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**A theoretical model of physician's behaviour  
with informal payments and ethical  
concern; the case of Greece**

NEKN01

Master Essay I within Health Economics

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## **Abstract**

The purpose of this essay is to analyze the phenomenon of informal payments in Greece and introduce a theoretical model for the physicians' behavior while including ethical concern in the physicians' utility maximization problem. The inspiration model of this essay comes from the empirical paper of Thompson and Xavier (2002), which introduces informal payments in physicians' behavior. According to that paper, a physician chooses an informal payment in order to solve his utility maximization problem. Aiming to the solution of the maximization problem, a physician needs to make a choice of the price of the informal payment so as to equalize his marginal revenue with marginal cost, hence acting as a monopolist. From his choice it is possible to derive a mark-up of the price of the informal payment which shows that his behavior is influenced by the choice of the informal payments' price. Following the same structure as in the Thompson and Xavier's paper about the solution of physician's utility maximization problem, the current essay adds an ethical concern factor and derives that physicians' behavior is influenced by giving them a lower power to impose more informal payments in the informal market of unofficial payments.

Key words: ethical concern, informal or unofficial payments, physicians' behavior, , utility maximization

### **1. Introduction**

Informal payments have been reported in many countries and can be defined as payments that are made outside the official channels of the system. The phenomenon exists in many countries worldwide, with percentages that range from 3 % in Peru to 96% in Pakistan. In Greece the phenomenon is also widely reported by quantitative research and social medias' publications.

The existence of the phenomenon is attributed to many reasons than can be mainly divided into three categories; the legal-ethical factors, the social-cultural factors and the economic factors' category. In addition, the majority of informal payments are reported to be given to doctors with subsequent negative effects on equity and efficiency (Gaal & McKee, 2005).

Furthermore, health care markets can be approached as special markets because they do not meet the characteristics of perfect competitive markets. The paradox in the Greek health care market is that even though the health market is by itself special and mainly public regulated, there is an informal market of unofficial payments where the doctors are price setters and have a leading role. The informal market is created due to doctors' behavior to demand informal payments and act in an unethical way.

In particular, when a physician demands an unofficial payment, he is engaged into an unethical behavior which is against his duties as given by the law, as well as he takes advantage of his relationship with the patient and the state that gives him the authority to act as an agent in the provision of health care. According to the Greek law about physicians' medical ethics, it is legitimized that a physician should work in an ethical and professional way that does not allow him to discriminate among patients, meaning that he cannot provide differential care to those that do not have the ability to pay comparing to the people that have the ability to pay (Milionis, 2012). In this context and accepting that physicians when asking for unofficial payments are not obeying the law and have an unethical behavior, a model for physician's behavior in a utility maximization context is described extended with the informal payment and ethical concern as components of that behavior.

The paper is organized as follows: In section two the phenomenon of unofficial payments is described and defined with a focus in Greece, in section three the description of the Greek health care system is provided in details, in section four arguments of health care markets as special markets and the agency problem are introduced, in section five the Greek unofficial health care market is described, in section six physician's behavior is modeled with the utility maximization whereas adding informal payments and ethical concern, and in section seven conclusions and policy proposals are expressed.

## **2. Description and existence of the phenomenon of unofficial payments with a focus on Greece**

### **2.1 Definition of the unofficial payments**

In the first place, in order to proceed the analysis of phenomenon of informal payments it is important to know how this concept is defined. A very good definition of informal payments is that "informal payments are payments to individuals or institutions in cash or in kind made outside official payment channels for services that are meant to be covered by the public health care system" (Lewis, 2000, p.v). In Greece, apart from the existence of the unofficial channel of the provision of informal payments, these are conceived as payments such as additional fees or gratitude payments that are given to doctors in order to provide their services that are supposed to be free. (Liaropoulos, et al., 2008)

By looking through the unofficial payments literature someone can find many and different names of the phenomenon that refer to the same concept. The variety of the names may indicate a possible complexity when looking for different researches of the matter. Some synonyms that are used by different researches are "informal patient payments", "under the table payments", "envelope payments", "unofficial out-of-pocket payments", "under-the-counter payments" and "corruption in health care" (Delcheva et al. 1997; Chawla et al. 1998; Falkingham J. 2005, cited in Stepurko et al., 2010). In this essay, to avoid any possible misunderstandings the names informal payments and unofficial payments will be used to refer to the same concept.

### **2.2 Empirical studies about the worldwide existence of informal payments**

The phenomenon is very common in "former-socialist countries" but it has also been observed in countries that were not socialist, such as Greece and Turkey (Stepurko et al. , 2010, p.9). Several studies pointed out the problem of informal payments in different countries such as Czech Republic, Hungary, Bulgaria, Poland, Romania and Tajikistan (Tatar, et al., 2007). Also in Albania it was estimated that between 2000 and 2002 around 60% to 87% of Albanian citizens performed an

informal payment to doctors in hospitals (Vian et al., 2006). In Russia, Georgia, Romania and Poland studies about informal payments reported this phenomenon as well. Informal payments had been mentioned in South Asian countries and in Africa such as Bangladesh, India, Nepal, Pakistan, Srilanka, Uganda, Mozambique, Rwanda, and Ethiopia. Additionally, in South America in Bolivia, as well in China, Kazakhstan and Kyrgystan informal payments are found. (Thampi GK. 2002; McPake B. et al. 1999; Lindelow M. 2004; Lievens et al. 2006; Lindelow et al. 2005; Gatti et al. 2003; Bloom et al. 2009; Ensor et al. 1998; Sari et al. 2000; Gaál et al. 2011; cited in Cherecheş et al. 2013). The percentages that come from empirical studies about the existence of the phenomenon vary from 3% in Peru to 96% in Pakistan (Lewis M. 2007; Balanova D. , Mckee M. 2002 ; cited in Cherecheş et al. 2013).

### **2.3 Informal payments in Greece; by whom and where informal payments are received**

Informal payments and direct payments for health care which are types of out of pocket payments in Greece are counted as one of the largest in Europe Union's countries (Siskou et al., 2008). Cases of informal payments in Greece can be found through published articles and few quantitative studies approaching the matter. From different publications it can be understood that the amount of informal payments is large and is given to doctors (Liaropoulos & Tragakes 1998 ; WHO, 1996). Doctors in many cases demand the informal payment and it had been estimated that 60% of the official and unofficial informal payments are mainly given to them (WHO, 1996). The unofficial payment can possibly raise the salary of a doctor up to 40 %. It can also be the minor case that many patients offer unofficial payments as a gift to doctors. (Konstantoulaki , 2006)

It is a very usual case that the informal payment is demanded by the doctor from the patient in order to perform a surgery that is presented as a health problem that should be solved as soon as possible. In the case that a cardiac surgery exists, even though there is coverage by the security fund it was found that the patients had to pay an additional informal payment (Siskou et al., 2008). Many examples can be found to support the insistence of doctors to ask for informal payments in daily press

one of which is an example in an everyday newspapers blog with a case of a doctor who was caught while asking for the amount of 2000 euros so as to perform a surgery in a public hospital. (Parapolitiki, 2013 ; In.gr, 2013)

The place of their existence is almost everywhere in health care services as it has been reported that informal payments exist in private clinics, in public hospitals, in polyclinics of a social insurance fund, in a primary care center of National Health System, in a private diagnostic center, as well as given to a private doctor or a dentist (Fintanidou , 2012)

#### **2.4 Reasons of the existence of informal payments**

The general reasons for the existence of informal payments are many with some of these being the inability of the state to finance the public health care system, as well as the unavailability of control systems that can limit the corrupted phenomenon of informal payments (Stepurko, et al., 2010).The presence of informal payments may also be due to low wages of the medical personnel, the fear of not getting admitted for treatment by the side of the patient, and the case that a patient wants to get a better service. Another reason is reported to be the culture to give a present to someone as an expression of gratitude (Vian et al., 2006).

In addition, the reasons of informal payments can be further placed into three main categories ; the legal-ethical factors, the social-cultural factors and the economic factors' category. In the first category informal payments exist because the physicians accept and demand them, which imply that informal payments are a matter of doctors' low ethics to ask for informal payments. The state from its part is not able to control the problem of informal payments because their illegal nature is not confirmed by law. In the second category informal payments are engaged into the culture of the society to give a gratitude to the doctor and for that reason it is very difficult to be changed. As for the last economic category, informal payments are attributed to the factor of shortage of the system to provide the services that patients demand, as a result a patient perform an informal payment so as to receive the service that he would like to have (Gaal & Mckee , 2005).

In Greece someone pays informal payments to get more rapid access to care and as it had been reported that 3 out of 10 citizens who went to public hospitals gave an informal payment before the treatment and after the doctor's demand. (Fintanidou, 2012)

From a research that was conducted to 2.741 people, 80% of them reported as the main reasons for the performance of unofficial payments to get access in public hospitals and to reduce the waiting time. Only the 13.6% of the respondents gave informal payments as a gratitude expression (Factorx, 2013). Another research that more specifically was made in order to measure the informal payments in Greek public hospitals through telephone surveys on 4.738 individuals showed that 42% gave informal payments due to the fear that they will get a care with low quality, 20% gave it because the doctor asked for it and only 18% gave the informal payment as an expression of gratitude. Besides, the socioeconomic characteristics did not seem to be a factor that affects the size of unofficial payments (Liaropoulos et al., 2008)

According to the National Survey for transparency in Greece conducted in 2012 in a sample size of 12.104 individuals, 45% of the respondents declared that paid a bribe in hospitals, and 16.3% paid the bribe to doctors or to private medical services. It was also estimated that 68% of the respondents paid a bribe in the public sector and 32% in the private sector (Public issue & Transparency International Greece, 2012). It is written that even in the years of crisis the phenomenon of informal payments exist but the doctors have lowered the payments and they compromise for the amount of the received informal payment. In general terms it is possible that an informal payment can be up to 5000 Euros and public hospitals are the first in the list of the corrupted services in Greece (Kaitanidi, 2010).

Fitting the reasons of the informal payments of the Greek case; in one of the for mentioned categories seems to be a difficult task. The difficulty is attributed to the different reasons of existence of informal payments that are mainly related to get quicker access to the health care system, the fear to get low quality of service and



the doctors' demand for informal payments. The impossible placement of informal payments in one of these categories shows that the approach of the matter of informal payments in Greece can be complex, since without knowing the root of the problem it may not be easy to correctly come through the matter and decrease informal payments.

However, whatever the reasons of the informal payments consist of, most researches found that the majority of informal payments were given to doctors as well as the target of most researches was to explore the informal payments that were made to general practitioners (Stepurko et al., 2010). Accepting that argument of the focus of many researches on doctors who accept the informal payments, together with the difficulty to place the reasons of the performance of informal payments into a category, it is better to see informal payments as being created from the side of the doctors.

## **2.5 Efficiency and equity impacts of informal payments**

In addition, the effects of informal payments cannot be ignored because by their possible negative effects it can be understood why informal payments are a problem. A tremendous effect of informal payments that had been pointed out is the effect on equity and efficiency. The impact on equity largely depends on the way informal payments work and this is related to the optional or obligatory type of the informal payment. An informal payment can be an expression of gratitude and in this case may not affect the allocation of resources and the distribution of services since all the individuals can have the health care services that they need irrespectively to their ability to provide an informal payment. On the contrast, when the informal payment has an obligatory type it can more likely harm the poor who do not have the ability to pay and consequently they may be denied to get the health care service that they need. In the case of the obligatory type, there is an obvious impact on equity since the access to the system is not equal and depends on the paying ability of a person, while the needs of the patients are the same. As for the informal payments in Greece there is supportive empirical evidence towards the obligatory

type of this payment, as it is usually demanded by the physician and as result it is undeniable that the informal payments affect equity (Gaal , Mckee ,2005).

Moreover, informal payments can cause an impact on efficiency of the health care system. The problem on efficiency comes from the fact that the supplied health care services are not used by those individuals who are in the position of a serious need of their use , consequently the health care services are not utilized by those people who would have the highest benefit from the use of such services (Gaal , Mckee ,2005).

### **3. Description of the Greek health care system**

Further, a detailed description of the Greek health care system is given in order to provide the reader with a clear image of how the system works and the further aim to understand that the complexity of this system makes it difficult to find its problems, its control and hence its improvement.

#### **3.1 A historical review and introduction of NHS**

From 1830, that is the year which characterizes the Greek independence, until the end of the 19<sup>th</sup> century, a small percentage of the Greek population was covered with health care, that being only the 10 % of the working population. The creation of the Ministry of Hygiene and Social Welfare occurred only in 1922. Many attempts before the establishment of a system with the main aim to cover all the population were executed, and the first serious attempt was performed with the creation of "Social Security Organization (IKA)" in 1934. Later in 1941 some public hospitals were created for the needs of the war, and in 1960 the creation of social health insurance for the public sector workers and the self-employed workers happened. The farmers and their families had their social insurance coverage in 1961, with the set up of the "Agricultural Insurance Organization (OGA)" (WHO, 1996, p.3).

During the years 1960 to 1970 government's health care spending was accounted only for the 2.5% of the GDP and very few public hospitals were built in big cities . With the comeback of democracy in 1974 the great need of reforming the health care was a central goal of the new government (WHO, 1996).

In 1981 when the socialist party was elected it was in its main political agenda to create a health care system that everyone would have access to and in 1983 the creation of National Health Care System was established by law. The main principle was that the right of entry in health care should not be limited by the financial situation of any citizen. During the first years of the establishment from 1983 to 1988 governmental health care spending increased up to 5% of the GDP. An increase in the construction of hospitals and health centers also occurred (WHO, 1996) (Mossialos, et al., 2005).

At the end of 2000 a new health care reform happened with the main goals to decentralize the Greek National Health System (ESY), to unify the many different social insurance funds, to change the way that public hospitals were administered, to put in order the primary health care in urban areas, and generally to improve the health of the public and support healthy interventions (Tountas , et al. 2002).

The decentralization happened by the creation of seventeen regional health systems called PESYs (periferiaka sistimata ygeias). Also evening and afternoon changes for the doctors in public hospitals were formed together with the system of appointments of the patients that included the book of an appointment before visiting a doctor instead of waiting in the queue as it was the system before. Furthermore, the type of a five year manager administration team was introduced in hospitals with the aim that each hospital could have a kind of independence in terms of funding. The number of insurance funds was reduced from 39 to 5, therefore the creation of a unified health insurance fund that included five insurance funds was achieved ( Boutsoli Z., 2010).

### **3.2 The finance of the system and delivery of health care**

The Greek health care system funding is a combination of Bismarck model, which is based on insurance finance, and Beveridge model with the financing based on taxes and care provided by hospitals, and rural health centers (Siskou et al., 2008). For the Greek public health system to work three different ministries have to cooperate; the Ministry of Health, the Ministry of Labor and Social Insurance, and the Ministry of Finance. The first is in charge of the NHS, the second copes with the insurance funds

that are connected with the funding and stipulation of the NHS, and the third ministry is responsible for funding the insurance funds and the National Health System financial shortages. In fact there are additionally two more ministries that contribute to the existence and distribution of the public health care services, and these are the Ministry of Education responsible for the number of university places in the schools of medicine, and the Ministry of Development that establishes the medicines' prices ( Economou & Giorno , 2009 ; Mossialos, et al., 2005). Therefore, it can be understood that the Greek health care system is mainly financed by taxes and social insurance funds. Nonetheless, a private way of funding also exists and has the form of official or unofficial payments and in a less extent is composed by private insurance (Mossialos, et al., 2005).The supply side of the health care provision is attributed to public hospitals and rural health centers, whilst the demand side of the health system is based on health insurance funds (Siskou , et al., 2008).

Nowadays, there is a "tripartite" health care provision, with public hospitals, public primary health centers that are provided by the NHS. The health care services in Greece are categorized into primary care and hospital care (Mossialos, et al., 2005, p.S152). Health services are supplied through the public sector through public hospitals, "health centers and community medical offices, outpatients' departments of social insurance organizations, municipal dispensaries" There is also the private provision of health care which is done through "private hospital and clinics, diagnostic laboratories, self-employed doctors" (Milionis, 2012, p.18).

### **3.3 Doctors' payment**

After the initiation of the NHS in 1983 physicians could be employed only in public sector or only in private practice. Despite the forbid of the private practice many physicians were actually working privately against the established law and in some cases they asked for informal payments. In this case physicians' payment mainly consisted of a salary (Tountas, et al., 2002 ; Mossialos, et al, 2005). Later in 1992 the choice from the side of the physicians of a full time or part time occupation in the NHS was allowed, and furthermore permitted them to be privately occupied . In a subsequent reform, the problem of informal payments to give bribes to physicians

was reported to have risen (Tountas, et al., 2002). It should also be mentioned that there is a specific word in the Greek language that characterizes the informal payment and that is the word “fakelaki”, which means a small envelope that usually includes the informal payment that is given to physicians or health personnel.

Nevertheless, towards the decrease of the phenomenon of informal payments, evening shifts for the doctors’ practices were introduced, according to which doctors could work at the hospitals during the afternoon with the official charge of the patients who perform an out of pocket payments ranging from 25 to 90 Euros . So, doctors’ reimbursement was composed of a salary and a fee- for- service type. What is more, there is also the case that the physicians work part time in a social’s security fund health center, and also have their private office, thereafter these doctors have a “dual activity” that gives them a mixed payment. Therefore, one can observe a mixed system of reimbursement for physicians based on salary and fee- for- service (Economou & Giorno, 2009, p.94) (Tountas , et al., 2002).

#### **4. Health care market as a special market and the agency problem**

In continuing, it is important to provide the health care markets’ characteristics and the doctors’ role in that market. By this description it can be understood that doctors do not play their role correctly, which is one of the central in this market, thus they create an agency problem which gives the health care system a problematic function.

##### **4.1 Health care market as a special market**

In general, health care markets can be characterized as special markets that are far from being perfect competitive since the requirements that exist in a perfect competition scheme; the product that is sold is a perfect substitute, the price of the product is taken as given, the existence of free entry and exit in the market and perfect information by both the suppliers and demanders side, are not met (Frank, 2008 ). In the health care market, the patient-consumer of a good is not aware of the exact quality and quantity of the good that he wants to use since he does not possess the required knowledge that would allow him to choose the product of

health care that would give him the best health care outcome. In addition, in health care markets asymmetric information and search cost exist, together with the absence for a market of the risk pertains (Dranove & Satterthwaite, 2000).

Consumers in health care markets are in the position of not knowing what they need to use and possess different information from suppliers of health care services such as doctors. For that reason there is a relationship that is based on asymmetry of information that differentiates the health care market from a perfect competitive market where both sides of supply and demand obtain the same information (Milionis, 2012). In terms of search cost, a patient needs to search for a physician that best matches his preferences, and even when a patient performs that choice, he cannot be sure that this choice will give him the best health outcome. Further, in order to conceive the absence of the market for the risk in health care market, one needs to think illness as a random event that can happen in every person's life and it is a threat for someone's life, ability to have job, and in general a threat for a person's existence. There is not a market that can sufficiently pay an individual for the risk to get sick and it is not possible to have an insurance market that fully compensates patients for any possible negative health event that occurs since the time of the occurrence of an illness event is not known and totally random (Dranove & Satterthwaite, 2000).

#### **4.2 Doctors' role and agency problem**

In the special health care market, doctors' role is to represent the patient's needs and decide for the patient about the use of health care services. In this sense, the relationship between the patient and the doctor can be characterized as a principal-agent relationship where the principal is the patient represented by the agent who is the doctor. It is possible to expect that doctors do not act as perfect agents, whereas a perfect agent is a doctor who has the central aim to maximize the patient's utility by giving him any correct information to the direction of patient's health improvement. A deviation from perfect agency behavior can be referred to the term of agency problem and a reason to expect that a doctor might behave as a non perfect agent is that doctors' concern for his patients depends on many factors such

as ethical concern, net income and possibly prestige (Dionne & Contandriopoulos , 1985).

Moving one step forward, it can be conceived that when a doctor demands an informal payment, he is engaged into a behavior that puts him far away from acting as a perfect agent for the patient, and mainly take advantage of his role. So, the agency problem in this case which comes from physician's behavior to demand for informal payments, gives the health system a problematic function with a further possible creation of a more special unofficial health care market.

## **5. The Greek unofficial health care market, the shape of supply and demand**

### **5.1 The Greek unofficial health care market**

In the case of Greek health care system the main provider of health is the government, the supply and demand is mainly regulated, with the physicians in this case being price takers. However, the paradox in the Greek case is that even if the government is the main provider of health care and regulates the market, when looking more deeply into it; informal payments as being a big part of health care provision, the impression of a regulated and public market is not given. The doctors play an important role by setting their own prices and from price takers are transformed into price setters. So, when it comes to unofficial payments there is an informal market and the health care market in this case cannot be described neither as perfectly competitive nor as public regulated.

Consequently, in this case the market that can describe the informal market of unofficial payments in a better way is a monopolistically competitive model. In particular, there are characteristics which can support the existence of a monopolistically competitive market starting from that the providers of health; that being doctors, sell a different product, which is the difference in their ability as the patients perceive it. A big number of doctors exist, who give their services which are not conceived as perfect substitutes by the patients. The entry and exit of a physician in the informal market is easy and has no barriers. The easy entry is being implied by the large percentage of informal payments that attracts more doctors to get in. There are no barriers of exit, since the nature of this market as being

unofficial does not permit the existence of any type of contract that does not allow a doctor to be out of the informal market (Dranove & Satterthwaite, 2000).

## **5.2 The shape of supply and demand curve**

The next step for the better understanding of this unofficial market is the form of demand and supply. The demand that is faced by each physician has a downward slope and is steep with a price elasticity that is close to zero. The steepness of the demand curve can be attributed to some reasons, one of which is based on the perception of a patient that a purchase of health care good is necessary, thus the purchased health care quantity depends on a small extent on the price that patients have to pay. Demand's curve steepness is also explained by the fact that when a patient chooses a physician, a patient thinks other factors apart from price and it is typical that he is loyal to the physicians from whom he had positive health feedbacks before (Dranove & Satterthwaite, 2000).

Considering simultaneously that a physician sets his price for his services in the informal market, thus acting as a monopolist, a positive sloping supply curve cannot exist. A physician may provide more or less quantity of treatment depending on his choice of informal price and some other factors such as income and ethical concern which can affect this behavior, whereas physician's behavior can further be represented by a utility function.

## **6. Modeling physicians' behavior with utility maximization by adding ethical concern**

### **6.1 Key elements for analysis; physician as a utility maximiser**

Physician's behavior is an important topic in health economics since the physician is trained to be the leader in an assuming team of health provision, thinking also that without a physician no health care provision could possibly exist. Focusing on the informal market of unofficial payments in the Greek case, the theoretical approach that is adopted on the matter of physicians' behavior when they set their prices; that



implies that there is no one else that can impose a control on their reimbursement and more freedom is given to the physicians to set their prices, is a model which assumes that a physician has the highest power and as a monopolist can set his prices without being dependent on the prices that other doctors set (Fuchs 1974, cited in McGuire ,2000).

Synoptically, the key elements in order to proceed the analysis are that there is a monopolistically competitive market; as described in section 5.1, with physicians that are price setters but with the important distinction that physicians are not seen as profit maximisers; based on the argument that a physician is not a common businessman (McGuire, 2000). Physicians cannot be seen as common businessmen because they should have a concern about the health of their patients and that allows them to behave differently from a common businessman and subsequently not mainly care about income maximization. Therefore, physicians' behavior cannot be analyzed as a behavior of profit maximizers, but physicians are approached as rational individuals who try to maximize their utility. Subsequently, a physician's utility function can include factors such as income and ethical concern and possibly prestige. (Dionne & Contandriopoulos, 1985)

## **6.2 Theoretical framework**

In this section, firstly the standard monopoly case is presented with the further application of it into the utility maximization problem of a physician. This step is important because a monopolist's problem is connected to profit maximization problem and not to a utility maximization problem as in the case of doctors. In the second subsection a part of the model from the empirical paper of Thompson and Xavier (2002) is presented to show that a physician tries to solve his utility maximization problem by choosing the efficient amount of informal payment price. In the next section, the problem of a physician to maximize his utility is extended by inserting an ethical concern factor in order to see in what extent this contributes to the solution of the problem.

### 6.2.1 The standard case

In a classical monopoly case, a monopolist has some market power and is a price setter. In his try to maximize his profit function he faces a constraint of cost and a constraint that is connected to consumers' behavior who pay different prices to buy different amounts of commodities (Varian, 1992). Applying the standard case in the physician's behavior maximization problem, an existence of an unofficial health care market as described in section 5, gives a physician the power to act as a monopolist and being price setter with the purpose to maximize his utility. Physician's maximization problem is formulated as

$$\text{Max } U = P(Q) Q - C(Q) \quad (1)$$

P : informal price; set by physician

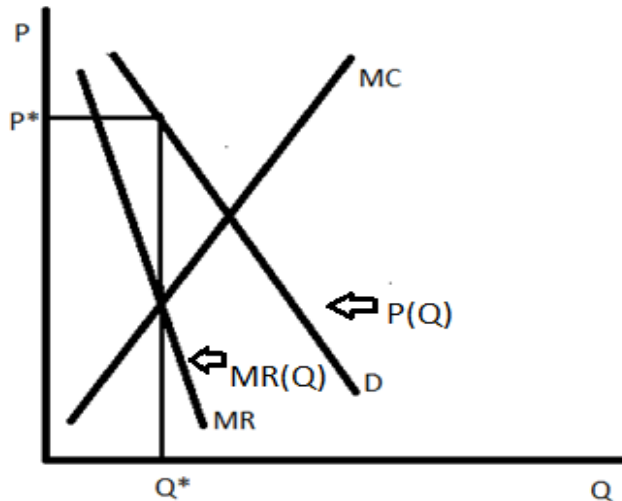
Q: output or quantity of treatment

C: cost; function of output or quantity of treatment

The cost depends on the produced or offered quantity of treatment, thus it is a production cost. This cost can for instance include the absence of some material or equipment that constrains the physician to supply the desired quantity of treatment. Solving the maximization problem by taking the first order condition with respect to quantity the following equation is derived (see appendix 1 for calculation)

$$P(Q) + \frac{\partial P}{\partial Q} Q = \frac{\partial C}{\partial Q} \quad (2)$$

Looking closer at equation (2) , the left hand side represents the marginal revenue (MR) and the right hand side represents the marginal cost (MC). So, equation (2) shows that in order to maximize utility a physician needs to offer a quantity of treatment so that his marginal revenue equals his marginal cost. And graphically this is what the problem represents:



### 6.2.2 The baseline model

In the paper of Thompson & Xavier (2002), informal payments were introduced in the doctors' utility maximization problem, and it was further shown that doctors chose to offer different quality of care depending on the informal payment that was given by patients. The cost which is included in the utility maximization problem does not represent a production cost as in the standard case but it is related to a sanction cost that the physician faces if he gets caught when asking for an informal payment.

The maximization problem of the physician in this case can be formulated as follows:

$$\text{Max } U = P Q(P) - C Q(P) \quad (3)$$

Solving the maximization problem by taking the first order condition with respect to price the following equation is derived (see appendix 2 for calculations):

$$Q(P) + \frac{\partial Q}{\partial P} P = C \frac{\partial Q}{\partial P} \quad (4)$$

By comparing equation (2) to (4) it can be seen that these two equations are similar, and equation (4) shows that for a physician to maximize his utility he needs to choose a price such as his marginal revenue equals marginal cost.

Rearranging equation (4) and performing some algebraic transformations; from equation (4) it is derived that (see appendix 2 for calculation) :

$$\frac{P - C}{P} = -\frac{1}{\varepsilon d} \quad (5)$$

where  $\varepsilon d < 0$  and represents the elasticity of demand.

On the left hand side of equation (5) there is a mark-up and on the right hand side the inverse elasticity of demand. The mark-up is the difference between price and marginal cost to the price, and the larger this difference gets the larger the mark-up. In addition, a mark-up shows the ability of a physician to charge a price higher than his marginal cost so as to maximize his utility function, hence a high mark-up implies a higher doctor's ability to charge a price higher than his marginal cost (Perloff , 2009).

Furthermore, equation (5) shows that there is inverse relationship between mark-up and price demand elasticity; low demand elasticity gives a high mark-up and high demand elasticity gives a low mark-up. By the description provided in section 5.2, the demand in the informal market has low price elasticity. Therefore, it is more likely that the mark-up of the physician is high in the informal market and his ability to charge a price higher than marginal cost is increasing as well. As a result in the informal market a physician is more able to increase the price of the informal payment and further take advantage of his role. It is notable that the ability of an individual physician to keep increasing price and have a high mark-up, is limited by the market situation<sup>1</sup>. This implies that there are competitors (other doctors) in the market that could possibly charge a lower informal price and attract more patients.

### **6.3 A new model; the baseline model with ethical concern**

The model that is used in order to insert ethical concern in the utility maximization problem is a combination of the Thompson & Xavier(2002) model and a model presented in a review article of Dionne and Contandriopoulos (1985), where ethical concern is indicated as a factor in the utility maximization problem of the physician. In the paper of Dionne and Contandriopoulos (1985) the prestige factor is included as a variable of maximizing doctor's utility but prestige is excluded from the following presented model mainly because its component of index of hospitals'

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<sup>1</sup> market situation means that the informal market is monopolistically competitive

quality cannot be measured, since neither measures about doctors' performance nor measures about quality indexes of the hospitals exist in the Greek health care system. In reality, these measurements are concepts far from the current situation when looking at the health care sector in Greece.<sup>2</sup>

The doctor maximizes his utility with the constraints of income and ethical concern. The problem can be formalized such that the physician tries to maximize his utility

$$\text{Max } U=U(Y, E) \quad (6)$$

Y= income

E=ethical concern

$$U_x > 0, U_{xx} < 0$$

$$x=Y, E$$

There is an exchange between the variables of income and ethical concern which means that a doctor might decrease his ethical concern in order to increase his income. The positive marginal utility that is given by  $U_x > 0$  shows that there is a positive relationship between utility and income, and utility and ethical concern. The negative second partial derivative of utility ( $U_{xx} < 0$ ) implies that there is a point for each of the factors of income, and ethical concern that gives the physician the highest level of utility (Dionne & Contandriopoulos, 1985).

Further, one should look at the constraints of the maximization problem so as to realize and understand in a better way the nature of the problem; meaning that there are factors behind the main determinants of the utility function that affect utility with one way or another . First there is the income constraint

$$Y=Y_{fixed} + Y_{informal} \quad (7).$$

The  $Y_{fixed}$  is the income that includes the type of reimbursement that the physician gain in the formal market and can have either the form of salary or the fee-for-

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<sup>2</sup> The prestige factor gives some policy implications that being discussed in the last section of the essay

service type of reimbursement. For simplicity of the analysis it is assumed that this income is fixed and exogenously determined, because the physician cannot directly influence that or at least he cannot influence this income at the same way that he can with informal payment income. The  $Y_{informal}$  needs to be determined as

$$Y_{informal} = P Q(P) - C Q(P) \quad (8)$$

P : price of informal payment

Q: output or quantity of treatment

C: cost

The cost in this model is similarly defined as in Thompson & Xavier empirical paper where a sanction cost is connected to the probability that a physician will be caught when asking for an informal payment.

Another constraint is the ethical concern constraint, which can be formulated as a negative relationship of the price of the informal payment; and as a positive relationship of doctor's accuracy about truth-telling. Accuracy can be conceived as the case when a physician plays the correct role in the principal agent relationship, being a perfect agent and not act for his interest. The more accurate the doctor is of saying the truth to a patient, the more the ethical concern of the doctor, and the higher the doctor's utility. It is noteworthy that the accuracy variable is possible to include some other variables, for instance an attitude variable that affects the behavior of the individual to act according to social norms and being a good doctor that only cares for the better health of the patients<sup>3</sup>. So, ethical concern is formally

$$E = E(P, A) \quad (9); \quad \frac{\partial E}{\partial P} < 0 \quad \text{and} \quad \frac{\partial E}{\partial A} > 0$$

A: accuracy of the doctor about truth-telling

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<sup>3</sup> Some policy implications connected with a possible attitude variable are discussed in the last section of this essay

The utility function of the physician is additive when taking into account the constraints (8) and (9) and the utility maximization problem is solved with respect to informal price.

$$\text{Max } U = P Q (P) - C Q (P) + E ( P, A ) \quad (10)$$

In continuing, the physician maximizes this utility function under the price of informal payment and solving the problem by taking the first order condition with respect to the informal price the following solution comes up (see appendix 3 for calculations) :

$$Q(P) + \frac{\partial Q}{\partial P} P = C \frac{\partial Q}{\partial P} - \frac{\partial E}{\partial P} \quad (11) ; \text{ where } \frac{\partial Q}{\partial P} < 0^4, \frac{\partial E}{\partial P} < 0$$

Comparing equation (11) with equation (4) , it is obvious that there is a similar result but extended with the partial derivative of ethical concern, which means that in this case the marginal cost is greater. However, for the solution of the utility maximization problem it is required that the marginal revenue should be equal to the marginal cost, and taking that marginal cost is higher; as shown in equation (11) when inserting ethical concern in the maximization problem, it is implied that marginal revenue should increase and this involves a lower price. More clearly, when looking at the left hand side of equation (11) for the marginal revenue to increase, quantity must increase, and by assumption the price negatively affects quantity, so quantity can increase if price decreases. The other factor which affects the marginal revenue is the partial derivative of price on quantity which is assumed to be negative, by the shape of the demand curve and requires that a decrease in price will give an increase in quantity and a subsequent increase in marginal revenue.

By applying some algebraic transformations in equation (11), (see appendix 3 for calculations) it gives

$$\frac{P-C}{P} = -\frac{1}{\varepsilon d} - \frac{1}{P} \frac{\frac{\partial E}{\partial P}}{\frac{\partial Q}{\partial P}} \quad (12)$$

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<sup>4</sup> It is derived from the assumption that price elasticity of demand is negative, which implies that there is a negative relationship between price and quantity

On the left hand side of this equation there is a mark-up and by comparing equation (12) with equation (5), it is obvious that the mark-up is now getting smaller. The reason for that is because the mark-up decreases with price demand elasticity at the same manner as in equation (5); a low demand elasticity gives a high mark-up and a high demand elasticity gives a low mark-up, but it also decreases by a second factor.

Looking at the extra factor, the fraction  $\frac{\frac{\partial E}{\partial P}}{\frac{\partial Q}{\partial P}}$  by itself gives a positive effect but that becomes negative<sup>5</sup> in the equation (12).

In subsection 6.2.2 it was concluded that it is more likely to have a high mark-up, hence a high ability of an individual doctor to charge higher prices. His ability can be restricted by the structure of the market that allows the existence of many doctors who can charge lower prices and attract more patients. In addition, with equation (12) it is implied that this ability is further restricted because the mark-up becomes smaller. Ethical concern plays a role in that restriction as seen from the fraction  $\frac{\partial E}{\partial P}$  since it gives an individual physician a lower mark-up, a lower ability to charge a higher price for an informal payment. Actually, by looking at equation (11); as argued previously, it is better for the individual doctor to decrease the price of the informal payment so as to maximize his utility.

## 7. Conclusions and policy implications

The models presented and discussed above strongly show that informal payments affect physicians' behavior because they contribute to the solution of the utility maximization problem of the physician. From Thompson & Xavier model it can be concluded that informal payments give physicians an ability to charge prices that are higher than the marginal cost and that ability is inversely related to price demand elasticity. Since an individual physician faces a downward steep demand curve with low demand elasticity in the informal market due to the necessity of the commodity of healthcare, it is likely that physician's ability is high. However, physician's ability to

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<sup>5</sup> Positive because it is assumed that  $\frac{\partial E}{\partial P} < 0$  and  $\frac{\partial Q}{\partial P} < 0$  and then negative because of the minus sign in front of this part  $-\frac{1}{P} \frac{\frac{\partial E}{\partial P}}{\frac{\partial Q}{\partial P}}$



keep increasing the informal price is restricted by the market of informal payments which is monopolistically competitive and allows the existence of other doctors who offer health care services that are not perfect substitutes. In this sense there are competitors; the other doctors who can charge a lower price and attract more patients.

In addition, when the model of Thompson and Xavier (2002) is extended by inserting the ethical concern factor in the utility maximization problem the physician continues to have a high ability to charge larger prices than the marginal cost due to low demand elasticity . Nevertheless the addition of ethical concern constraint lowers the power<sup>6</sup> of the physician. Physicians' power gets smaller, because the mark-up gets smaller as it does not only inversely depend on price demand elasticity but additionally depends on the marginal effect of the price of the informal payment on ethical concern and the marginal effect of the price of informal payments on quantity of treatment. It is therefore obvious to conclude that the ethical concern factor plays a role in the utility maximization problem and more focus should be made to improve that factor so as to affect doctors' behavior in the direction of not asking any informal payment.

The ethical concern factor can be influenced in different ways and this should be understood by looking at the ethical concern constraint more deeply.

By looking more closely to equation (9) the ethical concern can be influenced by increasing the variable of accuracy. The accuracy variable seems to contain an attitude variable that makes an individual doctor to act correctly so as to be a good doctor that cares for patients' better health. The attitude variable can be influenced during the university education period of a doctor which implies that more courses during the medical study period could be introduced. A good designed and sufficient number of ethical courses during the medical university education would teach medical students that an ethical attitude or behavior in their future profession is very important. In particular, in countries where the unofficial payments are strongly established in the health care system; one of which being Greece, more

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<sup>6</sup> The term power is the ability of the individual physician to charge a price higher than marginal cost

medical ethics courses should exist. By having a special focus in ethical part during the education period future doctors will have a high level of ethical concern when they get into the medical profession, which will make them not to ask for informal payments.

Additionally to the ethical concern that can be influenced, more policy implications can be derived in order to decrease the phenomenon of informal payments in Greece and in other countries that suffer from that. Governments should have stronger control mechanisms in addition to the illegality of the action of accepting informal payments. Stronger mechanisms imply serious punishments for those doctors that take informal payments (Tatar ,et al., 2007). For instance, a serious punishment can be related by calling the action of accepting informal payments a criminal action, and sentence the criminal–doctor to the prison.

Moreover, a state must try to have a system that is in general more transparent, which implies that if a patient comes across the behavior of a doctor that demanded an informal payment, this patient should be able to report the doctor’s action without any fear ( Ensor T., 2004 ; Vian et al., 2006). Therefore, the existence of an official state organization, where patients can complain and report doctors’ behavior of asking informal payments is vital to exist. By having an official organization for patients’ complaint not only the informal payments can be decreased but it can also be easily known that informal payments are generally unaccepted and illegal. In order to make the formentioned organization known it is important that a government has a good advertising plan, for example by using social media and have advertising campaigns in places such as hospitals.

Furthermore, a prestige factor as Dionne & Contandriopoulos argue in their paper is possible to affect physicians’ utility maximization problem. However, in the new constructed model with the ethical constraint, the prestige constraint was decided not to be included because the part of quality index does not exist in the Greek health care market. Since it is likely that quality indexes affect prestige and prestige affects doctors’ behavior, it would be a good idea to insert quality indexes into the Greek health care system so as to measure and evaluate doctors’ performance. The

establishment of quality indexes is possible to give incentives to doctors to work more and increase their offered quantity of treatment, since their performance will be in a sense monitored. It is more likely that doctors would mainly focus on increasing their quantity and quality of treatment and have a high quality index and as a result they will not care to ask or induce informal prices. The quality indexes when established should further be connected to doctors' reimbursement so as the higher the quality index the higher the reimbursement.

Lastly, the empirical application of the model with the ethical concern factor can be an interesting and open topic for further research. Nevertheless, one should also consider that there are limitations for empirical application with models that include informal payments in general because it is very hard to find people that want to openly talk for that matter, which makes the data collection a complex task.

## 8. Appendices

### Appendix 1

$$\text{Max } U = P(Q) Q - C(Q) \quad (1)$$

$$\frac{\partial U}{\partial P} = 0$$

$$P(Q) + Q \frac{\partial P}{\partial Q} - \frac{\partial C}{\partial Q} = 0$$

$$P(Q) + \frac{\partial P}{\partial Q} Q = \frac{\partial C}{\partial Q} \quad (2) ; \text{ which shows that MR=MC}$$

$$\text{where MR} = P(Q) + \frac{\partial P}{\partial Q} Q \text{ \& MC} = \frac{\partial C}{\partial Q}$$

### Appendix 2

$$\text{Max } U = P Q(P) - C Q(P) \quad (3)$$

$$\frac{\partial U}{\partial P} = 0$$

$$Q(P) + P \frac{\partial Q}{\partial P} - C \frac{\partial Q}{\partial P} = 0$$

$$Q(P) + \frac{\partial Q}{\partial P} P = C \frac{\partial Q}{\partial P} \quad (4)$$

### Algebraic calculation from equation (4) to equation (5)

$$\text{Note that } \varepsilon_d = \frac{\partial Q}{\partial P} \frac{P}{Q} < 0 \text{ and } \frac{1}{\varepsilon_d} = \frac{\partial P}{\partial Q} \frac{Q}{P} < 0$$

$$\text{Rearrange the } Q(P) + \frac{\partial Q}{\partial P} P = C \frac{\partial Q}{\partial P} \quad (4)$$

$$\frac{\partial Q}{\partial P} P - C \frac{\partial Q}{\partial P} = -Q(P) \text{ and divide both sides by P}$$

$$\frac{\frac{\partial Q}{\partial P} P}{P} - \frac{C \frac{\partial Q}{\partial P}}{P} = -\frac{Q(P)}{P}$$

$$\frac{(P-C) \frac{\partial Q}{\partial P}}{P} = -\frac{Q(P)}{P}$$

$$\frac{(P-C)}{P} = - \frac{Q(P)}{P} \frac{\partial P}{\partial Q}$$

$$\frac{(P-C)}{P} = - \frac{1}{\varepsilon_d} \quad (5)$$

### Appendix 3

$$\text{Max } U = P Q(P) - C Q(P) + E(P, A) \quad (10)$$

$$\frac{\partial U}{\partial P} = 0$$

$$Q(P) + P \frac{\partial Q}{\partial P} - C \frac{\partial Q}{\partial P} + \frac{\partial E}{\partial P} = 0$$

$$Q(P) + P \frac{\partial Q}{\partial P} = C \frac{\partial Q}{\partial P} - \frac{\partial E}{\partial P} \quad (11) \quad \text{where } \frac{\partial Q}{\partial P} < 0, \frac{\partial E}{\partial P} < 0$$

### Algebraic calculation from (11) to (12)

Rearrange equation (11)

$$P \frac{\partial Q}{\partial P} - C \frac{\partial Q}{\partial P} = -Q(P) - \frac{\partial E}{\partial P} \quad \text{and divide both sides by } P$$

$$\frac{\frac{\partial Q}{\partial P} P}{P} - \frac{C \frac{\partial Q}{\partial P}}{P} = - \frac{Q(P)}{P} - \frac{\frac{\partial E}{\partial P}}{P}$$

$$\frac{(P-C)}{P} \frac{\partial Q}{\partial P} = - \frac{Q(P)}{P} - \frac{\frac{\partial E}{\partial P}}{P}$$

$$\frac{(P-C)}{P} = \left( - \frac{Q(P)}{P} - \frac{\frac{\partial E}{\partial P}}{P} \right) \frac{\partial P}{\partial Q}$$

$$\frac{(P-C)}{P} = - \frac{Q(P)}{P} \frac{\partial P}{\partial Q} - \frac{\frac{\partial E}{\partial P}}{P} \frac{\partial P}{\partial Q}$$

$$\frac{(P-C)}{P} = - \frac{1}{\varepsilon_d} - \frac{1}{P} \frac{\frac{\partial E}{\partial P}}{\frac{\partial Q}{\partial P}} \quad (12) \quad \text{where } \varepsilon_d < 0, \frac{\partial Q}{\partial P} < 0, \frac{\partial E}{\partial P} < 0$$

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