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Research on the Related Subject Behavior of Medical Insurance Based on Game Theory and Incentive Compatibility Principle

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Abstract

Objective:The main target of interest and behavior through the analysis of the government, the hospital, the insured persons in the medical insurance reform, related conclusions of game theory analysis of individual interests.

Study design:According to the equilibrium point of the incentive compatibility principle for

the interests of all parties, we find the extreme interest expectation.

Conclusions:The study found that the government is the social welfare defenders and representatives, build a government for the comprehensive management of medical service system leadership, coordination between the hospital and the insured's interests, establish incentive compatibility principle of medical insurance development incentive mechanism is an important measure for our country to deepen the reform of medical insurance.

Key words: Medical insurance,Game theory,Incentive compatibility

Introduction

At present, China has built a basic medical insurance system covering urban and rural residents, including basic medical insurance for urban workers, basic medical insurance for urban residents and new rural cooperative medical insurance(Jia Haihong, song Yong,2014). "The right to development: the concept, practice and contribution of China"(2016) released by the press office of the State Council, pointed out that in 2015, the number of basic medical insurance coverage reached 1336 million people, and the insured rate remained above 95%. In 2015, urban workers' basic medical insurance, basic medical insurance for urban residents, the new rural cooperative medical insurance inpatient medical expenses reimbursement within the scope of policy were more than 80%, 70% and 75% respectively, the fund maximum payment limit is 6 times higher than the average annual wage of local employees and local residents per capita disposable income(Jia Haihong, song Yong,2014). Thus, we can see that the basic medical security system in our country has a fast speed and a great guarantee.

The construction of modern hospital management system is the important content of reform. How to balance the interests of the basic medical insurance related economic entities, leverage the policy and mobilize the enthusiasm of reform is of great importance. The main economic subjects related to basic medical insurance in China are the government, the hospital and the consumers. Therefore, only a full understanding of the interest demands of the economic subjects related to basic medical insurance can better build the basic medical security system in our country.

Basic medical security refers to the system arrangement for everyone to enjoy a reasonable basic medical service. The main features follow: (1) all means covering all citizens; (2)

reasonable means with accessibility, security and payment; (3) the basic medical service is composed of three directory treatment, drugs and check equipment, basic medical services commensurate with the level of economic development the package.

The research on the reform of medical system and the related subject behavior and incentive mechanism of medical insurance is rich. Jin Bei(2009)believes that the main body of the "incentive compatibility" mechanism should be focused on the formation of supply growth incentive, price constraint incentive and moderate supply and demand incentive. Yao Yuchun and Liu Yuansheng(2010)think that the medical system reform is a dynamic process of institutional change. We should constantly identify stakeholders and establish an incentive compatible reform concept to promote the reform of health care system. Chen Xiaoyang and Yang Tongwei(2006)believe that doctors have dual roles and are easy to induce patients' needs. They should encourage doctors to pay attention to payment mechanism, cost constraint and external supervision, so as to reasonably regulate medical behaviors and reduce of medical expenses.

Based on the study of the related scholars, using game theory in medical insurance stakeholder relationship and interest conflict analysis, and then use the incentive compatibility principle design coordination among all the stakeholders interests, and ultimately achieve the overall social welfare maximization and the sustainable development of medical insurance.

The status and interest demand of related subjects in medical insurance

Government

Due to the complexity and particularity of the medical industry, the orderly operation of the medical market must rely on the government's compulsion. Basic medical service belongs to the category of social public service, and it is an important aspect of the government to guarantee the livelihood of the people and to build the social security system. The basic medical insurance system is an important measure for the government to avoid risk and realize social mutual aid. Because of the spontaneity and uncertainty of the market, the government as a medical insurance agency must undertake the responsibility of correcting market failure and ensuring the basic medical needs of the people. In the process of medical insurance reform, the goal of the government's interests is consistent with the interests maximization of the whole society, and it is an important promoter of the reform of medical insurance.

Hospital

Hospital is a medical institution that aims at providing medical care services for people. It is an important place to protect people's lives, health and safety. It plays a key role in health management, medical insurance, emergency rescue, public health services and other fields. But the hospital as independent economic units, is bound to the pursuit of maximizing their own interests, in the drive to maximize the benefits, will induce medical needs of patients, there is a common prescription, acts of excessive medical inspection, not only caused the waste of medical resources, but also increase the burden of patients and medical insurance. Because of the risk of the medical industry, on the one hand, the hospital does not want to overtake the patient's medical risk, on the other hand, it also wants to get more compensation for medical insurance. If the government does not act to restrict and supervise the medical hospital, the hospital will not increase the cost, improve health care technology, more efforts to treat patients, so that patients and the overall social welfare loss, and affect the sustainable development of medical insurance.

Consumers

The insured consumers are one of the main stakeholders of medical insurance. The pursuit is to maximize their health benefits and maximize their pursuit of quality of life and ensure their health. When the insured person due to their own health problems to the hospital, the medical insurance need to pay a certain proportion of medical expenses, reduce the economic burden of the patients, is the medical activities of the beneficiaries. However, due to the information asymmetry in the medical industry, when the insured comes to the hospital, there will also be their own welfare loss due to the pursuit of the maximum benefit of the hospital, which will become a victim of the medical activities. Therefore, the government's restriction and supervision on the hospital's medical behavior make the insured become the most direct beneficiary of the reform of medical insurance, and also become an active initiator of the medical system reform.

Game Analysis of different interests of medical insurance

Game analysis between government and hospital

The main two main stakeholders of medical insurance are the government and the hospital. In order to simplify the analysis, this paper sets the following four hypotheses:

- (1) Both the government and the hospital are the rational stakeholders.
- (2) In general cases, the cost of medical activities in hospitals is C_1 , the price of medical services is P , the hospital output is Y_1 , the economic profit of hospitals is $Q_1=Y_1 (P-C_1)$, and

the medical risk is R_1 . Doctors avoid medical risks and lead to the reduction of social utility and the social utility of $-X$.

(3) Through the efforts of the hospital to improve the technical level of the medical staff, the cost of the investment is C_2 , the hospital output is Y_1 , the medical risk is R_2 ($R_2 < R_1$), and the social benefits gained by improving the technical level of the medical staff are X .

(4) The cost of government regulation and supervision for hospitals is C_3 . If hospitals choose to directly avoid medical risks, the social utility is $-W$. If hospitals improve their technology level and avoid medical risks, the social utility obtained is W . If the government in the restraint and supervision of hospital found in the hospital has irregularities, such as prescription, inspection and other unreasonable medical behavior, will be for the hospital for punishment, assuming that each fined for cases is m , if the hospital medical behavior in a certain period of time to meet the restraint and supervision of the government, medical insurance the hospital will give some compensation and reward, compensation and reward for S .

In the game model between the government and the hospital, the government has two choice strategies: regulation and non regulation; the hospital also has two options: improving the technology level and not improving the level of technology.

Table 1 Government hospital game income matrix

	Improving technical level in hospitals	Without improving technical level (maintenance of hospital status)
Government regulation	$(-C_3+W-S, Y_1(P-C_1)-C_2+X+S)$	$(m(R_1-R_2)-C_3-W, Y_1(P-C_1)-m(R_1-R_2)-X)$
Without government regulation	$(W, Y_1(P-C_1)-C_2+X)$	$(-W, Y_1(P-C_1)-X)$

The following conclusions can be drawn through the analysis of game income matrix of government - hospital in Table 1:

(1) For the hospital, not to raise the level of technology, to maintain the current situation in the hospital, if the total utility of medical behavior to avoid medical risk violations punishment for $Y_1 (P-C_1) -m (R_1-R_2) -X$, improve the technical level, standardize the medical behavior obtained by the government (medical insurance) total revenue compensation

and reward for $Y_1 (P-C_1) -C_2+X+S$;

(2) For the government, the hospital and regulatory constraints, the total utility of hospital caused by risk averse society $-W$, improve the technical level of hospital total utility for social W ; and regulatory constraints of the hospital, the hospital total utility is caused by risk averse Society for $m(R_1-R_2) -C_3-W$ hospital to improve the technical level of the total utility of social $-C_3+W$;

(3) If the government does not constrain and supervise of the hospital, the hospital will raise the level of technology mainly depends on the technology to improve the level of investment required to bring and improve the technical level of the social utility; if the government does not constrain and supervise of the hospital, the hospital to improve technical level of influence factors include: improve the level of technology required the cost of inputs, improve the technical level of social utility difference before and after the government (medical insurance) for the amount of punishment illegal medical behavior, the government (medical insurance) for the standardization of the medical behavior of the compensation and reward and improve the technical level of the social utility.

Game analysis of the insured consumers in the hospital

The operation of medical insurance depends not only on the participation of the government and the hospital, but also on the efforts of the insured consumers. The insured consumers are the ultimate beneficiary of medical insurance. Therefore, the game process and results of government and hospitals in the operation of medical insurance under the participation of the insured consumers are the most comprehensive and real. In order to simplify the analysis, based on the game model under the condition of complete information symmetry, the following four hypotheses are set up.

(1) Both the hospital and the insured consumers are the main body of rationality, the initial benefit of the hospital is Q_1 , and the initial interest of the insured is Q_2 .

(2) Assuming that the insured consumers do not supervise the reporting, the government will not punish the unreasonable medical behavior produced by hospitals avoiding risks and pursuing interests. If the insured continues to choose to avoid risks and pursue interests and cause unreasonable medical practices, the government will pay the punishment to F for the hospitals, and the reward for the insured is e .

(3) In the case of improving the technology of the medical and nursing staff, the cost of the hospital need to be invested is C_1 . At the same time, the cost of the insurer to report the

irrational behavior of the hospital is C2.

(4) If the hospital improves the technical level of medical staff, it will improve the quality and level of medical service and bring more social benefits, including the image of the hospital B1 and the health level of the insured consumers B2. If the hospital does not improve the technical level of the medical staff and maintain the current situation of the hospital, in the fierce market competition, it will be eliminated to some extent by other types of hospitals, resulting in the loss of social utility.

This model has two choices of strategies: improving the level of technology and not improving the level of Technology (maintaining the status quo of the hospital); the insured consumers also have two choice strategies: Supervision and unsupervision. Therefore, the income matrix of the hospital and the insured person is as follows:

Table 2 Hospital insurer game return matrix

	Improving technical level in hospitals	Without improving technical level (maintenance of hospital status)
Insured consumers supervised	$(Q2-C2+B2, Q1-C1+B1)$	$(Q2-C2+e-B2, Q1-F-B1)$
Insured consumers unsupervised	$(Q2+B2, Q1-C1+B1)$	$(Q2-B2, Q1-B1)$

The following conclusions can be drawn through the analysis of the game income matrix of the hospital participants in Table 2.

(1)When the hospital improves the technology level and standardizing the medical behavior, $Q2-C2+B2 < Q2+B2$, the insured consumers will get better medical services. The insured consumers will no longer pay the cost to supervise the behavior of the hospital, so the insured will choose not to supervise.

(2)If the hospital chose not to raise the level of technology, to maintain the current situation in the hospital, $(Q2-C2+e-B2) - (Q2-B2) = e-C2$, the insured consumers as a rational economic subject will cost C2 and government supervision of hospital pay (medical insurance) report given hospital medical behavior unreasonable reward size, if the government (give the insured medical insurance) reward is greater than the cost of the hospital report, the participants will choose supervision;

(3)If the insured choice of supervision, $(Q1-C1+B1) - (Q1-F-B1) = 2B1+F-C1$, then the

hospital considers there are three main factors: whether to raise the technical level of the government (medical insurance) punishment, improve the technical level of the cost and social utility, only when the government (medical insurance) punishment and social utility more than pay the cost of improving technology, the hospital will choose to raise the level of technology. If the insured person chooses not to supervise, $(Q1-C1+B1) - (Q1-B1) = 2B1-C1$, the participants did not participate in, the government (medical insurance) has not received the report, it will not be punished for the hospital, so the hospital influence factors of improving the technical level of the following two aspects: to improve the technical level of the pay cost and social utility.

The incentive compatibility analysis of the main body of medical insurance

The central role of the government in the incentive mechanism of medical insurance

In the medical insurance related stakeholders, the government is the main body with special interests, and the behavior of the government can have an important impact on other stakeholders of medical insurance. According to the incentive compatibility principle, in the process of medical insurance reform, the interests of the government is consistent with the interests maximization of the whole society, and it is an important promoter of the reform of medical insurance. This shows that in the reform of medical insurance, the government is the mainstay of social public interest, the policymaker and executor of medical insurance policy, and it is necessary to improve the incentive mechanism of medical insurance. Therefore, when considering incentive mechanism, as long as we can well coordinate the interests of the hospital and the insured, establish a reasonable incentive mechanism for the hospital and the insured, we can better promote the development of the medical insurance system.

The incentive compatibility analysis of the government on the reform of hospital participation in medical insurance

The goal of hospital in the reform of medical insurance is to avoid medical risks as much as possible, to provide effective medical services and to maximize hospital profits under the premise of meeting national laws and regulations. According to the incentive compatibility principle, consistent to the coordination of hospital benefits and welfare of whole society, we should give full play to the economic and policy levers of government, reduce the cost of the hospital to improve the level of medical technology, to give some financial subsidies and preferential policies to guide the hospital benign development trend in the pursuit of economic benefits and social benefits, and fully mobilize the hospital to improve the level of

medical technology and actively improve the quality of medical services.

Based on the incentive compatibility theory, we need to solve the mixed Nash equilibrium of the complete information static game model, and study the impact of government incentives on hospital interests and behavior choices. The assumptions in the above analysis are unchanged. In order to simplify the calculation and analysis, the variables are adjusted as follows.

The government supervision and restriction on hospital cost for C ; to improve the technical level of the cost for N ; the unreasonable medical behavior of punishment of the government hospital for F ; to improve the technical level of the social utility and disutility for S ; the government does not control and supervision of the hospital and the society for the government is R ; the utility of hospital effective restraint and supervision of social for M .

Based on the analysis of the above assumptions, the mixed strategy for government $X = (x, 1-x)$, and $0 \leq x \leq 1$; that the government choice probability constraint and supervision for x , the probability of restraint and supervision of choice for $1-x$. The hybrid mixed strategy for hospital $Y = (y, 1-y)$, and $0 \leq y \leq 1$; that the hospital selection probability to improve the level of medical technology for y , choose not to increase the probability of medical technology for $1-y$.

The cost matrix of the government's choice of constraints and supervision.

$$A = \begin{bmatrix} -C + M & -C \\ -R & -R \end{bmatrix}$$

Then the hospital choose the matrix to improve the cost of medical technology.

$$B = \begin{bmatrix} S - N & -F \\ S - N & 0 \end{bmatrix}$$

Based on the Nash equilibrium, the principle of positive affine transformation and invariance of local transformation can make partial transformation for the above game models, that is to say, transform the matrix A , and do row transformation to matrix B at the same time(Li Shuang,2012).

$$A = \begin{bmatrix} -C + M & -C \\ -R & -R \end{bmatrix} \rightarrow \begin{bmatrix} M + R - C & 0 \\ 0 & C - R \end{bmatrix}$$

$$B = \begin{bmatrix} S - N & -F \\ S - N & 0 \end{bmatrix} \rightarrow \begin{bmatrix} S + F - N & 0 \\ 0 & N - S \end{bmatrix}$$

For the transformation of the above matrix, the optimal response of the government can be obtained: the choice of the appropriate X for the fixed Y, and the optimization of the government's expectation. The government's expectations are as follows:

$$E1(x,y) = XAY = (x,1-x) \begin{bmatrix} M+R-C & 0 \\ 0 & C-R \end{bmatrix} (y,1-y)^T = Mxy + (C-R)(1-x-y)$$

Then E1 (x, y) on X converts $\frac{\partial E1}{\partial x} = My + R - C$, and then discuss the optimal value of the expected value of X.

(1)When $R > C$, $\frac{\partial E1}{\partial x} > 0$, if y can get the maximum value, X must get maximum value, so the value of X is 1.

(2)When $M+R > C > R$, if $y > (C-R)/M$, $\frac{\partial E1}{\partial x} > 0$, if $x=1$; if $y = (C-R)/M$, $\frac{\partial E1}{\partial x} = 0$, then $x \in [0,1]$ can be taken to the desired optimization; if $y < (C-R)/M$, $\frac{\partial E1}{\partial x} < 0$, $x=0$.

(3)When $C > R+M$, $\frac{\partial E1}{\partial x} < 0$, if the maximum expected value, $x=0$.

In the same way, we can analyze the situation of the hospital. The optimal response of the hospital is to select the appropriate Y for the fixed X, and to optimize the expectation of the hospital. The expected value of the hospital is:

$$E2(X,Y) = XBY = (x,1-x) \begin{bmatrix} S+F-N & 0 \\ 0 & N-S \end{bmatrix} (y,1-y)^T = Fxy + (N-S)(1-x-y)$$

Then E2 (x, y) on Y converts $\frac{\partial E2}{\partial y} = Fx + S - N$, and then discuss the optimal value of the expected value of Y.

(1)When $S > N$, $\frac{\partial E2}{\partial y} > 0$ for $x \in [0,1]$, if the expected value can reach the maximum value, then the value of Y is 1.

(2)When $S+F > N > S$, if $x > (N-S)/F$, $\frac{\partial E2}{\partial y} > 0$, if $y=1$; if $x = (N-S)/F$, $\frac{\partial E2}{\partial y} = 0$, then $y \in [0,1]$ can be taken to the desired optimization; if $x < (N-S)/F$, $\frac{\partial E2}{\partial y} < 0$, $y=0$.

(3)When $N > S+F$, $\frac{\partial E2}{\partial y} < 0$ for $x \in [0,1]$, if the maximum expected value at $y=0$.

Therefore, government incentives may lead to three kinds of situations, specific analysis is as follows:(1)If the $S > N$, improve the medical technology, improve the quality of health care, the cost is less than brought to the hospital social image promotion, medical insurance

compensation, increase income, improve the competitiveness of the hospital to increase the total social benefit and etc.. At this time, no matter what kind of behavior the government takes, hospitals will choose to improve medical technology and improve the quality of medical services as a balanced strategy of game. (2) If $N > S + F$, the hospital will choose to maintain the status of the hospital when the cost of improving medical technology is too high. Although hospitals can improve the overall welfare of the whole society after the improvement of medical technology, the hospital has not got the equivalent return to improve the cost of medical technology. (3) If $S + F > N > S$, the cost of improving technology in hospitals is higher than the cost of choosing to maintain the status quo and avoiding risks. At this time, the choice of hospital behavior and the government's behavior choice will form an interaction with each other. Government regulation, improving medical technology and government regulation and not improving medical technology are game equilibrium solutions. At this time, rewards and punishments mechanisms play an important role in game theory, that is to say, they satisfy the requirements of incentive mechanism to play a role.

Incentive compatibility analysis of the government's participation in the health insurance reform of the insured

The interest goal of the insured consumers for medical insurance reform are to take medical expenses when sick and hospitalized, and to maximize the cost reimbursement of medical insurance, so as to avoid the economic burden risk caused by disease factors. At present, the insured has limitations on the reform of medical insurance, only considering its recent interests, and has not paid more attention to the long-term development of medical insurance. According to the incentive compatibility principle, let the participants realize the ultimate benefit goal of medical insurance reform is closely related to their long-term interests and short-term interests, not set, but is consistent with the interests of the insured and overall social welfare, to establish long-term interests of the eye, and constantly improve the insured to participate in medical insurance reform enthusiasm and a sense of identity.

Based on the incentive compatibility theory, this paper needs to solve the mixed Nash equilibrium of the static game model of the above complete information, and study the influence of the participants' behavior selection. The assumptions in the above analysis are unchanged. In order to simplify the calculation and analysis, the variables are adjusted as follows.

Assuming that the insured does not report to the hospital, the government will not punish the hospital. The insured person to pay for hospital supervision cost for C ; to improve the

technical level of the cost for N; the insured for the hospital's report is true, the unreasonable medical behavior of punishment of the government hospital for F; to improve the technical level of the social utility and S; negative utility as unreasonable behavior of the insured the hospital and the society for R; access to the insured person to supervise the hospital and report the unreasonable behavior effectively when government incentives for M.

Based on the analysis of the above assumptions, the mixed strategy insured for $U = (U, 1-u)$, and $0 \leq u \leq 1$; said insurance supervision and reporting hospital selection probability is u , the probability of choosing not to supervision and reporting for $1-u$. The hybrid strategy for $V =$ hypothesis hospital $(V, 1-V)$, and $0 \leq v \leq 1$; said the hospital selection probability to improve the level of medical technology is v , choose not to increase the probability of medical technology for $1-v$.

Then the insured consumers choose the matrix that supervises and reports the cost of paying.

$$G = \begin{bmatrix} -C + M & -C + M \\ -R & -R \end{bmatrix}$$

Then the hospitals choose the matrix to improve the cost of medical technology.

$$H = \begin{bmatrix} S - N & -F \\ S - N & 0 \end{bmatrix}$$

Based on the Nash equilibrium, the principle of positive affine transformation and invariance of local transformation can make partial transformation for the above game models, that is to say, transform the matrix G , and do row transformation to matrix H at the same time(Li Shuang,2012).

$$G = \begin{bmatrix} -C + M & -C \\ -R & -R \end{bmatrix} \rightarrow \begin{bmatrix} R - C & 0 \\ 0 & C - M - R \end{bmatrix}$$

$$H = \begin{bmatrix} S - N & -F \\ S - N & 0 \end{bmatrix} \rightarrow \begin{bmatrix} S + F - N & 0 \\ 0 & N - S \end{bmatrix}$$

For the transformation of the above matrix, the best response of the insured can be obtained: that is to select the appropriate U for the fixed V , so as to achieve the optimal expectation of the insured. The expected value of the insured is:

$$\begin{aligned} E1(u,v) &= UGV = (u, 1-u) \begin{bmatrix} R - C & 0 \\ 0 & C - M - R \end{bmatrix} (v, 1-v)^T \\ &= -Muv + (C - M - R)(1 - u - v) \end{aligned}$$

Then $E1(u,v)$ on u converts $\frac{\partial E1}{\partial u} = -Mv + C - M - R$, and then discuss the optimal value of

the expected value of U.

(1)When $R > C$, $\frac{\partial E1}{\partial u} > 0$, if E1 can get the maximum value, u must get maximum value, so the value of u is 1, the maximum value is $E1 = (R - C)v$.

(2)When $M + R > C > R$, if $v < (M + R - C) / M$, $\frac{\partial E1}{\partial u} > 0, u = 1$, the maximum value is $E1 = (R - C)V$; if $v = (M + R - C) / M$, $\frac{\partial E1}{\partial u} = 0$, at this time, $u \in [0, 1]$ can take to the desired optimization, $E1 = C - M - R < 0$; if $v > (M + R - C) / M$, $\frac{\partial E1}{\partial u} < 0, u = 0$, the maximum value is $E1 = (C - M - R)(1 - v) < (M + R - C)(R - C) / M$.

(3)When $C > R + M$, $\frac{\partial E1}{\partial u} < 0$, if the maximum expected value, then $u = 0$, the maximum value is $E1 = (C - M - R)(1 - V)$.

In the same way, we can analyze the situation of the hospital. The optimal response of the hospital is to select the appropriate V for the fixed U, and to optimize the expectation of the hospital. The expected value of the hospital is:

$$E2(u, v) = UHV = (u, 1 - u) \begin{bmatrix} S + F - N & 0 \\ 0 & N - S \end{bmatrix} (v, 1 - v)^T = Fuv + (N - S)(1 - u - v)$$

Then $E2(u, v)$ on v converts $\frac{\partial E2}{\partial v} = Fu + S - N$, and then discuss the optimal value of the expected value of Y.

(1)when $S > N$, $\frac{\partial E2}{\partial v} > 0$, $u \in [0, 1]$, if the expected value can reach the maximum value, then the value of V is 1.

(2)When $S + F > N > S$, if $u > (N - S) / F$, $\frac{\partial E2}{\partial v} > 0, v = 1$; if $u = (N - S) / F$, $\frac{\partial E2}{\partial v} = 0$, then $v = [0, 1]$ can be taken to the desired optimization; if $u < (N - S) / F$, $\frac{\partial E2}{\partial v} < 0, v = 0$.

(3)When $N > S + F$, $\frac{\partial E2}{\partial v} < 0$, $u \in [0, 1]$, if the maximum expected value is $v = 0$.

There are five possible maxima of the above game analysis model, which is in $\alpha(u \rightarrow 1, v \rightarrow 1, R > C, S > N)$ (supervision, improve technology), $\beta(u \rightarrow 1, v \rightarrow 1, M + R > C > R, S + F > N > S)$ (supervision, improve technology), $\gamma(u = (N - S) / F, v = (C - R) / M, M + R > C > R, S + F > N > S)$ (expected value is less than 0, down), $\pi(u \rightarrow 0, v \rightarrow 0, M + R > C > R, S + F > N > S)$ (without supervision, improve technology), $\delta(u \rightarrow 0, v \rightarrow 0, N > S + F, C > R + M)$ (not supervision. Do not improve the technology). Among the above five possible maxima points, other than the equilibrium point γ , the other are likely to reach the

maximum expectation. The two maximum equilibrium points of α and β are the positive evolution of the insured consumers' interest expectation, which is increased with the possibility of the supervision and reporting of the insured consumers. The two maximum equilibrium points of π and δ are the negative evolution of the insured consumers' interest expectation as the possibility of supervision and reporting by the insured increases, so we should try to avoid it.

So the supervision measures of the participants may lead to three kinds of situations, specific analysis is as follows:(1)If the hospital to improve the level of medical technology is less than the cost of technology to improve the level of the social benefit and then no matter whether the insured supervision and reporting, the hospital will choose to raise the level of medical technology, perfect medical service quality as game equilibrium strategy;(2)If the hospital to improve the level of medical technology the cost is too high, then no matter whether the insured supervision and reporting, the hospital will choose not to raise the level of medical technology, the hospital to maintain the status quo;(3)When the constraints in the internal boundary value, then the hospital behavior and the behavior of the government selection of mutual restriction and promotion, equilibrium in α (supervision, improve technology) and δ (without supervision, not to mention Between the high technology), the equilibrium point α (supervision, improvement of Technology) and δ (unsupervised, not improved technology) will eventually be tended by different initial conditions. Therefore, we can find that the expectation value of the insured hospital model is different from that of the government hospital model, but the conditions for achieving the equilibrium point are exactly the same.

As one of the subjects of medical insurance reform, the participants play an important role in the process of medical insurance reform. The interests of the insured is to promote an important barometer of government medical insurance policies, not only can the hospital medical behavior supervision, improve the quality of medical services, but also can promote the reform of medical system, perfecting the medical security system to protect the insured person's medical service demand.

Conclusion

By analyzing the interests and behavior objectives of the three main actors in the reform of medical insurance, this paper concludes the correlation between the interests of all actors by game theory. The study found that the government is the social welfare defenders and representatives, according to the incentive compatibility principle, build a government led

comprehensive management of medical service mechanism, coordination between the hospital and the insured's interests, establish incentive compatibility principle of medical insurance development incentive mechanism is an important measure for deepening the reform of medical insurance(Hu Yanping, Li Lele, Gao Bowen,2016; Li Lele, Zhang Zhi Xin, Wang Chen,2016).

Based on the above analysis, to form a government led mechanism, incentive mechanism and the development of medical insurance comprehensive management of medical service behavior of all the main parties of social policy and public opinion environment good, active participation and common development and mutual coordination, safeguard people's demand for medical services, to achieve the great goal of "Health China ".

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