Asymmetric Information in Health Insurance

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Abstract

This paper aims to study the asymmetric information in the health insurance industry from the demand side and check whether there is presence of asymmetric information in health insurance in India. An inter-dependent model of health insurance demand and health care demand is used to check for informational asymmetries using cross-section data for India provided by WHO (SAGE Survey, Wave 1 2007-2010). Econometric modelling involves an application of count data while controlling for endogenity of insurance choice.

Health Status is an important determinant of health care demand rather than health insurance demand, while income plays a role in health insurance determination. Evidence of moral hazard has been found in health insurance markets of other countries, this is the first study testing for the same in India. In the demand for health care we see more visits to the doctor on account of being insured; indicating presence of moral hazard. The social loss of moral hazard is not entirely negative though, it prevents negative externalities and prevents poor decision making on account of individuals.

Keywords:

Health Insurance, Moral Hazard, Demand side Financing, Count Data, SAGE Wave 1

INTRODUCTION

Importance of Health & Health Insurance

Health is stated as a human right in the Constitution of World Health Organization (WHO), 1946. All individuals are entitled to enjoy the highest attainable standard of health irrespective of gender, class, economic or social conditions. Again, in International Covenant on Economic, Social and Cultural Rights (1966), health was recognized as a human right. The due importance of health is seen by its presence in the 17 Sustainable Development Goals (SDG), listing out the Agenda 2030 (SDG 3).

Health is considered synonymous with economic growth (Chaudhuri et al. 2015). Healthy individuals of a nation bring out higher economic growth through increased productivity and higher earnings. The benefits are similar, in fact higher, to the capital spending and provision of subsidies. A country's growth is characterised by the productivity of its labour force. At a conceptual level, health is assumed to affect this productivity because a healthy individual can produce higher output, *ceteris paribus*. Due to the contribution to the productivity of an individual, health is treated like a capital stock (Grossman 1972). Thus, health can be seen as an important constituent in generating livelihood of a person. A risk to individual's health is a risk to his livelihood generating capacity. Health security is therefore essential for the society in the development process.

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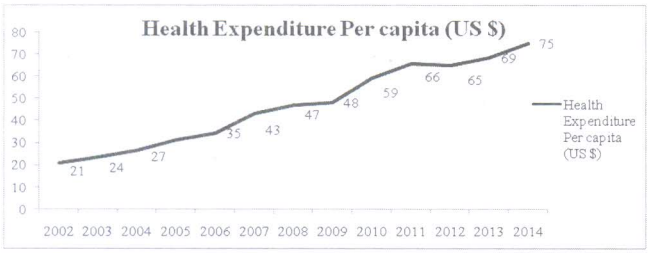
The treatment of health as a consumption good as well as capital good by Grossman (1972) shows that the current state of health condition of an individual is a consumption good today while the same goes on to increase the productive capacity later , and therefore, it is also a capital good. In a single period utility framework, it is shown that an individuals' utility is dependent on the level of health and a composite good. The investment aspect of health shows up in multi-period framework, wherein, good health in one period leads to an increase in outcomes in later periods. Often health is treated as function of healthcare (Srinivasan 2008), ignoring the fact that it includes prevention of diseases as well as it is an important determinant of the well-being of an individual.

The costs of availing the health care facilities are however rising every day. In India, the health care expenditure per capita has increased from 27$ in 2004 to 75$ in 2014(see figure 1)[1]. Healthcare expenses now are considered one of the major triggers of impoverishment in developing countries but also elsewhere (Van Doorslaer et al. 2006).

Figure (i): Health Expenditure per capita in US $, India



Source: World Bank

In light of increasing medical care costs, along with the increasing demand for medical care; health insurance is coming up as a mechanism to finance health. Health insurance provides individuals to pool the costs of health care services and share the burden in an attempt to prevent or reduce the loss which might occur due to ill health. This way the burden of high expenses in the event of bad health condition can be minimised per head. Being insured by health insurance protects individuals from the financial risk in case of unforeseen event like critical illness or health accident.

Health Care Expenses and Insurance in India

Health care in India is in a state of transition. There is growing level of health consciousness about being healthy leading to an increase in productivity. This health consciousness leads to an increase in health care demand. Rapid influx of medical technology (new procedures, more effective medicines) has driven up the health care expenditures (from 4.3 percent of GDP to 4.7 percent of GDP in 2008-2014-World Bank)[2] and led to the growth of role of private sector in India. Public health care expenditure is only 30.03 percent of the total expenses in India up to 2014[3].

The data by National Health Accounts 2013-14 shows that India's spending on health care is mere 4.02 percent of the GDP, of which the government health expenditure is 1.15 percent of the GDP. The breakup of this expense further at centre and state level reveals that the share of central government in total government health expenditure is 0.4 percent of the GDP (this includes expenditure on health insurance schemes) while the state government and local government together contribute 0.75 percent of the GDP. The division shows 34 percent is contributed by the Central Government while 66 percent by the State and local governments (National Health Accounts 2013-14). The higher share of state in the total expenditure is primarily due to the fact that health is a state subject in the division of subjects between state and centre in the Constitution of India[4].

The rapid influx of advanced technology in healthcare and increasing role of private sector in the market for providing health facilities has led to the availability of better services (higher quality) but it comes at an increased cost. To account for the high treatment costs, the role of health insurance comes in. There is growing awareness among the people that access to health care needs financing to save them from high out of pocket

1 *Data accessed from http://data.worldbank.org/indicator/SH.XPD.PCAP?end=2014&start=2004&view=chart*
Total health expenditure is the sum of public and private health expenditures as a ratio of total population. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation.

2 *Website link , last accessed on 07 Oct 2017 : https://data.worldbank.org/indicator/SH.XPD.TOTL.ZS?end=2014&locations=IN&start=2008*

3 *Website link , last accessed on 07 Oct 2017: https://data.worldbank.org/indicator/SH.XPD.PUBL?end=2014&locations=IN&start=2008*

4 *Total government expenditure for 2013-14 is Rs. 1, 29,778 crores (Rs. 1042 per capita). The share of central government is Rs. 44,564 crores (Rs. 358 per capita) while the state governments bears Rs. 85,215 crores as health expenditures (Rs. 684 per capita). [National Health Accounts 2013-14]*

expenses. Individual households bear 69.1 percent of the current expenditure as out of pocket expenditure (OOP) (National Health Accounts 2013-14). It is estimated at Rs. 2,336 per capita (2013-14).

Health Insurance:

Any insurance which is non-life insurance falls under the category of general insurance. A general insurance includes car, fire, travel, health etc. In India, we have 4 public sector general insurance companies, 5 standalone health insurance companies and 18 other general insurance companies which provide the facility for health insurance (IRDA 2015-16).

Table (i): List of general insurance companies in India (IRDA annual report):

Public Sector General Insurance Companies (4)	
National Insurance Co. Ltd.	The Oriental Insurance Co. Ltd.
The New India Assurance Co. Ltd.	United India Insurance Co. Ltd.
Standalone Health Insurance Companies (5)	
Star Health and Allied Insurance Company Limited	Apollo Munich Health Insurance Company Limited
Religare Health Insurance Company Limited	Max Bupa Health Insurance Co. Ltd.
Cigna TTK Health Insurance Company Limited	
Other General Insurance Companies (18)	
Bajaj Allianz General Insurance Co. Ltd.	Magma HDI General Insurance Co. Ltd.
Bharti AXA General Insurance Co. Ltd.	Raheja QBE General Insurance Co. Ltd.
Cholamandalam MS General Insurance Co. Ltd	Reliance General Insurance Co. Ltd.
Future Generali India Insurance Co. Ltd.	Royal Sundaram General Insurance Co. Ltd.
HDFC ERGO General Insurance Co. Ltd.	SBI General Insurance Co. Ltd.
ICICI Lombard General Insurance Co. Ltd.	Shriram General Insurance Co. Ltd.
IFFCO Tokio General Insurance Co. Ltd.	TATA AIG General Insurance Co. Ltd.
L & T General Insurance Co. Ltd	Universal Sompo General Insurance Co. Ltd.
Liberty Videocon General Insurance Co. Ltd.	Kotak Mahindra General Insurance Co. Ltd.

Health insurance falls under the category of general insurance. Often health insurance is confused with life insurance. The term health insurance relates to the insurance that covers health related expenses/medical expenses until an individual is alive while the latter generally includes returns which accrue due to death or maturity of the plan.

A health insurance policy is a contract between an insurer and an individual /group in which the insurer agrees to provide specified health insurance cover at a particular "premium"(IRDA: Handbook of Health Insurance 2012) . They can be offered both by life insurers and general insurers; the former generally offers long term policies while the latter offers policies covering health related expenses on a short term basis usually for a year or so.

The growth and evolution of health insurance policies started with the "Mediclaim" policy, launched as the first retail health insurance product which coincided with setting up of corporate hospitals in few metro cities (IRDA 2013). Post liberalisation of insurance sector in 2000, health insurance market grew exponentially .The middle class started to realise the importance of covering the high medical expenses and the increase in the longevity of lives led to the significance of health insurance being known.

Today, health insurance policies mainly include cost of routine health care, expenditure on hospitalisation, though diverse plans have started to be made available now with different offers for the consumer (IRDA: Handbook of health insurance 2012).

Private health insurance schemes are offered by standalone health insurance companies while government health insurance schemes include Employees State Insurance Scheme (ESIS) for workers in organised private industrial sector (1948), Central Government Health Scheme (CGHS 1954), Mediclaim Policy by General Insurance Company (1986), Universal Health Insurance Scheme (2003), Rashtriya Swasthya Bima Yojana (2008) etc. at the national level while state health insurance schemes include Yeshasvini (2003), Aarogyasri (2007), Kalaignar (2009), RSBY Plus (2010), Vajpayee Aarogyasri (2013) (Forgia and Nagpal 2012). A restructured RSBY was proposed in 2016-17 named as Rashtriya Swasthya Suraksha Yojana, launched in 2017-18 as National Health Protection Scheme.

Asymmetric information in Health Insurance:

The health insurance market or any market for insurance is characterised by the presence of asymmetric information. There is more information with one of the transacting party than the other. It can be in the form of hidden action or information from one of the transacting parties. Asymmetric information means absence of same information among two or more parties (Riphahn et al. 2003). , the two parties are the insurance companies

(known as the principal) and the individuals taking up insurance (known as the agents).

This insurance market distortion can be of two types: Adverse Selection and Moral Hazard.

Adverse selection is the problem of hidden information where one party has private information. There are heterogeneous individuals in terms of health state and the individuals have this information which is not completely revealed to the insuring party. It can be also seen as the endogenity in the demand for health insurance. This is the problem where the type of "insured" is unobservable as he/she has private information about his/her type. The individual with high risk can hide the information about his/her health status and enrol in a generous plan. It is a problem for the insurance companies as they have to account for this risk while formulating the different plans.

The main reason to be concerned about adverse selection is that it can create a market for bad risk individuals where, healthy individuals do not enter the insurance market at all because of high premiums; which are set by the companies to deter the unhealthy lot (Pauly 2007). This can lead to breaking down of the insurance market (Rothschild and Stiglitz 1976).The Gresham's law – "bad money drives out good" or the Akerlof's market for lemons –"The lemon cars drive out the peach cars" are the concepts which are in sync with the health insurance market where the "high risk individuals drive out the low-risk individuals". Insurance companies are aware of this selection problem and try to develop the premiums taking into this information rent into account.

Moral Hazard is the problem of hidden/unobserved action. Such asymmetry arises after the contract has been accepted by the individual (*ex-post moral hazard*). This problem occurs when the unexpected loss from an event increases as insurance coverage increases because consumer's behaviour changes in a way that their expected expenditure from the event increases (Pauly 2007).Since insurance lowers the marginal price of consumption, it alters the utilisation of health care facilities (Vera Hernandez 2003).When an individual has financial coverage against an adversity then he/she is less likely to be careful in preventing mis-happening against which he/she is insured. In medical insurance, the unobserved action can be attributed as the action of taking care of one's own health. People take extra insurance so that they don't have to take care of their health (avoiding the preventive effort /behaving recklessly) i.e. *ex-ante* moral hazard, they can demand more medical care and better health care facilities. The insurance induced distortion in the price of health care demand leads to over-utilisation of health care services (Zweifel and Manning 2000).

Dividing this problem into demand side (insuree) and supply side (insurer), asymmetric information can be explained as:

- Adverse selection problem or the self selection problem: Insurance companies are the principal as they do not have information about the health status of the individual and agents are the individuals. This occurs at the stage where individuals choose insurance from a menu of contracts (Demand side problem).
- Moral Hazard from the Demand side: Individuals have the incentive to over-consume services due to presence of insurance. They are the agents while the insurance companies are the principal once again.
- Moral Hazard from the supply side: Health care providers have more information about the individual's health problem and he/she is the agent here. They want to extract as much amount as possible from the insurance companies. This leads to over-medication and opportunity cost of time spent in the hospitals for the individuals.

The economic significance of studying this area is that presence of asymmetric information can lead to higher than average premium setting by the companies which can create a market for bad risks. Also, the companies can withdraw and the insurance markets can break down. They can become reluctant to sell insurance at all. The economically poor sections of the society, already burdened by the high health care costs, further face this problem the most as they can be completely excluded from this cost sharing mechanism of insurance; due to the presence of high premiums. They bear the double burden of high costs leading to a problem of inequity. From a welfare point of view, scale up of health insurance should also ensure coverage for the economically poor so that there is an increase in access to health care for the disadvantaged section of the society (promoting equity) (Vellakkal 2009).

Literature Review

The market of medical care and uncertainty has been well studied in the past theoretically (Arrow 1963, Akerlof 1970, Rothschild and Stiglitz 1976) and tested in various

markets empirically (Cameron et al. 1988, Bajari et al.2006, Holly et al. 1998, Riphahn et al. 2003 etc.). Arrow (1963) mentions, that the presence of uncertainty and information asymmetry distorts the competitive equilibrium outcome. This uncertainty lies in the behaviour of patients and the physicians. The author analyses the medical care industry and provides the insight in the welfare effects of moral hazard.

Through an empirical analysis, Cameron et al. (1988) have studied the inter-dependency of health insurance choice and health care demand decisions by individuals by developing a theoretical model and using cross-section data from Australian Health Survey to empirically test for moral hazard. Using a negative binomial model for health care utilisation and accounting endogenity of insurance through instrumental variable approach, they find evidence of moral hazard. Insurance creates a price change for the consumer and this leads to the behaviour of moral hazard among the consumers. A model of inter-dependency has been estimated by Cardon and Hendel (2001) using data from National Medical Expenditure Survey. The authors test for link between unobserved components of insurance choice decision and health care demand. This link between the insurance demand and health care demand is found to be due to hidden information or the unobservables if there is presence of asymmetric information. They test for evidence using a tobit style model of insurance choice (individuals have a set of insurance plans to choose from) and similar consumers choosing different plans is attributed to presence of adverse selection. Change in demand due to change in prices (moral hazard) is tested non-parametrically by calculating price elasticities .The elasticities are compared to seminal RAND health insurance experiment and there is no evidence of moral hazard. In a similar manner, Harmon and Nolan (2001) provide a simultaneous linear probability model for jointly modelling insurance demand and service utilisation using the first wave of Irish element of the European Community Household Panel 1994.

Similarly Einav et al. (2011) develop the joint distribution of individual's health type, riskiness and the extent of moral hazard following the theoretical model used by Cardon and Hendel (2001).They divide the change in spending due to presence of insurance in two sections-one relating to difference in the insurance plans people choose and the other due to the difference in the type of treatment taken up based on health state. This is the introduction of selection effect in moral hazard which helps in reducing the over-estimation of moral hazard when it is looked only by the type of plans individuals enrol in.

Special attention to the problem of moral hazard, has been in the literature on using the demand for additional health insurance (or supplementary insurance) coverage in the presence of mandatory health insurance. Coulson et al. (1995) study this effect in the demand for prescription drugs by the elderly using a two stage regression where the first stage is a multinomial regression for insurance choice and then estimates from these are used in the second stage non-linear least square estimation in the demand for prescription drugs. Presence of supplementary insurance is associated with increase in demand of prescription drugs. Cameron et al. (1988) follow an IV-approach for the treatment of endogenity when looking only at the moral hazard problem and have a linear model of health care demand.

Using Swizz Health Survey (SHS,) Holly et al. (1998) capture the effect of supplementary health insurance by a simultaneous equation model to calculate the probability of using health care services when an insured person takes up additional supplementary insurance. In the two part equation, the first one is a reduced form of insurance choice and the second is a structural equation for propensity that an individual will have at least one inpatient stay conditional on past medical treatment and the type of insurance plan. They find that having additional insurance by an insured person increases the probability of health care demand, signifying presence of moral hazard in the swizz health care market.

The effect of supplementary insurance has been studied by using panel data by Riphahn et al. (2003) in the German Health Insurance market. They test for moral hazard as well as adverse selection. They use a bivariate random effects panel estimation technique in count data in modelling visits to the doctor and visits to the hospital jointly.

With the use of dynamic data, Abbring et al. (2003) describe that the effect of moral hazard and adverse selection can be detangled. The limitation of cross-sectional data is that the past history which influences an individual's behaviour of insurance and health care demand is not captured and hence the direction of causality is not clear (being insured leads to more usage or there is high usage by individuals, so they take up generous insurance to cover it).

Studies focussing only on the adverse selection problem are few in the literature, though not insignificant.

Deb and Trivedi (1997) by using cross-section data of National Medical Expenditure Survey (NMES) model the problem of adverse selection .They divide the population into healthy and ill. The insurance status is pre-determined rather than being endogenous. Proxy variables are used for health status which divides the population into healthy and ill. The difference in health care service use (due to health status) between the two groups brings out the presence of moral hazard. Income is found to be less important factor in determination of health care demand.

The impact of insurance on out of pocket expenditures(OOP) for the individuals using World Health Survey 2003 has been tested by Joglekar (2008) and he finds that in India OOP are reduced for the insured individuals. It is found that it is the poorer households in India that have to spend more on health care services as they are not covered under insurance. He estimates a two part model where at the first level the probability of health care expenditure is calculated which is dependent on economic variables, demographic variables, and health risk factors. The second part models the extent of catastrophic health expenditure. He finds that insurance has a negative impact on the health care expenditures.

Table (ii): Literature Review: A summary

Study	Data	Major Findings
Cardon and Hendel (1996)	Cross-section Data (NMES)-1987	No adverse selection. Link between insurance choice and health care demand explained by observables, no role of unobserved heterogeneity.
Cameron et al. (1988)	Cross-section Data (AHS) - 1977	Health insurance effect is found to be result of both M.H. &A.S. (self selection cannot be separated from moral hazard).
Joglekar (2008)	Cross-section Data (WHS) - 2003	Impact of health insurance on health expenditure is positive (presence of insurance reduces out of pocket expenditures for the insured).
Riphan et al. (2003)	Panel Data (GSOEP) - 1984 to 1995	Presence of Adverse Selection, however no moral hazard found.
Deb and Trivedi (1997)	Cross section Data (NMES) - 1987	Emphasize the importance of health status and health insurance as determinants of health care demand (presence of asymmetric information-moral hazard mainly).
Chiappori & Salaine (2000) French Market Automobile Insurance	Cross section Data (1990)	No evidence of asymmetric information (whether adverse selection or moral hazard)-Distinguishing between the two is difficult.
Manning et al.(1987)	Panel Data (RHIE) - 1975 to 1982	Evidence of moral hazard.
Holly et al.(1998)	Cross section Data (SHS) - 1993	Evidence of Moral Hazard (Supplementary insurance increases use of health care utilization).

The empirical evidence for asymmetric information in health insurance is found in other countries, while such an analysis has not been done for India previously. Previous research, as pointed out in the literature review, has not focused on the Indian health insurance market. With the central and state governments pushing for the health insurance model of healthcare, it is important to look at the plausible evidence for moral hazard in India.

OBJECTIVES OF THE STUDY

This paper intends to explore the *presence of asymmetric information in the health insurance* market in India and study it from the demand side perspective. It also brings out the determinants of health insurance choice and health care demand.

The focus is on *the inter-dependency between demand for health insurance and health care services in India and checking for empirical evidence of demand side moral hazard in the health insurance market* using data from "Study on Global Ageing and Adult Health (SAGE) Wave-1, 2007-2010 provided by World Health Organisation . It would be useful to further look at economic problems of medical care market and explore the divergence between private and social costs & benefits.

Hypothesis: Whether insurance significantly affects the health care demand by individuals?

i.e. $\hat{Y}_1 = 0$ (Absence of Moral Hazard)

$\hat{Y}_1 \neq 0$ (Presence of Moral Hazard, insurance is significant)

METHODOLOGY AND DATA

Theoretical Background

The idea of reducing (or increasing) consumption of a good when it is costly (or less expensive) comes from the basic law of demand in the microeconomic theory. This is rational behaviour of individuals. So consumers while deciding their demand for medical care take into account this factor of out-of -pocket expenditure.

Health is treated in a similar manner as human capital and can be treated as capital stock that produces output as healthy life ahead (Grossman 1972) .Sick days would give negative utility to the consumer. Individuals decide upon level of health just like other commodities and bring it in their expected utility functions. Before purchasing insurance, they have private information about their health which is unknown to the insurer. They maximise their expected utility conditional over different insurance choices and choose the one which gives them maximum returns (Riphahn et al. 2003; Cardon and Hendel 2001). Then they decide upon the level of health care consumption. This may be considered as a two time period problem for the individual.

Economic Model

The consumer's behaviour of choosing health insurance and demand for health care is two stage behaviour of utility maximisation. A risk averse utility maximising consumer/individual first makes the decision about his insurance status by maximising his expected utility from the decision of taking insurance and then after the health state is realised (which was uncertain/latent in the previous stage), he makes a decision about health care consumption in the second stage. This would be done by the taking the behaviour in the reverse order/backward induction. The theoretical model is provided by Cameron et al. 1988; Cardon and Hendel 2001; and Bajari et al. 2006.

Econometric Model

The test for presence of moral hazard in health insurance is done by using a two-stage regression procedure following an IV-approach (Cameron et al. 1988). The first stage accounts for the insurance choice demand and the second stage is for the health care demand.

Stage 1: Probit Model

To account for the endogenity of insurance status, a probit model is used which is the first stage regression. The practical reason for using probit over logit is that it is strongly assumed that the underlying distribution is normal.

$$Y_1 = \alpha_0 + \alpha_1(Z_1) + \varepsilon \qquad \text{[PROBIT MODEL]}$$

where,

Y_1 is the dependent variable i.e. insurance status of the individuals. It is equal to 1 if the person is covered under any mandatory or voluntary insurance plan and 0 if no insurance. Z_1 is a vector of explanatory variables for insurance decision. α_1 is the vector of coefficients of the explanatory variables while ε is the independently distributed random error term with mean 0 and variance σ^2.

Table (iii): Variables for Health Insurance Decision (Probit Regression)

Dependent Variable: Insurance Status of the Individual	
Independent Variables:	
Female	A binary variable with female=1 if the individual is female, 0 otherwise.
Urban	A binary variable for area of residence of the individuals, urban =1 if individual resides in an area that has been legally proclaimed as being urban. Any other area which is not classified as urban is rural area.
Married	Variable for marital status of the individuals. Married=1 if the individual is married or cohabitating and =0 if unmarried or divorced.
Income Quintile	An income quintile divides the population in five equal income groups from the lowest income to the highest income such that twenty percent of the population is in each group.
Years of Education	The number of years of education the person has received.
Age	Age of the individuals (only the adult population is taken so above eighteen years).
Health Status	It gives information about the self perceived health status of the individuals & is an ordered categorical variable with the categories- very good, good, moderate, bad and very bad, rated 1 to 5 respectively.
Private occupation	A dummy variable for occupation status of the individual. It is equal to 1 if the person is working in the private sector, 0 otherwise.
Public occupation	If the individual is working in public sector, it is equal to 1 and 0 otherwise.
Informal Employment	A binary variable where working in the informal sector is equal to 1 and 0 otherwise.
Self Employed	A binary variable where individuals who are self employed are denoted as 1 and 0 for others.
Additional Variables for 2nd Stage Regression	
Insurance hat	Predicted probability of taking up insurance, calculated from the insurance choice decision
Need for Care	A dummy variable giving information on whether the individual thinks he needs health care. It takes the value 1 if he needs health care and 0 otherwise.

Stage 2: Negative Binomial Model

The visits to the doctor is a discrete count variable going from zero visits to ninety in the past twelve months and hence modelled using a negative binomial model. For count data, the most general form is poisson regression. Negative binomial is a generalisation to the poisson model.

$$Y_2 = \beta_0 + \beta_1(Z_2) + \beta_2\left(\hat{Y}_1\right) + \upsilon \qquad \text{[Negative Binomial Model]}$$

Y_2 In the last twelve months how many times have you received care or consultation from a doctor?

Z_2 is a vector of explanatory variables for health care demand decision while $\hat{Y}_1$ is the predicted probabilities of taking up insurance, from the first stage. β_1 is a vector of coefficients of health care demand decision variables and β_2 is the coefficient of predicted probabilities of insurance decision. In the above equation, υ is independently distributed normal random error term with mean 0 and variance σ^2.

The independent variables, which are same as the first stage, are female, urban, age, income quintile & health status. Additional independent variables are Insurance hat and Need for Care.

Data and Summary Statistics

(SAGE) Wave-1, 2007-2010 is a multi-country survey conducted in six countries with the aim of addressing the data gaps on ageing, adult health and well-being in lower and middle income countries, whilst being comparable to the surveys conducted for developed countries. It has nationally representative samples of adults aged 18 and above.

The data is used for India, where the survey was conducted in six states for a representative of six regions classified on the basis of development and geographical location. For the current analysis the individual level data is used where they themselves or proxy respondent is answering the questions.

The individual level data contains information on socio-demographic conditions, health state perception, health care utilisation, health insurance status, health state valuation, risk factors, chronic conditions, mortality, health care utilization, health systems responsiveness and social capital. It provides detailed information on the utilization of health care facilities, characteristics of current employment, and the insurance schemes under which individuals are covered.

The limitation of this data is that it is not entirely representative of the sample. In India, we have about 20 percent of the people who are insured (about 80 percent financing is out of pocket expenditure-World Bank) while in this data we have about 5 percent people who are insured.

Table (iv): Summary Statistics of Quantitative Variables

Variable	Mean	Standard Deviation	Min	Max	No. of observations
VISITS TO DOCTOR	3.917781	5.389863	0	90	8453
Years of Education	7.929391	4.073802	0	23	6104
Age	49.94036	16.77294	18	106	12122
Income Quintile	3.134745	1.417917	1	5	12045

Table (v): Summary Statistics of Qualitative Variables

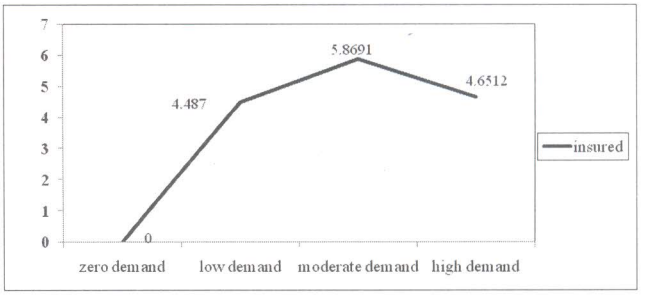
INSURANCE STATUS		Insured= 4.12%		Uninsured= 95.88 %	
Female		Females = 61.37 %		Males= 38.63%	
Urban		Urban = 25.70%		Rural = 74.30%	
Married		Married= 77.54%		Unmarried=22.46%	
Need for Care		Yes=3.30%		No= 96.70%	
Private Occupation		Yes= 7.66%		No, Others= 92.34%	
Public Occupation		Yes=5.82%		No, others= 94.18%	
Self Employed		Yes=27.61%		No, others=72.39%	
Informal Employment		Yes=19.48%		No, others=80.52%	
Health Status	Very good=4.91%	Good=34.04%	Moderate=45.22%	Bad =14.51%	Very bad=1.32%

The respondents lie majorly in the age group of late 20s to the late 60s. The respondents lie majorly in the rural areas with only 25 percent in the urban area setting. Awareness about health insurance is expected to vary by the place of residence. Region wise those staying in the urban areas are expected to have more insured people due to higher health consciousness, but it does not vary much. Among the insured about 47 percent people are from rural areas while 52 percent from urban areas. Also, among the insured about 86 percent of the people are married hence indicating that married people are more likely to be insured. Looking at insurance status by gender, it is males who are more insured though not much of a difference, 53 percent males and the rest females. The highest proportion of the insured individuals lies in the age group of 45 to 65.

When insurance status is looked up with reference to the occupation type, we see that the insurance status varies by occupation status a lot. The highest proportion of the insured are in the public sector (37.92 percent) followed by the private sector and the least insured are those who are self employed (17.13 percent).This is because in the formal sector (private and public) employees are given compulsory insurance. People in informal sector and self employed take up insurance on their own discretion.

Visits to the doctor depend on the individual's socio-economic profile, income and insurance status. Females visit the doctor more often than males. A preliminary analysis of the inter-linkage between demand for health insurance and demand for health care tells us that as the demand for health care goes from low to moderate, people start to take up more insurance. However, for very high demand of health care the percentage of insured drops. Those who have zero visits to the hospital, they do not take up any insurance at all. Those who have moderate demand; among them the percentage of people insured are the highest indicating the presence of moral hazard. As the demand goes very high, percentage of insured again drops down. This might due to the elimination mechanism of insurance companies who keep premiums high to eliminate these bad risks to take up insurance.

Figure (ii): Percentage of people insured and health care demand



Source: Author's own calculation

RESULTS AND DISCUSSION

Probit Regression

Probit regression is used to model dichotomous or binary outcome variables. In the probit model, the inverse standard normal distribution of the probability is modelled as a linear combination of the predictors.

The chi square value of 269.84 with a p-value of 0.000 tells us that the model is highly significant. The probit coefficient estimates α are the partial derivates of the estimated probit index function $Z^T\alpha$ with respect to individual regressors.

Table (vi): Results for Stage 1 (Probit Regression)

Probit Regression: **Dependent Variable: Insurance Status** **N= 6071, Wald chi2 (10) = 269.84** **Prob > chi2 = 0.0000** **Pseudo R2 = 0.1251**		
Variable	α (coefficients)	**Z value**
Female	0.040	0.59
Urban	0.265***	4.62
Income Quintile	0.246***	8.36
Married	0.230**	2.80
Age	0.005*	2.38
Years of Education	0.022**	2.72
Private occupation	0.287**	3.03
Public occupation	0.598***	7.43
Informal employment	0.560***	6.88
Health status	-0.098*	-2.56
Constant	-3.257***	-16.34

*Superscripts *, **, *** correspond to 10%, 5% and 1% level of significance respectively.*

The marginal probability effects are calculated after regression using the post estimation margins command.

The propensity of being insured changes with a change in health status, socio-economic & demographic characteristics of an individual. The results are summarised in Table 6. With one unit increase in the years of education for an individual, the probability of taking up insurance increases by 0.2 percent, *ceteris paribus*. Educated individuals are more aware of the insurance schemes and hence there is positive relation. The probability of married individuals taking up insurance is higher by 2.4 percent which is a significant determinant in taking up insurance. Gender of an individual is not significant in determining the insurance status of an individual.

Insurance status varies by occupation and the coefficients of public, private and informal employment are highly significant confirming the same. The dummy variable private occupation denotes that being in private sector; the probability of being insured is higher by 3 percent. Individuals in public sector occupations are 6.2 percent more likely to take up insurance than those in other sectors while it drops down for those in informal sector. The probability is 5.8 percent more for informal sector employees.

As the health status of an individual goes from very good to bad (with each changing category), the probability of taking up insurance reduces by 1.03 percent. The variable is significant but is not pertinent in explaining the insurance choice decision. Income on the other hand, is highly significant in the model. With the changing income quintile (lower to higher) the probability of being insured increases by 2.58 percent. All the variables in the insurance choice model are significant other than one representing sex of the individual.

Negative Binomial Regression:

The visit to the doctor is modelled using negative binomial model. Here, the predictions from the first stage about probability of taking up insurance are taken and used as an independent variable in determination of health care demand (following the IV-approach).

Table (vii): Results for Stage 2(Negative Binomial Regression)

Dependent Variable: Visits to the Doctor **N= 4565 Prob > chi2 = 0.0000** **Wald chi2(7) = 168.92** **Log pseudolikelihood = -10881.941**		
Variable	β (coefficients)	**Z**
Female	0.094*	2.04
Urban	-0.110*	-2.43
Age	0.004**	2.89
Income Quintile	-0.070***	-3.81
Health Status	0.250***	8.82
Need for Care	0.296*	2.34
Insurance Hat	1.298**	3.03
Constant	0.588***	6.01

*Superscripts *, **, *** correspond to 10%, 5% and 1% level of significance respectively.*

The coefficients of negative binomial model are interpreted in terms of logs. A more simplified way is through incidence rate ratios (IRR). Incidence rate ratio is a ratio based on rates or incidence of counts. It is obtained by exponentiation of each coefficient. It represents the change in the dependent variable in terms of a percentage increase or decrease, with the precise percentage determined by the amount by which incidence rate ratio is above or below one.

Table (viii): Incidence Rate Ratio for Negative Binomial

Variable	**IRR**	**Z values**
Female	1.098*	2.04
Urban	0.896*	-2.43
Age	1.004**	2.89
Income Quintile	0.932***	-3.81
Health Status	1.285***	8.82
Need for Care	1.345*	2.34
Insurance Hat	3.662**	3.03

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Females compared to males, holding other variables constant are expected to have doctor visits higher by 1.09 times. Individuals living in urban areas are expected to have visits to the doctor 9% less than those living in rural areas. As the age of an individual increases by 1 year, the difference in the logs of expected counts would be expected to increase by .004 units. People in the higher income quintile are expected to have doctor visits higher by 7 percent. As the health status of an individual goes from good to moderate & moderate to bad (changing category), the expected visits increase by 28 percent. Those who believe they need health care, as compared to those who don't, are expected to have visits to doctor higher by 34 percent. Insured individuals are expected to have visits to the doctor higher than the uninsured by 266 percent. This figure indicates high presence of moral hazard and the variable is significant at 1% level of significance.

Two stages together: Thus, self reported health status plays a role in determining health care demand though not very significant in the insurance choice decision. This variable is an indicator of the health risk type of individuals. Income is negatively related to the health care demand. With increasing income, individuals are expected to have better standard of living and are more inclined towards taking care of their health.

Discussion: The results of the two stage regression show that there is presence of moral hazard, since insured individuals are expected to visit the hospital 266 percent higher than those who are not insured. A demand side moral hazard is confirmed in the present study. Over consumption of health care services on account of being insured brings to attention the need to review the model of healthcare being followed by a nation. With India moving towards Insurance model via the restructured RSBY (National Health Protection Scheme), such an analysis brings to light the ill-effects that laden the scheme.

While the presence of moral hazard has been tested empirically for other countries, such an analysis has not been attempted previously for India. With the government pushing towards universal health coverage via insurance, the asymmetry arising in it is analysed in this study. The current data (collected before 2010) presents merely a handful of insured individuals and brings out higher use of health care services in the presence of insurance. This presents a caution for the upcoming health care schemes where the policies aim to cover the entire population by insurance, that too funded by the public exchequer.

CONCLUSION

In the presence of moral hazard in the insurance market, efforts by institutions to increase the coverage to all and reduce the price of services is more likely to *reduce the welfare* of the people as a whole (Pauly 1968). This idea of presence of insurance reducing the prices of services (due to presence of co-payments) is generally associated with a loss in the social welfare. This is described as *inefficient moral hazard* (Nyman 2003).[5]

However the situation is not all grim. Insurance induced health care utilisation leads to increase in social welfare. According to this postulate, individuals demand health insurance for an income transfer when an unforeseen health accident is there and not the reduction in prices of services due to presence of insurance. This would enable them to use services which otherwise would not have been affordable. Cases of chronic illness, heart surgery, chemotherapy are few examples (Nyman 2003).[6]

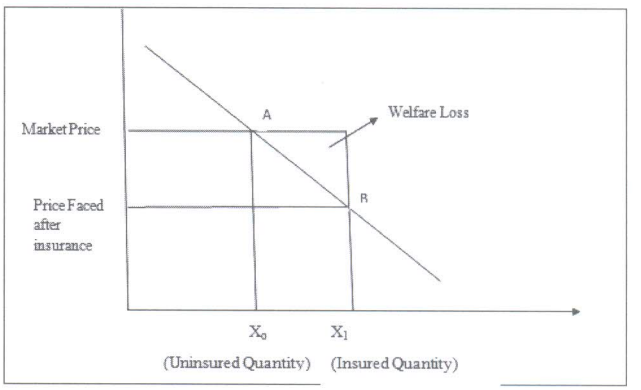
So this inter-linkage of demand for health insurance and health care utilisation suggests that there is an income transfer which is increasing welfare. This is the *efficient moral hazard* and it is not an issue for the society.

The presence of moral hazard in the Indian Health Insurance market can be analysed from both these aspects. The increase in utilisation of services in the presence of insurance, if seen in the proper context may not be all bad for the economy.

In the case of *inefficient moral hazard* where the use of health care likes prescription drugs, visits to the doctor etc. increase on account of being insured; the idea of providing incomplete insurance and better observation of the actions of the insured (Arrow 1963 , Pauly 1968) are already in place and insurance companies still are looking for further solutions. Not providing insurance at all is never a feasible solution (Shavell 1979).

The distortion induced by price distortions can be presented graphically in the figure below (following Frick and Chernew 2009, Feldstein 1973).

Figure (iii): Welfare Loss in the presence of Insurance due to Price Distortions



Similar to the deadweight loss incurred due to subsidies.

Point A represents the equilibrium in the absence of insurance. X_0 is the quantity of health care use in the absence of insurance (considered to be efficient). In the presence of insurance, the prices of services are in effect reduced and the quantity of health care use increases to X_1. Point B is the equilibrium in the presence of insurance. The triangular region is the welfare loss which is calculated when we keep factors like quality of care unchanged. This is the welfare loss. However, the gains

induced from increase in the quality and reduction in risk is not considered and the insurance-induced loss is over-calculated.

Arnott and Stiglitz (1990) mention that if producer prices are fixed (i.e. the price of insurance policies is taken as given) then the government can control the quantity of insurance being purchased by individuals through taxes. This will increase the precautions an individual takes and reduce excessive insurance purchase. It can introduce taxes on activities which increase health risk and provide subsidies on the activities that improve the care the individuals undertake of themselves. This form of government intervention can yield pareto improvements in the market. Responses by private players are the provision of down payments, initial charges etc. to prevent this universally prevalent problem of moral hazard peculiar to insurance markets.

In the case of *efficient moral hazard*, the quantity of health care use for an individual is more efficient than in the case of uninsured. The individuals are able to overcome the excessive market prices and accessibility increases. Frick and Chernew (2009) provide three situations in which health insurance is efficient. It leads to efficient income transfers, helps in mitigating negative externalities and offset the harmful effects of poor decision making by the individuals. In case of chronic diseases, presence of insurance with the effect of moral hazard still leads to positive effects. The demand here is considered highly inelastic.

Thus, presence of moral hazard is not entirely a welfare loss for the society. As long as the presence of insurance prevents under-utilisation of health care services, it is indeed beneficial. For the analysis done, the increase in the health care services as the probability of taking up insurance increases, represents presence of moral hazard (*ex-post*). Here, we cannot distinguish it into efficient and inefficient moral hazard. Thus, government policies aimed at increasing universal coverage must not be discouraged thinking it can only be inefficient moral hazard. The low levels of insurance (about 4 percent of GDP) should be increased and awareness about insurance is pertinent.

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