

A MODEL OF DEMAND FOR HEALTH INSURANCE

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CERTIFICATE

Certified that the dissertation titled "A MODEL OF DEMAND FOR HEALTH INSURANCE", submitted by ASHWINI KUMAR in partial fulfilment of the requirements for the award of the degree of MASTER OF PHILOSOPHY, has not been previously submitted for any degree of this or any other university.

We recommend that this dissertation may be placed before the examiners for evaluation.

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Contents

I.	Introduction	1
II.	Theoretical Background and Review of Literature	6
III.	Health Insurance Scenario in India	17
IV.	A Model of Demand for Health Insurance	30
V.	Conclusion	45
VI.	Bibliography	47

Introduction

Health insurance is a mechanism through which the insured consumer of healthcare does not feel the impact of cost of healthcare. It gives the insured person flexibility to readily adjust to stochastic quirks. Looking in a broader perspective health insurance can be defined as “any mechanism which covers the risks of payment for health care at the time of its requirement”(Ellis et al, 2000). In other words, health insurance is a scheme that entails a subsidized payment, non-payment or delayed payment for covering health expenses.

Insurance markets in health care differ from conventional insurance markets. Many of these differences trace back of other kinds of uncertainty. Not only the level of the loss-probability for a particular individual, the actual loss in real income or well being that he (the individual) experiences is also unknown to the insurer. Ignorance about probabilities means that the insurer may find it difficult to determine which purchaser of insurance is at which level of risk, so there will be possible tendency of the low risk individual not to buy the health insurance policy and hence, adverse selection may result. Further, ignorance about the actual loss in well being suffered and/or the actual illness of the individual may force the insurer to base benefits on the level of expenditures that the individual incurs, so moral hazard may result.

Health insurance also has redistributive consequences, their nature and magnitude depending on the financing of the scheme and the way in which premiums are assessed. Because the occurrence of the illness being insured against is uncertain, some agents will draw out more than they pay in, thus resulting in redistribution from the healthy to the sick. World Bank has also advocated the use of health insurance as a way of improving health sector efficiency and equity in developing countries.

It has also been argued that health insurance improves the social welfare. The basic argument is that if the individual is risk averse i.e., characterized by

possessing a concave utility function, he will accept any health insurance policy whose premium is actuarially determined. It is due to the fact that any such individual will be better off having some amount of utility with certainty than by taking risk, which yields an expected utility of the same amount. At this rate of premium the insurance provider will also be better off and thus the social welfare is increased (Arrow, 1963).

Risk-pooling in health insurance

Through insurance the insured individual (agent) and the insuring firm (the principal) trade risks among themselves. In fact risk and uncertainty involved in future health care needs creates demand for health insurance. Health insurance thus provides the means by which risks, or uncertain events, are shared between many people. Health insurance like any other insurance is based on the principle that what is unpredictable for an individual is highly predictable for a large number of individuals. Health insurance thus helps in reducing losses due to sickness by spreading the risk among individuals.

Like any other insurance, for health insurance to be financially viable there must be enough individual insured to spread the risks widely among them, and the uncertain events must be relatively independent of each other. The insurer in such arrangements pools independent risks and via the law of large numbers converts risky contracts into almost sure things¹. Therefore one of the most effective devices for mitigating uncertainty entails co-operative arrangements.

Health insurance needs of India

When we study the financing of health care in India, we find that the poor end up shouldering a disproportionate burden of health care. Even the better offs have to incur a significant amount of *out-of-pocket* expenses towards this end. As

¹ Law of large numbers states that probability of an event occurring deviating from its given natural probability by any fixed positive number goes to zero as the total number of event goes to infinity.

Berman notes, out-of-pocket expenditures of the households is three-fourth of total health expenditure in India (Berman, 1996). Expansion of health insurance will help individuals reduce these expenses.

As far as government provision of health care is concerned, it exists but only a small fraction of population has access to it. Moreover, the quality of services provided in government run hospitals is pathetic. Many reasons could be attributed to this. One of the major reasons is resource crunch faced by the government. India has a very narrow tax base consisting mainly of indirect taxes. It is also facing problems of huge fiscal deficits. Further with the economic reforms, which started in 1991, the role of government is getting limited. Hence there are pressures to seek ways of financing the expansion and maintenance of its health care system that do not depend upon the availability of general tax revenue.

From a macroeconomic point of view the arguments which can be put forward in favour of health insurance is that it taps money which otherwise would not be spent on health care and provides a stable source of revenue for the health sector. At the same time it does not reduce the funds available for the government. It is also argued that health insurance improves the health of those workers most vital for a country's growth, and when it provides its own facilities, it uses funds more efficiently than the private sector which might grow rapidly in the absence of insurance (Romer, 1971).

Indian health scenario leaves a lot to be desired. For improving the health status of India's population, financing of its health expenditure poses a crucial question. Due to widespread poverty and government's constraints in providing the health care services at subsidized prices, health insurance assumes an important role in the financing of health expenses. The health insurance system, which exists in India at present, mostly caters to the needs of those working in the organised sector, belonging to middle income segment of the population. The segments of the population (elderly and poor), whose needs of health insurance are most pronounced, remain largely neglected. Further, most of these existing health insurance schemes involve some amount of subsidy. The market-based health

insurance is still not a popular concept, with only 0.2 per cent of the population buying such schemes. The people also seem to be largely ignorant about the concept of health insurance. This underlies the need to promote health insurance policies in India.

In this context, study of individual's behaviour vis-à-vis health insurance becomes relevant. This becomes even more relevant if we consider the linkage between health insurance and improvement of health indicators. The present study makes an attempt to look into the behaviour of an individual in the framework of a model and notes its implications for the Indian health insurance industry.

Plan of study

The chapter, entitled, "Theoretical background and review of literature", sets out the theory involved in the economics of health insurance, particularly the theory concerning consumer's behaviour. It studies the rationale for demanding health insurance – the precaution and the access motives of demand for health insurance. It also studies the problems of moral hazard and adverse selection arising out of informational asymmetries in health insurance. This chapter ends with a review of the existing literature in this area, which has helped in evolving the theory of health insurance.

The chapter, entitled, "Health insurance scenario in India", describes the various health insurance schemes operating in India. It points out the provisions of these schemes and gives an insight into the merits and demerits of its policies. This chapter uses the broader definition of health insurance mentioned above, while studying the health insurance schemes existing in India. It points out different methods of health insurance as exhibited in these schemes.

In the chapter entitled, "A theoretical model", a static theoretical expected utility model of demand for health insurance is developed. The individual is assumed to be globally risk averse and rational in his behaviour. Faced with the uncertainty of health loss, due to sickness, he decides to purchase that amount of insurance cover, which maximizes his expected utility. The factors that influence

his decision making include the price of insurance, his disposable income, his perceived probability of sickness, price of medical care, and the government's tax policy (tax concessions on the premium paid). After calculating the individual's optimal level of health insurance coverage, the impact of changes in the determining factors on this optimal level of insurance coverage is studied. The signs of income elasticity and price elasticity are also worked out. The impact of changes in public health scenario leading to an increased probability of sickness and the governmental policy regarding tax concession is also studied. It also notes the implications emanating out of this model, especially in the Indian context. It points out some policy prescriptions for boosting the health insurance industry in India.

Chapter entitled, "Conclusion", sums up the findings of this work.

Theoretical Background and Review of Literature

Health economics as a specialized stream of economics is relatively new. Its beginning can be traced to Arrow's classic paper—"Uncertainty and the Welfare Economics of Medical Care" published in 1963. A substantial amount of literature has come up ever since in this area. Health insurance as an important sub-topic of health economics has also witnessed rapid theoretical evolution. This chapter studies the theory involved in demand for health insurance as evolved in the literature over the years. It also contains a survey of previous studies in this area.

Why do people buy health insurance?

The most important reason behind purchasing health insurance is avoiding financial loss due to illness. Illnesses, at times, inflict severe financial loss. Even though such illnesses may occur with very little probability, but the losses could be fairly high. These losses include not only expenses on health and medical care but also due to inability to perform productive activities. Therefore, there are two kinds of risks involved – a) risk of becoming ill, and, b) risk of total, incomplete, or delayed recovery (Arrow, 1963).

Nyman suggests that health insurance is purchased because of it also being a mechanism for gaining access to health care that would have otherwise been unaffordable (Nyman, 1999a). Hence Nyman emphasises the affordability factor. He argues that the costs of intervention in case of certain illnesses are so high that in absence of insurance, the individual would have to go without them.

Traditional theory of insurance tells us that any risk averse individual¹ would purchase full insurance at fair odds².

¹ A risk averse individual is one who prefers a level of wealth of, say, Z with certainty to a risky prospect with a level of expected wealth equal to Z . Any such person is characterized by possessing a concave utility function.

² When the premium charged is equal to the expected loss, insurance is said to be at fair odds, i.e., if premium is X and the loss due to illness is C with a probability p then $X = pC$ implies insurance at fair odds

Problems in health insurance

Health insurance market faces problems arising due to asymmetries of information. Like any insurance market, expansion of health insurance market is normally inhibited by problems of moral hazard and adverse selection.

Moral hazard refers to carelessness on the part of the insured person in view of insurance. It is the phenomenon whereby the method of insurance and the form of insurance policy affect the behaviour of the insured and, therefore, the probability of the hazard (Pauly, 1968). It can occur because insurance affects either the probability of an event associated with a loss or the size of the loss based on the occurrence of event. Translated into the context of health care, the first sort of moral hazard arises, when the purchase of health insurance encourages individuals to spend less on preventive health care. The second kind of moral hazard occurs when the purchase of insurance induces an individual, to spend more resources on treatment in case of illness. Moral hazard can lead to substantial welfare loss due to over-consumption of health care. It is because health care's price to the consumer is less than cost, primarily because the insurance reduces the user price below cost (Pauly, 1968). This view that moral hazard leads to substantial welfare loss is supported by several empirical studies (Feldstein, 1973; Feldman and Dowd, 1991; Manning and Marquis, 1996). In fact, they argue that these welfare losses are so huge compared to the benefits that it is difficult to understand why a consumer would buy unsubsidized health insurance.

However, Nyman suggests that fears of Pauly and others may be unfounded. He argues that Pauly's welfare loss is too large because it counts moral hazard due to both price and income effects. Whereas for him, the welfare loss should only be related to moral hazard from price effect. Nyman questions the validity of Pauly's assumption that consumers' purchase of health care is not responsive to income (Nyman, 1999b). On the contrary, empirical studies show that the individual's demand for health care generally increases with income³. He

³ Manning and Marquis (1996) find an overall income elasticity of 0.22 using the RAND health insurance experiment data.

further argues that welfare loss due to price-related moral hazard could be offset by gains from insurance. These gains can be derived from insurance's ability to permit access to health care otherwise unaffordable, from standard risk-bearing, and from an income transfer effect, which results in additional consumption of medical care and other goods and services (Nyman, 1999b).

Actually, by paying a premium the agent (the consumer) transfers the risk associated with illness to the principal (the insurer). This risk transfer affects the incentives and behaviour of an agent. This refers to the tendency of individuals, once insured, to behave in such a way as to increase the likelihood or size of the risk against which they have been insured. Incentive effect is called moral hazard caused by inability of the principal, to observe the actions of the agent costlessly. Hence when the untoward event (illness) occurs, the principal is not sure whether it was caused by agent's carelessness or by chance. From the principal's point of view, such behaviour may lead to a larger quantity of health care being consumed, and thus to higher costs, which requires higher premium. In a developing country like India, where only a small proportion of population receive the benefits of health insurance, such a process can accentuate the differences that exist in the amount of health care received by different sections of the population.

Moral hazard can be reduced by requiring the agent to bear some cost of the contingency or by monitoring the agent's behaviour. However, it may not be easy for insurer to observe the insured's preventive activities that reduce the likelihood of the illness. Another related problem is of objectively defining the severity of an individual's illness (Pauly, 1971). It is due to this reason that the amount of medical expenditure is often taken as a proxy for the severity of illness. Even this is not foolproof as though medical expenditure is often correlated with the severity of illness. It is also a quantity under partial control of the insured individual.

Methods to combat moral hazard include '*coinsurance*' - making the insured pay a proportion of his medical costs; '*deductible*' - making the insured liable for the initial expenses up to a stated sum; and '*fixed indemnity*', - where an individual is insured for a given expenditure, usually for an illness or a year, but

occasionally over his life-time. Health insurance increases demand for health care. Coinsurance is introduced to meet the increased demand for health care and risk aversion of insurers. Not only does coinsurance reduce the amount devoted to a proportional loading, it also serves to restrain the use, by raising the user price per unit of medical care. In principle, knowledge of the demand curve, and especially, the user price elasticity, can predict the effect of a linear coinsurance arrangement (Pauly, 1986). To some extent physician can check the necessity or lack of given treatment. However, physicians themselves stand to gain by increase in demand. It is true that hospitalization and surgery are more easily certifiable than illness of general treatment and therefore, less subject to moral hazard.

In developing countries, the purpose of co-insurance is not only to limit demand, but also to make an insurance scheme financially viable when incomes are low. There is evidence that lower the cost-sharing rate, the larger the demand. However, at the same time, there are fears that cost-sharing may deter those in need, and discourage early attendance, leading to more severe cases and greater expenditure on treatment later on. Deductibles, as an alternative to coinsurance, can be particularly useful to the insurer if applied to those services (such as medicines), which generate large volumes of small claims for reimbursement, and thus impose considerable administrative cost.

Deductibles can be understood as an attempt to reduce the administrative cost of total insurance or loading fee actually paid (Arrow, 1963). In practice, however, loading is not proportional to total premiums or benefits, but rather depends on number of claims. Therefore, the prevalence of deductibles is also alleged to be due to the desire to avoid the cost of processing many small claims (Pauly, 1986). Deductibles affect the demand by making the user price nonlinear; it will be equal, to the market price for a while, and then it will fall. Deductibles tend to discourage use if expenses are below the deductible limit, and to leave large expenses unaffected. Hence deductibles seem to have some depressing impact on health care costs.

Insurance, by changing the relative prices that consumers face for different health services, can either unintentionally distort the pattern of demand, or can provide a positive opportunity to shape the demand, in favour of cost-effective treatment patterns. The impact of moral hazard, in an insurance- financed system, will depend not only on demand factors but also on the availability of supply and the response of providers. Moral hazard has been considered a major problem in the context of developed countries. Moreover the fears of over-consumption and cost inflation have prompted the development of mechanism for rationing of available resources. In developing countries like India, the problem of rationing is even more acute in the absence of price. Here free services lead to excessive use of health care facilities and the consequence of free services may be high demand, that can swamp health facilities and increase cost.

Adverse selection can be defined as the propensity of low-risk individuals to underinsure. It also arises due to information asymmetries. Agents tend to have more information about their health status than the principal (insurer). Because the principal cannot discriminate between healthy and sickly agents, the latter will pose as healthy agents and be adversely selected by the principal.

Like any insurance, in health insurance also agents have differing probabilities of claiming from their insurer. If insurers charge all agents the same premium, and consumers have some information on their illness and likely probability of claiming, then low- risk individuals will tend to opt out of the scheme. As a consequence premiums will have to be raised for remaining agents, causing the remaining lower risks to exit, and so on. Hence such a system is unstable with no equilibrium being possible (Rothschild and Stiglitz, 1976). Even if equilibrium occurs it is at sub-optimal levels of cover. In this situation the potential agent's preference for high or low levels of cover acts as a signal to the insurer of their likely risk of requiring health care with those choosing high levels of cover being more likely to be high risk.

Attempts to reduce adverse selection may cause some problems regarding equity. If insurers know the health status of the agents without information cost,

then they can charge perfectly risk-rated premiums. This may lead to ‘dumping’- excluding those individuals from cover, who are likely to have high health care costs, or ‘cream-skimming’- making special efforts to attract low-risk, healthy agents. In fact, in the real world, the existence of information differences between principals and agents may reverse the Rothschild-Stiglitz equilibrium result, with high-risk persons being underinsured, and low-risk ones getting more cover (Newhouse, 1996). However, the potential for any form of active risk selection (dumping or cream-skimming) is offset by the costs of gathering information to facilitate selection.

As figure 1 points out, an indifference curve (U^s) represents safe or low probability insured individual, if it is steeper than the market average fair odds line, MM' , through the endowment point E . Now, if the insurer offers insurance at the market average premium, the safe type of individual would choose not to insure and to remain at the endowment point, since expected utility is higher at E than at any point to the north-west of E along MM' . Hence, the safe individuals would prefer to gamble rather than to insure along MM' . Here x-axis measures W_i , wealth in case of illness, and y-axis measures W_{ni} , wealth in healthy state.

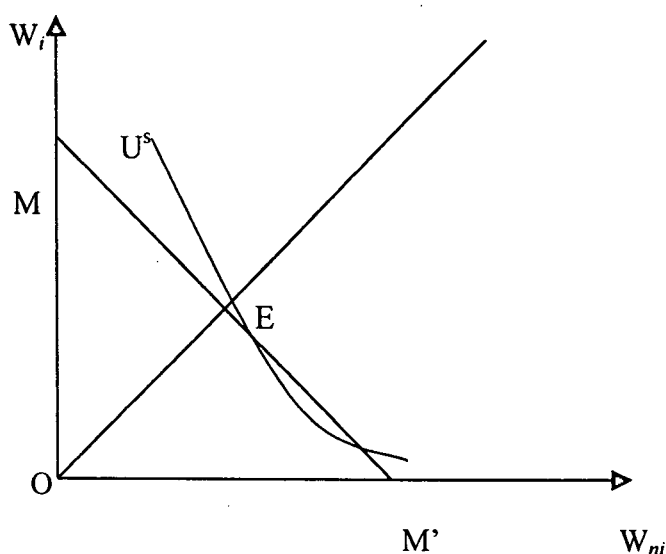


Fig. 1: Adverse Selection

There is little empirical evidence on whether adverse selection is an important problem in health insurance or not. This, mainly, because it is difficult to define any kind of econometric test. There has been no comprehensive empirical study of adverse selection impacts on the stability of health insurance markets to test Rothschild-Stiglitz hypothesis of non-existence of equilibrium due to adverse selection (Pauly, 1986). In fact, the market for individual coverage appears to be stable; there is little evidence that more comprehensive plans are driven out of existence by switching of good risks into less comprehensive plans.

Review of previous studies

Most of the studies for the demand for health insurance have been done using data from surveys. Marquis and Holmer (1994) have worked out the different models of how people evaluate outcomes in terms of their ability to predict families' preferences for health insurance. They have assumed that the preference function for risky prospects is a linear combination of objective probabilities and the utility of outcome. They have used a probit model to determine the probability of a family having non-zero health expenditure in a particular year and a linear regression for the logarithm of total annual expenditure for families with positive expenditure. The explanatory variables include the family's prior estimate of how much it would spend during the year, the experimental insurance plan, an indicator for site, and economic and demographic attributes of the family. They have assumed premiums for each plan to be actuarially determined. Findings of the study show that the price elasticities range from -0.13 to -0.38 , depending on the utility model and reference plan. An important finding of the study is that changes in price have less influence on demand when full coverage is the reference than when a catastrophic plan is the reference. Another significant outcome is that losses loom larger than gains, implying that there is some inertia or persistence in the consumer's choice of health insurance plan. This is because plans that a consumer

has bought are more highly valued than equivalent plans that has not been purchased. This sticky behaviour suggests that increasing the number of alternative insurance schemes, that consumers can select, may not result in greater competition. It also indicate that tax policy that give preferential treatment to employer paid health insurance premium may have been more effective in encouraging the purchase of insurance than eliminating it. Otherwise it would be encouraging people to assume a greater degree of the risk.

Nordquist and Wu (1976) suggest two ways of maintaining this uncertainty. One, by purchasing an insurance policy that promises benefits contingent on his future state of health and second, by purchasing preventive medicine which does not have direct effect on utility but makes beneficial changes in the consumer's health prospect. It thus makes insurance a substitute of preventive medicine⁴. An insurance is defined by the pair $[I, x(h)I]$, where I is the stated premium, and $x(h)I$ is the total future payoff or benefit. They mention that if change in the terms of the policy $[I, x(h)I]$ causes the individual to purchase more insurance and less prevention we have what is called moral hazard. To tackle this problem, the insurance company would try to avoid offering contracts that would make post-insurance income in better health smaller than in worse health, and would make any payments in the state of perfect health. These conditions imply a monotonic decreasing payoff schedule. Further, in order to increase the size of a policy without inducing moral hazard, the insurance company will never choose a concave payoff schedule. With sophisticated theoretical modeling, they point out that the optimal outlay on insurance equates the expected marginal utility of present consumption with that of future consumption, the latter weighted by the insurance payoff schedule. They have also tried to find out the impact of changes in price, income, and the amount of uncertainty on the demand for health insurance. They find that total income effects are ambiguous. If the direct effects are greater than

⁴ The difference between the two competing commodities is that the health insurance enables the consumer to redistribute his wealth from the present to the more hazardous, uncertain future, whereas preventive medicines alter the prospect of future health without changing the payoffs.

indirect effects, both of which are signed, the combined effects are also signed: the demand for insurance will vary directly with present income and indirectly with future income. Similarly for the impact of riskiness: they predict that if the direct effect outweighs the indirect effect, the demand for insurance will vary directly with the greater riskiness of the health environment. Further since insurance competes with preventive medical care, fall in the price of health insurance will raise the demand for insurance.

There has been very few study analysing Indian health insurance market. One reason for this could be less spread of health insurance coverage. An estimate shows that only 10 per cent of health insurance market has been tapped in India. Further only 2 per cent of total health expenditure is funded by public/social health insurance in India (Mavalankar and Bhat,2001). As Berman notes, out-of-pocket expenditures of the households is three-fourth of total health expenditure in India (Berman, 1996). This underlines the scope of health insurance as a risk-pooling and redistributive mechanism. In this regard Gupta (2000) notes that in India, health insurance schemes are closely related to the kind of work and occupation, as most of such schemes are employer-financed. She further notes that health insurance is still not a voluntary phenomenon in India. Therefore the link between health status and insurance is a weak one. She uses probit model to test the willingness of people to purchase health insurance, taking several explanatory variables like income, employment status and educational status. She finds that the poorer people are most willing to purchase health insurance policy. This is primarily because they are not covered under any governmental scheme of health insurance. She finds that the middle income class, who, at present, spends less on health care because of coverage, is only willing to pay a lesser premium rate, which is much below than their ability to pay. And for the high income people, higher ability to pay may inhibit their participation in health insurance schemes. The reason is that they can always pay for medical expenses. Moreover, they do not see the usefulness of such participation. Here lies a problem. Despite the willingness of the poorer class the insurance companies are not interested. This either due to their low ability to pay

premiums or to their high risk of illness. Lower premium rates and better risk-pooling are essential to bring them in the fold of insurance coverage. Among those who opted for any insurance coverage, the largest majority opted for insurance of a general nature, which paid for routine expenditure. This may not be attractive for insurance companies, as it would invariably involve huge scope for moral hazard. An interesting finding was presence of adverse selection⁵.

Gupta has also calculated premiums, putting 10 per cent mark up on average per capita expenditure on health care for different income categories. For low income category this figure is Rs. 265 per month both for risk pooled categories and high risk category. For middle income category this figure is Rs. 139 per month for risk pooled category and Rs. 150 per month for high risk people. The low amount reflects their unwillingness to pay high premium, since they have access to subsidized insurance coverage. For high income group, this sum is Rs. 333 and Rs. 353 per month for risk pooled and high risk categories respectively (Gupta, 2000).

Summary

In summary, previous studies have focused both on the theoretical and empirical aspects of health insurance. Over the years, it has led to development of theory of health insurance, as it has been recognized that health insurance is different than other forms of insurance, because of a much larger scope of adverse selection and moral hazard. Moreover, health care as a commodity is very different from other commodities, as the demand for health care is largely supplier-induced. The motive for demanding health insurance itself is much debated with emphasis on the precautionary motive and the access motive. Several studies have tried to find out the problems involved in health insurance and how to minimise their effects. Welfare effects of health insurance have also been emphasised. Most of the empirical studies have been carried out for developed countries. Using different

⁵ Seven respondents talked of lack of illness as a main reason for not joining any scheme (Gupta, 2000).

methodologies, these studies have tried to estimate demand behaviours of individuals for health insurance. The estimates of various elasticities have also differed accordingly. Thus, we get, price elasticity estimates ranging between -0.13 to -0.67 . With the proliferation of health insurance in India in several forms, attempts to study Indian scenario have also been made. These attempts are, however, very few in numbers. And a number of aspects of health insurance, in Indian scenario, needs to be studied. With the anticipation of massive growth in health insurance sector, the number of such works will also expectedly grow.

Health Insurance Scenario in India

Financing of health care is an important aspect of any country's health system. In India this becomes even more important for two reasons. First, despite all the improvement in the health indicators, 'Health for All' remains a distant dream. According to the Planning Commission estimates the life expectancy at birth at 65.2 years in 1997, which is much below the world average. Indian health scenario is still characterized by relatively high mortality and morbidity rates. There are also vast inequalities in health situation in India. There are urban-rural gaps, interregional inequalities, and rich-poor gap in health status. There is an urgent need to bridge this gap.

Further, women's health is also widely neglected, though paradoxically, the life expectancy at birth for women is higher than that of men. The number of people on medication for major sickness is put at 40-50 million at any point of time and about 200 million workdays are lost every year (Mavalankar and Bhat, 2001). All these point towards the fact that lot remains to be done in health sector in India.

Secondly, the financing of health care in India poses few important questions. Compared to most of the developing countries, India's total health care expenditure at 6% of GDP is much higher. Three-fourth of this expenditure (4.25% of GDP) is private and the government funds amount for one-fourth of this expenditure (1.75% of GDP). Most of this public expenditure is on preventive, promotive, and primary health care programmes. While private health expenditure is almost exclusively for curative health care. With the government provision of health care, suffering from lack of quality and access problems, most of the people have no alternative but to fall back on private sector for their health care requirements. The problem here is that the cost of health care has increased substantially. This is due to various reasons including general price rise and the proliferation of medical care technologies. The increased cost of health care is reflected in private health care expenditures. Estimates show that private health

care expenditure's growth is in excess of 12% per annum and the income elasticity of health care expenditure is at 1.47 (Mavalankar and Bhat, 2001). This poses serious problem of affordability of health care to poorer people. Ironically, it is the poorer class, which is most susceptible to sicknesses due to their poor nutritional intake. Moreover, the government funding of health care expenditure is restricted due to fiscal constraints. Composition of government expenditure on health care points out that most of it goes towards paying salaries of the government employees and maintenance of the facilities.

These two reasons imply that there is a need to look for the alternative sources of financing of health care. The increasing health care cost has resulted in high financial burden on people.

In such circumstances, it has become imperative to develop health insurance as a mechanism of health care financing. At present only about 2 % of total health expenditures is funded by public/social health insurance (HI).

HI can be defined in a narrow sense, where individual or group purchases health coverage in advance by paying a fee called premium. It can be also broadly defined by including all financial arrangements, by which consumers can avoid or reduce their expenditures at time of use of services.

In fact, at present different modes of health insurance exist in India. These are, for example, employer-provided insurance schemes, health insurance as a social security measure, community-based insurance schemes, or user charges paid through insurance arrangements. In India, all these arrangements exist, though the concept of risk-sharing is still not a popular one. This chapter provides a brief survey of the prevalent health insurance schemes in India.

Employer provided health insurance

In this category of health insurance schemes we have both government schemes like CGHS and private sector schemes.

CGHS :

The Central Government Health Scheme (CGHS) was introduced in 1954. The objective of this scheme is to provide comprehensive medical care to the central government employees and their families. In fact, as Ministry of Health and Family Welfare in its Annual Report, 1993-94 has noted, it was designed to replace the cumbersome and expensive system of reimbursements. This scheme is contributory in nature, though the amount contributed is very little – Rs. 0.50 per month for the lowest salary group and Rs. 12 per month for the highest salary group.

CGHS provides for the maintenance of separate dispensaries for exclusive use of the central government employees who come under the purview of the scheme. This scheme provides both the allopathic system of medicine as well as non-allopathic systems of medicine. This scheme provides a wide range of facilities for medical care. Family planning services are also provided through various CGHS dispensaries. Apart from all these, it also provides for free domiciliary visits by the medical officers, if required. This scheme also reimburses for part of out-of-pocket costs on treatment at the government hospitals and some other facilities (Ellis et al, 2000).

By 1993, 4.5 million people were beneficiaries of this scheme. Further, as observed by Ellis et al (2000) since most of the beneficiaries covered are middle income group people (part of the central bureaucracy) they are likely to make above-average use of health services provided through this scheme (Ellis et al, 2000).

The three dominant items of expenditure under this scheme are salaries and wages, materials and supplies, and payment for professional and specialized services. A study of Maharashtra state puts the average expenditure by CGHS per family in the range of Rs. 350-450 per year, which is substantially higher than the contributions per family (G. Giridhar, 1993).

At present the CGHS suffers from poor quality of services provided and access problems. NCAER (1993) suggests that people used hospitals

disproportionately for access to specialist consultants. It also found that in as many as 83% of the cases people showed up without any referrals. There are problems of significant out of pocket expenses in treatment as well. It is also characterized by erratic and inadequate supply of medicines and drugs. The conditions of many CGHS dispensaries are highly unhygienic. Therefore, the quality of services provided through CGHS dispensaries need to be improved. It is very essential to provide adequate medicines and equipments, and to increase the number of staffs. The medical practitioners should be given more decision making power so that they can take decisions according to the local need. Further, there is a need to mobilize resources for CGHS. Charging user fees can be one way out. At least, there should be some increase in the contributions of the central government employees.

Employer managed health facilities :

Many large public sector and private sector enterprises manage health facilities for their employees. Ratnam observes that almost all public sector manufacturing enterprises, being large in terms of size of employment, invariably have their own dispensaries and hospitals and provide medicine etc. across the counter, usually within the company premises (Ratnam, 1995). Some large private sector companies like Tata Iron and Steel Co. (TISCO) also provide health care services to its employees through their own health facilities. In the Plantation Labour Act 1951, minimum standards for employer-managed hospitals and dispensaries are laid down. Besides, there are several government departments who do have their own health care facilities—Railways, defence services, educational institutions, government-owned mines. All these departments provide employees health services through hospitals and dispensaries, which are usually located in the premises or residential township of their employees.

All such employer-managed health facilities do help in keeping the health care expenses of its employees considerably low. The number of people covered under such facilities is likely to be around 50 million (Ellis et al, 2000).

Employer reimbursement of health expenses :

Many large and medium sized organizations, autonomous institutions and private sector enterprises offer medical reimbursement plans to their employees. There are two types of medical reimbursement systems. One type requires the employees to save a certain fraction of their income towards medical expenses. The coverage provided under such system is both for out-patient expenditures and for hospitalization expenses, though the former is more widespread. The second type of system provides for employers reimburse medical claims of their employees, usually subject to some ceiling per year. No contribution from employees is required under such system.

There is a large scope for problems linked to moral hazard, coming to the fore in this form of health insurance. There have been cases of collusion between the insured individual and medical services provider, which leads to over-reporting of medical expenses by the individual.

Health Insurance as a Social Security Measure

Such schemes are intended to provide relief to the low income workers from heavy burden of medical expenses. Among such schemes the employee state insurance (ESI) scheme is most prominent.

The ESIC :

The Employees State Insurance Corporation (ESIC) was set up under the ESI Act 1948. This scheme is a social security measure of the government for the benefit of the industrial workers. Broadly, there are seven types of coverage available for each insured person – medical benefits, sickness benefits, maternity benefits, disablement benefits, dependents' benefits, funeral benefits, and rehabilitation allowances.

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The ESI offers three types of medical benefits – full, expanded and restricted medical care. Full medical care covers out-patient treatment, specialist consultation and hospitalization for the insured person and health insurances family members. Expanded care does not cover hospitalization, and restricted care covers only out-patient treatment. However, there is no difference in premium rates between these three types of coverage.

The Act covers following:-

- (a) all power using non-seasonal factories employing 10 or more persons;
- (b) all non-power using factories employing twenty or more employees; and
- (c) service establishments like shops, hotels, restaurants, cinema, and road transport.

The element of compulsory enrolment in the scheme is intended to eliminate the scope of adverse selection, i.e., the tendency of people with lesser probability of sickness opting out of the scheme.

The financing of the scheme is done by the ESIC, which is made up of contributions mainly from two sources:-

- (a) employees, who contribute 1.75% of their wages (if daily wage is Rs. 25 or less, health insurances contribution is waived); and
- (b) employers, who contribute 4.75% of total wage bills of their employees.
- (c) The state government share one-eighth of the expenditure on medical care.

The major heads of expenditure of the scheme are medical benefits, cash benefits, and administrative costs. Cash benefits have been dominant and within that category, sickness benefits have been particularly high.

In its practice for reimbursing expenses to the state, the ESIC does not differentiate between indoor and outdoor patients. Indoor patients are increasing at a higher rate in relation to outdoor patient. This leads to an increase in the rate of total expenditure by the state government. Contractual agreements with existing

providers to set up panels for out-patient treatment would be more cost-effective for the state, but the insured person generally prefer to go the ESI service centers. Further, the cost of switching from a panel system to a dedicated facility system could be very high.

People, under the coverage of the ESI scheme complain that the scheme does not operate satisfactorily. The quality of medical check-ups, medicines, and doctors' attendance needs to be improved. They also experience difficulties in getting their cash benefits paid. However, the ESIC feels that there is a substantial amount of false certification for sickness benefits. Because of the increasing size of these benefits and the upgradation of its facilities, the ESIC's expenditure is increasing faster than its income. Consequently, the quality of medical facilities is declining.

It is also noted that the Insurance Medical Practitioners (IMPs), who are private doctors contracted by the ESIC to treat 750-1000 insured families, are often uninterested in treating the insured patients. Though they are keen to keep their IMP status. Continuous shortages of Insurance Medical Officers, who are full time doctors employed by the state governments, also plague the ESI scheme. Further the service doctors are subject to frequent shiftings and cannot develop continuing personal relations with patients. This adversely affects the standards of diagnosis and the treatment.

Another important problem in this scheme is that it is not economically viable to set up dispensaries in sparsely populated areas. It is also difficult to get enough medical officers to serve in sparse areas. At present service dispensaries are located in a few selected centers. In some cases, the patients have to travel long distances, as it is not possible to provide a dispensary at the door of every insured person.

Commercial health insurance policies

In India over the years, market based insurance systems have also proliferated. In the market based systems of insurance, expenses on certain kind of medical services are reimbursed within the coverage limit. In India the Life

Insurance Corporation (LIC) and the General Insurance Corporation (GIC) market such insurance policies. There are several health insurance policies in India marketed by GIC and LIC. Among these, the policies marketed by the GIC include Mediclaim policy, Jan Arogya Policy, Personal Accident Policy, Overseas Mediclaim Policy, Cancer Insurance Policy, Bhavishya Arogya Policy, and Dreaded Disease Policy. Those marketed by the LIC include Ashadeep Plan II and Jeevan Asha Plan II.

The GIC:

Until very recently the government-owned General Insurance Corporation (GIC) and its subsidiaries—the National Insurance Co. Ltd, the New India Assurance Co. Ltd., the oriental insurance Co. Ltd., and the United India Assurance Co. Ltd.—had a monopoly in operation of the commercial health insurance schemes in India.

These companies were formed by the government and given a monopoly in order to capture the benefits of economies of scale in the still nascent insurance industry and to maintain an element of healthy competition. In this section I will describe the Mediclaim policy, which is the most prominent market based health insurance policy in India.

Mediclaim :

The Mediclaim policy was introduced in 1986 by the GIC and it became operational in 1987. A modification in the policy in 1996, led to differential pricing of the policy. In the sense that now it has different premiums for people in six different age groups – 5-45, 46-55, 56-65, 66-70, 71-75 and 76-plus. The GIC offers this policy for both groups and individuals.

The standard Mediclaim policy reimburses the expenses on hospital care and domiciliary hospitalization benefits. The policy holders are reimbursed for their claims only after they have made the payments out of their pocket to the provider of medical services. One important feature of Mediclaim policy is its tax saving

nature. The agent of this scheme gets a tax concession of an amount equal to the premium paid upto a limit of Rs.15000 per year. This is very important factor as it provides people, particularly those who cannot evade taxes, an added incentive to purchase health insurance. Now a person between 3 months to 80 years of age can buy Mediclaim policy upto a maximum coverage of Rs.5 lakhs. Presently the Mediclaim policy covers about 2 million people which is only 0.2 per cent of total population.

Ratnam (1995) finds that people prefer Mediclaim policy to the ESI scheme. This is reflected in the trend of insured persons over the years. It has been found that during 1990s the growth in number of Mediclaim policy holders was more than 17 times the growth in number of ESI beneficiaries (Ellis et al,2000). Similarly, the premium revenues of insurance companies have also grown at a rapid pace. This has helped these companies to earn profits because the claims paid has remained less than premium revenues. However, with the number of claims settled growing at a faster rate than the premium revenues, it will be difficult for the insurance companies to maintain this profit.

The Mediclaim policy suffers from several lacunas. First, it covers only in-patient and domiciliary expenses. Thus it leaves the out-patient care expenses out of the insurance cover, which is not appropriate, considering that most of the health care expenses are on out-patient care. Even within hospital facilities it is subject to several exclusions, coverage limits and restrictions on eligibility (Ellis et al, 2000).

Further, the premiums are high as compared to the claim payments. It has been noted that the average claim payments are only 58 per cent of average premiums (Ellis et al, 2000). It is beneficial for the private sector hospitals also as the insured persons tend to over use the medical care facilities.

The high growth of claims is a significant problem. The growth in GIC's claims are more than the growth of public or private health care spending. One explanation of this could be moral hazard on the part of agents. Nevertheless, if the insurance coverage is extended to new groups, it does imply that there is enormous potential for increased spending by other segments of the population.

The Mediciclaim policy also suffers from poor services provided by the insurance companies. There is a lot of uncertainty about the reimbursement and the claim settlement usually takes a long time.

Then there are various complexities, which go against the Mediciclaim policy's growth. The acceptance of the scheme is also hampered because of technicalities of health service business. It is also important to market this scheme in a much better way.

The group insurance schemes have largely been unprofitable for the insurance companies. This is because of concessions on premiums and high claim rate for such policies. However, they are continued as part of the total business relationships with corporate clients. While some corporate clients appreciate the ability to transfer their own problems in managing health coverage to the insurance agencies, others complain about delayed settlements by the insurance companies and the consequent unhappiness among their employees.

Thus the rapid growth in the number of Mediciclaim policy holders notwithstanding there are several problems in this scheme. With the liberalization of insurance sector through the Insurance Regulatory and Development Authority Act, 2000 (IRDA), in accordance with WTO agreement, the GIC will have to be more efficient in its functioning to compete with various private sector insurance companies.

Community-based insurance systems: NGO sector

The government operated and regulated HI schemes have limited coverage in the sense that these are almost exclusively confined to the organized sector. Public health facilities and commercial health insurance policy are only options available to the people working in unorganized sector. Therefore, the poorer segment of population, which is mostly employed in unorganized sector or unemployed end up paying for health care rather disproportionately high. Hence, there is a need to develop insurance mechanism, which caters to this segment of population and acts more like a social security measure. This is even more required

when this segment is the most vulnerable as well. The reason being its low income, which leaves little to spend on health improving items. Majority of this segment lives at subsistence level. Health, due to obvious reasons, comes very low on their priority list.

Presently, the task of providing health coverage to this segment of population is mainly undertaken by several voluntary and charitable organizations. The role of these non-governmental organizations (NGOs) is important, as these 'are often the only sources of health services for the population they serve' (Ellis et al, 2000).

This form of health insurance is quite important and even in developed countries like USA and UK not-for profit organizations constitute a large share of HI market. In fact, in many countries, the health insurance has grown out of small non-profit schemes. In India, too, many small and big NGOs like-SEWA, Helpage, ACCORD, and CARE etc. have implemented various health insurance schemes.

Last few years have seen huge proliferation of HI through NGOs. These NGOs have developed several innovations in monitoring the performance, pricing of various services, integrating various risks in a single product. They also cover many services, which are not included in market-based schemes such as maternity services, transportation etc.

Some NGOs have developed special linkages with public and private health systems. In fact, most of these NGOs treat health as an important aspect of overall development and on this basis offer comprehensive assistance packages to tackle health related social problems in a holistic fashion (Ellis et al, 2000).

Here Self-Employed Women's Association (SEWA) merits a special mention. SEWA is a membership based women workers' trade union. It has developed an assistance package to protect the poor women from financial burden arising out of high medical costs and other risks. So, it is addressing health needs of poor women, which is quite noticeable as women's health, particularly poor one's is most neglected in India. Under the SEWA scheme one has option to join the programme by paying Rs. 60 per annum and it provides limited cover for risks

arising out of sickness, maternity needs etc. SEWA has also been innovative in linking this scheme with saving scheme. Members have the option to either deposit Rs.500 in SEWA bank and interest on this deposit will cover the annual premium or pay annual premium of Rs.60.

SEWA scheme shows that the insurance companies are not well equipped to handle the present day complexities of health insurance, particularly in the context of lower income group needs (Mavalankar and Bhat, 2001). For example, insurance products have to be integrated with several add-ons that may be priced differently. The overall premium has to be low and the people need to understand the concept of HI. Since costs in private sector are much higher than in the public sector, developing linkages with public sector facilities is very crucial. Schemes like SEWA can help a lot in improving women health standards in India.

An important aspect of NGO schemes is that, most of these use their own health workers to provide primary care and have tied up with hospitals for secondary care. Premiums are low, generally fixed and not related to risk. Most schemes have limited coverage and some also provide wider services besides health and treatment. Further, almost all of these NGOs had good track record of social services in the community and then have added health insurance in their existing activities. Hence they did not have to establish credibility with the community.

Summary

In summary we can say, that a wide network of health insurance mechanism does exist in India, though the mode of delivery may be different. However, there are several problems which need to be addressed to get the maximum welfare out of health insurance. There has been neglect of health insurance in the overall business of insurance itself. Even the IRDA Bill contains no reference to the health sector or to health insurance. There is a need to bring more people employed in unorganized sector under the fold of health insurance. The market based insurance schemes should be modified to bring services of more general in nature under the insurance cover. The quality of services also leaves a lot to be desired. In the

market based insurance the claim settlement need to be made quicker. In the schemes like CGHS and ESI the quality of health care provided through the scheme needs to be improved.

A Model of Demand for Health Insurance

In this chapter I formulate a model of demand for health insurance and see how it behaves with respect to the changes in the factors it depends on. The individual is assumed to be rational in his behaviour, i.e., he chooses that course of action, which maximizes his welfare. He is assumed to possess a certain level of stock of health and he perceives that there is a certain probability of him falling sick. He is also assumed to have a complete, transitive, reflexive and monotonic preference ordering. The decision maker in this model is a globally risk-averse¹ person whose welfare depends on his consumption and health. It is a static model. In this model individual's optimal consumption of health insurance is estimated within the framework of some theoretical assumptions. This chapter also specifies behaviour of the individual when some crucial factors determining his optimal level of insurance coverage vary. The problems of adverse selection and moral hazard are also specified in the framework of the model. In the end the implications of this model are discussed, particularly in the context of India.

The Model

It is assumed that the individual possesses a von Neumann-Morgenstern utility function². His utility, U , is a function of X and H , where X is a composite

¹ If any individual has a utility function as $f(W)$, where W is his wealth, then he is said to be globally risk averse if $f''(W) < 0$ for all W (Nordquist and Wu, 1976).

² This utility function is defined over some set of outcomes, and when faced with alternative risky prospects over these outcomes, will choose that prospect which maximizes the expected value of $U(.)$. So if there are a finite number of outcomes (x_1, \dots, x_n) and the probability distribution over this set is given by its vector of probabilities $P = (p_1, \dots, p_n)$, where $p_i = \text{prob}(x=x_i)$, the individual can be represented as possessing a preference function $V(.)$ defined as $V(P) = V(p_1, \dots, p_n) = \sum_i U(x_i)p_i$. The

individual chooses that prospect which maximizes his preference function $V(.)$. Mathematically, the hypothesis that the preference function $V(.)$ takes the form of a statistical expectation implies that it is linear in probabilities.

good and H is stock of health of the individual, i.e., $U = f(X, H)$. I assume X and H to be non-negative in \mathbf{R} . It is further assumed that the individual is globally risk averse, i.e., his utility function is concave³ in X and H . I assume that the utility function is defined as

$$U = \alpha \log X + \beta \log H; \quad \alpha > 0, \beta > 0; \alpha + \beta \geq 1; U' > 0; U'' < 0. \quad \dots(1)$$

This is a Cobb-Douglas utility function. Its first derivatives with respect to X and H are positive and second derivatives are negative implying that the individual is globally risk averse. Now, assume that the individual's income is Y . Further, assume that the tax rate is given by t and hence, the individual's disposable income is $(1-t)Y$ ⁴. It is further assumed that the individual's stock of health, H , is subject to random losses due to illness. Assume that the individual falls sick with probability π , where π is a positive fraction, i.e., $0 \leq \pi \leq 1$. This illness leads to a loss of l units of health, where $l \leq H$. To compensate for this loss in the stock of health, the individual purchases h units of medical care. This adds to the stock of health through a health production function $g(h)$ ⁵. So the individual has a stock of health equal to H (the endowed level of health) with probability $(1-\pi)$ and with probability π , i.e., when he falls sick, his stock of health changes to $H-l+g(h)$. Let H^* be equal to $H-l+g(h)$.

Now we will see the expected utility of the individual first if the individual does not buy health insurance and then if he does. If the individual does not fall sick his consumption of composite good X is given by $(Y-tY)/P_X$ units where P_X is the price of X . Let us assume that price of X , P_X , is a numeraire. Then his consumption of X is $(1-t)Y$ units⁶. And if the individual falls sick his consumption of X is $(Y-tY-P_h h)$ units. This all when the individual has not bought any health

³ The function $f(\cdot)$ is concave if $f(y) \leq f(x) + Df(x)(y-x)$ for all x and y in \mathbf{R}^n . The function is concave if the matrix of second derivative $D^2f(x)$ is negative semi-definite at all x (Varian, 1984).

⁴ The case of a non-tax payer will be considered later.

⁵ Health production function, $g(h)$, is assumed to be a well defined concave function.

⁶ The individual's budget constraint is given by $Y-tY = P_X X + P_h h$, where P_h is price of medical care. Here since $P_X = 1$ and $h=0$, $X=Y-tY$ is the utility maximizing level of X .

insurance cover. Therefore, when the individual does not buy any health insurance cover, his expected utility is given by

$$EU_{ni}=(1-\pi)\{\alpha \log(Y-tY)+\beta \log H\}+\pi\{\alpha \log(Y-tY-P_h h)+\beta \log H^*\} \dots(2)$$

where EU_{ni} is expected utility when the individual is not insured.

I assume further that there is a health insurance policy, which the individual can buy. The health insurance policy is characterized by insurance premium of Rs. I for coverage of Rs. C . It is assumed that the insurance company charges this premium as a cost plus mark-up basis, so that the premium I is defined as $pC(1+i)$; $i>0$, where i is the mark-up or loading factor⁷ and p is the mean probability of illness of the population. This is a plausible assumption as any insurance company will determine premium, which is the price of insurance, as cost plus mark-up. In this case the insurance company sets premium equal to the expected cost plus mark-up. It is further assumed that the individual gets a concession in tax payments of an amount which is equal to γ proportion of the premium paid, where γ is a positive fraction, i.e., $0 \leq \gamma \leq 1$ ⁸. In this case, i.e., when the individual buys an insurance coverage of Rs. C paying a premium of Rs. $I=pC(1+i)$ and consequently getting a tax concession of Rs. γI , the individual's expected utility is different from equation (2). Here if the individual does not fall sick his consumption of X is $Y-tY-(1-\gamma)I$ units. And if the individual falls sick his consumption of X is $Y-tY-(1-\gamma)I-P_h h+C$ units. So if the individual buys health insurance, his expected utility is

$$EU_i=(1-\pi)\{\alpha \log(Y-tY-(1-\gamma)I)+\beta \log H\} \\ +\pi\{\alpha \log(Y-tY-(1-\gamma)I-P_h h+C)+\beta \log H^*\}; \dots(3)$$

⁷ If the insurance premium is actuarially determined $I=pC$. If the insurance company puts a mark-up of i on this, the premium I becomes equal to $pC(1+i)$. This i can be understood as loading factor or as a factor which covers for the administrative costs.

⁸ Presently in India the tax concession is of 100% of the premium paid on mediclaim subject to a maximum of Rs. 15000 per annum (see chapter 3).

where EU_i is expected utility when individual is insured. Since the insurance company reimburses for the medical expenses, $C \leq P_h h$.

It is obvious that the individual would buy insurance if EU_i given by equation (3) is more than EU_{ni} given by equation (2). It requires that the losses expected due to the insurance (premium paid) in healthy state remains less than the expected gains due to insurance in the state of illness. Let us assume that the expected gains of insurance in the state of illness are more than the expected losses of insurance in the healthy state so that the individual buys the health insurance.

Now, the individual's problem is choosing the amount of insurance coverage, which maximizes his expected utility given by equation (3), i.e.,

$$\text{Max}_C EU_i.$$

If we put $Y^* = Y - tY$ and $K = (1 - \gamma)(1 + I) \pi$, so that K is the effective price of insurance to the individual, in equation (3) we get

$$EU_i = (1 - \pi) \{ \alpha \log(Y^* - KC) + \beta \log H \} + \pi (\alpha \log(Y^* - KC - P_h h + C) + \beta \log H^*) \quad \dots(4)$$

It is clear that $0 \leq K < 1$ otherwise if $K=1$ $EU_i < EU_{ni}$. Further putting $A = Y^* - KC$ and $B = Y^* - KC - P_h h + C$ in equation (4) we get

$$EU_i = (1 - \pi) (\alpha \log A + \beta \log H) + \pi (\alpha \log B + \beta \log H^*) \quad \dots(5)$$

Then the first order condition of utility maximization requires that the first derivative of equation (5) with respect to C is equal to zero.

Therefore setting $\frac{\partial EU_i}{\partial C} = 0$ we get

$$(1 - \pi) \frac{\alpha}{A} (-K) + \pi \frac{\alpha}{B} (1 - K) = 0$$

Dividing through by α we get

$$\frac{(1-\pi)}{A}(-K) + \frac{\pi}{B}(1-K) = 0$$

$$\text{or, } \pi A(1-K) = (1-\pi)BK$$

$$\text{or, } \pi(Y^* - KC)(1-K) = (1-\pi)(Y^* - KC + C - P_h h)K$$

Rearranging the terms we have

$$Y^*K - K^2C + KC - KP_h h + pKP_h h = \pi Y^*$$

$$\text{or, } CK(1-K) = Y^*(\pi - K) + KP_h h(1-\pi)$$

$$\text{or, } \bar{C} = \frac{Y^*(\pi - K)}{K(1-K)} + \frac{P_h h(1-\pi)}{(1-K)} \quad \dots(6)$$

where \bar{C} is the utility maximizing level of insurance coverage.

The second order condition requires that second order derivative of EU_i with respect to C is negative, i.e.,

$$\frac{\partial^2 EU_i}{\partial C^2} < 0.$$

Now differentiating EU_i given by equation (5) twice with respect to C we get

$$\frac{\partial^2 EU_i}{\partial C^2} = K(K-1) \quad \dots(7)$$

Since $0 < K < 1$, $K(K-1) < 0$. Hence the second order condition is satisfied.

Now I will consider the case of a non tax-payer. A non tax paying individual's case is different from that of a tax payer because here both the tax ratio t and the tax concession factor γ both are zero. Hence the individual's disposable income is Y and the effective price for individual per unit of insurance coverage, say K^* , is $p(1+i)$. So for such an individual the expected utility is given by

$$EU = (1-\pi)\{\alpha \log(Y - K^*C) + \beta \log H\} + \pi\{\alpha \log(Y - K^*C + C - P_h h) + \beta \log H^*\} \quad \dots(8)$$

The first order condition of maximising this expected utility requires that its first derivative with respect to C is equal to zero. Hence the utility maximizing level of coverage, \bar{C} , is given by

$$\bar{C} = \frac{Y(\pi - K^*)}{K^*(1-K)} + \frac{P_h h(1-\pi)}{(1-K^*)} \quad \dots(9)$$

Adverse selection

Adverse selection is the tendency of people with low probability of sickness of opting out of health insurance scheme. Here I will find that level of π below which any individual would be better off without insurance.

Adverse selection will occur if EU_{ni} is greater than EU_i . Hence from equations (2) and (5) we have

$$EU_{ni} > EU_i$$

$$\Rightarrow (1-\pi)\{\alpha \log(Y - tY) + \beta \log H\} + \pi\{\alpha \log(Y - tY - P_h h) + \beta \log H^*\} > (1-\pi)(\alpha \log A + \beta \log H) + \pi(\alpha \log B + \beta \log H^*)$$

$$\Rightarrow (1-\pi) \log Y^* + \pi \log(Y^* - P_h h) > (1-\pi) \log A + \pi \log B$$

$$\Rightarrow \log\left(\frac{Y^*}{A}\right) > \pi [\log(Y^* B) - \log\{(Y^* - P_h h) A\}]$$

$$\Rightarrow \log\left(\frac{Y^*}{A}\right) > \pi \left[\frac{\log(Y^* B)}{\log\{(Y^* - P_h h) A\}} \right]$$

$$\Rightarrow \pi < \left[\frac{\log\left(\frac{Y^*}{A}\right)}{\log\left(\frac{Y^* B}{\{(Y^* - P_h h)A\}}\right)} \right] \quad \dots(10)$$

Equation (10) gives that value of π below which the individual is better off without buying any insurance cover. Hence, if any individual perceives his probability of sickness to be low enough to satisfy equation (10) he will opt out of the insurance.

This problem of adverse selection will lead to a consistent upward movement of premium by the insurance company to cover the costs. This will lead to an unstable equilibrium (Rothschild and Stiglitz, 1976). To ensure that every individual is covered under the insurance one possible way out is that the premium is determined on the basis of minimum probability of sickness as perceived by any individual. This invariably involves subsidizing of insurance. If this minimum probability is $\underline{\pi}$ ⁹ then the amount of subsidy involved will be $\sum_i (\pi_i - \underline{\pi}) C_i$ where π_i is the actual probability of sickness for individual i and C_i is the amount of his insurance coverage.

Moral Hazard

Moral hazard refers to the tendency of an insured individual to act in a way so as to increase the probability of risk he is insured against. Here I try to work out a way for the insurance company to avoid this phenomenon. In order to avoid moral hazard the insurance company must make sure that the policy does not make

⁹ Even the most healthy person would perceive a non-zero probability of his getting sick. The uncertainty of future, bad public health scene, and environmental health hazards can be few possible reasons for this.

post-insurance expected utility in better health states smaller than in worse health states.

So if π' is another probability of sickness such that $\pi' > \pi$ then avoiding moral hazard would require that the individual's expected utility with π' is less than his expected utility with π being the probability of sickness. That is, from equation (5) we have

$$EU_{\pi} > EU_{\pi'}$$

$$\text{or, } (1-\pi)\{\alpha \log A + \beta \log H\} + \pi\{\alpha \log B + \beta \log H^*\} >$$

$$(1-\pi')\{\alpha \log A + \beta \log H\} + \pi'\{\alpha \log B + \beta \log H^*\}$$

$$\text{or, } (\pi' - \pi)\{\alpha \log A + \beta \log H\} > (\pi' - \pi)\{\alpha \log B + \beta \log H^*\}$$

$$\text{or, } \{\alpha \log A + \beta \log H\} > \{\alpha \log B + \beta \log H^*\}$$

$$\text{or, } \alpha(\log A - \log B) > \beta\{\log H^* - \log H\}$$

$$\text{or, } \alpha \log\left(\frac{A}{B}\right) > \beta \log\left(\frac{H^*}{H}\right)$$

$$\text{or, } \left(\frac{B}{A}\right) < \left(\frac{H}{H^*}\right)^{\frac{\beta}{\alpha}} \quad \dots(11)$$

So the insurance company will have to fix premium at a level, which satisfies equation (11).

Another important feature of moral hazard is over consumption and reporting of medical expenses by the individual. It is often done in collusion with the medical practitioners. It is often due to over consumption of medical care as physician wants the individual to consume more units of medical care. And the

individual is also not averse to over consumption once he is insured. This phenomenon is more visible in the organizations, which reimburse their employees' medical expenses. One way of combating this type of morally hazardous behaviour is better monitoring. The insurance company needs to avoid a policy that would make any payments in the state of health. As noted by Arrow (1963) it is easier to monitor the consumption of surgical or domiciliary health services. That perhaps explains why only hospital and domiciliary expenses are covered under the Mediclaim policy offered by General Insurance Corporation of India.

Comparative statics of demand for health insurance

In this section I will analyze effects of income, price of insurance and health care, probability of sickness, and tax concession factor on demand for health insurance.

Income :

Here I calculate the income elasticity of demand for health insurance. The first differentiation of \bar{C} as given in equation (6) with respect to income Y gives

$$\frac{\partial \bar{C}}{\partial Y} = \frac{(1-t)(\pi - K)}{K(1-K)}$$

The income elasticity is defined as $\frac{\partial \bar{C}}{\partial Y} \cdot \frac{Y}{\bar{C}}$. Putting the value of $\frac{\partial \bar{C}}{\partial Y}$ we get the income elasticity of demand for health insurance

$$\eta = \frac{(1-t)(\pi - K)}{K(1-K)} \cdot \frac{Y}{\bar{C}}$$

Transposing the value of \bar{C}

$$= \frac{1}{K} \left[1 + \frac{P_h h (1 - \pi)}{Y(1 - t)(\pi - K)} \right]^{-1} \quad \dots(12)$$

The sign of this income elasticity depends on whether $\pi > K$. If $\pi > K$, η is positive. On the contrary if $\pi < K$ the individual will have a negative income elasticity of demand. This is understandable since if $\pi < K$ the expected gains from health insurance, πC becomes less than the premium KC that the individual has to pay. Again η is less than 1 even if $\pi > K$. In other words demand for health insurance is income inelastic. This implies that it behaves like a necessary good.

Probability of sickness :

I will now check the effect of change in the individual's probability of sickness on his demand for health insurance. For this we differentiate the \bar{C} of equation (6) with respect to π , the probability of sickness.

$$\begin{aligned} \frac{\partial \bar{C}}{\partial \pi} &= \frac{Y^*}{K(1 - K)} - \frac{P_h h}{(1 - K)} \\ &= \frac{1}{1 - K} \left(\frac{Y^*}{K} - P_h h \right) \quad \dots(13) \end{aligned}$$

Now since $0 < K < 1$ and $Y \geq P_h h$, the right hand side of equation is positive. This implies that, *ceteris paribus*, the individual will buy more insurance cover if he perceives that his probability of getting sick has increased.

Price of health care :

Differentiating the \bar{C} with respect to P_h , the price of health care we get

$$\frac{\partial \bar{C}}{\partial P_h} = \frac{h(1-\pi)}{(1-K)} \quad \dots(14)$$

Since π , K , and h all are positive numbers the term at right side of equation (12) is also positive. This implies that if there is a price rise in medical and health care the demand for health insurance will increase, *ceteris paribus*.

Price of health insurance :

To see the effect of change in the price of health insurance on its demand we differentiate \bar{C} with respect to K which is the effective price that the individual has to pay per unit of coverage, and not with respect to the insurance premium, I , due to the tax benefits that the individual gets on account of insurance.

$$\frac{\partial \bar{C}}{\partial K} = -\frac{Y^* \pi(1-2K)}{K^2(1-K)^2} - \frac{Y^*}{(1-K)^2} + \frac{P_h h(1-\pi)}{(1-K)^2} \quad \dots(15)$$

The sign of the right side of equation (15) is not clear. In fact it contains of two effects of price change – income and substitution effects. The sign of the income effect equal to

$$-\frac{Y^*}{(1-K)^2} + \frac{P_h h(1-\pi)}{(1-K)^2}$$

is clearly negative since $Y^* \geq P_h h$, $\pi \geq 0$, and $K < 1$. However, the sign of substitution effect

$$-\frac{Y^* \pi(1-2K)}{K^2(1-K)^2}$$

is not clear as it depends on the value of K . If $K < 1/2$, this sign is negative, and hence, the overall right side becomes negative giving us a negative price elasticity

of demand for health insurance. At $K=1/2$ this substitution effect is zero. But if $K>1/2$ then the sign of substitution effect is positive. Then the sign of total effect of price change is determined on whether the substitution effect is greater than the income effect in absolute terms.

Tax concession factor :

Now I will test the effect that any change in the government policy regarding tax concessions on the premium paid will have on the demand for health insurance. Differentiation of \bar{C} with respect to the tax concession factor, γ , gives

$$\frac{\partial \bar{C}}{\partial \gamma} = \frac{\partial \bar{C}}{\partial K} \cdot \frac{\partial K}{\partial \gamma}$$

$$= -\frac{Y^* \pi (1-2K)}{K^2 (1-K)^2} - \frac{Y^*}{(1-K)^2} + \frac{P_h h (1-\pi)}{(1-K)^2} \cdot \left(-\frac{K}{(1-\gamma)} \right) \quad \dots(16)$$

Equation (16) shows that if $\frac{\partial \bar{C}}{\partial K}$ is negative then $\frac{\partial \bar{C}}{\partial \gamma}$ has a positive sign.

That is, if the demand for health insurance is negatively elastic in its price, which it will be if the individual perceives health insurance to be a superior good, it will have a positive relation with the tax concession factor.

Implications of the model

This model has several implications, particularly for the Indian health insurance industry.

First, as equation (14) shows, any increase in medical care costs would lead to greater demand for health insurance, either through more persons buying insurance policies or the current buyers buying larger coverage or a combination of both. As Mavalankar and Bhat(2001) notes, India has witnessed substantial rise in

the prices of medicines and other health services. A look at the number of Mediclaim policy holders confirm that it has also grown at a good rate. The dual occurrence of these two phenomena is consistent with the findings of this model. With the growing awareness of health insurance among Indian people and continuous increase in the prices of medical care there is every possibility of demand for health insurance in India growing at even greater rate.

Second, if the public health scene deteriorates, the probability of sickness will increase. With the increased pressure on public health facilities and fiscal constraints coupled with the deterioration in environmental standards, we can plausibly expect the probability of sickness to go up in India. This should, according to this model, lead to an increase in demand for health insurance policies.

Third, in India most of the health insurance schemes, at present, cater almost exclusively to those employed in the organized sector. This helps in keeping their medical expenditures, shown by $P_h h$ in this model, considerably low. This low $P_h h$ reduces their incentives for buying commercial health insurance policies. Hence lower demand is expected.

Fourth, in India, the organized sector employees have less or rather no chance of evading taxes. Health insurance policies such as Mediclaim provide them a way to avoid these taxes. So the effect of their access to health insurance mechanisms like CGHS or other employer managed facility on their demand of health insurance should, at least, partially be offset by the tax concession factor. However, prevalence of other tax saving instruments like National Savings Certificate, PPF etc. may act as a counter to this.

In fact, points three and four mentioned above explains why middle class respondents, mostly working in the organized sector, were willing to pay very low premiums in the survey results of Gupta(2000).

Fifth, under Mediclaim policy only hospital expenses are reimbursed. This may be in order to avoid moral hazard. However, a major portion of health expenditures is on outpatient medical care and other associated costs like transportation cost and expenses on diagnostic tests. Therefore, in the present health insurance scheme the medical reimbursement through insurance is a very low share of total expenses on medical care, i.e., C is considerably lower than $P_h h$. This has been one of the reasons of health insurance not being very popular in India. If the insurance companies are able to bring more medical services of rather general in nature under cover, the demand for health insurance will certainly go up. Another thing to note is that this acts as a sort of co-payment. Mediclaim covering only a fraction of total medical expenses is like coinsurance, and transportation cost works as a deductible since this is not reimbursed at all.

Sixth, the tax concession on premium paid has a ceiling in India of Rs.15000. Hence the γ factor is not fully in operation for high income group people. Further, the principle of decreasing absolute risk aversion states, risk aversion decreases as the income rises. Therefore, an increase in the people's income may not lead to that much increase in demand for health insurance as predicted by this model.

Seventh, the most vulnerable groups or the groups with highest probability of sickness are the old and the poor class of the society. Besides, their income or capacity to pay is also very low. Hence, no commercial health insurance policy would cover these groups for the sake of financial viability and they will indulge in cream-skimming. Therefore, it is imperative to have a good social health insurance, either through the government or through the NGOs to take care of their health needs.

Eight, the administrative costs are very high in India due to inefficient system. Delays in settlements and large number of litigations do not help the matter

either. It necessitates a high loading factor , i in the above model, to cover for administrative costs, which may lead to lower demand.

Ninth, to prevent the collusion between medical practitioners and providers of other health services like diagnostic service provider, an efficient monitoring system is needed.

The implications above mentioned are crucial for growth of Indian health insurance industry.

Conclusion

Health insurance is a way of financing health care expenditure. As such, its importance lies in pooling and spreading the individual risks among the population. Any effort for promoting health insurance is only a part of achieving a larger goal of improved health indicators. How far growth in health insurance affects the health indicators will depend, *inter alia*, on the price and quantity of health services covered under insurance. Further, any welfare gain of health insurance depends on its coverage (number of people insured). This (coverage) depends on both supply side and demand side factors. Supply side factors include policies of insurance company (premium and compensation) and administrative convenience in settling claims. On demand side we have individual or group consumer's response to the insurance schemes. This study is intended to explain a rational individual's behaviour regarding purchase of health insurance. A static expected utility model is developed to find the utility maximising level of insurance coverage.

The optimal coverage depends on several factors, viz., income, price of health care, the individual's perceived probability of sickness, premium and tax measures. This coverage shows a direct relationship with tax concession, price of health care and probability of sickness. On the contrary, it shows negative relationship with tax rate. Signs of price and income elasticities of demand for health insurance are, however inconclusive.

Total effect of price change consists of income effect and substitution effect. The sign of income effect is negative. But the sign of substitution effect is not clear. It depends on the effective price of insurance to the consumer (premium discounted by tax concession) per unit of coverage. For health insurance to be a normal good, the substitution effect has to be either nonpositive or if it is positive it should be outweighed by income effect.

The sign of income elasticity depends on whether the perceived probability of sickness is less than the effective price of insurance or not. If the perceived

probability of sickness is less than the effective price of insurance, the income elasticity is negative. If the perceived probability of sickness is more than the effective price of insurance, income elasticity of demand is positive. The sign of income elasticity notwithstanding, the demand for health insurance is inelastic. This implies that health insurance is more of a necessary good.

In India, the government faces a policy choice of financing preventive or curative health care (or a mix of the two) through budgetary sources. At present, most of public health spending is on curative health care. Though in the last decade the government has initiated many immunisation programmes like pulse polio etc. the preventive health care needs promotion. The expansion of preventive health care will reduce the incidence of diseases among masses. Unless the poor masses are brought into insurance net, this is needed for lessening the burden of their health expenses. As far as provision of curative health care is concerned, NGOs will have an enhanced role to play. The advantage with NGOs is that they are more localised in operation with a simple organisational setup. Hence their administrative cost are kept low. They also work more closely to the people.

The model formulated in this study has some important implications for empirical studies. However, the hypotheses emanating from the model could not be tested here due to unavailability of data.

For theoretical study the area that needs to be explored is how the individual behaves when he maximises his expected utility over his life span. The effects of availability of other tax saving instrument on the individual's demand for health insurance is also an interesting area for theoretical and empirical study.

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