

The Evolution and Influencing Factors of Chinese Out-of-Pocket Healthcare Expenditure Efficiency: DEA-Tobit Analysis Based on Panel Data

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Abstract

Based on the panel data from 2002 to 2009 and with the method of DEA-Tobit, firstly we get the conclusion that the state health expenditure efficiency is increasing and personal health expenditure efficiency is descending since health reform and that total health expenditure efficiency is not rising so the problem of inadequate and overly expensive medical services is not solved. Then we analyze the influencing factors of personal health expenditure efficiency by panel Tobit model. The result shows that there are efficiency differences among different regions in China. The influencing factors include population structure, per local financial expenditure, urbanization ratio, per GDP and population scale.

Key words: Out-of-pocket health care expenditure efficiency; Medical reform; DEA-TOBIT Model; Economic development

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INTRODUCTION

Since the implementation of the reform and opening-up

policy and with the deepening of market economy, great changes have taken place in China's medical and health system. The medical and health industry has experienced several reforms but unlike other reforms, they failed to achieve the same effect as expected. On the contrary, consulting a doctor is becoming increasingly difficult and expensive. Meanwhile, the doctor-patient relationship has been deteriorating and medical costs are rising rapidly. In consideration of these sharp problems, state and citizens both come to realize the necessity to increase investment in health care. From 2009 to 2011, Chinese government at all levels has provided a 850-billion financial input in total and carried out work in the following five aspects: basic medical insurance system, the national system for basic drugs, basic medical and health service system, basic public health service and public hospital reform. In general, these policies have obtained positive results: basic medical insurance system has achieved full coverage by and large; the national system for basic drugs has made new breakthrough; basic medical and health service has attained further improvement; the equalization of basic public health services and the reform of public hospitals have been accelerating.

However, many problems remain unsettled, for instance how do we quantify the effectiveness of health care reform? how is the efficiency of China's total health expenditure that contains government health expenditure, social health expenditure and personal health expenditure? why consumers cannot enjoy the benefits from the medical reforms and the problem of consulting a doctor at high costs and with great difficulty still exists when many researches indicate that the health expenditure of China's provincial government has improved its efficiency since the medical reform (Zhang, Hu, & Zheng, 2006; Liu, 2007; Wang, 2008; Han, 2010). In this paper we analyses the efficiency of China's provincial health expenditure, government health expenditure and personal health expenditure; on this basis we analyze the influencing

factors of personal health expenditure efficiency by panel Tobit model.

The present paper consisted of five parts. We first introduced the research topic; Then we presented a literature review; next we demonstrated the methodology and data; afterwards, we evaluated the input efficiency of health expenditure from 2002 to 2011; finally, we analyzed the influencing factors of personal expenditure efficiency and provided suggestions on how to improve personal expenditure efficiency so as to enhance the total health expenditure efficiency.

1. LITERATURE REVIEW

The health economics both at home and abroad have already used various methods to conduct efficiency evaluation. Folland (2003) stated that it was relatively easy to define expenditure efficiency of health resources and allocation efficiency, but rather difficult to perform empirical analysis. Health economists emphasized on interface research so DEA method (Data Envelopment Analysis) and SFA (Stochastic Frontier Analysis) are applicable to such analyses. Jian Shi reviewed the methods of efficiency evaluation in hospital and health system. Hollingsworth and Wildman (2003) compared in detail the DEA and SFA and demonstrated their advantages and disadvantages in evaluating medical organization efficiency. Based on the microcosmic survey data, Ruizhi Pang made an overall analysis and assessment on operating efficiency of 249 city-hospitals in China. Whilst, Li (2005), Cheng (2008) analyzed the organization efficiency of township health centers. Zhang, Hu and Zheng (2006) employed statistics to evaluate the health output efficiency in various regions of China. Gupta and Verhoeven (2001) selected three factors as the governmental health expenditure output indexes: Life Expectancy, Infant Mortality Rate (IMR) and Children Immunization Coverage (CIC). Wang (2008) analyzed the state health expenditure efficiency of Chinese local governments not based on the above indexes but the following more specific indexes instead: health output, number of health institution in each province, number of health technician and bed in health institution. Roberts (2004) studied on the health technical efficiency on OECD (Organization for Economic Co-operation and Development) countries via DEA method and found that the American health input resource seemed wasted. Hilsenrath (2011) made comparison in the proportion between per capita income in OECD countries and health expenditure in GDP, the proportion of personal expenditure in total expenditure and concluded that the American personal health expenditure was relatively inefficient.

Meanwhile, many scholars placed emphasis on the influencing factors of output efficiency. Newhouse (1980) indicated that income was the main factor that

influenced the growth of health expenditure. Tanzi (1997) illustrated that industrialization and urbanization increased the government financial expenditure power and promoted people's public expenditure demand. Belli (2004) made analysis on the influencing factors of Georgia's health service on relative efficiency of personal and informal health expenditure, including cultural and trust system factors in demand side and governmental support and management openness and transparency in offer side. Chaudhuri (2008) analyzed the change and influencing factors of Vietnam's personal expenditure from 1992 to 2001 during which Vietnam, like China, had experienced economic reform and health system reform and pointed out that the discrepancy on paying ability and medical insurance coverage impacted the proportion rate and efficiency of personal health expenditure in overall expenditure. Based on Wang's study, Han and Miao investigated the influencing factors of local government health expenditure and analyzed the effect of financial decentralization and medical reform on the financial output efficiency of local government. Luo (2010) used panel data of 26 Chinese provinces to investigate the influencing factors on urban and rural residents' health expenditure and stated that the income and change of medical price had great influence. You (2010) reviewed CHNS (China Health and Nutrition Survey) data and suggested that residents' self-evaluation of health, age, paying ability, medical insurance and other factors affected the Chinese residents' personal health expenditure. He (2011) studied the influencing factors of the governmental public health expenditure behavior.

The above analyses have the following limitations: for one thing, the contemporary studies mainly focus on the evaluation of the operating efficiency of governmental health expenditure. In fact, from Table 1 we can see that since 2002 the Chinese governmental health expenditure has accounted for only 15% to 30% of overall health expenditure but out-of-pocket payments is as high as 37%-58%. This is a relatively high percentage in comparison and may produce negative effects (Ling et al., 2011). Therefore, single evaluation of the governmental health expenditure efficiency cannot fully reflect the change of health expenditure efficiency in China, which is the reason why people still find it expensive to consult a doctor despite the repeated stress on the accelerated growth of governmental health expenditure by Chinese government. For another, the output-indexes of governmental expenditure mainly refer to the hardware indexes like the number of health institutions, health technicians and bed in health institutions, whereas personal out-of-pocket expenditure is more concerned with the number of outpatient visits and hospital admission since they are more effective reflectors on whether the problem of "difficult to hospitalize" is solved. Therefore, single evaluation of governmental health expenditure output-indexes is unlikely to fully reflect the change of efficiency.

Table 1
Health Expenditure of China from 2002 to 2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
The comprehensive health expenditure (/rmb billion)	5790	6584	7590	8660	9843	11574	14535	17542	19980	24269
The governmental health expenditure (%)	15.7	17	17	17.9	18.1	22.3	24.7	27.2	28.7	30.4
Out-of-pocket health expenditure (%)	57.7	55.9	53.6	52.2	49.3	44.1	40.4	37.5	35.3	34.9

Note. Adapted from China Statistical Yearbook (2013).

2. METHODOLOGY AND DATA

As a frontier non-parametric subjective evaluation method, DEA has several competitive advantages: the evaluation results is insusceptible to measuring unit; weight coefficient by this model is optimized and thus is impervious to man-made setting (Charnes, Cooper, & Rhodes, 1978). Unlike other efficiency evaluation methods, DEA can handle multiple input and output variables. The present paper stresses output health efficiency so we use DEA as the efficiency evaluation method for it centers on variable scale reward outputs. Now that DEA is relatively mature, it is unnecessary to describe the detailed mathematical principles. More specific information can be seen in papers written by Coelli et al. (1998).

On the first stage of our study, we get the score of DEA efficiency of health expenditures in different provinces. On the second stage, we use DEA score as an explanatory variable to search for the influencing factors. We find that the value of efficiency evaluation ranges from 0 to 1. Thus, we use Tobit model to analyze the possible influencing factors on health expenditures to explain which factors influence Chinese output health expenditures efficiency. On this basis, we provide some suggestions on medical reform policy.

Drawing lessons from Zhang et al. (2006), we employ personal health expenditure in each province as the input variable and divide total health expenditure of China into three parts: governmental expenditure, social health expenditure and out-of-pocket health expenditure. The last one refers to the cash payments of urban and rural residents when they receive medical and health services of all sorts, including the extra cash that residents pay themselves for various health insurances. In this way their medical affordability is reflected. Based on the study of Wang (2008) and Han and Miao (2010), we avoid vague health evaluation index, such as life expectancy, infant mortality rate and so on. Instead, we adopt unambiguous health expenditure index like the number of technicians

and the beds of health facilities. In regards to out-of-pocket health expenditure, we select the number of hospital visits and admissions as indexes that have been collected in each province since 2002. As for social health expenditure, it refers to various social funding including social health insurance output, commercial health insurance output, hospitals output invested by social people, social donation and revenue from administrative fees except government investment. Due to the composition complexity of social health expenditure and a lack of data record of such expenditure in concrete provinces, we do not investigate social health expenditure efficiency.

In respect to the influencing factors of out-of-pocket health expenditure efficiency in each province, we adopt the population structure and government fiscal capacity as substitution variables for controlling variables to control regional differences (Belli, 2004; Chaudhuri, 2008). Meanwhile, the state council established 11 medical reform coordination groups in September 2006, which officially indicated a new round of medical reform. We set virtual variables of medical reform to investigate its influence on personal health expenditure in each province and introduce the interaction terms between medical reform variables and virtual variables to explore the different effects of medical reform policy on the eastern, middle and western regions (Han & Miao, 2010). In the same time, personal paying ability represented by per capita GDP is also a worthy variable (Chaudhuri, 2008; You, 2010; Luo, 2010) since it reflects the regional difference of economic development's influence on health expenditure efficiency. In consideration of the close relation between urbanization level, population size, pure technical efficiency of personal health expenditure and scale efficiency, we also analyze their influence on the comprehensive personal health efficiency (Chaudhuri, 2008; You, 2010). The present paper retrieves data from China Financial Yearbook, China Health Statistics Yearbook, China Statistical Yearbook and China Compendium of Statistics. See Table 2 for details.

Table 2
List of Variables

	Input index on the first stage	Output index in the first stage	Influencing factor on the second stage
Out-of-pocket expenditure	Residents' medical expenditure (/0.1million)	Hospital visits (/0.1million times) Hospital admissions (/0.1million person)	
Governmental health expenditure	The final accounts of health expenditure (/0.1million)	Health Care Institution number Health technical personnel number (/0.1million person) Bed number in Health Care Institution (/0.1million)	Total dependency ratio Per capita local financial expenditure Per capita GDP Medical reform Urbanization rate Population size
The comprehensive health expenditure	Total health expenditure (/0.1million)	Hospital visits (/0.1million times) Hospital admissions (/0.1million person) Health Care Institution number Health technical personnel number (/0.1million person) Bed number in Health Care Institution (/0.1million)	

3. COMPARISON OF OUT-OF-POCKET HEALTH EXPENDITURE EFFICIENCY AMONG PROVINCES

We collect the provincial average value from 2002 to 2011 and then calculate the comprehensive technical efficiency of personal health expenditure, pure technical efficiency and scale technical efficiency.

From Figure 1, we can see a big regional difference in personal health expenditure efficiency. The lowest 0.43 is

in Inner Mongolia, and the highest 1 is in Tibet. Diverse distribution exists in the eastern, middle and western provinces, for instance, among the top ten provinces, five of them are in the western region, four of them are in the eastern region and only one is in the middle region while among the last ten provinces, five of them are in the middle area, three of them are in the western region and two are in the eastern area. Therefore, seen from these three regions, the comprehensive efficiency of the eastern and western regions is higher while it is lower in the middle region.

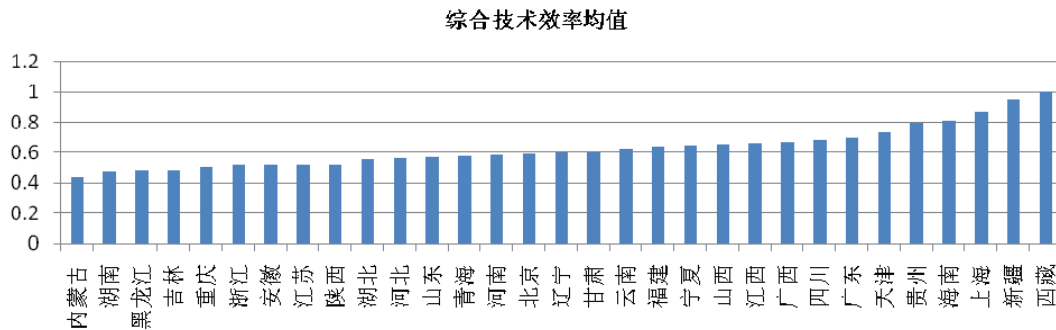


Figure 1
The Comprehensive Technical Efficiency of Personal Health Expenditure

Note. The province name from left to right: Inner Mongolia, Hunan, Heilongjiang, Jiling, Chongqing, Zhejiang, Anhui, Jiangsu, Shaanxi, Hubei, Hebei, Shandong, Qinghai, Henan, Beijing, Liaoning, Gansu, Yunnan, Fujian, Ningxia, Shanxi, Jiangxi, Guangxi, Sichuan, Guangdong, Tianjing, Guizhou, Hainan, Shanghai, Xinjiang, Tibet.

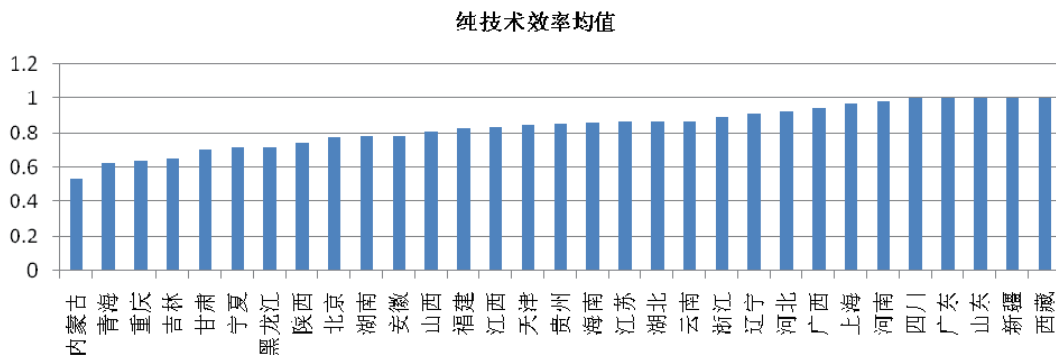


Figure 2
Pure Technical Efficiency

Note. The province name from left to right: Inner Mongolia, Qinghai, Chongqing, Jiling, Gansu, Ningxia, Heilongjiang, Shaanxi, Beijing, Hunan, Anhui, Shanxi, Fujian, Jiangxi, Tianjing, Guizhou, Hainan, Jiangsu, Hubei, Yunnan, Zhejiang, Liaoning, Hebei, Guangxi, Shanghai, Henan, Sichuan, Guangdong, Shandong, Xinjiang, Tibet.

Pure technical efficiency reflects the degree of rationality on the management and planning of personal health expenditure under the same scale. Based on the average value from 2002 to 2011 in Figure 2, we can see that China's pure technical efficiency of personal expenditure is not markedly improved. As for provincial distribution, the top ten provinces contain 5 provinces

in the eastern region, 1 in the middle region and 4 in the western region while the last ten provinces include 1 province in the eastern region, 3 in the middle region and 6 in the western region. Therefore, viewing from these three regions, we conclude that the highest technical efficiency is in the eastern region, while the efficiency in the western region is overtly lower.

规模技术效率均值

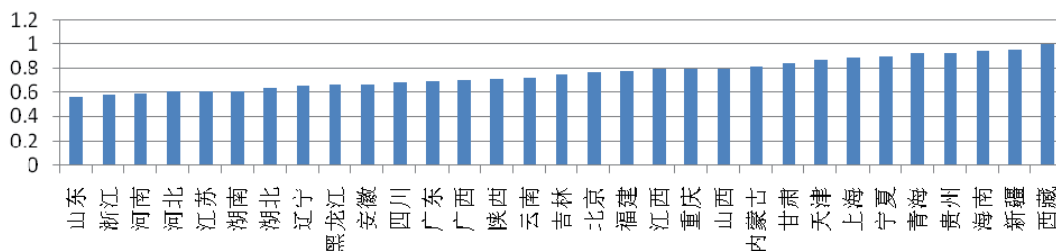


Figure 3
Personal Health Expenditure Scale Technical Efficiency Values

Note. The province name from left to right: Shandong, Zhejiang, Henan, Hebei, Jiangsu, Hunan, Hubei, Liaoning, Heilongjiang, Anhui, Sichuan, Guangdong, Guangxi, Shaanxi, Yunnan, Jilin, Beijing, Fujian, Jiangxi, Chongqing, Shanxi, Inner Mongolia, Gansu, Tianjing, Shanghai, Ningxia, Qinghai, Guizhou, Hainan, Xinjiang, Tibet.

Scale efficiency refers to the ratio between the output of technical efficiency production boundary and the output under the optimized scale, provided no input difference exists. The higher the ratio is, the closer the production unit is to the optimal scale. We analyze the values of personal health expenditure scale and technical efficiency from 2002 to 2011 in Figure 3 and find that the top ten provinces includes 7 provinces in the western region, 3 in the eastern region and 1 in the middle region, while the last ten provinces consist of 4 provinces in the eastern region and 6 in the middle region, none in western region. Hence we infer that scale technical efficiency is the highest in the western region and lower in the middle region.

demonstrate an increase in scale rewards on personal health expenditure and all of them have a small scale, including Tianjing, Guizhou, Ningxia, Hainan and Qinghai province. If scale rewards present a decreasing trend in DEA model, then we need to reduce the output scale to raise the production efficiency, which evidences that the ratio of personal health expenditure in China is irrationally high.

By DEA model we find that only 11 provinces

We classify the provincial average efficiency of health expenditure in ten years by stages into the following three efficiency groups: the lowest 10 provinces, the highest 10 provinces and the rest of 11 provinces. Then we analyze their efficiency value variation trend. In Figure 4, the deeper of the color is, the higher the efficiency value is.



Figure 4
The Distribution Diagram of Average Efficiency

From Figure 4, we can see that on the whole those three groups of out-of-pocket health expenditure efficiency demonstrate a diverse distribution. Technical efficiency in the northeast and middle regions is relatively high while in the northwest and southwest it is relatively low; pure technical efficiency in the northeast and northwest provinces is higher while it is lower in north China; scale efficiency is higher in east China and north China but lower in the northwestern region.

4. INFLUENCING FACTORS ANALYSIS: HAVE ECONOMIC GROWTH AND MEDICAL REFORM IMPROVED OUT-OF-POCKET HEALTH EXPENDITURE EFFICIENCY?

Since the data is panel and dependent variable is the score of comprehensive technical efficiency ranging from 0 to 1, we adopt limited Tobit panel model for regression analysis to make full use of the panel data and time sequence information contained in cross section and avoid OLS

(Online Service) error. Then we establish a new model as follows:

$$y_{it}^* = x_{it}'\beta + \gamma_i + u_{it}, y_{it} = \begin{cases} y_{it}^*, y_{it}^* > 0 \\ 0, y_{it}^* \leq 0 \end{cases}$$

In this model, y_{it}^* represents the comprehensive technical efficiency in each province from 2002 to 2011. X refers to a group of social, economic and policy variables that affect out-of-pocket health expenditure efficiency, including total dependency ratio, per capita local financial expenditure, per capita GDP, virtual variables of medical reform, urbanization ratio, population scale, virtual variable in the east, middle and west regions

and interaction item between per capita GDP and regional virtual variables. γ is the unobservable regional effect. U is the random disturbance term. Subscript i and t stand for i province and t stage. For panel data, we cannot obtain a consistent estimated value through nonlinear model with fixed effects so we have to use Tobit model with random effects. In the same time, we examine the panel data of each province from 2002 to 2011, which show that the maximum likelihood ratio disaffirm the assumption that there is no difference between panel Tobit model and mixed sectional Tobit model. Therefore, we use limited panel Tobit model with random effects to conduct the estimation and the results are as follows:

Table 3
the Influence Factor Analysis on Chinese Personal Out-of-pocket Health Expenditure Efficiency in Each Province

	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Total Dependency Ratio	0.309 [#] (1.535)	0.416* (1.755)	0.459* (1.940)	0.369 [#] (1.577)
Per Capita Local Financial Expenditure	2.4e-8** (-1.968)	-3.9e-8** (-1.968)	-3.8e-8* (-1.882)	-2.7e-8 (-1.358)
Urbanization Ratio		0.001 [#] (1.468)	0.001 [#] (1.583)	0.001** (2.049)
Population Size		-6.6e-10* (-1.730)	-5.8e-10 [#] (-1.538)	-2.4e-10 (-0.635)
Per capita GDP		3.2e-06** (2.376)	2.7e-6* (1.935)	
Eastern Virtual Variable	-0.005 (-0.084)	-0.061 (-1.099)		
Middle Virtual Variable	-0.106* (-1.855)	-0.103* (-1.865)		
Medical reform Virtual Variable	-0.064** (-4.763)	-0.101*** (-5.398)		-0.076*** (-3.921)
Medical reform*East			-0.084*** (-2.992)	
Medical reform*Middle			-0.124*** (-4.792)	
Medical reform*West			-0.089*** (-4.105)	
Per capita GDP*East				2.03e-6# (1.558)
Per capita GDP*Middle			-5.2e-6* (-1.727)	
Per capita GDP*West				-2.7e-06 (-1.071)
Absolute Term	0.612*** (5.840)	0.497*** (4.417)	0.439*** (4.166)	0.512*** (4.859)
Standard Deviations of Individual Effects	0.119*** (7.183)	0.115*** (7.022)	0.119*** (6.948)	0.121*** (6.929)
Standard Deviation of Interference Item	0.092*** (20.774)	0.089*** (20.705)	0.088*** (20.656)	0.086*** (20.629)
The Likelihood Ratio (Chi-Square test)	41.642	63.255	61.278	72.963
Rho	.627	.627	.643	.663
Log Likelihood	199.0	207.9	207.2	211.6

From the above analysis, we can see the Rho value in model 1-4 is more than 0.6. This indicates that the change of personal expenditure efficiency is mainly caused by the change of individual effects. Based on the logarithmic likelihood ratio, we conclude that the goodness-of-fit in model 4 is better than that of model 1-3.

From the model 2 and model 3, we find per capita GDP has a remarkable positive effect on efficiency, which indicates that economic development and increase of personal income play an active role in promoting personal health expenditure efficiency. If economic growth brings a comprehensive social and economic development,

it will lead to scientific decision on personal health expenditure (Chaudhuri, 2008; Luo, 2010). However, through model 4, we realize the regional difference of per capita GDP's influence on expenditure efficiency: per capita GDP presents a significantly positive effect in the eastern region, yet a negative impact in the western and middle region. This corresponds to the Chaudhuri's (2008) study on Vietnam: differences between urban and rural areas in economic growth and development pattern result in different efficiency influence. From economic growth mode, the economic chasing of the middle and western regions after the eastern region has turned into a single GDP quantity chasing while ignores the overall social development, for instance, some areas embezzle health care resources investment and cause medical resources constraints and limitation on personal medical choice (Lin et al., 2011). Therefore, if not transmitted to social development, pure economic growth will hinder the increase of personal health efficiency. Since the present data are limited, if we had access to health input and output data in the eastern and western rural regions, we would demonstrate a more evident influence difference of economic growth on personal health expenditure efficiency.

Virtual variables of medical reforms has a negative impact on expenditure efficiency and such features are presented markedly in the eastern, middle and western regions. This indicates that China's medical reform policy has not played a positive role in the increase of personal health expenditure efficiency. According to Han and Miao (2010), medical reform promotes governmental health expenditure efficiency, but fails to increase individual expenditure efficiency. Thus, it substantiates the previous findings realized by DEA: the reason why the total health expenditure efficiency has not been improved after the reform is that the personal health expenditure efficiency is stagnant or even declining. Therefore, we should take measures to improve both governmental expenditure efficiency and personal health expenditure efficiency and Only in this way can we increase the total health care expenditure efficiency and realize truly effective medical reforms.

In models 2 to 4, the increase of urbanization ratio plays a positive role in promoting the personal health expenditure efficiency and makes it more convenient for residents to consult a doctor. In addition, urban regions house more qualified medical resources so it improves the efficiency and quality of personal health care consumption. However, population size hinders personal health care expenditure efficiency, which indicates an extensive management in personal health care in China and the knowledge of health care management mainly comes from the advertisement and promotion of local administration. Relevant departments lack individualized health care management measures as well as openness and transparency in the management process. The insufficiency of human resource in public health service management department leads to overloaded per capita

management and over extensive management. This conclusion is consistent to the previous findings realized by EDA where scale rewards in 86.7% provinces present a declining trend.

In models 1 to 4, we find that total dependency ratio has a positive effect on personal health expenditure efficiency. Compared with young labor force, children and the elder pay more attention to the medical service information because of higher hospitalizing frequency. Therefore, their health expenditure efficiency is higher than young labor force. However in accordance to Bian (2001) and Sun (2010), we discover that per capita local financial expenditure has a negative effect on personal health care expenditure efficiency, which is closely related to the current Chinese medical service charge policy-Fee-for-Service. The stronger the local government's financial expenditure power is, more personal health care expenditure subsidies will be provided, more likely to induce medical service demand in the offer side (Lv, 2009) and decrease personal health care expenditure efficiency. This is consistent to Belli's (2004) study.

CONCLUSION AND POLICY SUGGESTIONS

We have analyzed the efficiency and influencing factors of personal out-of-Pocket health expenditure by using the panel data from 2002 to 2011. The state health expenditure efficiency is increasing and personal health expenditure efficiency is descending since health reform. This gives rise to no significant change in total health expenditure efficiency. Therefore, in order to improve China's health expenditure efficiency, we need not only attach importance to the governmental health expenditure efficiency but also take measures to improve personal health expenditure efficiency. On the cross-section, there is great diversity in expenditure efficiency in eastern, middle and western region; the middle region is the lowest as regards total efficiency; the eastern region is the highest in respect to pure technical efficiency; the western region is obviously low on scale efficiency; the majority of Midwest provinces is declining on scale rewards.

On this basis, we analyze the factors that influence the personal health expenditure efficiency by panel Tobit model and find that per capital GDP causes different influence on personal health expenditure efficiency in the eastern, middle and western regions, that virtual variable of medical reform has negative impact on personal health expenditure efficiency, that urbanization is beneficial to the promotion of personal health expenditure efficiency and that a negative relationship exists between population size and personal health expenditure efficiency.

Correspondingly, we provide the following policy suggestions: Firstly, middle and western regional governments should step up to increase the positive effects of the economic growth on all-round social development. Government needs to develop actively medical and

health resources, realize synchronous development in various social aspects and improve the quality of the social development while in the pursuit of economic development, since the unilateral pursuit of GDP growth can not promote personal health expenditure efficiency. In addition, the government's fiscal expenditure should supply both the demand side and the offer side, due to the induced demand characteristics of medical and health services. Single complement for the demand side and personal expenditure cannot promote personal health expenditure efficiency.

Secondly, So far most of Chinese health service facilities implements extensive and unilateral management and doctor is overloaded in per capita services, so we need to strengthen the ability training of individualized service on primary and local health services managers. We should reinforce the management and service of personal health expenditure in medical reforms so as to increase the scale of optimal service. We also need to strengthen the publicity and popularization of individual health knowledge, the regulation of hospital information and the competition between hospitals; we should increase the openness and transparency of individual information to the patient as well.

Thirdly, we should improve urbanization rate and optimize health resources. The advantage of urbanization lies in the concentration of residential living so the waiting time for treatment is reduced. This leads to the concentration of medical resources and is conducive to the quality competition among medical services. In impoverished rural region where residents live in scatter, we should strengthen rational scheduling and allocation of health resources and improve the universal services of basic medical insurance in order to avoid local market monopoly by rural barefoot doctors.

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