Payment reform and changes in health care in China

Chen Gao [a] [*], Fei Xu [a] [b], Gordon G Liu [c] [a]

[a] PKU China Center for Health Economic Research
[b] School of International Pharmaceutical Business, China Pharmaceutical University
[c] Peking University Guanghua School of Management
[*] Corresponding author, Tel.: +86 18600075900, E-mail addresses: gaochenterry@gmail.com

Abstract

This paper is intended to track down the primary effects of healthcare payment reform of capitation experiment and the supplementary open enrollment policy in Changde city, Hunan Province of China. Based on the longitudinal Urban Resident Basic Medical Insurance (URBMI) Household Survey, this study analyses the 2008-2010 URBMI data through a set of regression models. The study finds the payment reform to reduce its inpatient out-of-pocket cost by 19.7%, out-of-pocket ratio by 9.5%, and length of stay by 17.5%. However, the total inpatient cost, drug cost ratio, treatment effect, and patient satisfaction showed little difference between Fee-For-Service and capitation models. We conclude that the payment reform in Changde decreased the financial burden of inpatient patients and improved hospital efficiency, without compromising quality of care or responsiveness to patients.

Key Words: Payment, Capitation, Policy Impact, Patient-level data, China

1. Introduction

In China, the issue of *"kan bing nan, kan bing gui"* which translates to 'getting medical care is difficult and expensive' is one of the most prominent problems in health care system (Yip et al, 2012). The quote has been directly cited by a number of academic publications on China's health care system (Yip & Hsiao, 2009, 2008; Eggleston, 2007) and has been listed among the top five concerns of the Chinese people according to annual national polls (Xinhua, 2008, 2009, 2010). *"Kan bing nan, Kan bing gui"* is a "systemic disease" stemming from the confluence of three factors: lack of government financing, lack of universal coverage, and improper payment incentives (Hu, 2006). Although recent reforms have targeted the first two factors, the problem of improper payment incentives remains an unresolved challenge.

The present payment system is ill-suited to alleviate the current health system's problems. Chinese payers primarily use a "Fee-For-Service" (FFS) payment method, which incentivizes providers to induce unnecessary demand because a higher volume, especially on drugs and procedures with high profit margins, means a higher profit. The problems with FFS are exacerbated in China with an irrational pricing policy that allows mark-ups for some drugs, but sets basic service prices below cost. Together, these two policies induce demand for innovative equipment tests and expensive drugs with high profit margins at the expense of more cost-effective or efficacious treatment. This overuse of expensive and unnecessary drugs and procedures results in cost inflation, waste resources, and may lower quality of care.

Many countries including China have begun moving away from the fee-for-service payment model and experimenting with alternative payment plans. The payment reform is on the political agenda for China's health care system reform (CPC Central Committee and the State Council, 2009; the State Council, 2012). The two major payers in China, the Ministry of Human Resources and Social Security (MOHRSS) and the Ministry of Health (MoH) have both issued official documents on payment reform, in 2011 and 2012, respectively, which identified the use prospective payment methods including Diagnosis Related Groups (DRGs) and Capitation as a priority of payment method reform (MoHRSS, 2011; MoH, 2012). Because of the de-centralized nature of the Chinese political system, payment reforms in China have taken on various forms in different regions. This has provided opportunities for empirical investigations of the impact of local payment experiments.

In this paper, we focus on a local payment reform of capitation experiment for inpatient patients from Urban Resident Basic Medical Insurance (URBMI) program in Changde city, Hunan Province, China. The payment reform in Changde is unique in that it included an open enrollment policy that not only facilitates calculating payments to providers, but also incentivizes in-network providers to compete over price, quality, and responsiveness for contract patients.

While it is generally accepted that the way providers are paid affects their performance, and that this response can be very large (McClellan, 2011; McGuire, 2010), the empirical studies on the impacts of changes in health care payment methods are limited in scope. The existing literature is specifically limited in the following three ways: One, although there are several important exceptions, the existing literature is largely focused on the effects of payment-method reform within the United States. For instance there is evaluation of cost reduction associated with prospective payment reform in Hainan, China (Yip & Eggleston, 2001), study of the effects on hospital admissions and length of stay from DRGs reform in Hungary (Kroneman & Nagy, 2001), and an experiment of payment reform in rural China to study its impact on efficiency and cost (Want et al, 2011). Two, previous literates are limited in data and methodologies (Moreno-Serra & Wagstaff, 2010; Eggleston et al, 2008), where there are few studies using patient-level data or differences-in-differences (DID) model to control for the confounding effects. Three, the existing literature largely concentrates on provider-centric outcomes rather than patient-centric outcomes. (Schmidt et al., 2011; Dafny,2005; Shmueli et al., 2002). If the basic principles of health care reform are that comprehensive, high quality medical care should be timely available and affordable to all citizens (Weale, 1998), then studies which evaluate the real changes payment reform has brought to individual patients are of great value to advancing these goals.

This paper tries to avoid the aforementioned limitations in the following three ways: one, we

evaluate the policy impact of payment reform in the broader context of expanding health insurance coverage in China, adding to the limited payment literatures from developing countries; two, we employ micro-level survey data for the empirical investigation, based on a couple of regression techniques to isolate the payment system effect from other confounding factors; and three, we use a set of variables to track down the effects of the payment change on both providers and patients. These variables include patients' out-of-pocket payment as a percentage of total cost as a measure of patients' financial burden, length of stay as a measure of hospital efficiency, a method also adopted by Britain's National Health Service (Clark, 1996), patient self-reported treatment outcome as a measure of quality of care (Donabedian, 1988) and patient satisfaction as a measure of responsiveness etc.

This paper is organized as follows: section 2 introduces the policy background of payment reform in general and the evaluated local capitation experiment in particular; section 3 outlines the research design; section 4 describes the study results; section 5 is the conclusion and discussions.

2. Background

2.1. Payment Reform

2.1.1. DRGs

Diagnosis Related Groups (DRGs)-based prospective payments have been frequently considered as one of the best platforms for healthcare payment reform, because of its scientific regulation of treatment protocols, risk distribution between payers and providers, and balance between cost, efficiency and quality considerations.

Despite the advantages of the DRG-based payment system, its use in China is limited by inadequate data-collecting infrastructure, a lack of unified disease classification system, and so forth. As a result, it is difficult to set rates according to protocols or to group all diseases. Currently, the disease-based fee rates (either fixed payments or caps) are used in China, and they are mostly determined by looking at the actual past expenditures. However, research has found that basing rates on standard protocols of treatments is much more effective in directing and controlling physician behaviors and accomplishing the goals of payment reforms (Wu et al., 2004).

Most of the local practices of DRGs in China, although called DRGs in much of the literature, are actually case-based payments, (The World Bank, 2010). These "DRG-based payment" cases refer to many different kinds of payment methods experimented throughout China. These projects usually use an ex-ante fixed rate for each treated hospital case, be it for a single disease as in Mudanjiang city, Heilongjiang Province or groups of diseases as in Beijing. Although most cases do not reimburse based on protocols, there are a few exceptions, notably in Ji'ning city, Shandong Province. However, these protocols often only cover a limited number of diseases and are vulnerable to cost shifting.

Previous studies have shown evidence of the positive impacts from DRGs-based payment on cost containment and length-of-stay reduction (Wu et al., 2007; Luo et al., 2007). Despite DRG-based payment's potential to contain costs and reduce the average hospital length of stay, its impact is limited if the payment system is not rigorously-designed or covers only a limited number of diseases. For instance in Shanghai, 13 diseases were subjected to DRGs payment as an experiment. Researchers using DID and triple-difference models found that the use of DRG-based prospective payments in Shanghai was associated with a shorter length of stay, but with a higher patient's medical expenditure, and a cost shifting to the uninsured (Zhang, 2010). Another case in Zheng'an, found that after the implementation for DRG-based payment for some diseases, health care costs on uncovered diseases increased rapidly (Chen et al., 2007).

2.1.2. Capitation

Aside from DRGs, a second potentially effective payment approach is capitation. In a capitation system the providers are incentivized to deliver more preventive care in order to avoid larger treatment expenses in the future. In this way, providers and patients share a common goal of preventing future illness. This is in contrast to the FFS model, where physicians are compensated in proportion to the volume of treatments performed and drugs prescribed, and therefore have no comparable incentives to invest in preventive medicine.

However, capitation may also lead to under-treatment as more volume means less profit. Capitation systems are also vulnerable to adverse selection; since the elderly and those with chronic conditions are expected to consume more than young and healthy people. Providers will attempt to attract the latter group, while attempting to avoid treating the former. Finally, capitation is vulnerable to cost-shifting to the uninsured or to services not covered by capitation if there is insufficient regulation from payers or the government.

In China, the lack of a well-established gate-keeping or referral system also provides challenges for the implementation of capitation. Since information systems and patient data are often limited, it can be difficult to calculate the number of individuals enrolled at an in-network provider or the total amount that a provider will be paid. Furthermore, a capitation payment system relies on individuals being registered with a single provider for a fixed period; in this case, the in-network providers are thought to contribute most to improving health of the communities rather than serving only those patients who actively seeking care (Ministry of Health of New Zealand, 2001), creating positive externalities for the community at large.

There are two major types of capitations used in China today, outpatient capitation, implemented in Zhenjiang, Hangzhou and Zhuhai, and inpatient capitation, implemented in Jiujiang and Changde, etc. (Li, 2010). Both inpatient and outpatient capitation systems differ in how they assign providers to patients, with some favoring direct administrative assignment and others favoring open enrollment with patient choice. One study from the World Bank found that allowing patients to choose their own provider creates new incentives for providers to change their behavior and to be more responsive to patients (Langenbrunner et al., 2009).

China's experiments with capitation have taken a number of different approaches when deciding how to match patients and providers. For instance in Zhenjiang, the residents are administratively assigned to the local in-network community health institutions (Anon., 2007). In Zhuhai, open enrollment policy allows residents to choose among all contracted community health institutions, and there are no caps or deductibles. In Hangzhou, Jiujiang and Changde, patients are allowed to choose among all contract health facilities including the community health centers and hospitals. Especially in Jiujiang, there are exit mechanisms for in-network hospitals, which allow the municipal insurance bureau to cancel contracts with providers if they failed to attract enough patients.

Evidence of policy impacts of capitation in China is thin and mostly lack rigorous methodology (Eggleston et al., 2008). One study in Hangzhou city compared the outpatient service utilization and expenditures between two groups of male subjects of the same age group and benefit package. It found that capitation is associated with statistically significant less service utilization and lower expenditures than FFS (Wang, 2005). Zhuhai has reported the results of its outpatient reimbursement and capitation payment reform two years after its implementation in July 2009. Almost 1 million residents contracted with community health institutions, accounting for 71% of its population. The annual increase of outpatient visits and revenue for contracted community health institutions was 65% and 25% respectively; most contracted institutions had some balance (MoHRSS, 2011). In 2001, Jiujiang city switched from fixed payment to capitation. The policy change was associated with a decrease in medical expenditures per insured inpatient from 2320 to 1778 yuan, and a decline in drug share from 76.5% to 59.8% (Jiujiang Health Insurance Office, 2004).

2.2. The Evaluated Local Policy

2.2.1. Insurance Expansion

This study focuses on the capitation experiment in Changde, Hunan Province of China, which was introduced co-currently with a new national health insurance program.

To achieve universal coverage, China's health care system is undergoing a fundamental reform through URBMI. Prior to 2007, there were two social health insurance programs: Urban Employee Basic Medical Insurance (UEBMI) for urban employed and New Rural Cooperative Medical System (NRCMS) for the rural population. However, the third population cohort without formal employment in urban areas was left out of the state health care safety net. To remedy this and to meet the Chinese government health care reform goal of universal coverage, Urban Resident Basic Medical Insurance (URBMI) was created in 2007. The newly implemented URBMI covered "primary and secondary school students who are not covered by UEBMI (including students in professional senior high schools, vocational middle schools, and technical schools), young children, and other unemployed urban residents," thereby helping to close the hole in the state safety net (The State Council, 2007; Lin & Liu et al., 2009).

Changde was one of the seventy nine cities chosen in 2007 to participate in a URBMI pilot project. At the start of its URBMI pilot project, Changde adopted a capitation payment method for URBMI holders' inpatient care, while maintaining fee-for-service for other insurance programs and for the uninsured.

2.2.2. Reform rationales

Three main challenges emerged from the expansion of insurance in Changde city (Tan, 2009). These challenges, which will be discussed in greater depth below are: a disparity between the demand and ability to pay for health care from the URBMI population, the insufficient size of the Changde Health Insurance Bureau, and the continued inflation of city healthcare costs due to overprescribing. Cumulatively, the effects of these three challenges led Changde to pursue payment reform in order for a more smoothly implement of the URMBI policy.

First, compared with UEBMI, the financing of URBMI is disproportionate to the demand for health care. The population cohort enrolled in URBMI is considered to be a relatively vulnerable group compared with the UEBMI population who hold formal jobs. Therefore, the demand for care from this population should not be expected to be lower than that of the UEBMI cohort. Changde statistics show that the morbidity for the 60 and above age group is more than 17%, and the average medical expenditure is over 6000 RMB. Both indicators are higher than their UEBMI counterparts, though the children enrollee in the URBMI program may help balance out to some extend (China Center for Health Economic Research, 2009). At the same time, both the financing level and ability to pay for the URBMI population are lower than UEBMI counterparts. For example, in 2009, the URBMI financing level for Changde adults was 240 RMB (individual contribution and government subsidy combined, and is expected to increase to 360 RMB in 2015), whereas the financing level of UEBMI was 1,100 RMB per person per year in 2009. This created a potentially significant gap between the URBMI's population's demand for care, and the URBMI's ability to purchase.

Second, the management of the new implemented URBMI is beyond the administrative capacity of Changde's social insurance agency. In 2009, there were more than 200 health insurance staff members serving around 500,000 UEBMI insureds. If the city had used FFS payment for URMBI, it would have required at least doubling the current health insurance staff. This increase would be a large financial burden for the local government of a low-to-middle income city such as Changde.

Third, as in most other places in China, there are perverse incentives for doctors and a supply-induced demand issue in Changde,. The problems of over-prescription, over-service, and denial of service to the extremely ill are not uncommon. Prior to URBMI, Changde implemented several regulatory measures to address these problems but saw little effect on outcomes, while sustaining high administrative costs.

2.2.3. Capitation policy

In response to these challenges, and in conjunction to the implementation of URBMI in Changde in 2007, the city also introduced a capitation payment system to reimburse inpatient expenditure. In 2009, Changde extend its URBMI coverage to general outpatient services. However, even after 2009, the expenses for outpatient care are minimal so they are not considered in this paper. It is also worth noting that the URBMI plans vary across different counties in Changde in terms of both financing and reimbursement, as the financing level is at county level for Changde URBMI.

The insurance fund in Changde URBMI was divided into three parts to reimburse inpatient care: the equalization fund, the preservation fund and the capitation fund. The equalization fund equalizes the operational risks brought by the differences in financing level, enrollee characteristics, medical facilities and personnel etc., across districts within Changde city. For instance, the equalization fund may compensate the loss of a small hospital which has only a small number of registered patients, many of whom have chronic conditions or serious disease histories such as mental health facilities. This is somewhat similar to the risk adjustment system employed in European countries such as Netherland and Germany. But it differs essentially from their risk adjustment systems in that the different plans across districts in Changde are not competing with each other in the same region, and unlike in Netherlands or Germany, the risk adjustment is not performed at the individual level.

The reservation fund was created to reimburse providers for performing special outpatient services and to compensate non-management related hospital losses. Special outpatient services reimbursement in Changde was designed to reimburse common chronic diseases that need long-term medications such as diabetes or hypertension, which differs from general outpatient services. Non-management related losses may occur if events like a natural disaster or large-scale communicable disease happens, the hospital through no fault of its own will provide far more care than anticipated and will sustain a loss in this case.

The capitation fund is allocated to the hospitals month by month according to the number of people registered to each hospital. The capitation fund is meant to reimburse hospitals for inpatient services provided to the URBMI patients registered at each hospital. Once the payments are made, they are not adjusted for the volume of care provided. If the actual expenses are above the allocated budget, the hospital must bear the extra cost itself. If it is lower than the budget, the hospital may keep the surplus as a profit. Therefore, under the Changde system, hospitals have a financial incentive to contain costs by not over-providing care. The capitation fund makes up the large majority of the URMBI budget. In the year 2008, the equalization fund and the reservation fund combined accounted for 13% of the total insurance fund of URBMI, with the capitation fund making up the remainder.

2.2.4. Open Enrollment

The supporting policy for capitation payments in Changde is open enrollment, or "marketized first admission policy" *("Shi Chang Hua Shou Zhen" in Chinese)*, which means the insured can freely select their URBMI in-network health care provider without any restrictions as their first provider when seeking inpatient care. In China, the health delivery system is fragmented. There are no mature general practitioner systems or primary health centers playing a gate-keeping role as there are in the UK and in many other European and North American countries. Since patients may come to different hospitals seeking medical care without referral, there is often no rigorous way to calculate the number of people registered in a hospital, which is the base for calculating the per capita rate. This lack of data makes determining each provider's budget extremely difficult under the current system. Some locations use history data to calculate the per-capita rate, but this data suffers from many limitations. In response, during the URBMI enrollment process, the household needs to decide and sign for one hospital or community health center out of the all the contract hospitals and community health institutions as their first admission institution, and the family members in the household cannot get reimbursement from URBMI if they seek care from providers other than the sighed providers without referral from the primary provider.

The URBMI enrollment process differs from the enrollment policy in many other cities in that it is not limited to community health institutions. In fact, the URBMI contract institutions cover almost all medical institutions in Changde. The contract can be changed once a year. The contracted institutions are responsible for all of a patient's in-patient care. If a patient is referred to another provider, the first-admission provider has to reimburse her/his inpatient expenditure. In this type of contracting, the number of people registered in the contract hospital can be counted as the base to calculate the per-capita rate. Since hospital's budgets are defined partly by how many URBMI patients they have under contract, the contracted institutions have the incentive to compete over the price and quality of care to attract more individuals in order to increase their revenue. They also have the incentive to contain costs and improve efficiency in order to increase their profits, as the profits equals the average residuals for each enrollment resident multiplied by the number of contracts.

Without complementary reforms, competing for patients may exacerbate the existing problems and lower quality and access to care. Therefore, the present paper defines Changde's payment reform project as a comprehensive set of policy measures including patient choice when choosing providers, and regulations from payers, but with the capitation payment method at the core.

3．Method

3.1. Data

The data used for this paper was from the URBMI household survey. In 2007, commissioned by the State council, the Peking University Guanghua School of Management conducted the URBMI household survey. Starting with the baseline survey in November 2007, the project has been scheduled for four consecutive years till 2010, covering nine representative cities including Changde. The objective of this survey is to understand the coverage and effects of the basic medical insurance. Using Probability Proportion to Size (PPS) sampling technique, there were 141 communities, 42 districts from nine cities amongt the 79 pilot cities in 2007 included in the final survey: Baotou City, Inner-Mongolia SAR; Changde City, Hunan Province; Chengdu City, Sichuan Province; Jilin City, Jilin Province; Shaoxing City, Zhejiang Province; Xiamen City, Fujian Province; Xining City, Qinghai Province; Urumqi City, Xinjiang SAR; and Zibo City, Shandong Province (Lin et al., 2009). The URBMI household survey includes information on the population demographics, individual health behaviors and status, health insurance status, utilization and satisfaction for outpatient and inpatient services, and household socio-economic status etc. In additions, we also have the inpatient diagnosis coded according to ICD-10 by senior doctors, which provide solid database for research of this paper.

The URBMI insurance program started its pilot in 79 cities since October 2007, and the baseline survey was conducted in November, 2007. The period between the two is so short for any policy intervention taking evident effect; therefore the baseline data in 2007 was not included in the final analysis. The final analysis includes the data from 2008, 2009, and 2010. According to the filed interviews with the local government from all nine surveyed cities, Changde is the only city among them who carried out such thorough payment reform through URBMI program as well as in UEBMI program. The URBMI and UEBMI in the other 8 cities and the UEBMI in Changde are still paying providers mostly under traditional FFS method.

The data used for this paper is the patient-level data from household survey. The payment reform in Changde URBMI focused on reimbursement of inpatient services, so we choose the inpatient-related variables as the dependent variables. Meanwhile, we conduct research from both provider and patient perspectives in order to examine the policy effect in an all-round way. From provider's perspective, the total inpatient medical expenditure, drug expenditure ratio as percentage of total medical expenditure, average length of stay were chosen as dependent variables to track down the effects on cost containment, drug utilization, and hospital efficiency, respectively. From patient's perspective, out of pocket expenditure, treatment effect, and patient satisfaction were used as dependent variables to examine the effect on financial burdens, quality

of care, and overall satisfaction for health services, respectively. The treatment effect and patient satisfaction are actually much related to the provider's medical behaviors. Table 1 presents the descriptive statistics of inpatient-related information of URBMI patients and UEBMI patients in Changde and other surveyed cities. Student t-test was used to examine whether the difference of URBMI or UEBMI between Changde and other cities are statistically significant. We find that the total inpatient medical expenditure, length of stay, and out of pocket expenditure of Changde URBMI are all statistically lower than that other city's URBMI, and the inpatient total medical expenditure, out of pocket expenditure, and out of pocket ratio are all statistically lower in Changde than other cities' UEBMI. The rest differences are not statistically significant according the t-test.

Table 1 Descriptive statistics of inpatient information from Changde and other cities

	Changde				Other cities			
	URBMI		UEBMI		URBMI		UEBMI	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Inpatient (Yuan)	4598.26[***]	9088.33	7222.42[***]	15319.60	7213.58	11424.91	9706.50	15178.80
Drug Ratio (%)	72.95	30.03	72.07	30.64	72.16	30.41	70.19	36.67
Length-of-Stay (Day)	11.63[***]	11.06	17.53	18.41	15.91	20.65	19.04	24.02
Out-of-Pocket (Yuan)	3330.32[***]	8779.36	2870.13[***]	4581.27	5169.84	9202.94	4370.49	9641.56
Out-of-Pocket ratio (%)	66.44	29.24	51.72[***]	34.93	69.24	28.17	43.70	33.50

Note: *** means the difference between Changde and other cities is significant at 1% level. The comparison is made between the Changde URBMI and other cities' URBMI, and between Changde UEBMI and other cities' UEBMI

3.2. **Model specifications**

In October 2007, Changde implemented the URBMI pilot program and at the same time began using capitation to reimburse inpatient care for URMBI enrollees' inpatient services. Therefore it is difficult to distinguish the effects of the payment reform from the insurance coverage expansion through a before-and-after comparison because both events happened simultaneously. It is possible though, to isolate the effect of just the payment reform on the dependent variables by comparing Changde's URBMI program with capitation and other cities' URBMI programs with fee-for-service, to examine the impact of payment reform. The straightforward approach is to calculate the difference in dependent variables between Changde URBMI and other cities' URBMI. However, one of the potential problems is that along with the effects caused by payment reform, the dependent variables are also associated with some underlying differences between Change and other cities (such as the population health, health service consumption capability, and health service price variations across different regions). In an effort to control for the city fixed effects by deducting the inherent differences, it is plausible to assume that the differences between Changde's UEBMI and other cities' UEBMI are a good proxy for the magnitude of effects caused by inherent differences between cities. Changde's UEBMI program, like all other cities included uses a fee-for-service reimbursement plan, which produces similar incentives for both patients and providers. The difference between Changde's URBMI program and other cities' URBMI program, once the difference between cities has been controlled for, is considered as the policy effect of Changde's payment reform in this paper. The Difference-in-Difference model is:

$$Y_{it} = \alpha_0 + \alpha_1 D_{it} + \alpha_2 C_{it} + \alpha_3 (D_{it} \times C_{it}) + \alpha_4 Z_{it} + \varepsilon_{it} \qquad (1)$$

Where Y_{it} is the average inpatient medical expenditure the out of pocket expenditure and its share as percentage of the total expenditure, the inpatient length of stay, treatment effect, and patient satisfaction for patient i in the year t (2008-2010). D_{it} is the city dummy variable to distinguish the effect of cities where different payment policies adopted with 1 for Changde with payment reform in URBMI and 0 for other cities without thorough reform in URBMI or UEBMI. C_t is the insurance dummy variable with 1 for URBMI and 0 for UEBMI. Z_{it} is the characteristics of patient i in the year t, including age and its square, gender, household income and square, education, chronic conditions, self rated health conditions and ICD-10 classification for the diagnosed disease. The coefficient of the interaction term of city and insurance dummy is the difference between Changde URBMI with payment reform and other cities' URBMI without, which can be interpreted as the policy effect of payment reform in Changde URBMI.

It is worth noting that the payment reform will have a proportional, not additive, effect on medical expenditure and length of stay. In other words, reducing the length of stay from 12 days to 11 days is easier than reducing to from 2 days to 1 day. The same applies to medical expenditure. This is a theoretical reason to take the logarithm of the dependent variable of total inpatient medical expenditure, out of pocket expenditure, and length of stay (Norton et al, 2002). The other two dependent variable, treatment effect and patient satisfaction, are ordinal variables, with 1-4 representing full recovery, bettered, unchanged, and worsened treatment effect respectively, and 1-5 representing very unsatisfied, unsatisfied, fair, satisfied, and very satisfied to measure patient satisfaction.

4. **Results**

Table 2 presents the parameter estimates for the policy impact on inpatient medical expenditure, out of pocket expenditure and it share as the total inpatient medical expenditure, drug expenditure ratio based on OLS model, and treatment effect and patient satisfaction based on Ordered Probit model.

Table 2 Parameter Estimates for the policy impact of payment reform in Changde

	Model (1)	Model (2)	Model (3)	Moedel (4)	Model (5)	Model (6)	Model (7)
	Ln(total cost)	Drug cost ratio	Ln(length of stay)	Treatment Effect	Patient Satisfaction	Ln(out-of-pocket)	Out-of-pocket ratio
City	-0.45	0.014	-0.107	0.09	0.087	0.129	0.072
	[0.060]***	[0.024]	[0.038]***	[0.067]	[0.062]	[0.045]***	[0.020]***
Insurance	-0.118	0.022	-0.114	0.046	0.06	0.396	0.209
	[0.044]***	[0.017]	[0.029]***	[0.052]	[0.047]	[0.032]***	[0.015]***
Interaction	-0.029	-0.019	-0.175	-0.015	-0.056	-0.197	-0.095
	[0.089]	[0.036]	[0.058]***	[0.104]	[0.094]	[0.066]***	[0.030]***
Gender (Female=1)	-0.095	0	-0.102	-0.072	0.1	0.049	0.02
	[0.032]***	[0.013]	[0.021]***	[0.038]*	[0.034]***	[0.024]**	[0.011]*
Education (years)	0.01	-0.001	0	-0.01	0.002	-0.001	-0.001
	[0.004]**	[0.002]	[0.003]	[0.005]**	[0.004]	[0.003]	[0.001]
Age	0.017	-0.001	0.007	0.03	0.004	-0.005	-0.003
	[0.004]***	[0.002]	[0.003]***	[0.005]***	[0.004]	[0.003]*	[0.001]**
Age_square	0	0	0	0	0	0	0

	[0.000]**	[0.000]	[0.000]	[0.000]***	[0.000]	[0.000]	[0.000]
Ln(household income)	-0.148	0.128	0.165	-0.435	-0.52	0.094	0.026
	[0.252]	[0.102]	[0.166]	[0.295]	[0.269]*	[0.187]	[0.083]
Ln(income)_square	0.018	-0.008	-0.011	0.019	0.033	-0.012	-0.004
	[0.016]	[0.007]	[0.011]	[0.019]	[0.018]*	[0.012]	[0.005]
Chronic conditions	0.052	0.018	0.11	0.568	-0.064	0	0.004
	[0.041]	[0.016]	[0.026]***	[0.048]***	[0.043]	[0.031]	[0.014]
Self-rated health	-0.048	0.02	-0.049	-0.323	0.174	-0.039	-0.02
	[0.018]***	[0.007]***	[0.011]***	[0.021]***	[0.018]***	[0.013]***	[0.006]***
year2010	0.082	0.036	-0.015	0.046	0.052	-0.113	-0.066
	[0.038]**	[0.015]**	[0.025]	[0.045]	[0.040]	[0.029]***	[0.013]***
year2009	0.01	0.024	-0.002	0.01	-0.014	-0.082	-0.048
	[0.039]	[0.015]	[0.025]	[0.045]	[0.040]	[0.029]***	[0.013]***
Ln(total cost)						0.936	
						[0.012]***	
Observations	3985	3296	4934	4612	4673	3620	3956
R-squared	0.16	0.02	0.14			0.66	0.15

Note: All models controlled for ICD-10; t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1

4.1. Providers

Firstly in general, the coefficients of key independent variable (the policy effect, i.e. the interaction term of city and insurance dummy variables) from model (1) to model (5) show interesting results. The coefficients of total inpatient expenditure and the drug cost's share are -0.029 and -0.019 respectively; both are negative but are not statistically significant even at 10% level. The coefficient for inpatient length of stay is -0.175 and is significant at 1% level. The coefficients of treatment effect and patient satisfaction are -0.015 and -0.056 respectively, though neither of them is significant even at 10% level. It indicates that the payment reform in Changde did not have significant cost-containment impact for providers; however, it significantly reduced the inpatient length of stay, and at the same time, without influencing the treatment quality and patient satisfaction for health services.

Specifically as in model (1), although the coefficients of payment reform effect is not statistically significant, the coefficients of city and insurance dummy are 45% and 11.8%, all significant at 1% level, indicating that the total inpatient medical expenditure is lower in Changde, a city located in less developed inland China, than other surveyed cities by about 50%, meanwhile, the same indicator is lower for URBMI patients than UEBMI patients in all nine surveyed cities, possibly due to limited financing level and different enrollee characteristics. As for the controlled variables, the results show that the male, highly educated, elders, and those respondents with poorly self-rated of health conditions have higher inpatient medical expenditures, while the household income and chronic conditions of respondents have no significant impact on total cost.

As seen from model (3), the inpatient length of stay in Changde is shorter than the rest surveyed cities by 10.7%, and the same indicator is shorter for URBMI patients than UEBMI patients from all nine surveyed cities by 11.4%, both are statistically significant at 1% level. The women, elders, those with chronic conditions, and with poorly self-rated health conditions have longer length of stay, while education and family income have no significant impact on length of stay.

4.2. Patients

After controlling for total medical expenditure, the coefficients of out-of-pocket payment and its share as the total expenditure are -0.197 and -0.095 respectively, both are significant at 1% level. In model (6), the coefficients of city and insurance are 0.129 and 0.396 respectively, and are both significant at 1% level, indicating that after controlling for the total expenditure, the average out-of-pocket payment for Changde inpatient patients is higher than their counterparts in other cities by 12.9%, at the same time, the same indicator is 39.6% higher for URBMI patients than their UEBMI counterparts in all nine cities. Among the coefficients of controlled variables, the self-rated health conditions have most significant impact on out-of-pocket payment.

4.3. **Robust Test**

According to the above regression results, the self-rated health conditions have evidently significant impact on both providers and patients. Partly because people with different health status also differs in their medical seeking behaviors, health service utilizations, and medical expenditures, and partly because in-network providers might select patients according to their health status, we divided the full sample into two groups according to their self-rated health conditions, with the first group including those with fair, poor, and very poor health conditions, and the second cover the rest people with good and very good self0rated health conditions. Separate regressions were conducted based on the two subsamples to examine the potential differences in coefficients.

Table 3 presents the parameter estimates based on the first sample of fair, poor, or very poor health conditions. The results from the relatively poor health subsample present a similar pattern with the results based on the full sample, that the out-of-pocket payment, out of-pocket ratio and length of stay are all reduced while the total inpatient medical expenditure remain unchanged. As for the population cohort with good and very good self-rated health conditions, the payment reform in Changde has little impact on either providers or   patients.

Table 3 Parameter Estimates based on the subsample of fair-, poor-, or very poor- self-rated health conditions

	Model (1)	Model (4)	Model (5)	Model (6)	Model (7)	Model (2)	Model (3)
	Ln(total cost)	Drug Ratio	Ln(length of stay)	Treatment effect	satisfaction	Ln(out-of-pocket)	Out-of-pocket ratio
city	-0.407	0.015	-0.093	0.043	0.09	0.117	0.084
	[0.070]***	[0.024]	[0.044]**	[0.076]	[0.070]	[0.051]**	[0.023]***
insurance	-0.137	0.03	-0.132	0.11	0.039	0.417	0.216
	[0.053]***	[0.018]	[0.034]***	[0.060]*	[0.055]	[0.038]***	[0.017]***
Interaction	-0.054	-0.003	-0.177	-0.001	-0.069	-0.193	-0.103
	[0.107]	[0.038]	[0.068]***	[0.118]	[0.108]	[0.077]**	[0.035]***
Observations	2848	2353	3561	3293	3334	2600	2829
R-squared	0.13	0.02	0.11			0.66	0.14

Note: All models controlled for ICD-10; t-statistics in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

5. **Conclusion and Discussions**

In this paper, we found that the payment reform in Changde was associated with a 19.7% reduction of the inpatient out-of-pocket cost, 9.5% reduction of out-of-pocket ratio, and 17.5% reduction of length of stay. However, the total inpatient costs, drug cost ratio, treatment effect, and patient satisfaction exhibit little difference between the Fee-For-Service and capitation models. We assume the data shows that providers respond to payment incentives by reducing the length of stay rather than containing the cost of care. We conclude that the payment reform

in Changde decreased the financial burden for patients and improved hospital efficiency, without compromising treatment quality and patient satisfaction.

The lack of decrease in overall in-patient medical expenditure is not consistent with the theory surrounding the use of capitation or much of the previous empirical literature, as capitation has been widely thought to be associated with under-utilization of health services and thus less medical expenditure. There are two plausible explanations for the lack of decline. First, the financial incentives to decrease costs and use less care built into the capitation model did not lead Changde providers to change their medical behaviors. This lack of response to incentives may have occurred because URBMI is a newly introduced insurance program and its share as a percentage of the entire social health safety net is relatively small as compared with UEBMI or NRCMS. URBMI is new so it may take years for physicians to learn when they are used to practicing under fee-for-service for years. By looking at the nationwide picture, the 2010 statistics show that the URBMI covers only 195 million populations as compare with 836 million for NRCMS, and that the financing and payment for URBMI are RMB 35.4 billion and RMB 26.7 billion respectively, as compared with 395.5 billion and 327.2 billion respectively for UEBMI, which is more than 10 times of that for URBMI (Dong, 2012). Whether the providers would respond to the incentives of cost-containment in the long run remains to be a research topic in the future.

The second possible explaination is that the medical expenditure for referred patients might be so high as to outweigh the positive effect of cost-containment of capitation. The sighed provider has to bear the responsibility of reimbursement for the contract residents, even if she/he is referred to another hospital; while on the other hand, the referred hospital (receivers) has no incentive to contain costs, because they are still operating under a fee-for-service model and it is not supposed to be responsible for any loss or profit. Additionally, the Changde capitation model does not reimburse 100% of the expenditure, as in most other places in China, which create further strong economic incentives for the referred hospitals to use more   as there are alwyas cost-sharing for patients at the point of service. This is especially true when there is no formulary for drugs, service, or equipments for Changde URBMI, and thus no limits for the receivers to use innovative and expensive drugs which they would not if the patients were well-informed. In order to address this problem, Changde has organized several meetings across different types of providers and encouraged them to sign cooperation contracts and forge agreements to improve the responsiveness and contain the cost for referred patients. The URBMI payer in Changde also intervenes heavily in cases of mal-practice. However, the local payer has limited influence over the cases if the patients are referred outside of Changde city. If future data permits, we thought this may be an interesting research topic.

In this paper, we also focus on the impact of payment reform on patients, a perspective lacking in much of the previous capitation literature. The data show that the financial burden of seeking medical care is reduced for patients, so the problem of *"kan bing gui,"* was alleviated under Changde's capitation reform. Equally important, patient-reported health care quality and satisfaction showed no significant difference from cities using the fee-for-service system, which were mostly contributed by its complementary policies of open enrollment that allows in-network providers to compete over quality and responsiveness. In such payment design, the providers and patients are sharing a common goal of a healthy population. It greatly helps to alleviate the stress relationship between provider and patients in current China, and furthermore, capitation through its emphasis on population health, helps build a more equitable and healthier society.

In particular, how to use the innovative payment methods to serve the objectives of health system reforms is an important topic. Many countries including China are using payment as an important instrument in health care reform. This is especially true in China as the recent reform efforts have targeted the government financing and insurance expansion.

In 2009, the Chinese Government committed to spending an additional RMB 850 billion (USD 135 billion) over the period from 2009 to 2011 to provide universal basic care for its people (Anon, 2009). In reality, the government surpassed this number with health expenditures as high as RMB 1,400 billion (USD 222 billion) from 2009-2011, as compared to RMB 36 billion (USD 6 billion) spending in 2008 (Economic Daily, 2012). In the context of such massive new funding, the

important question was how the new funding could be transformed into effective and efficient services (Yip & Hsiao, 2008). One important component to ensure that government health expenditures are not wasted is the adoption of payment reform. The way in which physicians are paid has a potentially large effect on their performance in delivering services (McClellan, 2011; McGuire, 2010). By moving away from fee-for-service, countries like China can control costs more effectively while also providing incentives for their providers to pay attention to areas like preventive medicine and population health, which are too easily ignored in a fee-for-service system.

The expansion of insurance coverage in the recent health care reform in China makes the need for Chinese payment reform even greater and more urgent. Around one half of the total government investment from 2009 to 2011 went towards subsidizing insurance coverage expansion. By the end of 2011, the social insurance programs covered 95% (1.295 billion) of the total Chinese population (Sun, 2011), and the total payment from these programs was estimated to account for over 50% of provider revenues (Yao, 2011). As the health care safety net continues to grow even further in both depth and breadth, the insurer's choice of payment system will play an increasingly important role in the resource allocation of health care in China.

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