

University at Buffalo

**On The Relationship Between Health Insurance And Life
Insurance Choice: A Disaggregate Level Analysis**

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By

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Certificate

It is certified that the work contained in this thesis, titled “On The Relationship Between Health Insurance And Life Insurance Choice: A Disaggregate Level Analysis” by Ashish Kumar, has been carried out under my supervision and is not submitted elsewhere for a degree.

Date

Advisor: Dr. Yong Yin

To my parents and teachers.

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Abstract

Some decision makings in life require tradeoffs among many financially risky factors. In day to day life we see individual decision making to purchase health insurance and life insurance to minimize the financial risks in the event of illness or death respectively. In this study we investigate how individual choices for health insurance and life insurance are correlated. Using the data from Consumer Expenditure Survey, we model individual choices for health and life insurance using recursive bivariate probit model. The model allows us to estimate the impact of health insurance choice has on choice of life insurance and correlation between these two choices. Our results suggest that choice of health insurance positively affects the choice of life insurance and in the basket of individuals' risk minimizing goods, health insurance and life insurance act as complements.

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INTRODUCTION

Individuals choose different kinds of insurance in order to avoid financial risks in case the unfavorable events occur. The common types of insurance that households buy in order to safeguard against any financial risks in future are health insurance, life insurance, auto insurance, and house insurance among many other types. Households decide to choose among these insurances jointly. Moreover the choice of one kind of insurance could have an impact on choice of others.

In this study we are looking at joint household decision for choice of health and life insurance¹. In Figure-1 we plot the aggregate percentage allocation of household expenditures on health insurance and, life and other personal insurance from year 1984 to 2008. There is too much variation in percentage allocation for expenditure on health insurance and over the period it has increased. However there is not much variation in percentage allocation for expenditure on life insurance and over the period it has decreased. Even though we do not see the definite trend in movement of expenditure allocations for insurance, the widening gap between the two might suggest that households prefer one over the other. However the question of association between these two insurance is open to empirical investigation.

The underlying motive for households to choose health insurance or life insurance or both is to mitigate the financial risks arising out of unfavorable events. Therefore depending on household characteristics, financial constraints and health status, households might prefer one over the other or both. In 2007 there were 253.4 million people in the United States with health insurance and 30.8 million with life insurance (U.S. Census Bureau). Neither the number of

¹ Hereafter by 'insurance' we mean 'health and life insurance' unless otherwise specified.

people with insurance nor the household expenditure allocations for insurance gives any direction as how household choice for insurance is correlated and is there any causal relationship between the two choices i.e. does the choice of health insurance has any influence on choice of life insurance and vice versa.

The study of the interactions between insurance has important implications. In most countries health insurance is regulated by the government and spending on health care constitutes an important fraction of the overall economy. For example the United States spends over \$2.2 trillion on health care each year which is 16% of the total economy and this share is growing every year. Therefore the effectiveness of any health care policy might be influenced by other factors that possibly interact with households' choice for health insurance. For example in the basket of risk minimizing goods apart from health insurance, life insurance is other important goods. It is important to know when a household makes choice for one, how it affects the choice for other. Insights from such study will not only reveal the behavior of individual choice for insurance, but it will provide a guideline for policy makers to consider the effectiveness of the policy by taking into account the factors that has significant interaction effects with the policy being implemented.

In this study we propose a structural model of consumer decision making for choice of insurance. Using a recursive bivariate probit model we estimate the joint decision making of household choice for insurance simultaneously. We control for household demographics such as age, education, race, household size and others and we account for financial information of the households. Moreover we estimate our model by controlling for the health status and premiums paid by the individuals which are two important factors that have significant impact on household choice for insurance.

Our results show the expected effects of household demographics, financial information, health status and premiums paid. Interestingly we find that after controlling for all these effects the correlation between insurance is positive. This suggests that health insurance and life insurance act as complements in the basket of individual's risk minimizing goods. Moreover the health insurance choice positively affects the choice of life insurance.

BACKGROUND

Most of the literature on household decision for choice of insurance has looked at them separately. To our knowledge there is no existing literature that looks at household choice for insurance in a joint framework at disaggregates level. One stream of literature looks at the household choice behavior for insurance goods in general given consumers are risk averse and try to minimize the risk. Another set of literature in this field looks at different correlates that affect consumer choice for insurance.

In the seminal work by Ehrlich and Becker (1972) they integrated the market insurance with individual private actions to minimize the risk. The authors show that market insurance and self-insurance are substitutes whereas market insurance and self-protection can be either substitutes or complements. The basic assumption of the framework is that various events that prompt consumption of insurance are mutually exclusive and jointly exhaustive. However in real life the 'state of affairs' influencing individual decision making for choice of various risk minimizing goods might be correlated i.e. they might have influence on one another for the choice decision. Doherty and Schlesinger (1983) show that optimality condition for deductible policies for optimal insurance purchase depends on the correlation between insurable and uninsurable risks. The extant literature has looked at health and life insurance, two primary

goods in an individual's risk minimizing basket, independently and there is no documented evidence of impact of one on another on individual choice for insurance. Even though these literatures discuss the risk in general broad economic term, the scope of 'risk' in our study mainly covers the households' financial risk.

The changes in household characteristics will affect the demand for insurance. Shower and Shotick (1994) find that income and number of earners are both positively related to demand for insurance. Increase in family size and age also increase the demand for insurance. Ven De Ven and Van Praag (1981) find significant effect of health, medical consumption and income on individual choice for types of insurance between complete coverage versus one with deductibles. Paulin and Weber (1995) find that out-of-pocket health care expenditure is associated with individual spending pattern. Rubin and Koelln (1993) find that socioeconomic variables such as age, household size, financial assets, income, race, education, employment and house ownership are important determinants of individual out-of-pocket health care expenditure. Levy and Delire (2003) study the consumer spending behavior across sixteen different goods and find the significant differences between insured and uninsured individuals' spending pattern.

There are factors other than household characteristics such as household motives, household health status that can affect household demand for health insurance. McCluer (1996) proposes that purchase of health insurance might be related to precautionary savings however the author does not find evidence for such behavior and finds that there is strong positive relationship between health insurance and wealth. This is consistent with the previous literature where effect of risk on savings is found to be relatively weak. Fiensein (1993) emphasizes the importance of lifestyle, health care utilization, psychological and biological factors to be important determinants of consumer choice for health insurance. Gerdtham et al. (1999) estimate

the 'Grossman' model for demand for health and find that it decreases with price for medical care, age, overweight, smoking and living alone and increases with income, education and level of sporting activities.

Similarly for life insurance the literature finds the significant effect of demographics. Lewis (1989) proposes an analytical model to show that demand for life insurance depends on demographic structure of breadwinner of the household. Chen, Wong, and Lee (2001) show that age, period and cohort has strong influence on life insurance purchases in the US. Gutter and Hatcher (2008) find that there is not much difference between white and black on life insurance ownership however allocation of human capital for insurance is much higher for white households. Li et al. (2007) examines the demand for life insurance in OECD countries and find that it increases with dependents and level of education and decreases with life expectancy and social security expenditure. They emphasize the joint importance of product market and socioeconomic factors in determining the demand for life insurance. He (2009) finds the significant correlation between life insurance purchase and subsequent mortality. Celik and Mesut (2009) find that income plays a central role in demand for life insurance however education level and inflation affect life insurance consumption in negative way.

The existing literature studying household demand for insurance has two major limitations. First, the literature looks at demand for insurance separately. Secondly, many of the models are estimated at aggregate level. Shower and Shotick (1994) emphasize the importance of estimating such models at disaggregate level and simultaneously. The understanding of household decision for choice of different kinds of insurance is important from policy making in both the private and public sectors. Therefore the joint estimation of household choice for insurance at disaggregate level will provide parameter estimates accounting for two-way

causalities and correlation among error terms. For such model we need conceptual framework that gives the structure of the household decision making for choice of insurance.

Apart from household demographics, the health status of the household will play a significant role in their decision for the choice of insurance. The disaggregate level data often do not contain the information on household health status. Therefore it is going to be one of the challenges to account for household health status in the individual level choice model of insurance.

We present conceptual model of our framework for choice of insurance in Figure-2. The first part of the conceptual model is that households' choice for insurance is not independent i.e. household jointly decide for the choice of insurance. However there is an underlying structure as how the choices are made. This structure of the choice for insurance is taken from Grossman model (details presented in Methodology section) where we postulate that a household first decides on the choice of health insurance and the subsequent choice for life insurance is influenced by his/her choice for health insurance. The second part of the conceptual model is that household demographics, financial information, health status, and insurance characteristics are exogenous factors that will influence the household choice for insurance.

Following our conceptual model we propose a structural model of household choice for insurance. Using a recursive bivariate probit model we estimate the model at disaggregate level controlling for the covariates associated with household demographic, financial information, health status and insurance characteristics. The model not only allows us to estimate the correlation between error terms of insurance but also the impact of health insurance choice has

on the choice of life insurance. The sign of the correlation will indicate whether they act as complements or substitutes in the basket of households' risk minimizing goods.

METHODOLOGY

Households try to minimize the financial risk associated with health and safety (Viscusi 1993). They prioritize their financial risk mitigation based on the magnitude of the hazard, risk attitude and constraints they face in life (Viscusi 1993, Kahneman and Tversky 1979). Financial risk in general is minimized by households by purchasing insurance. Some schemes of financial risk mitigations are shared across e.g. health insurance schemes are shared by the government as well as the households whereas some are households specific, e.g. life insurance which is purchased mostly on household basis.

The purpose of different kinds of insurance that individuals buy varies across. The purpose might depend on nature of risk being minimized. However at the very broad level insurance protects risk-averse individuals suffering from full consequences of those actions that affect them unfavorably (Spence and Zeckhauser 1971). This protection is mostly in the form of avoiding full financial risk. Health insurance is purchased by an individual to protect oneself from unfavorable consequence of bad health such as cost of hospitalization, medical supplies and prescription drugs, doctor visits. The choice of life insurance depends on demographic structure of the household's breadwinner. Even though the purpose of health insurance is benefit to self and that of life insurance is benefit to others, there could be strong association between the two as both serve the same purpose of minimizing financial risk.

Health insurance has direct impact on reduction to financial risk associated with unfavorable conditions arising out of bad health. For example cost of medical supplies,

hospitalization, doctor visit etc. It plays an important role in household's choice for purchasing health insurance as health is a major determinant of wages, hours and labor force participation. Becker (1964) recognizes health as a form of human capital and distinguishes it from other form of human capital such as education. Grossman (1972) further proposes a model that views health as durable capital stock that produces an output of healthy time.

The stylized form of Grossman (1972) model is as follow. Consumers are maximizing the intertemporal utility function given by,

$$\sum_{t=1}^T E(\delta^t U_t) + B(A_{T+1})$$

where δ is discount rate, $B(\cdot)$, is bequest function, A is assets, and utility U_t is given by,

$$U_t = U(Q_t, C_t, L_t; \mathbf{X}_t, u_1, \epsilon_{1t})$$

where Q is stock of health, C is consumption of other goods, L is leisure, \mathbf{X} is exogenous taste shifter, u_1 is permanent individual taste shifter, and ϵ_1 is shock to preferences.

The utility is maximized subjected to following resource constraints,

$$Q_t = Q(Q_{t-1}, G_t, V_t; \mathbf{Z}_t, u_2, \epsilon_{2t})$$

$$C_t = Y_t + P_t G_t - (A_{t+1} - A_t)$$

$$Y_t = I_t + w_t H_t + r A_t$$

$$L_t + V_t + H_t + S_t = 1$$

$$S_t = S(Q_t, u_3, \epsilon_{3t})$$

G and V are material time inputs into health production function, Z is exogenous productivity shifters, u_2 are permanent individual specific productivity shifters, ϵ_{2t} is productivity shock, Y is total income, P is prices, I is unearned income, w is wage, r is interest rate, S is sick time, u_3 are permanent individual determinants of illness and ϵ_{3t} are shocks that cause illness. The initial endowments of health and assets, Q_0 and A_0 , are assumed to be given.

This model states that health is considered important by individual because it increases their utility and moreover sickness takes away the individual time from market and non-market activities. The empirical insight into the model emphasizes the treatment of the health as endogenous variable. Health as human capital is distinct from education as with time it depreciates and one must replenish it with investment in health. Another important point to note is that bequest function B depends on assets A which is determined by individual investment in health.

Motivated by the literature from labor economics we propose a structural model of individual choice model for health insurance and life insurance at disaggregate level. Faced with adverse conditions in life A household first decides for whether he should choose health insurance or not. However his subsequent choice for life insurance is influenced by his decision of choice for health insurance as his bequest motive is affected by investment in his health. We as an economist observe the household decision making for both insurance simultaneously.

Let's assume (y_{1i}, y_{2i}) are two decision variables for individual i for health and life insurance respectively. The observed variables (y_{1i}, y_{2i}) are dichotomous variables taking value '1' when the choice is made and '0' otherwise. The latent utilities associated with the choices of insurance conditional on choices being made is given by,

$$y_{1i}^* = \alpha_1 + \mathbf{x}'_i \beta_1 + \mathbf{z}'_{1i} \gamma_1 + \epsilon_{1i}, \quad y_{1i} = 1 \text{ if } y_{1i}^* > 0, 0 \text{ otherwise}$$

$$y_{2i}^* = \alpha_2 + \mathbf{x}'_i \beta_2 + \mathbf{z}'_{2i} \gamma_2 + y_{1i} \delta_2 + \epsilon_{2i}, \quad y_{2i} = 1 \text{ if } y_{2i}^* > 0, 0 \text{ otherwise}$$

where \mathbf{x}'_i are variables related to household demographics, financial information, and health status, \mathbf{z}'_{1i} and \mathbf{z}'_{2i} are variables specific to health and life insurance respectively. The details of the variables are presented in the data section.

Assuming ϵ_{1i} and ϵ_{2i} have joint normal distribution,

$$\begin{pmatrix} \epsilon_{1i} \\ \epsilon_{2i} \end{pmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}\right)$$

The above formulation of the model gives rise to bivariate probit model which can be estimated using maximum likelihood method efficiently (Green 2006).

The life insurance equation contains the household choice for health insurance as one of the covariate. This follows from the structure of the household choice behavior for insurance that we discussed above. Moreover this structure leads to recursive bivariate probit model (Green 2006) which can still be estimated using maximum likelihood method efficiently.

The sign of ρ will dictate as whether the health and life insurance are perceived as complementary or substitute goods. If the sign of ρ i.e. correlation coefficient between health insurance choice and life insurance choice is positive then we interpret health insurance and life insurance act as complementary goods in the individual's basket of risk minimizing goods, if it is negative then we expect the two goods to be substitutes. The sign of δ_2 should be consistent with the sign of ρ i.e. either positive if health and life insurance are complements or negative if they are substitutes.

DATA

The data we analyze is 2008-2009 cross-sectional data of panels of the Consumer Expenditure Survey (CE). The CE data is collected by the Census Bureau under contract from the Bureau of Labor Statistics. The CE data contain comprehensive data on buying habits of American consumers which covers wide range of product categories ranging from food, apparel to insurance goods. The data also contains detailed household characteristics, including demographic, income and tax. The CE samples a nationally representative approximately 7000 households on a rotating panel basis.

In order to answer our research questions we select the households from panel who make conscious decision for insurance for them as well as for their family. Therefore we select our sample in such a way that we exclude all households with some kind of free health insurance plan for which the households do not make decisions.

We begin with 34485 households who were interviewed in the period 2008-2009. Our research interest lies in those households who have single main decision making unit for the household expenditure. Therefore we drop 995 household who have more than one consumer units. Next we concentrate on household who do not have free health insurance plan. We drop households who have Medicare. All of Americans who are older than 65 years of age are eligible for Medicare, therefore we drop household with age greater than 65 years. In our sample 7148 households have age greater than equal to 65 years that were dropped. Next we drop households who have free medical insurance plan such as Medicare. There are 5712 households who avail free medical insurance which were dropped. Finally we drop 79 household who had some missing information. Thus our final sample results in 20551 households.

Once the final sample consisting of 20551 households is ready we look at their choice for insurance. All those households who have net positive present and past quarter expenditure for health insurance are treated as household making conscious decision for health insurance choice. Moreover we infer households' decision making for health insurance choice from the health and hospitalization expenditure file. Similarly for life insurance we treat households with net positive present and past quarter expenditure for life insurance as households making conscious decision life insurance choice. Also from expenditure file for households stating purchase behavior for insurance other than health we infer whether household is making conscious decision for choice of life insurance or not.

In our sample we find approximately 80% household have health insurance and only 47% household have life insurance. Of these households approximately 43% have both health and life insurance whereas 36% have health insurance but no life insurance and 4% have life insurance but no health insurance. Overall we find approximately 16% household having neither health nor life insurance. In Table-1 we provide the cross-tabulation of health and life insurance.

One of the measures of risk aversion is quantified using the risk premium paid by the individuals (Pratt 1964). In our data set we use premium paid dummy for households whether the premium is paid by the households or not. This dummy is an indirect proxy for the households' risk attitude. This dummy takes value of one for the households with insurance who pay premium themselves (partially or fully), for rest of the households it is set to zero. We observe approximately 81% of the household with health insurance paying premium themselves whereas 86% of the household with life insurance pay their premium. The cross tabulation of the health insurance and premium paid is given in Table-2. In Table-3 the cross tabulation of life insurance and premium paid is given.

Health status of the household whether the household is healthy or not will influence the household choice for insurance. In CE data there is no direct stated information regarding the health status of the households. We use household expenditure for medical service, prescription drug and medical supplies as proxy for their health status. The health status dummy for households with net positive expenditure in current and past quarter for medical service, prescription drug and medical supplies takes value one. The health status dummy is set to zero for households with no such expenditure in current and past quarter. Overall we find that approximately 58% households have net positive expenditure.

Apart from insurance characteristics and health status we use household demographics and financial information as correlates of insurance choice in the model. As the composition of US households evolves, the demand for insurance will be affected by the consumer characteristics (Shower and Shotick 1994). Moreover these consumer characteristics will influence various insurance types differently. Therefore we expect consumer characteristics will have differential and significant impact on consumer choice for insurance.

Age, household size composition, sex, earner type, family type/composition, education, occupation, race, residence, region are used as household demographic characteristics. Household size is decomposed into four parts namely infants for number of members below 2 years, juvenile for members between 2-16 years, adults for members above 16 and old for members above 64 years of age. The mean age of household in the sample is 43 years. In our sample 50.54% of households are headed by the female. Approximately 34% of the households have reference person as well as spouse as earning member of the family. Small but significant 4% households report they have no earning member in the family. In the sample the family type/composition has 34% households with husband and wife with children. Majority of

household with health insurance have college graduation degree. The sample constitutes 89.27% households who are white. Interestingly the black race proportion is highest in the group 'with life insurance but without health insurance'. Most of the households own house (69.30%) and they reside in urban area (95.08%).

The occupation of the households is divided into seven groups namely, technical and sales, service, blue collar, self employed, retired, out of labor force and manager or professional services. Majority of the households (42.02%) belong to the last group.

Income after tax, income from asset and retirement and pension deductions are financial information of households. Income from asset constitutes return from business, financial and real assets which are source of income for households on and above the regular income. The overall average annual income of the household is \$771930.00; however this drops to \$428461.00 for household belonging to the group with no insurance.

The overall data descriptive for household demographics and financial information over the period of the study is provided in Table-5. In Table-6 we group the household into four segments namely, household with no insurance, household with life insurance but without health insurance, household with health insurance but without life insurance and household with both insurance, and provide the data descriptive for group wise demographics and financial information.

RESULTS

We estimate our full structural model as specified in Methodology section using maximum likelihood method. Apart from the full structural model we estimate other benchmark models.

Benchmark Model I

In Table-4 we present the association between individual choice for health and life insurance. We see that Pearson and Spearman correlation are positive. However usual Pearson, product moment correlation is inappropriate as a measure of this correlation since it is used for continuous variables (Green 2006). For dichotomous variable appropriate measure of correlation is tetrachoric correlation. We see in Table-4 the tetrachoric correlation is positive and significant in magnitude. In order to test the association between health insurance and life insurance we specify the bivariate probit model with intercept term only.

$$y_{1i}^* = \alpha_1 + \epsilon_{1i}, \quad y_{1i} = 1 \text{ if } y_{1i}^* > 0, 0 \text{ otherwise}$$

$$y_{2i}^* = \alpha_2 + \epsilon_{2i}, \quad y_{2i} = 1 \text{ if } y_{2i}^* > 0, 0 \text{ otherwise}$$

The result of this model is given in Table-9. We see that correlation coefficient is positive and significant. Moreover individuals' inherent preference favors choice of health insurance over choice of life insurance.

Benchmark Model II

In addition we estimate the independent logit and probit model of individual choice for health insurance and life insurance.

For health insurance choice we specify the following equation,

$$y_{1i}^* = \alpha_1 + \mathbf{x}'_i\beta_1 + \mathbf{z}'_{1i}\gamma_1 + \epsilon_{1i}, \quad y_{1i} = 1 \text{ if } y_{1i}^* > 0, 0 \text{ otherwise}$$

And for life insurance we specify the following equation,

$$y_{2i}^* = \alpha_2 + \mathbf{x}'_i\beta_2 + \mathbf{z}'_{2i}\gamma_2 + \epsilon_{2i}, \quad y_{2i} = 1 \text{ if } y_{2i}^* > 0, 0 \text{ otherwise}$$

The logistic distributional assumption for the error terms gives rise to logit model of choice whereas the normal distributional assumption gives rise to probit model of choice.

In Table-7 we give the results for independent logit and probit model for health insurance choice and in Table-8 we provide the same results for life insurance. The results are consistent with the results of the full model.

Benchmark Model III

We estimate the bivariate probit model without taking into account the structure of the economic choice for insurance. The model is specified as follows,

$$y_{1i}^* = \alpha_1 + \mathbf{x}'_i\beta_1 + \mathbf{z}'_{1i}\gamma_1 + \epsilon_{1i}, \quad y_{1i} = 1 \text{ if } y_{1i}^* > 0, 0 \text{ otherwise}$$

$$y_{2i}^* = \alpha_2 + \mathbf{x}'_i\beta_2 + \mathbf{z}'_{2i}\gamma_2 + \epsilon_{2i}, \quad y_{2i} = 1 \text{ if } y_{2i}^* > 0, 0 \text{ otherwise}$$

The results of this model are given in Table-10. The results are consistent with the full structural model.

Benchmark Model IV

The structural model of individual choice between health insurance and life insurance specified by the recursive bivariate probit model (discussed in Methodology section) can have another structure where an individual makes choice first on life insurance and his/her choice of life insurance influence the subsequent choice for health insurance. Even though there is no

theoretical explanation to support such behavior or claim, however one can specify the econometric model in this way.

The recursive bivariate probit where household first decides on life and insurance and subsequent choice of health insurance is influenced by the choice life insurance choice is given by,

$$y_{2i}^* = \alpha_2 + \mathbf{x}'_i \beta_2 + \mathbf{z}'_{2i} \gamma_2 + \epsilon_{2i}, \quad y_{2i} = 1 \text{ if } y_{2i}^* > 0, 0 \text{ otherwise}$$

$$y_{1i}^* = \alpha_1 + \mathbf{x}'_i \beta_1 + \mathbf{z}'_{1i} \gamma_1 + y_{2i} \delta_1 + \epsilon_{1i}, \quad y_{1i} = 1 \text{ if } y_{1i}^* > 0, 0 \text{ otherwise}$$

The results of this model are given in Table-11. The specification of such behavioral structure of choice between life and health insurance do not change the results what we get in full structural model specified in Methodology section. The results from this model are consistent with results from full structural model and it further strengthens our interpretation of the results from the full structural model.

Results of Full Structural Model

We present the result from our full structural model (described in Methodology section) in Table-12. The model is estimated using maximum likelihood method which gives efficient parameter estimates (Green 2006). All of the parameters are found to be significant at 95% confidence interval.

Households prefer health insurance to life insurance given a choice from bundle of risk minimizing goods constituting health and life insurance. The impact of age on household preference for insurance is non-linear in nature. Interestingly we find this relationship is convex in nature for health insurance and concave in nature for life insurance. When an individual is

young his initial stock of health is high therefore his concern for health insurance will be low, however as the individual ages this initial stock of health will deplete and he/she needs to replenish it with investment in health. One way they make this investment is by purchasing health insurance. However when an individual is young so does his/her dependents such as spouse and children, therefore the individual is concerned for their welfare in case he/she dies untimely. The individual minimizes any such financial risk arising out of such situation that might potentially affect his/her beneficiaries by investing in the life insurance at early stages. However as the individual ages, his/her dependents also become settled in life thereby making the individual less concern for their welfare at older age.

From the parameter estimate we find female prefer health insurance to life insurance *ceteris paribus*. This can be attributed to risk-averse attitude of female which is pronounced more in them as compared to their male counterpart. Households with infants in their families prefer both insurance *ceteris paribus*. However households with members in the range 2-16 neither prefer health insurance nor life insurance *ceteris paribus*. This could be due to extra financial burden on households for these dependents' basic care expenditures such as education, food, clothing etc.

In general, *ceteris paribus*, if the household has reference person as well as their spouse as earning members then they prefer both health and life insurance. However if the household has spouse only as earning member then its effect is negative for choice of health insurance and positive for life insurance. Less educated households (with non high school graduate) do not prefer either insurance. Interestingly college graduate prefer health insurance but not life

insurance². Not owning the house affects the preference for either insurance in negative way. Similarly people living in rural area prefer neither health nor life insurance. Interestingly we see black household do not prefer health insurance but they do prefer life insurance. The effect of occupation has expected sign. Less paying job in general discourage household preference for either health or life insurance whereas good paying job has positive impact on preference for health insurance.

The regular income has positive impact on preference for health as well as life insurance, so does the retirement and pension deduction. However return from asset has negative impact on both health and life insurance preference.

Health status (operationalized using proxy for household expenditure on prescription drug, medical supplies and doctor visits) has expected sign. Household with bad health status prefer both insurance.

If households pay the premium themselves for health and life insurance then it has positive impact on household preference for both insurance. We treat this dummy variable as proxy towards households' risk-attitude behavior i.e. if households pay the premium themselves then they are more risk averse than compared to households who do not pay the premium. Compared between preferences for both insurance we see that more risk averse a household is more it prefers life insurance than health insurance.

We find the coefficient of health insurance preference on life insurance choice is significant and positive. Therefore household preference for health insurance positively affects their subsequent preference for their life insurance choice.

² This behavior is reported by Celik and Mesut (2009) also who find education level affect life insurance consumption in negative way.

The correlation coefficient between health and life insurance is found to be positive and significant. Even the LM test for the hypothesis that $\rho = 0$ is rejected (Green 2006). This is consistent with the sign of health insurance choice has on choice of life insurance. The positive sign of the correlation coefficient between health and life insurance suggests that in the basket of risk minimizing goods, health insurance and life insurance act as complementary goods. Therefore the household preference for health insurance positively affects their preference for the choice of life insurance. This has very important implication from both policy implications as well as from consumer choice behavior for insurance goods.

DISCUSSION

The health care reform in US is an ongoing puzzling question which is subjected to wide political as well as public debate. More than a quarter bills related to health care have been passed in past century (A History of Overhauling Health Care, The New York Time 19-Jul-2009) but still the topic remains as debatable as ever. Understanding health requires our standing about uncertainty associated with household health status accounting for resource scarcity, substitutability and heterogeneity (Fuchs 1996). In order to avoid financial uncertainty in life, risk averse individuals insure themselves against adversaries by paying risk premiums in the forms of insurance. At the very broad level purpose of both is to avoid financial risk. Health insurance policies are mostly shared policies where the risk premium is shared between household and the government whereas life insurance is shared mostly by households. Despite their differences we find there is association between individual choice for insurance.

Many measures of economic status such as income and wealth are associated with variety of health outcomes such as mortality and morbidity (Smith 1999). On occasion many economic

activities are also associated with each other. Many times consumer choices across varieties of goods are associated with each other. Related to health outcomes such as mortality and morbidity, individuals often make decision about choice of life insurance or health insurance respectively. Quantitatively individual choice for insurance has been found to be associated with each other. The ultimate question that arises is direction of causation in these choice processes and the explanation for the observed association.

The observed positive correlation between conscious choice of health insurance and life insurance by households could be explained in three ways. The first way to argue is that there is causal relationship between these two choices which runs from, choice for health insurance positively affects the choice for life insurance. The second way to argue is that the direction of causality is other way round i.e. the choice for life insurance positively affects the choice for health insurance. Third way to argue is that there is no causal relationship between these two choices and there is third variable such as certain consumer characteristics or consumer risk attitude behavior that affect both health and life insurance in the same direction.

All three explanations are valid explanations and can be used to rationalize the positive correlation between health insurance and life insurance choice. However from public policy and a theoretical perspective it is important to distinguish among these three explanations in order to obtain quantitative estimates of their relative affects. One of the main objectives of the health policy in the United States is to provide each American health insurance. Government spends a major portion of their budget in implementing health reform policy. However household choice for health insurance impacts their decision for the life insurance choice. For the policy effectiveness it is important to know the direction of causality. Since the government do not share the risk premium associated with household choice for life insurance, it is also important to

know how these two choice decisions are associated in order to determine the effectiveness of the health reform policy that might be affected by shocks in life insurance market.

In this paper we propose a structural model of household choice decision for insurance. The structural model is derived from the theoretical framework. The structural model specifies that an individual makes health insurance decision first and the subsequent decision for choice of life insurance is affected by the household's choice for health insurance. Since household choice for insurance is observed simultaneously by the economist, we use recursive bivariate probit model to estimate our structural model.

First, we find that choice decision for health insurance positively affects the households' decision for life insurance choice. Consistent with this observation we expect the two to be positively associated. The sign of the correlation coefficient estimate of the structural model is positive and significant validating the positive impact of health insurance choice on life insurance choice. More importantly we can now claim that unobserved shocks in either health or life insurance market tend to affect the individual choice decision for insurance in the same direction. The effect of consumer demographics and financial information were as expected. Thus in the basket of individuals' risk minimizing good health and life insurance acts as complements goods.

CONCLUSION

Health insurance and life insurance are two important goods that an individual choose to purchase in order to minimize financial risk from unfavorable health and life situation respectively. In this research we propose a structural model of individual choice for health and life insurance. Changing demographics will affect the demand for insurance and moreover these

changes will impact the demand for various insurance differently. We estimate our structural model of individual choice for health and life insurance at disaggregate level using recursive bivariate probit. The model not only accounts for the two-way causality but also the correlation between the error terms. We find that choice for health insurance positively affects the subsequent individual choice for life insurance. The correlation between error terms of health and life insurance choices is positive and significant implying unobserved shocks in either the health insurance market or life insurance market affects their choices in the same direction. This signifies that in the individual basket of risk minimizing goods health and life insurance act as complementary goods. The effects of individual demographics and financial information were found to be as expected.

Individuals not only make decision of whether to choose or not between health and life insurance but also decide on how much premiums to pay for these insurances. Future research can look at not only the individual choices but the actual expenditure on individual health and life insurance. Such model will give more insights into affects of consumer demographics and financial information play in their choices insurance.

Apart from health and life insurance individuals make decision for various other kinds of insurances such as auto insurance, house insurance etc. Another stream of literature can look at how these various kinds of insurances are correlated. Such empirical model will throw a general idea on how insurance goods in general are perceived by the individuals, as complements or as substitutes and how they interact among each other. Understanding the individual choice for various kinds of insurance and interaction among them is important from policy making in both private and public sectors.

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APPENDIX A: LIST OF FIGURES

Figure 1: Proportion of Health and Life Insurance Expenditures from 1984-2008

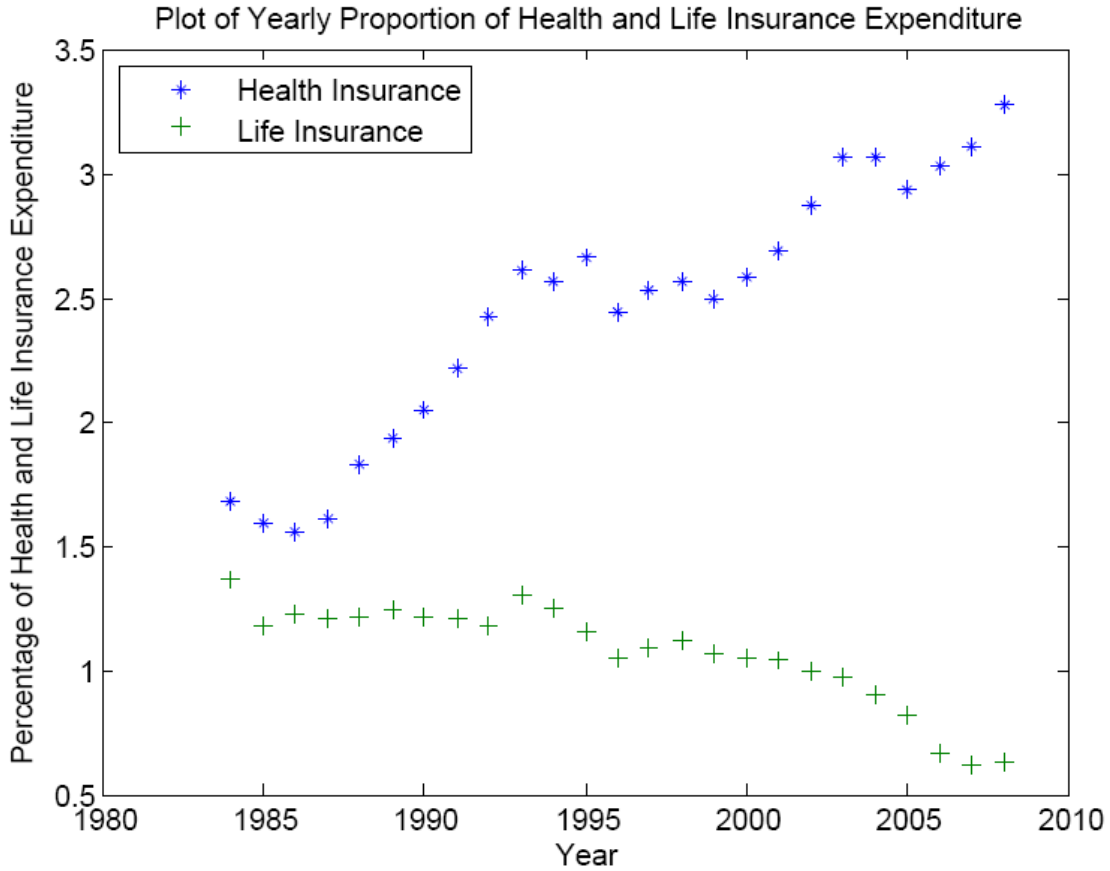
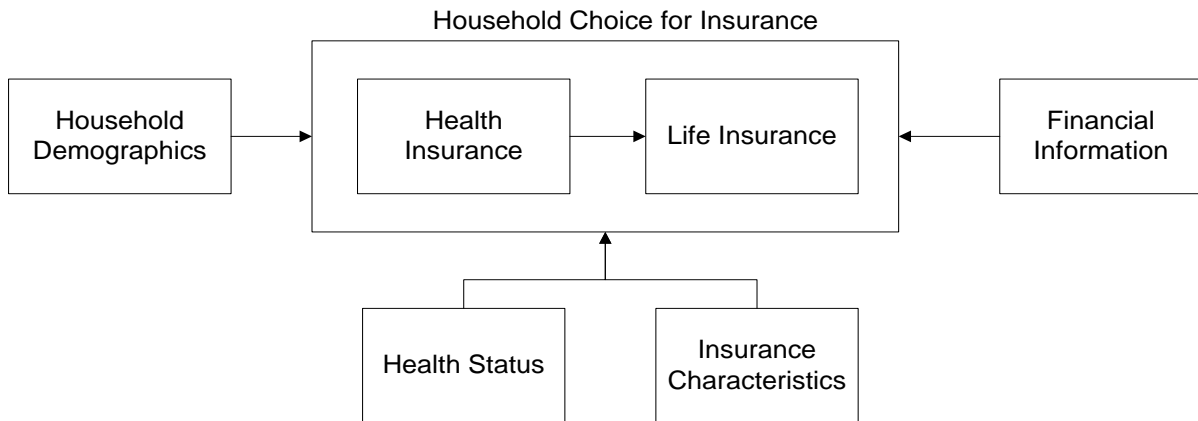


Figure 2: Conceptual Framework Diagram



APPENDIX B: LIST OF TABLES

Table 1: Cross Tabulation of Health and Life Insurance

		Life Insurance			
		0	1	Total	
Health Insurance	0	Frequency	3357	781	4138
		Percent	16.33	3.80	20.14
		Row Percent	81.13	18.87	
		Col Percent	30.93	8.05	
	1	Frequency	7498	8915	16413
		Percent	36.48	43.38	79.86
		Row Percent	45.68	54.32	
		Col Percent	69.07	91.95	
Total		10855	9696	20551	
Percent		52.82	47.18	100.00	

Table 2: Cross Tabulation of Health Insurance and Health Insurance Premium Paid

		Health Insurance Premium Paid by Self			
		0	1	Total	
Health Insurance	0	Frequency	4138	0	4138
		Percent	20.14	0.00	20.14
		Row Percent	100.00	0.00	
		Col Percent	57.12	0.00	
	1	Frequency	3107	13306	16413
		Percent	15.12	64.75	79.86
		Row Percent	18.93	81.07	
		Col Percent	42.88	100.00	
Total		7245	13306	20551	
Percent		35.25	64.75	100.00	

Table 3: Cross Tabulation of Life Insurance and Life Insurance Premium Paid

		Life Insurance Premium Paid by Self			
		0	1	Total	
Life Insurance	0	Frequency	10855	0	10855
		Percent	52.82	0.00	52.82
		Row Percent	100.00	0.00	
		Col Percent	89.50	0.00	
	1	Frequency	1274	8422	9696
		Percent	6.20	40.98	47.18
		Row Percent	13.14	86.86	
		Col Percent	10.50	100.00	
Total		12129	8422	20551	
Percent		59.02	40.98	100.00	

Table 4: Measure of Correlation between Health and Life Insurance

Correlation Measure	Value
Pearson Correlation	0.2847
Spearman Correlation	0.2847
Tetrachoric Correlation	0.5130

Table 5: Overall Data Descriptive

	Mean	Std.Dev.	Median	Maximum	Minimum
Family Information					
Age	43.2164	11.6258	44.0000	64.0000	16.0000
Infants (Members below 2)	0.0694	0.2672	0.0000	3.0000	0.0000
Juvenile (Members between 2-16)	0.6069	0.9682	0.0000	7.0000	0.0000
Adults (Members above 16)	2.0145	0.9057	2.0000	9.0000	1.0000
Old (Members above 64)	0.0140	0.1298	0.0000	3.0000	0.0000
Financial Information (in terms of thousands of \$)					
Income after tax	77.1930	65.8210	61.0000	1174.0205	-77.0563
Income from asset	5.7008	25.5278	0.0000	943.1294	-72.2926
Pension and retirement deductions	6.6735	6.0687	5.2020	70.4010	0.0000
Sex					
Female					50.54%
Male					49.46%

Earner Type	
Reference person only	33.73%
Reference person plus spouse	34.05%
Spouse only	5.90%
Others	22.34%
No earner	3.98%
Family Type	
Single person	23.54%
Husband/Wife with children	34.45%
Single parent	6.14%
Other type	16.07%
Husband/Wife only	19.80%
Education	
Non-high school graduate	8.93%
College graduate	46.63%
High school graduate	44.44%
Occupation	
Technical and sales	20.21%
Service	11.70%
Blue collar and other	12.33%
Self employed	8.89%
Retired	2.84%
Out of labor force	2.01%
Manager/Professional/Supervisor	42.02%
Race	
Black	10.73%
White	89.27%
House Ownership	
House not owned	30.70%
House owned	69.30%
Residence	
Rural	4.92%
Urban	95.08%
Health Status (based on expense on medical service, prescription drug and medical supplies)	
Non-Healthy (Non zero expense)	58.09%
Healthy (Zero expense)	41.91%
Region	
Northeast	18.11%
Midwest	24.51%
West	23.04%
South	34.34%

Table 6: Data Descriptive by Group

		$\bar{H}^3 \bar{L}^4$	$\bar{H} \bar{L}$	$H \bar{L}$	$H^5 L^6$
Family Information					
Mean Value	Age	39.4805	45.9373	41.4568	45.8648
	Infants (member less than 2)	0.0560	0.0435	0.0768	0.0704
	Juvenile (members 2-16)	0.4969	0.7042	0.5659	0.6744
	Adults (members above 16)	1.8776	1.9437	1.9437	2.1317
	Old (members above 64)	0.0170	0.0154	0.0152	0.0118
Financial Information (in thousands of dollar)					
Mean Value	Income after tax	42.8461	67.6593	69.9178	97.0806
	Income from asset	4.2693	7.2899	4.6798	6.9594
	Pen. and ret. deduction	3.4314	5.6778	5.8922	8.6387
Sex					
%	Female	47.24	54.03	52.59	49.75
	Male	52.76	45.97	47.41	50.25
Earners Type					
%	Reference person only	45.52	34.83	38.52	25.17
	Reference person + spouse	16.95	32.01	30.42	43.72
	Spouse only	5.99	7.04	5.32	6.26
	Others	22.97	20.87	21.79	22.69
	No earner	8.57	5.25	3.95	2.16
Family Type					
%	Single person	35.36	24.33	28.27	15.04
	Husband/Wife with children	22.01	33.80	29.66	43.21
	Single parent	7.86	8.19	6.74	4.81
	Other type	22.70	15.24	17.68	12.28
	Husband/Wife only	12.07	18.44	17.65	24.66
Education					
%	Non-high school graduate	23.41	10.37	8.35	3.84
	College graduate	25.89	38.80	47.39	54.49
	High school graduate	50.70	50.83	44.26	41.67
Occupation					
%	Technical and sales	17.22	18.44	21.78	20.17
	Service	18.86	13.96	12.06	8.51
	Blue collar and other	18.20	12.55	12.15	10.25
	Self employed	10.01	16.26	8.04	8.55
	Retired	2.09	3.46	2.69	3.19
	Out of labor force	5.60	2.30	1.61	0.98
	Manag./Profess./Supervisor	28.02	33.03	41.67	48.35
Race					

³ Do not have Health Insurance

⁴ Do not have Life Insurance

⁵ Have Health Insurance

⁶ Have Life Insurance

%	Black	15.91	19.46	9.63	8.94
	White	84.09	80.54	90.37	91.06
House Ownership					
%	House not owned	56.84	31.24	37.25	15.30
	House owned	43.16	68.76	62.75	84.70
Residence					
%	Rural	5.63	8.32	4.43	4.78
	Urban	94.37	91.68	95.57	95.22
Health Status					
%	Non-healthy	29.13	56.21	53.20	73.27
	Healthy	70.87	43.79	46.80	26.73
Region					
%	Northeast	13.85	13.06	19.87	18.68
	Midwest	17.75	21.64	24.42	27.39
	West	25.77	19.33	26.33	19.56
	South	42.63	45.97	29.38	34.37

Table 7: Independent Logit and Probit for Health Insurance

		Health Insurance			
		Logit		Probit	
		Param	SE	Param	SE
	Intercept	0.3951	0.0027	0.1949	0.0016
	Age	-0.1044	0.0001	-0.0607	0.0001
	Square of Age	0.1216	0.0002	0.0709	0.0001
Sex (base male)	Female	0.1415	0.0004	0.0893	0.0003
	Members below 2 years	0.2908	0.0008	0.1746	0.0005
	Members between 2-16 years	-0.0695	0.0003	-0.0446	0.0002
	Members above 16	0.0226	0.0004	0.0165	0.0002
	Members above 64	-0.6745	0.0018	-0.3816	0.0011
Earner Type (base No Earner)	Reference Person earn only	0.2626	0.0011	0.1675	0.0007
	Reference Person + spouse earn only	0.2287	0.0013	0.1511	0.0008
	Spouse earn only	-0.1331	0.0014	-0.0721	0.0008
	Other type	0.0439	0.0013	0.0394	0.0008
Family Type (base Husband/Wife only)	Single person	0.0292	0.0010	0.0189	0.0006
	Husband/Wife with child	0.0062	0.0008	0.0058	0.0005
	Single Parent	0.3653	0.0012	0.2184	0.0007
	Other family type	-0.2618	0.0010	-0.1490	0.0006
Region (base South)	Northeast	1.0880	0.0006	0.6516	0.0004
	Midwest	1.0545	0.0006	0.6292	0.0003
	West	0.6239	0.0005	0.3775	0.0003
Education (base High School)	Non high school graduate	-0.7641	0.0007	-0.4467	0.0004
	College graduate	0.2900	0.0005	0.1819	0.0003
Race (base White)	Black	-0.1195	0.0006	-0.0756	0.0004
Occupation (base Manager/ Professional/ Supervisor)	Technical and sales	0.0478	0.0006	0.0280	0.0004
	Service	-0.3275	0.0007	-0.2010	0.0004
	Blue collar and other	-0.2249	0.0007	-0.1352	0.0004
	Self employed	-0.6127	0.0008	-0.3653	0.0005
	Retired	0.4485	0.0015	0.2511	0.0009
	Out of labor force	-0.2814	0.0014	-0.1643	0.0008
Residence (base Urban)	Rural	-0.2698	0.0008	-0.1428	0.0005
House Ownership(base owned)	House not owned	-0.2814	0.0005	-0.1802	0.0003
	Income after tax	0.0069	0.0000	0.0041	0.0000
	Income from asset	-0.0110	0.0000	-0.0063	0.0000
	Retirement and pension deduction	0.0411	0.0001	0.0196	0.0000
Health Status (base Healthy)	Non Healthy	0.4297	0.0004	0.2567	0.0003
Premium Paid (base Others)	Premium paid by Self	19.9054	1.1701	6.6159	0.2466
-2 Log L		148851096		149124216	

Table 8: Independent Logit and Probit for Life Insurance

		Life Insurance			
		Logit		Probit	
		Param	SE	Param	SE
	Intercept	-3.9689	0.0039	-2.0972	0.0019
	Age	0.0532	0.0002	0.0236	0.0001
	Square of Age	-0.0414	0.0002	-0.0164	0.0001
Sex (base male)	Female	-0.0790	0.0005	-0.0470	0.0003
	Members below 2 years	0.2746	0.0009	0.1339	0.0005
	Members between 2-16 years	-0.0666	0.0004	-0.0359	0.0002
	Members above 16	-0.3175	0.0005	-0.1692	0.0002
	Members above 64	0.0138	0.0020	0.0102	0.0011
Earner Type (base No Earner)	Reference Person earn only	0.8465	0.0020	0.3966	0.0009
	Reference Person + spouse earn only	0.9073	0.0021	0.4310	0.0010
	Spouse earn only	0.8506	0.0021	0.4109	0.0010
	Other type	1.2089	0.0021	0.5955	0.0010
Family Type (base Husband/Wife only)	Single person	-0.2011	0.0012	-0.0891	0.0006
	Husband/Wife with child	-0.0609	0.0010	-0.0162	0.0005
	Single Parent	-0.1612	0.0015	-0.0552	0.0008
	Other family type	-0.1721	0.0012	-0.0898	0.0006
Region (base South)	Northeast	-0.1816	0.0007	-0.0947	0.0004
	Midwest	0.1824	0.0006	0.1134	0.0003
	West	-0.4045	0.0006	-0.2163	0.0003
Education (base High School)	Non high school graduate	-0.5377	0.0010	-0.2738	0.0005
	College graduate	-0.0805	0.0005	-0.0387	0.0003
Race (base White)	Black	0.2055	0.0008	0.1050	0.0004
Occupation (base Manager/ Professional/ Supervisor)	Technical and sales	-0.1580	0.0006	-0.0874	0.0003
	Service	-0.8349	0.0010	-0.4229	0.0005
	Blue collar and other	-0.1120	0.0008	-0.0673	0.0004
	Self employed	-1.1270	0.0012	-0.5778	0.0006
	Retired	0.0745	0.0018	0.0216	0.0010
	Out of labor force	-1.1883	0.0028	-0.5584	0.0013
Residence (base Urban)	Rural	-0.1456	0.0010	-0.0668	0.0005
House Ownership(base owned)	House not owned	-0.1917	0.0006	-0.0934	0.0003
	Income after tax	0.0013	0.0000	0.0007	0.0000
	Income from asset	-0.0068	0.0000	-0.0039	0.0000
	Retirement and pension deduction	0.0416	0.0001	0.0251	0.0000
Health Status (base Healthy)	Non Healthy	0.6184	0.0005	0.3203	0.0003
Premium Paid (base Others)	Premium paid by Self	22.3296	1.9388	8.3324	0.3846
-2 Log L		132855175		132617238	

Table 9: Bivariate Probit with Intercept only

	Health Insurance		Life Insurance	
	Param	SE	Param	SE
Intercept	0.8166	0.0001	-0.0806	0.0001
Correlation Coefficient		Param		SE
		0.5098		0.0001
Log likelihood				-421339210

Table 10: Bivariate Probit of Life and Health Insurance

		Health Insurance		Life Insurance	
		Param	SE	Param	SE
	Intercept	0.1754	0.0016	-2.1427	0.0019
	Age	-0.0599	0.0001	0.0253	0.0001
	Square of Age	0.0701	0.0001	-0.0181	0.0001
Sex (base male)	Female	0.0929	0.0003	-0.0514	0.0003
	Members below 2 years	0.1693	0.0005	0.1260	0.0005
	Members between 2-16 years	-0.0453	0.0002	-0.0373	0.0002
	Members above 16	0.0161	0.0002	-0.1708	0.0002
	Members above 64	-0.3887	0.0010	0.0458	0.0010
Earner Type (base No Earner)	Reference Person earn only	0.1866	0.0007	0.4147	0.0009
	Reference Person + spouse earn only	0.1999	0.0008	0.4435	0.0010
	Spouse earn only	-0.0383	0.0008	0.4221	0.0010
	Other type	0.0836	0.0008	0.5944	0.0010
Family Type (base Husband/Wife only)	Single person	0.0431	0.0006	-0.1008	0.0006
	Husband/Wife with child	-0.0066	0.0005	0.0006	0.0005
	Single Parent	0.2483	0.0007	-0.0579	0.0008
	Other family type	-0.1346	0.0006	-0.0814	0.0006
Region (base South)	Northeast	0.6297	0.0004	-0.0879	0.0004
	Midwest	0.5888	0.0003	0.1170	0.0003
	West	0.3516	0.0003	-0.2116	0.0003
Education (base High School)	Non high school graduate	-0.4314	0.0004	-0.2717	0.0005
	College graduate	0.1772	0.0003	-0.0316	0.0003
Race (base White)	Black	-0.0666	0.0004	0.1167	0.0004
Occupation (base Manager/ Professional/ Supervisor)	Technical and sales	0.0192	0.0004	-0.0891	0.0003
	Service	-0.2063	0.0004	-0.4106	0.0005
	Blue collar and other	-0.1450	0.0004	-0.0656	0.0004
	Self employed	-0.3884	0.0005	-0.5720	0.0006
	Retired	0.2270	0.0009	0.0156	0.0010
	Out of labor force	-0.1703	0.0008	-0.5700	0.0013
Residence (base Urban)	Rural	-0.1517	0.0005	-0.0522	0.0005
House Ownership(base owned)	House not owned	-0.1815	0.0003	-0.0848	0.0003
	Income after tax	0.0041	0.0000	0.0006	0.0000
	Income from asset	-0.0061	0.0000	-0.0037	0.0000
	Retirement and pension deduction	0.0180	0.0000	0.0252	0.0000
Health Status (base Healthy)	Non Healthy	0.2672	0.0003	0.3152	0.0003
Premium Paid (base Others)	Premium paid by Self	5.4907	0.0204	6.6090	0.0256
			Param		SE
	Correlation Coefficient		0.5211		0.0002
	Log likelihood				-138897425

Table 11: Structural Bivariate Probit Model-I

		Health Insurance		Life Insurance	
		Param	SE	Param	SE
	Intercept	0.1711	0.0016	-2.1309	0.0019
	Age	-0.0635	0.0001	0.0244	0.0001
	Square of Age	0.0718	0.0001	-0.0172	0.0001
Sex (base male)	Female	0.0913	0.0003	-0.0499	0.0003
	Members below 2 years	0.1854	0.0005	0.1293	0.0005
	Members between 2-16 years	-0.0480	0.0002	-0.0372	0.0002
	Members above 16	0.0324	0.0002	-0.1699	0.0002
	Members above 64	-0.3696	0.0010	0.0342	0.0010
Earner Type (base No Earner)	Reference Person earn only	0.1974	0.0007	0.4130	0.0009
	Reference Person + spouse earn only	0.1927	0.0008	0.4440	0.0010
	Spouse earn only	-0.0367	0.0008	0.4226	0.0010
	Other type	0.0806	0.0008	0.5995	0.0010
Family Type (base Husband/Wife only)	Single person	0.0652	0.0006	-0.0948	0.0006
	Husband/Wife with child	-0.0264	0.0005	-0.0059	0.0005
	Single Parent	0.2635	0.0007	-0.0547	0.0008
	Other family type	-0.1316	0.0006	-0.0831	0.0006
Region (base South)	Northeast	0.6557	0.0004	-0.0906	0.0004
	Midwest	0.6006	0.0003	0.1145	0.0003
	West	0.3803	0.0003	-0.2148	0.0003
Education (base High School)	Non high school graduate	-0.4053	0.0004	-0.2703	0.0005
	College graduate	0.1732	0.0003	-0.0337	0.0003
Race (base White)	Black	-0.0997	0.0004	0.1107	0.0004
Occupation (base Manager/ Professional/ Supervisor)	Technical and sales	0.0180	0.0004	-0.0892	0.0003
	Service	-0.1948	0.0004	-0.4159	0.0005
	Blue collar and other	-0.1531	0.0004	-0.0664	0.0004
	Self employed	-0.3962	0.0005	-0.5798	0.0006
	Retired	0.2235	0.0009	0.0170	0.0010
	Out of labor force	-0.1224	0.0008	-0.5655	0.0013
Residence (base Urban)	Rural	-0.1607	0.0005	-0.0585	0.0005
House Ownership(base owned)	House not owned	-0.1628	0.0003	-0.0866	0.0003
	Income after tax	0.0040	0.0000	0.0006	0.0000
	Income from asset	-0.0059	0.0000	-0.0038	0.0000
	Retirement and pension deduction	0.0139	0.0000	0.0252	0.0000
Health Status (base Healthy)	Non Healthy	0.2288	0.0003	0.3169	0.0003
Premium Paid (base Others)	Premium paid by Self	5.4753	0.0189	6.6327	0.0251
	Life Insurance	0.3416	0.0003		
			Param		SE
	Correlation Coefficient		0.3722		0.0003
	Log likelihood				-138378678

Table 12: Structural Bivariate Probit: Full Model

		Health Insurance		Life Insurance	
		Param	SE	Param	SE
	Intercept	0.1846	0.0016	-2.5410	0.0020
	Age	-0.0608	0.0001	0.0282	0.0001
	Square of Age	0.0711	0.0001	-0.0216	0.0001
Sex (base male)	Female	0.0919	0.0003	-0.0602	0.0003
	Members below 2 years	0.1722	0.0005	0.1200	0.0005
	Members between 2-16 years	-0.0450	0.0002	-0.0350	0.0002
	Members above 16	0.0176	0.0002	-0.1762	0.0003
	Members above 64	-0.3882	0.0010	0.0704	0.0011
Earner Type (base No Earner)	Reference Person earn only	0.1735	0.0007	0.3875	0.0010
	Reference Person + spouse earn only	0.1714	0.0008	0.4045	0.0011
	Spouse earn only	-0.0610	0.0008	0.4187	0.0011
	Other type	0.0539	0.0008	0.5745	0.0011
Family Type (base Husband/Wife only)	Single person	0.0308	0.0006	-0.1077	0.0006
	Husband/Wife with child	0.0009	0.0005	-0.0065	0.0005
	Single Parent	0.2352	0.0007	-0.0826	0.0008
	Other family type	-0.1425	0.0006	-0.0803	0.0006
Region (base South)	Northeast	0.6476	0.0004	-0.1285	0.0004
	Midwest	0.6155	0.0003	0.0807	0.0003
	West	0.3713	0.0003	-0.2336	0.0003
Education (base High School)	Non high school graduate	-0.4399	0.0004	-0.2081	0.0005
	College graduate	0.1817	0.0003	-0.0509	0.0003
Race (base White)	Black	-0.0716	0.0004	0.1321	0.0004
Occupation (base Manager/ Professional/ Supervisor)	Technical and sales	0.0255	0.0004	-0.0924	0.0003
	Service	-0.2007	0.0004	-0.3974	0.0005
	Blue collar and other	-0.1400	0.0004	-0.0507	0.0004
	Self employed	-0.3739	0.0005	-0.5486	0.0006
	Retired	0.2413	0.0009	-0.0075	0.0010
	Out of labor force	-0.1638	0.0008	-0.5185	0.0013
Residence (base Urban)	Rural	-0.1464	0.0005	-0.0374	0.0005
House Ownership(base owned)	House not owned	-0.1805	0.0003	-0.0597	0.0003
	Income after tax	0.0041	0.0000	0.0004	0.0000
	Income from asset	-0.0062	0.0000	-0.0033	0.0000
	Retirement and pension deduction	0.0189	0.0000	0.0236	0.0000
Health Status (base Healthy)	Non Healthy	0.2608	0.0003	0.2833	0.0003
Premium Paid (base Others)	Premium paid by Self	5.6147	0.0249	6.7759	0.0322
	Health Insurance			0.5083	0.0006
			Param		SE
	Correlation Coefficient		0.2434		0.0004
	Log likelihood				-138607469