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THE GIFT GAME IN HEALTHCARE SECTOR – THE CASE OF ROMANIA

***Abstract.** Offering gifts in the health care sector became common and expected in several East-European countries. Whether we are talking about an amount of money or flowers, such “gifts” deteriorate the access to care, influencing the way patients are treated and served. To examine this issue, we develop a game in incomplete information in order to describe the possible corrupt interactions between medical staff and patients. The patient can be of two types (unknown to the doctor): whether doctor’s friend - case where he will prefer to offer the bribe without denounce the doctor’s attitude, or to be correct, case when will denounce the doctor if he accepts the bribe. The game proceeds as follows: at the first stage, the patient (P) decides to offer or not a bribe to the doctor (D). If no bribe is offered, the game ends. If the patient decides to offer a bribe, the doctor can accept or refuse the “gift”, depending on his beliefs about patient’s type. Using this model and some available data for Romania we tried to estimate the conditions that will lead a doctor to receive a bribe or not. Contrary to the reality in the Romanian healthcare system, the model that we proposed suggests that rational actors that take into consideration their expected payoffs should decide not to give a bribe, and even in the case the bribe is offered, it should not be accepted. Looking at the sensitivity analysis, the players’ behavior depends on the type of patient, the bribe level and the probability of offering, respectively receiving the bribe.*

***Keywords:** bribe, corruption, gifts, healthcare, game in incomplete information.*

JEL Classification: C70, D73, I10

1. Introduction

Informal payments in healthcare system, called in a polite way “the plain envelopes giving habit in hospitals”, are not a specific phenomenon only for Romania but for all Eastern European countries. This is because most of the medical systems in the countries in this region inherited it from the Soviet tradition and are not able to provide to the patients access to treatments or medical services based on the so-called universal medical insurance. Such gifts – envelopes containing money - can seriously damage health system and make impossible increasing the efficiency of medical services. The worse situation is in Ukraine and Moldova, where the practice of giving envelopes with money to medical staff is a generalized practice. The more severe the disease is, the thicker the envelope is. In many cases, informal payments are conditioned by the medical staff and sometimes even to get analgesics patients need to pay. In Romania, some people believe it is their duty to provide informal payments to doctors, but what distinguishes Romanians from other peoples in the region is that most of the envelopes offered in hospitals are a sign of gratitude for doctors, at least as stated by most of those interviewed in an extended study realised by Stanculescu and Nicolau (2014) and published by the German foundation Friedrich-Ebert Stiftung. This "gratitude" of the Romanian patients is, however, expensive. Romanians, along with Ukrainians, are the Europeans who borrow the most often or sell their goods most often to cover their health expenses, although they are theoretically physically insured. In the whole region, Romanians, with the exception of Ukrainians, are the most affected by the direct health-related expenses have to do even when they have compulsory medical insurance.

Most of the Romanian patients consider that the envelope is not compulsory, but it facilitates access to better care. At the same time, most patients prefer to go to the doctor's private clinic because "the same doctor performs better when paid privately, not publicly."

Conditioning the medical act by the doctor is considered corruption by the majority, but the same majority believes that if they offer the envelope, they will receive better treatment.

To describe corruption in medical care and bribing behavior, we developed a game in incomplete information considering possible corrupt interactions between medical staff and patients. We started from the assumption that patient can be of two types, which are unknown to the doctor: whether will cooperate with the doctor (that means to offer the bribe without denounce him), or the patient that denounce the doctor if he accepts the bribe. The game proceeds as follows: at the first stage, the patient (P) decides to offer or not a bribe to the doctor (D). If no bribe is offered, the game ends. If the patient decides to offers a bribe, the doctor can accept or refuse the “gift”, depending on his beliefs about patient’s type. Using this model and some available data for Romania we tried to estimate the conditions that will lead a doctor to receive a bribe or not.

Our paper is organized as follows: Section 2 includes some considerations and literature survey about the possibility of corruption in health system; Section 3 contains the game-theoretic model; Section 4 presents an application of the model based on Romania's data and Section 5 concludes.

2. Literature review

Patients often want to show their appreciation to medical staff by offering gifts, but this simple act can create serious issues to care practices, influencing the way patients are treated and served. In systems which are no well-defined regulations about patient's rewards on the medical staff, it exists various options in this direction. Caddell and Hazelton (2013) observe in their study that some Canadian care physicians accept some gifts from their patients, arguing this attitude can create a better connection between medical personnel and patients, while others never accept any gifts. They continued the study by examining the arguments for both opinions. They proposed an upper limit on the value of gifts. The medical staff can accept or refuse a gift, with some specificities: if they accept monetary gifts it is possible to redirect it toward charities. More of this, they propose that any proposed gifts (accepted or not) to be recorded. If the gift is rejected, they must offer a motivation to the patient that ensure him the level of care will not be adulterated.

Patients' attitude regarding health care systems (not only in East European countries) is a subject for many researchers in the last period. Burcea, Toma and Papuc (2013) shows the level of patient's dissatisfaction can be influenced by different factors as the level of medical personnel professionalism, the waiting time in emergency units, or the level of corruption that exists in the care health system. Popa et al. (2017) conduct a survey to analyze patients' levels of dissatisfaction. They analyze the questionnaire responses from 1838 patients regarding professionalism of medical personnel in Romanian hospitals. They observe from the responses that sanitary and privacy conditions within the hospital, medical staff's hygiene and medical personnel's ability to communicate with the patients are the main factors that influence the patients' dissatisfaction level.

Informal payments are a common practice in healthcare system, the reasons of this habit are diverse, ranging from economic factors (low salaries of medical staff, which lead them to accept payments from patients) to the social and cultural factors (high number of patients for one doctor and the willingness to take precedence, the mentality and the habits), ethical and legal factors (lack of effective tools for prevention and sanction). Some patients feel obliged to make informal payments, while others say that they do this in sign of gratitude to medical staff. (Petroia and Zubcova, 2016).

Gift-giving is a common practice in Romania, whether we are talking about money, small attentions or flowers. Hence many local researchers investigated the impact of these forms of corruption in the public health system. Farcasanu (2010) realized an opinion study in 2009 with the aim to understand

Romanians' perception regarding corruption in the health system, informal payments and introducing co-payments for medical services. One of every five respondents consider corruption as the main problem of the Romanian medical system and most of the participants are against the informal payments and considers that the introduction of co-payments will not decrease corruption or informal, neither will increase the health services' quality if they are not accompanied by measures directly addressed to these services. Few years later another survey-based analysis was performed by Lobont, Moldovan and Popescu (2013) to determine the level of corruption in Romania. The results are in line with the previous research: in Romania, corruption is pervasive. Stepurko, Pavlova, Gryga and Groot (2013) realized a comparison between the public perceptions towards informal patient payments in six Central and East European countries (Poland, Lithuania, Hungary, Bulgaria, Romania and Ukraine) and found that informal gifts are widely spread (between 35% and 60% of the respondents have offered gifts or other payments in health system). An interesting observation is that informal cash payments are seen as corruption acts, while gifts are often perceived as signs of gratitude to the medical staff.

Chereches, Ungureanu, Rus and Baba (2011) went deeper with the analysis and investigated the informal payments in the health system in Romania. They used three data sets: one from scientific literature, the second one from on-line sources and the third one from legislation and policies and analyze some keywords like: envelope payment, out of pocket money, healthcare corruption, under the table money or under-the-counter payment. They observe that informal payments are a big problem for healthcare system in Romanian and also there are a weak relationship between the policies implemented to reduce the corruption and the real facts.

Manea (2015) focused her attention on the medical bribery in Romania and analyzed similar situations in CEE countries. She proposed some strategies against corruption phenomenon, like increasing medical staff revenues, increasing healthcare system funds, to increase the trust in personnel and medical institutions or to implement an educational program that help to better understand the corruption mechanism and its negative consequences.

As we can see health systems are very exposed to corruption due to the many participants who play a role in providing or requesting medical services. Many researchers have focused on this aspect, trying to use Game Theory in order to analyze this. Jiang et al. (1999) considered a game in information asymmetry and analyzed the regulation corruption generated conditions and preventive measures.

Balafoutas (2011) build a game with three players (the public, the bureaucrat and the lobby part) in order to analyze the aversion guilt for corruption in administration. He defines a moral cost of corruption for bureaucrat (constant or time varying) and shows that in time –varying conditions the corruption level depend on duration of the game.

Berninghaus et al. (2013) analyzed the relationship between beliefs, behavioral choices and risk attitude of the players building a coordination game in a corruption situation scenario. They observe that risk attitude is not important for players' choice between corruption and non-corruption attitude, but a higher uncertainty level tends to reduce corruption incentives.

Choi, Jung and Yim (2021) analyze the effect of anti-corruption legislation in South Korean economy using a dynamic game in complete information. They study the effect of legislation modifying on Korean firm behavior and performances. The main result shows that the new legislation does not influence homogenous companies' behavior, depending on market position of the firm.

Tuchilus (2018) develops various games describing the patient-doctor interactions including the existence of corruption. The results contain the theoretical solution for a non-corruption equilibrium. Tuchilus and Roman (2019) have built a simultaneous game that analyze bargaining power of the players (patient and doctor) and suggest as solutions for diminishing corruption levels: the improvement of corruption detection (using inspections and audits), increasing corruption acts penalties, increasing medical personnel revenues or improving medical acts such that patients be equally cared for.

In this paper we investigate the corruption acts in healthcare system using a game theory model in incomplete information.

3. The Gift Game – A game theoretic approach

We define a model to represent a game in incomplete information which will describe the interaction between a doctor and a patient. Hence in this game, players may or may not know some information about the other players, e.g. their "type", their strategies, payoffs or their preferences.

Starting from this assumption, the game will look as follows: the patient (P) decides whether to offer or not a gift to the doctor (D) for its medical services. If no gift or bribe is offered, the game ends; if the patient offers the gift, the doctor decide if accept or reject it.

The Patient can be of two types: to considers himself to be doctor's friend, and to not anticorruption authorities in the doctor accept the bribe (type F) or to be correct, respectively to report the non-ethical doctor's behavior (type E). The patient knows his type and the doctor can only to make suppositions on the patient's type. In this case, if the patient is a friend it means that either the doctor accepts or not the bribe, he will not report the action, whereas the enemy will announce the anti-corruption authorities in case the doctors decides to accept the bribe. The doctor considers with probability p the type is F and with probability $1-p$ is the type E. The probability parameter p , is common knowledge for both players.

Doctor's payoffs depend on the patient's type. We suppose that type F is deciding whether to offer a bribe in order to receive good service and the type E is deciding to offer a bribe and denounce the doctor for bribery.

If patient is type F (Friend), the payoff matrix is described in Figure 1, and for the type E (call Enemy) the payoff matrix is described in Figure 2.

Our variables are:

- N represent doctor's revenue;
- R represent the bribe level;
- S represent the penalty imposed by authorities for corruption act, if it is discovered;
- t_1 represent the number of hours that patient is waiting in the queue;
- t_2 is the number of hours necessary for corruption interaction;
- $\epsilon \cdot Z$ is an psychological costs: ϵ represents the doctor's subjective personal attitude regarding receiving gifts, and Z is the social penalty from being charged as corrupt.

		D	
		A	R
P	NB^F	$-t_1, N$	$-t_1, N$
	B^F	$-R - t_2, N + \frac{R}{N}$	$-t_1 - t_2, N$

Figure 1: Payoff matrix – The case where patient is doctor's friend

Source: Authors calculation

		D	
		A	R
P	NB^E	$-t_1, N$	$-t_1, N$
	B^E	$-R - t_2, N + \frac{R-S-\epsilon Z}{N}$	$-R - t_2, N$

Figure 2: Payoff matrix – The case where patient is doctor's enemy

Source: Authors calculation

The set of available actions for each type of the patient is {Not Bribe (NB), Bribe (B)}. A strategy for patient is a function that specify the action he chooses by each type. Thus, the patient has four possible strategies: NB^F , NB^E , B^F , B^E , depending on his type.

The doctor has two possible strategies: to accept the bribe (A) or to refuse the bribe (R).

For any profile of strategies, we determine each player's expected payoff, in incomplete information, respectively if the patient do not reveal his type:

- the profile (NB, A) yields:
 - for patient an expected payoff of: $p(-t_1) + (1 - p)(-t_1) = -t_1$
 - for doctor an expected payoff of: $pN + (1 - p)N = N$;
- the profile (B, A) yields:
 - for patient an expected payoff of: $p(-R - t_2) + (1 - p)(-R - t_2) = -R - t_2$

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- for doctor an expected payoff of: $p\left(N + \frac{R}{N}\right) + (1 - p)\left(N + \frac{R-S-\epsilon Z}{N}\right)$;
- the profile (NB, R) yields:
 - for patient an expected payoff of: $p(-t_1) + (1 - p)(-t_1) = -t_1$
 - for doctor an expected payoff of: $pN + (1 - p)N = N$;
- the profile (B, R) yields:
 - for patient an expected payoff of: $p(-t_1 - t_2) + (1 - p)(-R - t_2) = p(R - t_1) - R - t_2$
 - for doctor an expected payoff of: $pN + (1 - p)N = N$;

Using the previous calculus, we build the payoff matrix corresponding to the Bayesian normal form (see Figure 3):

		D	
		A	R
P	NB	$-t_1, N$	$-t_1, N$
	B	$-R - t_2, p\left(N + \frac{R}{N}\right) + (1 - p)\left(N + \frac{R-S-\epsilon Z}{N}\right)$	$p(R - t_1) - R - t_2, N$

Figure 3: Payoff matrix corresponding to the game in Bayesian normal form
 Source: Authors calculation

We will convert the game of incomplete information into a Bayesian extensive-form game, by adding a supplementary player, the Nature, which have first decision choosing the patient type. Figures 4 and 5 contains the game trees corresponding to the situations doctor could be facing (for payoffs calculations, please see Figure 1 and Figure 2).

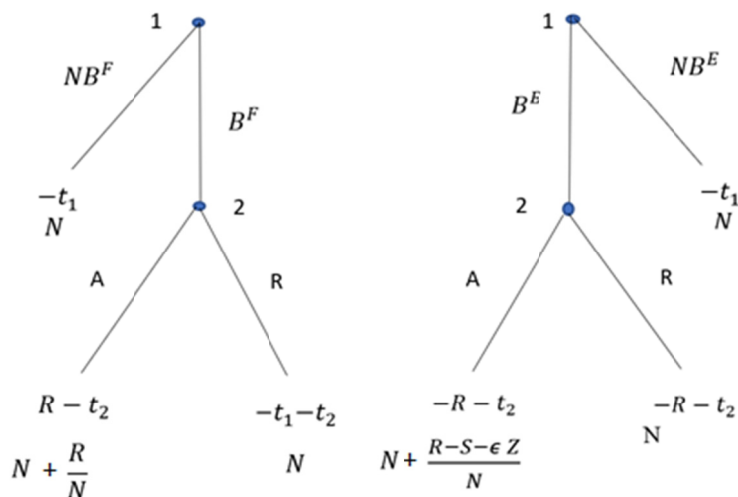


Figure 4: Bayesian Extensive-Form Game for the 2 situations doctor could be facing

Source: Authors calculation

The game in incomplete information is transformed into a game in dynamic imperfect information: we include Nature as first player who selects patient's type. In Figure 6 is the game in Bayesian extensive form. Nature choose first, selecting patient's type F with probability p and patient's type E with probability $1-p$. These probabilities are noted to the corresponding branches.

Based on the way the information sets are drawn, we observe that patient observes Nature's move (respectively knows his type) but the doctor does not observe Nature's move (and make assumptions on patient's type).

The player's decisions are not simultaneously. This introduces a new element of complexity into the game: the doctor may learn something about patient's type by observing his action. In this game a patient of type F cannot ignore the existence of the type E. While doctor cannot observe Nature's choose, he will accept the bribe only depending on that part of the tree the game develop. Also rational patients must take consideration about what his other types can decide.

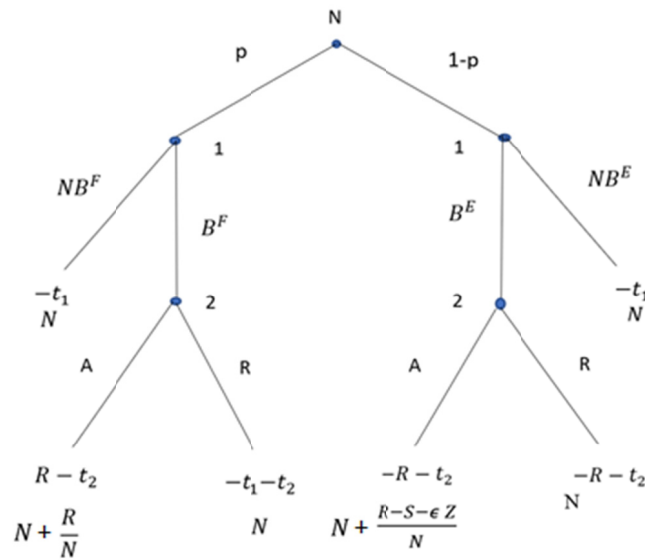


Figure 5: Bayesian extensive form of the game in imperfect information
 Source: Authors calculation

Bayes-Nash Equilibrium

Recall the strategies NB = no bribing, B = bribing, A =accept and R=Reject and the types: F – friend, E=enemy. We will assume the patient knows his true type, and therefore, which of the two games are being played: F, E. Also, we assume the doctor attaches probability p to the patient being his friend and 1-p to the patient being his enemy. Our big assumption is that the patient knows doctor’s estimate of p.

Bayes-Nash equilibrium is generalization of Nash equilibrium for an incomplete information game. To be able to find the equilibria we converted first the game into a game of imperfect

Information (see Figure 5). We will use the Nash equilibria of this imperfect information game as the solution concept and focus on pure strategies. Hence, doctor’s pure strategy choices are A and R. On the other hand, patient’s pure strategies are NB^F, NB^E, B^F, B^E .

4. Some implications to Romania’s Case

Considering the above presented model, we can try to predict the conditions that will determine a doctor from Romania to receive a bribe or not. Based on previously conducted studies¹ there were three categories of respondents: those who admitted to giving a bribe, those who said they did not give a bribe and

¹ Data source: CONFIDO Study, Aspen Romania Institute, www.aspeninstitute.ro

those who refused to answer the question. Those Romanians that admitted to giving a bribe will be further considered as those that were type friend (70% of respondents), while those that refused to answer the questions (approx. 10% of respondents) will be considered as those that gave a bribe but were of type enemy. Given the above numbers, we will consider that in Romania the probability of a patient giving a bribe in the healthcare system to be a friend of the doctor is 88%, while in 12% of those giving a bribe will most probably go to the Anti-Corruption authorities. Therefore, in the model we will consider $p = 0.88$. From the same study we find out that the average bribe value is 70 Euros, therefore we will consider for the model the value of the bribe $R = 70$ Euros.

In Romania, even if the penalty for corruption might end even with time spent in prison, in most of the cases the doctors that are denounced for bribery receive a fine, but they can still continue to practice their job. Combined with the fact that bribery is unfortunately a well encountered phenomenon in the public system in Romania, we can conclude that the psychological costs are not too elevated. Hence, we will consider a penalty of $S = 5\,000$ Euros and a psychological cost of $Z = 600$ Euros.

As for the patient, if there is no corrupt interaction let's assume for a waiting time of $t_1 = 15$ days, while if the corrupt interaction occurs the patient will only wait 3 days to be scheduled for a consult, so $t_2 = 3$ days. In order to have the same measure units, we will consider the cost of waiting time as the average salary that the patient loses by waiting in line instead of being at work. In Romania the average salary is 1,100 Euros, so the daily rate is approximately 55 Euros, therefore $t_1 = 825$ Euros and $t_2 = 165$ Euros.

The salaries of the doctors vary very much as per each medical area, but after the latest increases in their incomes we will assume an average monthly salary of 3 000 Euros.

Given the above estimated numbers we have the payoff matrix described in Figure 6.

For type friend, with a probability of $p = 0.88$:

		D	
		A	R
P	NB^F	- 825 ; 3 000	- 825 ; 3 000
	B^F	- 235 ; 3 000.023	- 990 ; 3 000

Figure 6: Payoff matrix – The case where patient is doctor's friend

Source: Authors calculation

For type enemy, with a probability of $1 - p = 0.12$:

		D	
		A	R
P	NB^E	- 825 ; 3 000	- 825 ; 3 000
	B^E	- 235 ; 1 157	- 235 ; 3 000

Figure 7: Payoff matrix – the case where patient is doctor's enemy

Source: Authors calculation

The game in Bayesian extensive form is described in Figure 8.

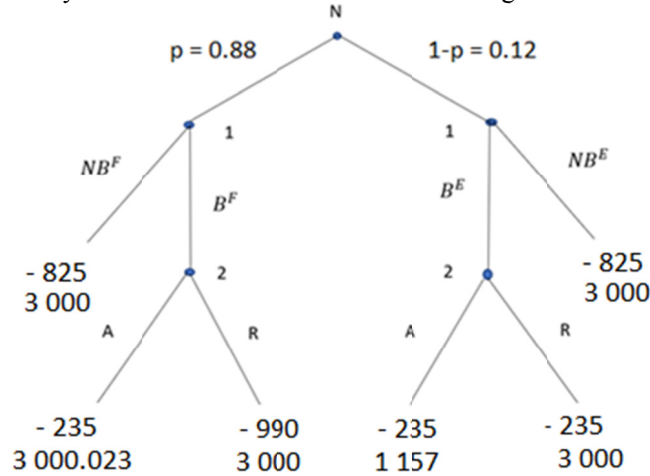


Figure 8: Bayesian extensive form of the game in imperfect information – Romanian healthcare system numbers

Source: Authors calculation

Considering the numbers computed for the Romanian healthcare system:

- the profile (NB, A) yields:
 - to the patient an expected payoff of - 825
 - to the doctor an expected payoff of 3 000;
- the profile (B, A) yields:
 - to the patient an expected payoff of - 235
 - to the doctor an expected payoff of 2 894.54;
- the profile (NB, R) yields:
 - to the patient an expected payoff of - 825
 - to the doctor an expected payoff of 3 000;
- the profile (B, R) yields:
 - to the patient an expected payoff of - 900
 - to the doctor an expected payoff of 3 000;

Based on the above information we can form the expected payoffs matrix and check for any pure strategies:

		D	
		A	R
P	NB	- 825 ; 3 000	- 825 ; 3 000
	B	- 235 ; 2 894.54	- 900 ; 3 000

Figure 9: Expected payoffs matrix

Source: Authors calculation

From the above matrix we can conclude that we have an equilibrium in pure strategies, in which the patient will not offer a bribe and the doctor will consequently do not accept a bribe.

Sensitivity analysis

In the following we will check the levels of the variables considered in the model and see when the game admits pure strategies and when it admits mixed strategies solutions.

We will take each type of patient, friend or enemy, and assign probabilities for each of the actions they might take: bribe or no bribe for the patient and accept or reject the bribe for the doctor. We will compute expected payoffs for each player. The equilibrium point is where the player is indifferent between its possible strategies.

When the patient decides not to give a bribe (NB) it yields to him an expected payoff of: $p(-t_1) + (1 - p)(-t_1)$ (1)

When the patient decides to give a bribe (B) it yields to him an expected payoff of: $p(-R - t_2) + (1 - p)(-t_1 - t_2)$ (2)

When the doctor decides to accept the bribe (A) it yields to him an expected payoff of: $qN + (1 - q)\left(N + \frac{R}{N}\right)$ (3)

When the doctor decides to reject the bribe (R) it yields to him an expected payoff of: $qN + (1 - q)N$ (4)

Patient type Friend:

		D		
		A	R	
P	NB^F	$-t_1, N$	$-t_1, N$	q
	B^F	$-R - t_2, N + \frac{R}{N}$	$-t_1 - t_2, N$	1-q
		p	1-p	probability

Figure 10. Payoff matrix for Friend Type of patient

Source: Authors calculation

When the patient decides not to give a bribe (NB) it yields to him an expected payoff of: $p(-t_1) + (1 - p)(-t_1)$ (5)

When the patient decides to give a bribe (B) it yields to him an expected payoff of: $p(-R - t_2) + (1 - p)(-t_1 - t_2)$ (6)

When the doctor decides to accept the bribe (A) it yields to him an expected payoff of: $qN + (1 - q)\left(N + \frac{R}{N}\right)$ (7)

When the doctor decides to reject the bribe (R) it yields to him an expected payoff of: $qN + (1 - q)N$ (8)

By equaling equations (1) and (2) we obtain the following condition:

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$$p(-R + t_1) - t_2 = 0 \quad (9)$$

Therefore $p = \frac{t_2}{t_1 - R}$ is the probability that the doctor will accept the bribe.

When $t_2 = t_1 - R$, the doctor will definitively accept the bribe, while when $t_1 - R$ is very high (the waiting time without the corrupt interaction is significantly higher than the one where the corrupt interaction occurs and the value of the bribe is low), the doctor will most probably reject the bribe.

By equaling equations (8) and (9) we obtain the following condition:

$$\frac{R}{N}(1 - q) = 0$$

This condition is met either when $q = 1$ or when N is very high. Therefore, we can conclude that the patient will definitively offer a bribe the bribe only when the ratio $\frac{R}{N}$ tends to 0 so the value of the bribe is insignificant and/or the salary of the doctor is very high. When the ratio between bribe and salary does not tend to 0, the patient will most probable refuse to give a bribe.

Patient type Enemy:

		D		
		A	R	
P	NB^E	$-t_1, N$	$-t_1, N$	q
	B^E	$-R - t_2, N + \frac{R-S-\epsilon Z}{N}$	$-R - t_2, N$	1-q
		p	1-p	probability

Figure 11. Payoff matrix for Enemy Type of patient

Source: Authors calculation

When the patient decides not to give a bribe (NB) it yields to him an expected payoff of: $p(-t_1) + (1 - p)(-t_1)$ (10)

When the patient decides to give a bribe (B) it yields to him an expected payoff of: $p(-R - t_2) + (1 - p)(-R - t_2)$ (11)

When the doctor decides to accept the bribe (A) it yields to him an expected payoff of: $qN + (1 - q)\left(N + \frac{R-S-\epsilon Z}{N}\right)$ (12)

When the doctor decides to reject the bribe (R) it yields to him an expected payoff of: $qN + (1 - q)N$ (13)

By equaling equations (10) and (11) we obtain the following condition: $-R - t_2 + t_1 = 0$ (14)

By equaling equations (12) and (13) we obtain the following condition: $(1 - q)\left(\frac{R-S-\epsilon Z}{N}\right) = 0$ (15)

This condition is met either when $q = 1$ or when $R - S - Z = 0$

Therefore, when the value of the bribe is equal to the costs incurred to the doctor by being caught (sanctions plus psychological costs) the patient type enemy will offer a bribe, otherwise he will not.

4. Conclusions

Even if the salaries of doctors have been raised, patients in Romania are continuing with the bribing practices, giving money or gifts to the doctors and nurses; it seems that corruption is a phenomenon that has entered in the Romanians' blood. This is mainly because the medical system is not performing well despite of the wage increases. We all know it's very busy in the hospitals, we often have to wait until we can get a medical service, we know we often do not find the doctor we need. And then, to get these things, somehow the system has to be bypassed and this leads, in the end, to informal payments. Patients offer money or gifts to get the diagnosis and treatment they need as soon as possible. The phenomenon of informal payments will diminish only when the patient will be able to benefit from medical services on time, without having to spend hundreds of minutes at the hospital's emergency room to be taken over by doctors.

To explain this phenomenon in Romania, a game in incomplete information was designed to describe the possible corrupt interactions between a doctor and a patient. We considered the case where the patient can be of two types which are unknown to the doctor: whether is doctor's friend - case where he will cooperate with the doctor, or doctor's enemy - case when patient is not likely to be corrupt and will denounce the doctor. Hence the game starts with the following move: the patient (P) needs to decide whether to offer or not a bribe to the doctor (D). In case when no bribe is offered, the game ends; in the other case, the doctor must decide whether to accept or reject the "gift". Based on this model, we try to predict the conditions that will determine a doctor from Romania to receive a bribe or not. Contrary to the reality in the Romanian healthcare system the model that we proposed suggests that rational actors that take into consideration their expected payoffs should decide not to give a bribe, and even in the case the bribe is offered, it should not be accepted.

When looking at the sensitivity analysis, depending on the type of patient, different factors influence the probability of offering, respectively the probability of receiving the bribe. For patient type friend the bribe will be offered I case the gift amount is low, but it will be rejected when the difference in waiting time is significant between corrupt and non-corrupt interaction.

In case of patient type enemy, the bribe will be offered only in cases when it is at most equal to the costs incurred to the doctor in case he is caught more exactly, in case the amount is lower than the penalty and the psychological costs.

REFERENCES

- [1] Berninghaus, S. H. et al (2013), *Risk Attitude, Beliefs, and Information in a Corruption Game – An Experimental Analysis*; *Journal of Economic Psychology*, 34: 46-60;
- [2] Balafoutas L. (2011), *Public Beliefs and Corruption in a Repeated Psychological Game*; *Journal of Economic Behavior & Organization*, 78(1-2): 51-59;
- [3] Burcea, M., Toma, S.R. & Papuc, R.M. (2014), *Patients' Satisfaction with the Health Care System in the Age of Globalization: The case of Romania*, *Transylvanian Review of Administrative Sciences*, Special Issue: 5-20;
- [4] Caddell, A., Hazelton, L. (2013), *Accepting Gifts from Patients, Can Fam Physician*. 59(12): 1259-1260;
- [5] Chereches, R.; Ungureanu, M.; Rus, I.; Baba, C. (2011), *Informal Payments in the Health Care System - Research, Media and Policy*; *Transylvanian Review of Administrative Sciences*, 32: 5-14;
- [6] Choi, S.J., Jung, S., Yim H.R. (2021), *Impact of Anti-Corruption Legislation on Corporate Entertainment Expense and Performance*; *Economic Computation and Economic Cybernetics Studies and Research*; ASE Publishing; 2(55): 143-158;
- [7] Farcasanu, D.O. (2010), *Population Perception on Corruption, Informal Payments and Introduction of Co-Payments in the Public Health System in Romania*; *Management in Health*, 14 (1), online at <http://journal.managementinhealth.com/index.php/rms/article/view/97/210>;
- [8] Stanculescu, M.S, Nicolau G. (2014), *The Performance of Public Health-Care Systems in South-East Europe*. Friedrich-Ebert Stiftung Eds. Belgrade, Serbia ;
- [9] Jiang, H.L., Wu, B.T. & Zhang, L. (1999), *Preventing the Corruption in Monitoring*; *Journal of Shanghai Jiaotong University*, 33 (10): 1257-1260;
- [10] Lobont, O.R., Moldovan, N.C. Popescu A.S. (2013), *The Perception of Corruption among Young People between Reality and Pragmatism*; *SEA - Practical Application of Science*, Fundația Română pentru Inteligența Afacerii, Editorial Department, 2: 150-157;
- [11] Manea, T. (2015), *Medical Bribery and the Ethics of Trust: The Romanian Case*; *The Journal of Medicine and Philosophy: A Forum for Bioethics and Philosophy of Medicine*, 40 (1): 26–43;
- [12] Petroia, A.C., Zubcova, E. (2016), *Global Fight against Informal Payments for Health Services*; SSRN Electronic Journal, <http://dx.doi.org/10.2139/ssrn.2859372>;
- [13] Popa, D., Drugus, D., Leasu, F., Azoicai, D., Repanovici, A., Rogozea, L.M. (2017), *Patients' Perceptions of Healthcare Professionalism—A Romanian Experience*; *BMC Health Services Research*, 2017, [Online] available at: 17:463 DOI 10.1186/s12913-017-2412-z. Date accessed: January 25, 2022;

-
- [14] Stepurko, T., Pavlova, M., Gryga, I., Groot, W. (2013) *Informal Payments for Health Care Services – Corruption or Gratitude? A Study on Public Attitudes, Perceptions and Opinions in Six Central and Eastern European Countries*; *Communist and Post-Communist Studies*, 46(4): 419-43;
- [15] Tuchilus, G. (2018), *Corruption in the Public Health System – A Game-Theoretical Approach*. *Proceedings of the 17th International Conference on Informatics in Economy*, 453-460;
- [16] Tuchilus, G.; Roman, M.D. (2019), *A Bribery Game: Corruption in Healthcare System*, *International Journal of Business and Management Invention*, 8 (5): 41-47;
- [17] *** (2014), *CONFIDO Study*, *Aspen Institute Romania*, www.aspeninstitute.ro, accessed at April 24, 2022.