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ABSTRACT

Purpose: The aim of this paper is to confirm that using indemnity health insurance decreases the problem of Moral Hazard in which people are over utilising healthcare services.

Approach: This paper modified the microeconomic model of utility that explains the relation between risk and incentives of using healthcare services developed by Thomas McGuire.

Findings: The model concludes that individuals with high probability of getting sick do not over utilise medical services when having indemnity health insurance.

Social implications: This paper suggests that using indemnity health insurance reduces Moral Hazard by the placing of responsibilities on both the insured and the insurer. The insured will be more careful when using healthcare services and might use preventive care.

Value: This paper adds to the literature a new mathematical approach that supports the provision of indemnity health insurance and why it might be preferable to universal health insurance.

Keywords: optimal health insurance coverage; demand for health insurance; moral hazard; cost sharing; private health insurance; welfare loss of moral hazard; indemnity insurance.





INTRODUCTION

Health insurance is one of the major topics in the field of health economics. Expenses on medical services are uncertain, and individuals may develop illnesses at random. Addressing the demand for health insurance has been the focus of many researchers for several years. Many studies focus on major topics in health insurance such as: the optimal health insurance coverage provided to individuals, the associated problems with health insurance, the demand and supply side rationing and the welfare economics of moral hazard.

It is worth mentioning here that the topic of moral hazard occupied a large part of the literature. Providing health insurance affect the individuals behaviour, specifically her incentives to take preventions which means having a substitution effect. Moral Hazard is a problem in which individuals trade-off between incentives and risk bearing (Arnott and Stiglitz, 1988).

Many tools have been used to manage this problem and these tools were classified into two types: the demand side and the supply-side rationing tools.

The demand management of moral hazard minimises the problem of moral hazard partially, and its believed that the supply management helps in solving this problem (Albert and Michael, 2002).

Another way of dealing with the problem of moral hazard was to analyse the components of the cause of this problem into a substitution and income effect associated with the price of medical care services being reduced by health insurance.

Marcos Vera-Hernández have tried to estimate the welfare loss resulted from moral hazard, with the income effects being taken into account. He also proposes a new measure of moral hazard (Vera-Hernández, 2003).

According to Nyman the welfare analysis of moral hazard has a major component that is the income transfers effect from the healthy insured to those who become sick. This income effect caused by the reduction of medical care priced as a result of providing insurance increases the demand for medical services and might lead to overutilisation of health services (Nyman, 2008).

When the income effect is eliminated, the moral hazard welfare loss become smaller (Nyman, 2001).

This paper investigates the elimination of income effect when providing insurance by using the MaGuire model when having indemnity health insurance.

METHODS

The economic model of utility that explains the relation between risk and incentives of using healthcare services developed by





Thomas McGuire was used in this paper to show the optimal level of coverage with indemnity insurance. This model provides information about factors determining the optimal level of health insurance in a competitive market. We compared the original model with our new model that uses health insurance plan in which premiums and coinsurance are the same as the original model, but the only difference is that the insured will pay the full cost of medical service at the time of treatment and will get back a full refund of the cost of treatment upon providing all legal documents that proves her payment.

We used the mathematical and the microeconomics tools to provide a full analysis of this model.

THE MODEL

According to the optimal health insurance model (McGuire, 2011), the expected utility function consumers tend to maximise is as follows:

$$EU = pU^s(x, y^s) + (1-p)U^h(y^h)$$

Where EU is the expected utility of income; p is the probability of getting sick; x is the quantity of healthcare coverage; y^s , y^h is the income when sick and income when healthy, respectively; U^h is the utility when sick and utility when healthy, respectively.

The McGuire model assumes that the price of care is one, and the individual pays a coinsurance (c) and a premium (π) when buying insurance. The total income of the individual is (I).

Given all the above information the expected utility function is as follows:

$$EU = pU^s(x, I - \pi - cx) + (1-p)U^h(I - \pi)$$

$$EU = pU^s(x, I - p(1-c)x - cx) + (1-p)U^h(I - p(1-c)x)$$

The first order conditions with respect to the amount of coverage (x) and coinsurance (c) is as follows:

$$\frac{dEU}{dx} = p(U_x^s + U_y^s(-p(1-c) - c)) + (1-p)U_y^h(-p(1-c))$$

$$\frac{dEU}{dx} = pU_x^s + pU_y^s(-p(1-c) - c) + (1-p)U_y^h(-p(1-c))$$

$$= pU_x^s - p(1-c)[(1-p)U_y^h - pU_y^s] - pcU_y^s$$

$$\frac{dEU}{dc} = pU_y^s(xp - x) + (1-p)U_y^h(px)$$





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Our model uses the same expected utility function with the indemnity in which the insured has to pay out of pocket for the full medical service cost at the time of treatment and afterwards the insurer will pay the insured what he paid upon providing all formal bills and documents of treatment. The expected utility function will be as follows:

$$EU = pU^s(x, I - p(1 - c)x - x) + (1 - p)U^h(I - p(1 - c)x + (1 - c)x)$$

Income when sick equals total income less premium and full cost of health service.

Income when healthy equals total income less premiums plus reimbursement of bared cost at time when sick.

The first order conditions with respect to the amount of coverage (x) and coinsurance (c) is as follows:

$$\begin{aligned} \frac{dEU}{dx} &= p(U_x^s + U_y^s(-p(1 - c) - 1)) + (1 - p)U_y^h(-p(1 - c) + (1 - c)) \\ \frac{dEU}{dc} &= pU_y^s xp + (1 - p)U_y^h(p - 1)x \end{aligned}$$

DISCUSSION AND RESULTS

According to McGuire first derivative with respect to c , shows that at any $c > 0$ the first order condition is negative, and thus the optimal c would be at the value of zero.

In our model the first order condition with respect to c can be rewritten as follows:

$$\frac{dEU}{dc} = p^2 x (U_y^s - U_y^h) + x U_y^h < 0$$

As c increases, income transfers from the sick to the healthy state.

Setting $c=0$, the MRS between healthcare and the marginal utility of income when sick equals to one according to McGuire model:

$$\frac{U_x^s}{pU_y^s + (1 - p)U_y^h} = 1$$

In our model, as $c=0$ rewriting the first order condition with respect to x yield the following:



$$\frac{U_x^s}{pU_y^s + (1-p)U_y^h} = \frac{1+p}{p}$$

Meaning the MRS between healthcare and the expected value of the marginal utility of income is greater than one which leads us to the following conclusion: in order to equalise the MU of healthcare with the expected MU of income we need to use less care (x) compared to McGuire model. A better way for utilising medical services and less moral hazard welfare loss. This is consistent with Nyman results that emphasis the indirect relation between the income effect and the probability of being sick. Its also consistent with Nyman results that eliminating the income effect will lead to less welfare losses.

The higher the probability of being sick the less the problem of moral hazard since we need to use less x compared to those with lower probability of being sick.

Those with pre-existing conditions might not over utilise medical services when having indemnity type of insurance.

LIMITATIONS

Our model assumes that individuals pay upfront for medical care costs meaning they have to have their money ready when being sick. Poor individuals might not be able to pay for medical costs upfront using this method which might lead poor being untreated.

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BIOGRAPHICAL NOTES

Dr. Nadia J. Sweis is an economist with research interests in health and International business. She researches the economics of tobacco taxation – its public health dimensions, the microeconomics of optimal excise taxes and the implementation of tobacco tax policies in Jordan. She assists in tackling the problem of obesity from an economic view. She also studies aspects of health insurance markets. She earned her PhD from the University of Illinois at Chicago in 2012.