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Determinants of demand and supply for health insurance in economic theory

Les déterminants de la demande et de l'offre d'assurance santé dans la théorie économique.

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Abstract :

This research aims to highlight the determinants of demand and supply for health insurance as a commodity in the insurance market, using the principles and foundations of economic theory to analyze the demand and supply for health insurance and the market equilibrium for this type of insurance. One of the most important findings of this study is that the determinants of demand and supply for health insurance vary depending on whether health insurance is mandatory and government-provided or optional and offered by private insurance companies or healthcare cooperatives. Demand and supply are influenced by increases or decreases in these determinants, while they appear to be less flexible for mandatory health insurance.

Keywords : Health insurance, demand, supply, health insurance market.
Jel classification codes : I13, I11, A10

Résumé :

Cette recherche vise à mettre en évidence les déterminants de l'offre et de la demande d'assurance maladie en tant que produit sur le marché de l'assurance, en utilisant les principes et les fondements de la théorie économique pour analyser la demande et l'offre d'assurance maladie ainsi que l'équilibre du marché pour ce type d'assurance. L'une des conclusions les plus importantes de cette étude est que les déterminants de la demande et de l'offre d'assurance maladie varient en fonction de savoir si l'assurance maladie est obligatoire et si elle est fournie par le gouvernement ou facultative et proposée par des compagnies d'assurance privées ou des coopératives de santé. La demande et l'offre sont influencées par des augmentations ou des diminutions de ces déterminants, tandis qu'elles semblent être moins flexibles pour l'assurance maladie obligatoire.

Mots clés : Assurance santé, demande, offre, marché de l'assurance santé.
Code de classification JEL : I13, I11, A10

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1. Introduction

The analysis of supply and demand for health insurance relies on the fundamentals of economics, where the latter studies methods of determining choices to ensure the best possible use of scarce resources in order to satisfy desires. In other words, the study of "the process of preference or choice regarding how to use scarce resources to produce different goods and distribute them among different segments of society for consumption either in the present or in the future. Thus, the essence of economic studies primarily involves analyzing various models of resource allocation, costs, and optimizing and developing these models and the returns derived from them" (Mooney, Russell, and Weir, 1986, page 03). However, when we attempt to use economic theory to explain the demand and supply for health insurance, we encounter difficulties related to how to measure and define healthcare services. In reality, insurance coverage varies based on population size, healthcare services, and medical costs it covers. It is also necessary to determine whether there are market conditions that hinder consumers from choosing the economically appropriate amount of insurance coverage and market conditions that hinder producers from offering the economically appropriate quantity.

The Problematic :

From the previous discussion, the following problematic emerges :

What are the variables that affect the increase or decrease in the demand or supply for health insurance?

Study Hypothesis :

The hypothesis of the study is that the economic law of supply and demand in the market does not apply to mandatory (government) health insurance, where we find that demand and supply are not responsive, regardless of changes in health insurance determinants. In other words, if the government decides to increase the price of health insurance premiums, this does not lead to a decrease in demand for it, and vice versa, if the government decides to reduce the subscription price, this does not lead to an increase in demand for it.

2. Analysis of the demand for health insurance

In this section, we will explain the demand for health insurance and present its determinants. We will also highlight the characteristics and advantages of demand for mandatory social health insurance (government-provided).

2.1 Demand for Health Insurance :

To understand individuals' behavior regarding the demand for health insurance, it is essential to be familiar with the economic theory related to the consumption or purchase of insurance. In other words, why do people buy insurance against certain risks and not others ?

The demand for health insurance includes the following assumptions :

- Individuals seek to maximize their utility : This assumption suggests that consumers are rational and aim to maximize their satisfaction from consuming goods. Consumers strive to maximize their expected utility since they cannot predict whether they will become ill. Therefore, when evaluating their choices, individuals consider the expected utility derived from their consumption. In the case of health insurance, individuals face two alternative decisions :

    - They can purchase insurance, which involves paying a premium and incurring a small loss in the form of insurance premiums.
    - They can self-insure, which means they face the low probability of a significant loss due to illness or the high probability of no such loss occurring. To determine whether consumers will buy health insurance for an unlikely medical event or self-insure, it is necessary to compare the two alternative decisions to identify which one provides a higher level of utility.

- There is an inverse relationship between quantity demanded and price: Concerning the demand for healthcare services, it follows the law of demand, where there is an inverse relationship between the price of healthcare services and the quantity demanded. When the price of healthcare services decreases, the number of patients seeking those services increases, as individuals with lower incomes who cannot afford high healthcare costs are now more inclined to seek medical care.

As the insurance price decreases, the demand for it increases because in this case, the insurance price does not lead to a significant decrease in utility for the individual.

It's worth noting that the demand for health insurance is a derived demand from the demand for healthcare services. The demand for health insurance and healthcare services varies with the age structure of the population. Demand for health insurance represents the purchase of a necessity, something that is not desired but is essential.

The demand for healthcare services and health insurance primarily depends on the health status of individuals. Therefore, there is a close relationship between health insurance and an individual's health status, which poses a challenge when trying to predict this demand.

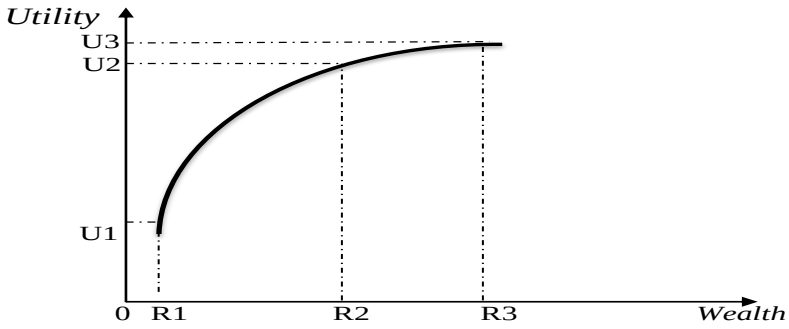
Furthermore, individuals assess their health status differently. For example, knee injuries may cause the same level of pain to two different individuals, but the complications may be more significant for a professional football player compared to another person (MOONEY, 1994, P 235).

Using the concept of expected utility, as discussed by Milton Friedman and Leonard Savage in their article (Feldstein, 1988, Page 114), it is assumed that consumers choose among

available alternatives based on their preferences and rank these alternatives based on their preference for each one of them. This allows us to describe a utility function for each level of wealth.

Moreover, for an individual to purchase insurance, they must believe that the marginal utility of wealth is diminishing. While individuals prefer more wealth to less, the additional wealth has a lower marginal utility. The following figure illustrates the relationship between total utility and wealth :

Figure N° 1. The Relationship between Total Utility and Wealth.



***Source :* P. Feldstein, 2007, p 190**.

In this figure, we observe that the marginal utility of insurance decreases as wealth increases.

To illustrate an individual's choices when making a decision to purchase insurance, let's assume that in the event of illness, the individual would incur a cost of 8,000 DZD, for example. If the individual is currently at point R3, meaning their wealth is 10,000 DZD, if illness occurs, they will have to pay 8,000 DZD, and as a result, they will move to point 1R (the utility levels corresponding to wealth levels R3 and 1R are U3 and U1, respectively). Let's assume that the probability of illness occurring is 2.50%, and it costs 8,000 DZD. Therefore, the net insurance premium covering the expected loss would be : 8,000 DZD × 2.50% = 200 DZD.

So, the net insurance premium is a function of both the expected loss amount (8,000 DZD) and the probability of its occurrence (2.50%) for a large group of people. If the individual wants to purchase insurance equal to the expected loss, they must pay 200 DZD, which reduces their wealth to point R2, which is 9,800 DZD (10,000 DZD - 200 DZD).

Let's also assume that as a result of buying insurance and reducing their wealth to 9,800 DZD, the individual is now at point U2. Therefore, the choices facing the individual are as follows:

- The first choice: Buy insurance worth 200 DZD and move to a lower utility level U2, with their wealth decreasing from 10,000 DZD to 9,800 DZD.
- The second choice: Do not buy insurance and face the 2.50% probability of losing 8,000 DZD, leading to a very low utility level 1U associated with wealth equal to 2,000 DZD (10,000 DZD - 8,000 DZD). Alternatively, they can remain with a 97.50% probability of no loss, which keeps their wealth at 10,000 DZD, associated with a high utility level 3U.

To compare the two choices, we must use expected utility :

Let's assume :

- 1U = 95 total utility units at wealth level R = 10,000 DZD.
- 2U = 93 total utility units at wealth level R = 9,800 DZD.
- 3U = 5 total utility units at wealth level R = 2,000 DZD.

It's important to note that the expected utility for the second choice is the weighted sum of the expected utilities for each possible event:

(Expected Loss Probability × Utility 1U) + ((1 - Expected Loss Probability) × Utility 3U).

(0.025 × 95) + ((1 - 0.975) × 5) = 91.775 expected utility units.

To determine whether the individual will purchase insurance, we compare the expected utility level for the first choice (i.e., buying insurance), which is at the utility level 2U = 93 units, with the expected utility for the second choice, which is U = 91.775 expected utility units.

Since the expected utility level for the first choice is greater than the expected utility for the second choice (93 < 91.775), we expect the individual to purchase insurance.

This example assumes that Insurance is purchased with a fair premium (as per the decision of the Ministry of Finance dated July 26, 2008). The utility function with respect to wealth is similar to the one depicted in Figure 01.

2 .2 Determinants of demand for health insurance

These are the determinants or factors that influence consumer purchasing decisions and may affect their consumption trends. These factors determine the level of demand for health insurance in the market. The most important of these determinants include:

A. Price or insurance premium: Every time the price of insurance increases, the desired insurance coverage decreases, or in other words, the number of incidents the individual insures against decreases.
B. Income: As an individual's income increases, their ability to pay for health insurance and participate in it increases, and vice versa in the case of a decrease in income. Therefore, the quantity of health services, including health insurance, that an individual can purchase depends on their real income.
C. Prices of complementary and substitute goods and services: The demand for health insurance is also affected by the increase or decrease due to complementary health services and/or substitute goods and services:
    - Regarding complementary goods and services: These are goods and services that are typically used together, so an increase in the consumption of one implies an increase in the consumption of the other and vice versa. In the field of healthcare, there are many integrated services by nature. For example, an increase in the number of surgical procedures is linked to an increase in demand for hospitals, clinics, accommodation services, medications, and nursing services. Therefore, an increase in the demand for health insurance.
    - As for alternative healthcare services : There may be more than one type of treatment available for a specific illness. If all these methods are equally effective, decisions can be made based on both price and appropriateness. The possibility of substitutability between services in the healthcare sector should be considered. This depends on factors such as available technology and the rules that define the scope of activities performed by various members of the medical profession, known as "appropriateness." If the cost of one treatment increases while everything else remains constant, the demand for that treatment will decrease, while the demand for the alternative treatment (such as traditional methods) will increase (Talaat El Damerdash, pp. 94-95).
D. The individual's willingness to risk aversion (Paul Feldstein, page 198): Individuals will be willing to pay an additional amount to purchase health insurance if they have increasing utility from it.
E. Probability of occurrence (illness): Consumers prefer to purchase insurance with moderate probability of utility and frequent occurrence. If the probability of illness is weak, consumers may not buy health insurance due to its limited utility, and for high probability incidents, they may avoid it due to the high cost.

F. Size of losses : The larger the expected loss, the more the individual is willing to pay beyond the insurance premium (Paul Feldstein, page 199).
G. Population size and structure : Any changes in the size or structure of the population will result in corresponding shifts in demand for various goods and services, including healthcare services and, consequently, health insurance.
H. Preferences : Changes in consumer preferences and tastes can lead to shifts in demand curves over time. While much of the development in healthcare services relies heavily on scientific research evidence, we often find that this evidence brings about changes in treatment patterns, increases individuals' health awareness, and subsequently alters their preferences. So, whenever preferences change in favor of a specific good or service, the demand for it increases. Conversely, if preferences shift away from a particular good or service, the demand for it decreases.

2 .3 Advantages of Mandatory Social Health Insurance Demand

The demand curve for mandatory social health insurance is considered inelastic, primarily due to the free nature of the service (Talaat Eldemerdash, p. 118). It takes on a vertical shape on the horizontal axis, indicating its inelasticity concerning price, income, preferences, prices of alternative or complementary goods. In other words, these factors do not play a significant role in influencing the demand for these free services, and the quantity demanded can be represented by a point on the horizontal axis of the demand curve.

However, in some cases, this rule can be broken, and the quantity demanded may be influenced by other factors, such as :

- The cost of some medical supplies that are not included in the free services. For example, vision tests and eye surgeries may be provided for free, but eyeglasses and medical lenses are often installed at the expense of those who wish to use them. Therefore, an increase in the prices of medical lenses may lead to a decrease in the demand for free vision tests.
- Opportunity cost of an individual's time.
- Supply constraints, as there may be long waiting lists for examinations and treatment.
- In summary, it can be said that for mandatory social health insurance, there are various determinants that affect demand beyond the primary determinants like price and income. In some cases, individuals may resort to alternative health insurance options due to services not being covered under the accepted compensation list of social health insurance funds or due to their unavailability.

As for the demand for healthcare services in general, it operates like the demand for any other goods or services in the market, primarily influenced by price, and there are other determinants, as mentioned earlier, that impact it.

3. Analysis of the Supply of Health Insurance :

3.1 Health Insurance supply

The foundation upon which the presentation of any good or service is built is the production function. The production function describes the technical relationship between the quantity of output of the commodity or service and the quantity of resources (or input factors) used in its production. If the output is healthcare for a patient (services provided by doctors and nurses), then the input factors will include the number and type of healthcare workers responsible for nursing care. This technical relationship that links healthcare for each patient and the types of healthcare workers can be expressed in the following formula (Paul Feldstein, p. 241):

$$Qi = f(ID, IA, AI, UI).$$

- **Qi** represents the volume of healthcare per patient, which is technically associated with :
- **ID** = The number of certified nursing personnel,
- **IA** = Licensed healthcare personnel,
- **AI** = Nurse assistants,
- **UI** = The type of nursing unit.

To study supply, economists make the following assumptions:

- Producers aim to maximize their profits. However, there are other potential goals, such as maximizing returns, output, or market share. This is primarily what commercial health insurers seek. As for mandatory social health insurance (associated with social insurance funds), the goal here is to achieve the greatest cost-effectiveness for the expenses incurred in delivering healthcare services (Henderson and Mooney, 1988, Page 251).
- The possibility of substituting inputs in the production process.
- Different groups of input factors that can be used in healthcare production are technically efficient. In other words, they represent the minimum necessary amount required to produce a certain level of service.
- Different groups of input factors that can be used in healthcare production are technically efficient. In other words, they represent the minimum necessary amount required to produce a certain level of service.

- Decision-makers are constantly looking for ways to reduce the cost of producing healthcare services. This last assumption is particularly important for studies related to non-profit hospitals and medical clinics.

3.2. The determinants of health insurance supply

Health insurance supply is considered a function that depends on the supply of medical services. In the medical field, there are several determinants that can be presented in two main factors :

A. **Technological Changes :** Technological advancements often result in changes in the production of healthcare services. These changes can lead to increased production efficiency or the ability to provide treatments for diseases that were previously untreatable. For example, the introduction of advanced diagnostic equipment may increase the use of certain inputs, such as specialized machinery. On the other hand, the development of new pharmaceuticals may reduce the need for certain facilities or treatments, impacting the use of inputs differently. Technological changes can affect the overall cost and supply of healthcare services.
B. **Legal and Professional Constraints :** In the medical field, there are legal constraints on what healthcare professionals can do. Healthcare providers must adhere to regulations that determine the scope of their practice. These legal constraints can limit the flexibility of healthcare supply. For example, certain tasks may only be performed by licensed physicians, and nurses or other healthcare professionals may be restricted from performing them. These constraints can impact the cost of healthcare services as different professionals with varying rates may be required.

Taking these determinants and constraints into account, determining the most cost-effective mix of input resources is essential to provide healthcare services at the lowest possible cost. This involves understanding the marginal increase in healthcare for each additional unit of input, adhering to the law, and considering technological advancements. In order to increase the volume of healthcare services, additional resources must be identified and integrated into the production process. Supply in healthcare can be more flexible if changes in input resources and alternatives are available.

3.3 Evaluation of Economic Efficiency in Production

The concept of economic efficiency is closely related to supply and demand in any economic activity. When evaluating economic efficiency, it is important to have an optimal rate and type

of production. Economic efficiency in demand is linked to its counterpart in supply through prices (Peterson & Macphee, 1983, P 221-224).

Regarding the demand for healthcare, achieving economic efficiency in healthcare production is unlikely for several reasons, including the lack of information among consumers about medical diagnosis, treatment needs, and the quality and expertise of service providers, as well as the prices of healthcare services.

On the supply side, economic efficiency is also a concern. In healthcare, many markets fail to achieve economic efficiency due to factors like the presence of health insurance coverage, tax deductions from insurance premiums, and incentives received by healthcare providers. These factors often result in an increase in overall expenses for healthcare services. It can be deduced that when the supply is inelastic, most of the increased expenses go to healthcare services, while in the case of inelastic supply, price increases may lead to a reduction in services, increasing the overall costs of national health insurance programs.

Analyzing the elasticity of the supply of medical services allows for more accurate predictions of its impact on prices, increased demand costs, and the performance evaluation of healthcare providers. Reducing costs without affecting medical performance can be achieved by streamlining the service delivery process, thus improving the performance of healthcare providers.

Since supply is essentially a flow, increasing the production rate may require an increase in the size of healthcare facilities, the quantity of equipment used, and the workforce. All these factors take time, making the supply of many services inelastic in the short term. For example, medical training takes several years, so the supply of doctors is not flexible in the short term but becomes more elastic in the long term.

4. The health insurance market :

The health insurance industry operates in two distinct markets : the insurance market where insurance companies compete based on pricing, and the market where medical services are purchased, which can sometimes be monopolistic. This duality can lead to higher premiums than necessary.

On the demand side, consumers aim to maximize marginal utility or health gains, and spending should be allocated in a way that makes marginal utility equal to the services purchased. Therefore, healthcare services should be provided within a competitive market framework to achieve economic efficiency from both the demand and supply sides.

However, economic efficiency can diminish when conditions for competitive markets are not met. These conditions include consumers having complete information about services and

prices, as well as unrestricted resource movement. In healthcare, these conditions are often not fulfilled. Consumers lack information regarding medical diagnoses, treatment needs, the quality of service providers, and their level of expertise. Moreover, there are barriers to resource movement, such as restrictions on the tasks each medical profession is allowed to perform and entry requirements for healthcare professions.

Therefore, two crucial aspects determine market performance :

- The degree of price competition : Price-based competition eliminates any excess profit and ensures that insurance premiums reflect the cost of health insurance production.
- Product competition : Competition based on product offerings allows insurance companies to respond to policyholders' preferences for various insurance types.

In summary, the health insurance industry operates in a complex environment where economic efficiency can be challenging to achieve due to information gaps and regulatory constraints. Competitive pricing and product offerings are essential factors to consider when evaluating market performance in this industry.

5. Results and Discussion :

5.1 Hypothesis Testing :

To test the hypothesis that "the economic law of supply and demand in the market does not apply to mandatory (government) health insurance, as we find that demand and supply are inelastic no matter how health insurance determinants change," we have observed that health insurance consists of optional health insurance and mandatory health insurance. The latter is generated through decisions made by the government, and individuals are thus forced to seek this insurance under the threat of penalties if they do not purchase it. Healthcare insurance supply is provided by public entities following specific legal procedures, far removed from market rules and competition.

Based on these considerations, the supply and demand for mandatory health insurance are inelastic, regardless of changes in their determinants. Therefore, we can confirm this hypothesis.

5.2 Results :

Through this research, we have reached the following results :

- The demand for healthcare services, in general, is like the demand for any goods or services in the market. It is primarily influenced by price and individual income, along with other determinants such as prices of complementary and substitute

goods, preferences, risk aversion, the likelihood of an insurable event, the magnitude of losses, and the size and structure of the population.

- The demand for healthcare services and health insurance is heavily dependent on the health status of individuals, creating a close relationship between health insurance and an individual's health condition.
- Health insurance supply is a function of healthcare service supply, and healthcare services are influenced by two main factors : technological advancement in the medical field and legal and professional constraints in medical practice.

4. Conclusion

In concusion, to outline the theory of supply and demand for health insurance :

- Health insurance comprises mandatory health insurance and optional health insurance. These two components represent the structure of supply and demand in the healthcare services and health insurance market.
- Evaluating health insurance involves analyzing the cost and cost-effectiveness, necessitating an understanding of the costs incurred relative to the returns.
- As a recommendation for this study, to analyze the theory of supply and demand for health insurance, it is essential to consider the following fundamental factors :
    - Factors influencing the demand for health insurance.
    - The impact of well-being on individuals' willingness to purchase health insurance (whether individuals are more or less likely to insure their health under different well-being conditions).
    - Technological advancement in the medical field.

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مدونة الحسابات وقواعد سيرها، الجريدة الرسمية العدد 19 الصادرة في 29 مارس 2009، ص 73: على انها المبلغ الذي يمكن أن يتم من أجله تبادل الأصول أو الخصوم بين أطراف راضية و على دراية كافية و هذا في اطار قواعد المنافسة العادية.

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