a premium $m(R)$ and receives a fraction α of the total costs of the health services consumed, where R is a risk index based on age and gender.

If the individual opts to contribute to the public security system, given an exogenously determined level of income I, an insurance payment program $S(\theta)$, and a realized value of θ, he solves in each state the following problem,

$$Max_{X(\theta)}U\big[I + S(\theta) - \Omega I - X(\theta), g(X(\theta),\theta,P)\big] \tag{3}$$

From the first order condition for utility maximization, we can derive the state specific demand function for health services,

$$X = X(I + S(\theta) - \Omega I,\theta,P) \tag{4}$$

and the state dependent indirect utility function is written as,

$$V(I + S(\theta) - \Omega I,\theta,P) = U\big[I + S(\theta) - \Omega I - X(I + S(\theta) - \Omega I,\theta,P), \tag{5}$$

$$,g(X(I + S(\theta) - \Omega I,\theta,P),\theta,P)$$

If the individual chooses to buy a private health plan, given his exogenously determined level of income I, a premium $m(R)$, and a realized value of θ, he solves in each state the following problem,

$$Max_{X(\theta)}U\left[I - m(R) - (1-\alpha)X(\theta),g(X(\theta),\theta,P)\right] \tag{6}$$

Then, from the first order conditions, for a given α, we can derive a state specific demand function for health services,

$$X = X(I - m(R),\ \alpha,\ \theta,\ P) \tag{7}$$

and the state specific indirect utility function can be written as,

$$V\left[I - m(R),\alpha,\theta,P\right] = U\left[I - m(R) - (1-\alpha)X(I - m(R),\alpha,\theta,P), \right. \tag{8}$$

$$\left. g(I - m(R),\alpha,\theta,P)\right]$$

Assuming a competitive private insurance market and zero administrative costs, the equilibrium contract is actually fair, therefore,

$$m(R) = \int_{\theta_0}^{\theta_1} \alpha\ X(I - m(R),\alpha,\theta,P)\ dF(\theta) \tag{9}$$

Since insurance is purchased ex ante, the individual will choose to buy a private health plan if the expected utility of this option is greater than the expected utility of contributing to the public security system, which can be expressed by means of a function corresponding to the difference in expected utility, ΔV,

$$\Delta V(I,R,\alpha,\Omega,P) = \int_{\theta_0}^{\theta_1} V\left[I - m(R),\alpha,\theta,P\right]dF(\theta) - \tag{10}$$

$$- \int_{\theta_0}^{\theta_1} V\left[I - S(\theta) - \Omega I,\theta,P\right]dF(\theta)$$

In order to estimate the model, we assume that the difference in expected utility for each individual can be modeled as,

$$\Delta V_i = \delta_1 HS_i + Z_{1i} \beta_1 + \mu_{1i} \tag{11}$$

where HS_i is the individual's health status, Z_{1i} is a vector of the other variables determining the choice of a private health plan, δ_1 and β_1 are parameters to be estimated, and μ_{1i} is an error term representing the collective contribution to ΔV_i of unmeasured characteristics which is assumed to be normally distributed with mean zero and variance 1.[7] ΔV_i cannot be directly observed, we only observe if the individual buys the private health plan or not, and an index variable taking the value of 1 if $\Delta V_i > 0$ (i.e. if the person gets a private health plan) can be used to estimate a probit model.

As it is implied by (4) and (7), the actual demand for health services is endogenous to the health insurance system chosen by the individual, and a model accounting for this joint endogeneity is needed. Therefore, we assume that the actual demand of health services can be modeled as,

$$HS_i = \delta_2 \Delta V_i + Z_{2i} \beta_2 + \mu_{2i} \tag{12}$$

where Z_{2i} is a vector of variables determining the demand of health services other than the health insurance system chosen by the individual.

Considering the determinants of the choice between a private health plan and the public insurance, we specified the model such as the Z_{1i} vector includes: income, income square, age, risk and private providers. As determinant of the demand for health services, we include in vector Z_{2i} the set of exogenous variables determining the demand for health services. Health care services demanded, being normal goods, are expected to increase as income rises. We also expect that the older the individual the larger is his demand for health services. We also include the square of age to capture an eventual non linearity. The demand for health care services is also expected to be positively correlated

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[7] The normalization of the variance is an innocuous standarization because the parameter vector β can be identified only up to a factor of proportionality.

with age and gender composition of the individual and his dependents, so we include the perceived risk index. In order to test for non linearities in the estimation of the probability of having a private health plan, we included income squared.[8]

Because the index variable indicating the enrollment to a private health plan is discrete, we cannot imbed this analysis in a standard simultaneous equations framework. Instead, we use a latent variable model first discussed by Heckman (1978) and used by Bollen et al. (1995), and Norton et al. (1998a and 1998b) among others, which allows us to make a simultaneous estimation of (11) and (12). To estimate the model we follow Maddala (1983, ch.8, pp. 242-247), who presents a two-stage procedure based on the work of Nelson and Olson (1978) and Amemiya (1979).

VI. The Results

The results for the estimation are presented in Table 3. These results show that the probability of an individual and his dependents having a private health plan increases with income, although at a decreasing rate. This probability is also positively correlated with the household living in an area with nearby private providers. One point which is interesting to note is the negative relation existing between the probability of having a private health plan and the age of the household head. The older the individual the less likely it is that he has a private health plan. By the same token, the perceived risk index is also negatively related to the possibility of having a private health plan. The older the individual and his dependents, or the larger the percentage of females, the lower the probability of having private health insurance.

Our Health status variable has a positive correlation with the probability

[8] Alternative specifications for the covariates including education and interactive income-education were also run. However, the results for the coefficients of main interest did not changed significantly. We only present the specification without education to avoid multicollinearity problems associated with the correlation between income and education.

Table 3. Simultaneous Equation Estimation

Dependent variable	Health status	Probability of having a private health plan	
Variable	OLS	Probit	Probit (*) (Marginal effects)
Private health plan	0.85 (14.59)		
Health status		0.064 (13.699)	0.025
Income	-0.01 (-0.88)	0.436 (312.30)	0.173
Income-square		-0.008 (-197.02)	-0.003
Age	0.14 (8.73)	-0.004 (-9.02)	-0.002
Age-square	-0.003 (-14.03)		
Risk	1.63 (55.15)	-0.264 (-35.04)	-0.105
Private providers		0.495 (104.07)	0.195
Constant	-2.81 (-8.81)	-0.574 (-50.35)	
Observations	20,181	20,181	20,181
Log-likelihood	---	-1,382,756.8	-1,382,756.8
Adj. R^2 / Pseudo-R^2	0.145	0.194	0.194

Notes: t-test in parenthesis. *Marginal Effects are computed at the sample average value of the variables. For "Private providers" a discrete change of the dummy variable from 0 to 1 was used.

of having a private health plan, suggesting that less healthier people are more likely to get a private health plan with better coverage than the publicly provided health insurance. This effect could be interpreted as evidence of an adverse selection bias in the enrollment into private health plans. People who are more likely to demand health services prefer to buy a private health plan.

To see the economic significance of the covariates, let's consider their impact on the average probability of having a private health plan. The average probability of having a private health plan in our sample is 0.539,[9] which is very close to the observed unconditional sample frequency 0.502. The marginal effect of income is 0.173 and -0.003 for income squared, meaning that when income doubles the probability of having a private health plan increases to 0.847. Therefore, income is a major determinant on the decision to buy a private health plan. We analyze this income effect in more details below.

The same is true for the possibility to have access to private providers of health care services. When the individual does not live in an area with nearby private providers the probability of buying a private plan decreases to 0.393, which denotes the importance of having access to better quality health care services in the decision of buying a private health plan.

The probability of having a private health plan for our sample drops to 0.47 (a drop of 13% in the average probability) if the household did not use any health service during the last three months. This latter finding implies important evidence of adverse selection bias. People expecting to demand health services prefer to buy a private health plan.

One of the characteristics of probit models is that changes in the probability are non linear on the value of the covariates. To see the economic significance of changes in covariates for different family types, we have defined nine baseline families based on their income and their stage in the life cycle. With respect to income, we define three types of families; low income families with a monthly income of $150,519 (Chilean pesos), middle income families with a monthly income of $242,373, and high income families with monthly

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[9] The average sample probability is evaluated at the average values of the covariates.

income of $677.294.[10] With respect to their stage in the life cycle, we also define three categories: young, middle aged, and older. Our young baseline family is composed of a male household head aged 35, a spouse aged 30, a female offspring aged 6 and a male offspring aged 4. The middle aged baseline family is composed of a male household head aged 50, a spouse aged 45, a female offspring aged 21 and a male offspring aged 19. The old baseline family is formed only by a male household head aged 67 and his spouse aged 61. Also, the baseline families have used the health services in the past 3 months at the average sample rate, and live in an area with private providers. The probability of having a private health plan for each of these baseline families, and its change when no private provider exists or there were no demand for health services are reported in Table 4.

Table 4. Probability of Private Health Plan for Family Types

Type of family		Young family	Medium age family	Old family
Low income	Baseline	0.36	0.22	0.11
	No private providers	0.20	0.10	0.05
	No health services	0.30	0.17	0.08
Medium income	Baseline	0.51	0.35	0.20
	No private providers	0.32	0.19	0.09
	No health services	0.44	0.29	0.16
High income	Baseline	0.95	0.89	0.78
	No private providers	0.87	0.76	0.61
	No health services	0.93	0.85	0.72

[10] Low income corresponds to the average value of the 3rd quintile. Medium income corresponds to the sample average value of income, and high income corresponds to the average income of the 5th quintile.

As can be seen, the probability of having a private health plan decreases as households get older, and this effect is greater for low income families. While for low income families the probability of having a private health plan when older is less than a third of the probability when young (drops from 0.36 to 0.11), for high income families this probability reduces only by 18% when old (drops from 0.95 to 0.78). Older families are less likely to have a private health plan, but their exclusion is hampered as income rises. This suggests that the main problem to keep a private health plan when old is the increase in its price.

The economic effect of not living in an area with nearby private providers turns to be very significant for low income families, but it fades as income rises. When a low income young family lives in an area with no private providers nearby the probability of having a private health plan drops from 0.36 to 0.20 (i.e. in 44%). Nevertheless, if this same family has a high income, its probability of having a private health plan drops only from 0.95 to 0.87 (i.e. only a 8.5%). A similar pattern is observed for medium age and old families. A possible reason for this is that the existence of private providers nearby is not that important for higher income families because they can afford traveling if they need medical services.

The economic effect of not having used medical services in the last three months is only marginal for high income families, but it becomes important as income decline. For example, the probability of having a private health plan drops only from 0.95 to 0.93 (i.e. only 2%) for young high income families. But, for low and middle income young families this probability drops from 0.36 to 0.30 (i.e. 17%) and from 0.51 to 0.44 (i.e. 14%) respectively. The same pattern is shown for medium age and old families. This result suggests that low and medium income families expecting to demand health services in the future are more likely to buy a private health plan, and that high income families buy a private plan independent if they expect or not to use health services in the future.

Another interesting finding is that the likelihood of buying a private health plan, when expecting to use medical services in the future, is larger for medium

age and old families compared with young ones. This suggests that private insurers are more likely to enroll high more costly families than the average in the medium age and old groups.

Our estimation also allows us to study the effect of having a private health plan on the demand for health services. The average sample value of our index measuring the use of health services, based on the actual demand for health services during the last three months, is 2.715, rather close of the predicted value, 2.718. As shown in Table 3, the demand for health services is positively and significantly correlated with the probability of having a private health plan, with age, and the existence of fertile females and elderly members in the family, but negatively correlated with income. The positive correlation between the demand of health services and having a private health plan suggests that families having a private insurance consume more medical services than families enrolled in the public insurance system. Many factors can explain this behavior. First, private health plan usually offer larger coverage than the public insurance and therefore pocket costs of medical services are lower for people enrolled in a private health plan. Second, most people enrolled in the public insurance system can only get health services from public providers, and are rationed by means of queues and waiting lists, and therefore they face an extra cost. Third, most private health plans consider, at least to some extend, a fee for service compensation mechanism. This can result in private providers inducing demand for health services.

An interesting finding is that this behavior does not differ across family types. In Table 5 we show the percentage change in the demand for health care services when households do not have a private health plan for our nine family types.

Young families reduce their use of health care services by 16% when they do not have a private health plan, and this reduction is equal for any level of income. The same behavior is observed for old families independent of their income. The effect of not having a private health plan is similar for medium age families, who reduce their use of medical services by 14% when they do not have a private health plan no matter their income.

Table 5. Average Health Services Demanded for Different Family Types

Type of family		Young family	Medium age family	Old family
Low income	With private plan	5.42	6.13	5.19
	No private plan	4.58	5.29	4.34
	Change (%)	-0.16	-0.14	-0.16
Medium income	With private plan	5.41	6.12	5.18
	No private plan	4.57	5.27	4.33
	Change (%)	-0.16	-0.14	-0.16
High income	With private plan	5.35	6.05	5.11
	No private plan	4.50	5.21	4.27
	Change (%)	-0.16	-0.14	-0.17

VII. Conclusion

The main findings of this paper are that the most important factors determining the decision to buy a private health plan are: income, age and gender composition of the household, whether people live in an area with private providers and their health status. By charging a premium contingent on age and gender, as families become older, and there is more female members in fertile age, the cost of the insurance rise, and low income people get excluded from the private health insurance system. Therefore, the way premiums are set in private health plans and the public insurance system generates a selection bias on people enrolled in the public insurance system. Older families, or families with more female in fertile age, unable to pay the higher premiums of a private health plan end enrolled in the public insurance paying a fixed percentage of their income. This selection bias is due mainly to the way premiums are set in both insurance schemes. While in the private insurance system people pays a premium that to some extend reflects their risk (older

people and women on fertile age are expected to be more expensive), in the public insurance system the premium relates only to their income.

The positive correlation of the probability of having a private health plan and the indicator of health status, constructed using private information not known by private insurers, shows that people with poor health conditions are more willing to buy a private health plan. This behavior creates a bias in the type of people who decides to buy a private health plan. Those who expect not to demand a large amount of medical services are not willing to pay as much as those who do expect to consume a larger amount. This adverse selection can put private insurers at financial risks. Nevertheless, an important caveat to interpret this result is that our analysis was based on a cross section of households, and therefore the adverse selection bias can only be interpreted as a short run effect.

Private insurers are not allowed to deny coverage, except for pre existing medical conditions, and cannot pre screen potential enrollees to set their premium. Therefore, in the short run there is room for people who do not have a long term medical condition but expect to have large medical expenses to choose a private plan instead of the public insurance. However, in the long run, there is a way private insurers can cream-skim their risk and avoid any major financial risk of collapse. Given that insurers can change their premium on an annually basis, if people get a long term and expensive medical condition their premium rises and can be forced to migrate to the public insurance system if unable to afford it.[11] Consequently, in the long run the adverse selection bias could be on the public insurance system. Although there is anecdotal evidence of this, the lack of data prevents a more systematic study. If data would be available, a natural extension of our work would be to study the enrollment to private health plan using a panel of individuals.

Our finding that people enrolled in a private plan demand more medical

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[11] Although the regulation does not allow private insurers to charge a higher premium to some of the people in a given health plan, private insurers move good risks to a new plan and increase the premium of the plan where poor risks are pooled.

services than those enrolled in the public insurance is also interesting, but the causes of such behavior are hard to disentangle. To discriminate whether this behavior is due to pure moral hazard by enrollees, or is explained by an induced demand by health care providers, or because medical services in the public sector are quantity rationed, would require a much rich data set that the one we used and which is not available. Further study of the correlation between holding a private plan and a larger expenditure in health services is justified for its economic implications. If consumers demand more health services when having a private health plan than when they have to pay the full cost, from a social standpoint, there is over expenditure on medical services. This is so, because the number of interventions is larger than the socially desirable and they can be non cost-effective. The same is true if a larger expenditure on health services is induced by providers. Since the late nineties, private insurers have being promoting health plans where enrollees' choice of providers is limited, and the insurance company share risk with providers. This move toward a managed care scheme was partly motivated by the aim to curtail moral hazard.

There have been many proposals to reform the health insurance system. They are geared partially to finish a perceived unequal and unjust access to medical services by poor and rich people. Our findings support this view in the sense that only young and rich people can enjoy the benefits of a private health plan, and olds and poor have to stay in the public insurance system with limited access to medical services. Our findings also suggest that any reform intended to finish with the segmentation of the health insurance system should eliminate the duality in the way both health insurance schemes set their premiums. Some of the proposed reforms consider to make the public insurance system more like a private health plan, and set the contribution made by enrollees contingent on their risk and not on their income. This measure, coupled with others intended to allow people enrolled in the public insurance system to use to a larger extend private providers of health services, would hinder the dual character of both insurance schemes. To secure universal access to health insurance, it would be necessary to set a subsidy to people

unable to pay for their insurance. Many proposal ranging from a universal redistribution fund to less comprehensive cross subsidy systems within each insurer have been discussed. The main shortcoming of all these proposals is their lack of hard data and evidence to evaluate their effects on people's behavior. More empirical work on the Chilean health insurance market is needed; unfortunately this effort is severely limited by the lack of suitable data.

Appendix

Table A. Relative Prices in Private Health Insurance Plans for 1996

Age	Male affiliate	Female affiliate	Male dependent	Female dependent
Age ≤ 18 years	-	-	0.54	0.54
18 ≤ Age ≤39	-	-	0.79	1.5
Age ≤ 40 years	1	1.6	-	-
40 ≤ Age ≤ 54	1.3	1.5	1	1.32
55 ≤ Age ≤60	2.3	2.3	1.79	1.79
Age ⊕ 61	3.6	3.6	2.7	2.7

Source: Authors' elaboration based on actual prices from a major insurer.

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