Health Reform and Out-of-Pocket Payments: Lessons from China

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Abstract

Objective: China’s ongoing new health reform aims to reduce individual out-of-pocket (OOP) payments for health care services. This article is to analyze the impact of this reform and to draw policy implications.

Methods: Data are retrieved from the relevant government publications. Polynomial regression models are used to predict future health expenditures. An extensive sensitivity analysis is conducted to investigate the ratios of OOP payments to the total health expenditures (THE) and to the disposable personal income (DPI) for 2009-2011 under different scenarios of cost projections and personal income distributions. Both quantitative and qualitative analyses are carried out to draw conclusions.

Results: The ratios of OOP payments to THE and DPI vary significantly across scenarios tested. Only if all committed government investments and social health expenditure are realized, the China’s new health reform can reduce both ratios and achieve its target goals. In particular, the ratio of OOP payments to DPI can also be significantly reduced by improving income distribution. Due to the complicated interplay among different cost components in health expenditures, these two ratios may not change in the same direction, indicating that both need to be examined when evaluating the reform.

Conclusion: The new health reform in China aims to alleviate the high OOP payments for health care services but it has not yet been able to reduce both OOP-to-THE and OOP-to-DPI ratios simultaneously. Major reasons include (1) inability of local governments to fulfill their responsible investments due to health finance decentralization and uneven economic development in China; and (2) a serious cost-inflation in health expenditures coupled with a low level of income distribution. The central government is suggested to bear more financial responsibility and assist local governments to fully invest; and to improve individual incomes, in particular for the poor.

Keywords: Out-of-Pocket Payments, China’s New Health Reform, Government Investment, Income Distribution, Health Finance Decentralization
Introduction

In the health care financing sector, out-of-pocket (OOP) payments are the direct outlay of cashes that the patient or the family pays to the health care provider. When individual’s health care expense has to largely rely on OOP payments, it may result in “financial catastrophe” or poverty deepening which prevents them or their family members from seeking necessary health services (Gotsadze et al. 2005; Joglekar 2008; Sun et al. 2009). In most developing countries, however, OOP payments are the principal source of health care financing (Chaudhuri and Roy 2008; Garg and Karan 2009; Leive and Xu 2008; Limwattananon, Tangcharoensathien, and Prakongsai 2007; Manzi et al. 2005).

China is not an exception. In China, the total health expenditures (THE) contain three components: (1) government health expenditure (GHE), which is financed by both the central government and local governments; (2) social health expenditure (SHE), which includes contributions from employers, employees and residents; and (3) individual OOP payments. Before the Chinese economic reform in the late 1970s, the GHE as a share of THE was over 32%, the SHE shared 48% of THE, and the OOP payments as a share of THE and DPI was only 20% and 1.4% respectively. However, the distribution of health care expenses has dramatically changed during the past several decades. In 1998, the GHE as a share of THE dropped to 16%, and SHE dropped to 29% due to the shrinkage of health insurance coverage. As a result, the OOP payments as a share of THE and DPI roared up to 55% and 5% respectively. Costly and sometimes unaffordable access to medical service (commonly known in Chinese as “Kan Bing Gui”) emerged as a major
social problem in the late 1990s. Since 1998, the Chinese governments have begun to solve that problem by implementing a series of reforms on the healthcare system. Despite these significant efforts, OOP payments as a share of THE and DPI in China still remain at a high level of over 40% and 4.5%, respectively, till 2008.

In order to improve the affordability of health care services, the China’s new health reform unveiled in 2009 with two major target goals: (1) to make the OOP payments as a share of THE fall below 30%; and (2) to gradually reduce the share of OOP payments in the disposable personal income (DPI) in the next five years (Mao 2010).

The China's new health reform has been ongoing for two years. How does it affect individual OOP payments in China? Does it achieve its target goals? By analyzing recent health economic data released from the Chinese governments, this paper tries to provide some insights on these issues. In particular, we will investigate the following two questions in this paper.

- Have the OOP payments as a share of THE as well as a share of DPI been effectively reduced?
- If not, why, and what are the policy implications?

The remainder of this paper is organized as follows. We first give a background of the China’s new health reform and briefly discuss its main policies. We then introduce the two measures for OOP payments (i.e., the shares of OOP payment in THE and in DPI, respectively). Using recent health economic data in China, we predict and evaluate the impact of the China’s new health reform on these two measures of OOP payments. Our
study suggests that, the reduction of OOP payments, if continuing with its current trend, seems inadequate to meet the reform’s target goals. We then present an in-depth analysis to generate policy implications, which are not only relevant to China but may also be helpful for health reforms in other developing countries. We conclude the paper by discussing our policy suggestions and future research directions.

**Background and Main Policies of China’s New Health Reform**

Recall that in China, the total health expenditure (THE) contains three components: government health expenditure (GHE), social health expenditure (SHE) and OOP payments. SHE is mainly contributed via three health schemes. The first scheme is the Urban Employee Basic Health Insurance Scheme (UEBMI), whose contributions come from both employees and employers in cities. These contributions have already been collected at a relatively high level and are hard to grow (Liu 2004; Wang and Deng 2009). The other two health insurance schemes are the New Cooperative Medical Scheme (NCMS) and the Urban Resident Basic Health Insurance Scheme (URBMI), both of which are via voluntary enrollment. The beneficiaries of these two schemes mainly consist of farmers, the low-income groups or those without permanent jobs in cities. Thus, it is very difficult to increase the premiums from the NCMS and URBMI enrollees for otherwise they may choose to opt out. In addition, it is also difficult to increase the number of people covered by these two schemes as the coverage is already very high. In 2009, the NCMS has covered more than 94 percent of the farmers, and the URBMI has covered 80 percent of the city residents. Because there is limited room for SHE to grow, the most viable strategy in the China’s new health reform which can be used to decrease
the OOP payment is to increase GHE.

To increase GHE, the Chinese central government requires that governments at different levels should collectively invest an additional 850 billion RMB (approx. USD 125 billion) in the healthcare system from 2009 to 2011 (The State Council 2009). This additional government health investment (AGHI) goes into both the patient side and the provider side. On the patient side, these additional funds are used to (1) subsidize individuals, especially those low-income and/or those without basic medical insurance, so that more people can get coverage; and (2) improve the reimbursement level of the existing basic medical insurance system via strategies such as lowering the deductibles and co-insurance premiums, raising the reimbursement ceiling and expanding the formulary covered by the insurance, so that individual’s OOP payments can be reduced (Ministry of Health 2011b). On the provider side, the government will financially support their infrastructure construction and equipment procurement and provide subsidies for policy-related losses, so that providers can practice at lower charges to patients (Ministry of Health 2011).

The increase of GHE is usually associated with the decline in OOP as a share of THE, if THE does not change much. However, this relationship may not always hold, because when GHE increases, the OOP as a share of THE might also increase if THE increases more rapidly. Indeed, historical data in China show that both GHE and the OOP to THE ratio increase in 1979-1981, 1982-1984 and 1987-2001 (Ministry of Health 2010). For instance, from 1999 to 2000, the GHE increased from 64.096 to 70.952 billion, while the OOP as a share of THE increased from 55.9% to 59% (Ministry of Health 2010). This
seemingly counterintuitive observation also motivates us to study the impact of China’s new health reform on the OOP payments.

**Measures for the OOP payments**

**The ratio of OOP payments to the total health expenditure (THE)**

In general, a health system with a low ratio of OOP payments to the total health expenditure (THE) indicates better health protection for its people. When the average OOP payment is less than 15% of THE in a country, very few households tend to be affected by “catastrophic” health payments (Xu et al. 2005). In 2007, while the OOP payments are on average 17.7% of THE in the world, this percentage is much higher in the middle-income and low-income countries; in many of these countries it is over 50% (World Health Organization 2010).

In 1978, OOP payments as a share of THE were 20% in China. During the economic reform, this percentage grew quickly from 20% to almost 60% in 2000, and stayed at that level until 2002. After the shock of Severe Acute Respiratory Syndrome (SARS) in 2003, the Chinese government started to invest more heavily in public health programs in order to strengthen the control of infectious diseases; the share of OOP payments began to decline. In 2008, it dropped to 40.4% (Ministry of Health 2010). Compared to other high-income and many middle-income countries, the health care financing in China relies much more on OOP payments (World Health Organization 2010).

**The ratio of OOP payments to the disposable personal income (DPI)**

The ratio of OOP payments to THE can be used to measure the relative burden of health
expenditures laid on individuals in a society. However, unless the OOP payments are zero, individual affordability for health care largely depend on the relative weight of his/her health care expense and his/her disposable personal incomes. Hence, the ratio of OOP payments to the DPI of a person (or household) is a complementary indicator in measuring personal (or household) level OOP payments. In 2008, the average ratio of OOP payments to DPI ratio in China is about 4.52%. However, among the lowest 10% income group, this ratio is 6.81%, more than the triple of that in high-income countries such as OECD countries in 2007, which is 2.1% (OECD 2009).

**Materials and Methods**

**Materials**

The data for our analysis are extracted from the China Health Statistics Yearbook 2010 (Ministry of Health 2010) and the China Statistical Yearbook 2010 (National Bureau of Statistics of China 2010). We will use these data to develop prediction models for health expenditures in China. We only collect data during 1998-2008 because the health financing mechanisms in China changed significantly in 1998 when the Urban Employee Basic Health Insurance Scheme (UEBMI) was implemented. This new program replaced the existing Government Health Insurance (GHI) and the Labor Health Insurance (LHI) in the urban areas. It expanded the coverage to employees of private enterprises and smaller public enterprises, and provided a more stable financing for health care spending (Liu 2002). Thus data prior to 1998 cannot be used. During 1998-2008, the macro-economic condition in China is relatively stable. In the context of healthcare, the
only shock appears to be the outbreak of SARS in 2003, but this did not change the financing policy in China too much (Liu, Li, and Yu 2007). Therefore, we expect that a regression model with limited data points can still fit the data well, which we will see in our analysis below.

The variables retrieved include THE (Total Health Expenditure), GHE (Government Health Expenditure), CGHE (Current Government Health Expenditure), AGHI (Additional Government Health Investment), SHE (Social Health Expenditure), DPI (Disposable Personal Income) and GDP (Gross Domestic Product). Among these variables, the CGHE is the regular health care investment by both the central and local governments according to their fiscal budgets every year. The AGHI refers to the aforementioned additional 850 billion RMB investments by both the central and local governments from 2009 to 2011 (The State Council 2009). The GHE is the sum of CGHE and AGHI.

Methods

We first develop a prediction model for the 2009-2011 health expenditures in China, and then investigate how the OOP payments in China would change during that period using the two measures introduced above. Since we only use the model to do a three-year forecast, we are reasonably confident in its reliability, which we will also validate shortly.

To start with, we use the historical data of THE, CGHE and SHE from 1998 to 2008 to predict THE, CGHE and SHE in 2009, 2010 and 2011. Scatter plots reveal a strong nonlinear trend in all these three time series and hence simple linear regression is not
appropriate. Our analysis shows that 3rd-order polynomial regression models fit these data very well ($R^2 = 0.99$), which are then used as the prediction model.

We suppose that the 850 billion RMB investment for AGHI will be evenly invested over 34 months (from March 2009 when the reform began to the end of 2011). That is, the investment amount will be 25 billion each month or equivalently 300 billion a year. Recall that the GHE is the sum of CGHE and AGHI in each year; and THE in China consists of three components: GHE, SHE and OOP payments. Therefore, the OOP payment in 2009 to 2011 can be computed as follows:

$$OOP \text{ payments} = \text{THE} - \text{CGHE} - \text{AGHI} - \text{SHE},$$

Where THE, CGHE and SHE are estimated by the aforementioned regression model and AGHI by the assumption above.

One implicit assumption we made in estimating OOP payments is that the following two ways to predict future THE in China provide equally reliable estimates. The first is to predict future THE based on historical THE. The second is to predict each components of THE (i.e., CGHE, SHE and OOP) separately and then sum the estimates of these components up to get the estimate for THE. Using recent health expenditure data in China, Wu and Song (2010) show that these two methods indeed lead to similar and accurate predictions for THE in China. Therefore, it is reasonable for us to first predict THE, CGHE and SHE separately, and then back calculate the predicted values for OOP payments.
The prediction above assumes that THE, CGHE and SHE grew according to our prediction model and AGHI was invested as planned. Since we do not know the true growth rate of these expenditures for the future, we carry out the following sensitivity analysis by assuming different cost growth rates. Instead of just giving a point estimate, this analysis provides additional information on how OOP payments in China could vary under different cost growth projections.

**Scenario I**: Both CGHE and SHE will continue their increasing trends as they were from 1998 to 2008 (i.e., CGHE and SHE follow the prediction of our regression models), but the AGHI cannot be put in place.

**Scenario II**: Both CGHE and SHE will continue their increasing trends as they were from 1998 to 2008, and the AGHI will be invested as planned.

**Scenario III**: The SHE will continue its increasing trend as it was from 1998 to 2008, the AGHI will be put in place, but the CGHE will keep the same as 2008.

**Scenario IV**: The CGHE and SHE will continue the same as 2008, but the AGHI will be put in place.

**Scenario V**: The CGHE will continue increasing according to its trend from 1998 to 2008, the AGHI will be put in place, but the SHE will keep the same as that of 2008.

These five scenarios simulate five possible future projections. Scenario I assumes no AGHI and hence means that there were actually no health reforms. Scenario II represents that the health reform took place and had been progressing as planned. Scenarios III, IV
and V simulate the situations where the health reform started, but either the GHE or the SHE had been invested less than expected. For brevity, we refer to scenarios I through V as scenarios of “without AGHI,” “complete reform,” “underinvested CGHE,” “underinvested CGHE and SHE” and “underinvested SHE,” respectively. For each scenario, we calculate the ratio of OOP payments to THE. Detailed results are presented in Table A of the appendix.

In doing this sensitivity analysis, we implicitly assume that the components of THE (i.e., SHE, GHE and OOP) are mutually substitutable. To test this assumption, we carry out an elasticity analysis and find that the elasticities of the OOP payments, SHE and GHE to THE are comparable (results not shown due to space constraint). This suggests that decreasing in one component of THE leads to an approximately equal amount of increment in others. Therefore, the expenditures predictions used in our sensitivity analysis seem reasonable.

In addition to these five cost scenarios above, we vary the proportion of DPI to GDP to study the impact of individual income levels on the ratio of OOP payments to DPI. We consider the following two setups.

**Presumption A**: The proportion of DPI to GDP is 42%. This accords with the present structure of income distribution in China (National Bureau of Statistics of China 2010).

**Presumption B**: The proportion of DPI to GDP is 60%. It equals to the average of OECD countries and was once achieved in China in the 1980s. Though this proportion may not
be realized immediately in China, it is not infeasible in the future given the newly elected
Chinese central government and its ambition to double the personal income levels in
China by 2025 (cite references).

Regarding GDP, we suppose that its growth rate will be 10% in 2011. This is
consistent with the recent GDP growth rates in China (National Bureau of Statistics of
China 2010). The estimated ratios of OOP payments to DPI are shown in Table B of the
appendix.

In summary, we consider 5 scenarios for the ratio of OOP payments to THE (5 cost
projections) and 10 scenarios for the ratio of OOP payments to DPI (5 cost projections *
2 DPI-to-GDP proportions).

Results

Using different testing scenarios for cost projections and DPI-to-GDP proportions
mentioned above, we estimate the 2009-2011 ratios of OOP payments to THE and DPI in
China, respectively (Figure 1 and Figure 2).

[Insert Figure 1 here]

[Insert Figure 2 here]

Comparison across scenarios over time

The ratios of OOP payments to THE and DPI vary significantly across scenarios. We start
by commenting on the OOP-to-THE ratio. In scenario I (without AGHI), this ratio in 2009
is even higher than that before the health reform. Then it decreases slightly, and remains higher than 2008 until 2011. Under scenario II (complete reform), this ratio decreases remarkably in 2009 and is kept at the level of 30% through 2011. Under scenario III (underinvested CGHE), this ratio also drops significantly in 2009, and then it rebounds. In 2011, this ratio almost reaches the level of 2008 again. Under scenario IV (underinvested CGHE and SHE), this ratio first drops slightly in 2009, and then rises up sharply. From 2010 onwards, scenario IV becomes the worst scenario, and this ratio is even beyond 56% in 2011. Under scenario V (underinvested SHE), this ratio first decreases in 2009 and then rebounds to a level higher than 2008 but lower than that of the scenario IV in 2011.

For the ratios of OOP payments to DPI, except for scenarios I and IV under Presumption A, all other ratios in 2009 are lower than 2008. After 2009, they rebound in 2010 and 2011, and some of them will be even higher than 2008.

These observations suggest that the reform can achieve its target goals only if all committed government investment, i.e., CGHE, AGHI and SHE, are realized. In particular, if the SHE and CGHE could keep increasing and the AGHI could be put in place at the same time (i.e., scenario II “complete reform”), the ratio of OOP payments to THE will be stabilized below the level of 30% (29.62%, 28.20% and 29.46% in 2009-2011, respectively). At the same time, the ratio of OOP payments to DPI ranges from 2.43% to 3.98% in 2009-2011, lower than that of 2008. However, in other scenarios (I, III, IV, V),
either the ratio of OOP payments to THE or the ratio of OOP payments to DPI will not achieve the target goals.

**Impact of income distribution**

Income distribution has a significant impact on the ratio of OOP payments to DPI. If the income distribution follows Presumption A (i.e., DPI-to-GDP proportion is 42%), the ratio of OOP payments to DPI ranges from 3.47% to 7.58%. In most scenarios there, this ratio is even larger than that of 2008, i.e., 4.52%. However, under Presumption B (i.e., DPI-to-GDP proportion is 60%), the ratio of OOP payments to DPI ranges between 2.43% and 5.30%. This ratio improves over that of 2008 in all scenarios tested during 2009 to 2011 except for scenario IV (underinvested SHE) in 2011.

**Contrast between the change directions of two ratios**

These two ratios may change in different directions even under the same scenario. For example, under scenario IV (underinvested CGHE and SHE) and presumption A (the DPI-to-GPD proportion is 42%), the 2009 OOP-to-THE ratio would be 39.63% which is smaller than that of 2008, i.e., 40.45%. However, the ratio of OOP payments to DPI would be 4.75%, larger than that of 2008, i.e., 4.52%. In this case, OOP-to-THE ratio improves but OOP-to-DPI ratio increases, indicating that the reform has only partially achieved its target goals. Traditionally, the Chinese government only focuses on the OOP-to-THE ratio to evaluate health reforms; our finding suggests that both ratios should be considered when evaluating the reform. In particular, the OOP-to-DPI ratio among lower income
groups should receive more attention, because the average OOP-to-DPI ratio is highly
dependent on the usually large OOP-to-DPI ratio in lower income groups.

This phenomenon could also happen when the reality falls between two scenarios. For
example, if all the health expenditures and investments happen to be the average of
scenarios I (without AGHI) and III (underinvested CGHE), then the 2009 OOP-to-THE
ratio and OOP-to-DPI ratio would be 38.78% and 4.65%, respectively. The former ratio is
smaller than that of 2008, while the latter one is larger than its counterpart in 2008. We
will discuss why this would occur in reality below.

**Discussion**

**Impact of China’ new health reform**

The China’s new health reform plays a crucial role in alleviating the social problem of
high OOP payments for health care services by increasing government financial
investment and improving health insurance plans. If China had not started the reform
(scenario I “without AGHI”), the share of OOP payments would remain at a high level
and people in China would still find it expensive and sometimes unaffordable to access
care. If the reform had been implemented as planned (scenario II “complete reform”), the
OOP to THE ratio would drop below 30% in 2009 and stay at that level for the next
several years. Compared with the data from the World Health Organization (WHO), this
ratio is close to the level of the upper middle income countries (World Health
Organization 2010). In scenario II, even with a lower DPI-to-GDP ratio 42%, the ratio of
OOP payments to DPI would drop to 3.55%. Compared to 4.52% in 2008, this is a sizable improvement.

If the financial investment committed by the reform had only been partially realized (scenarios III, IV and V), the ratio of OOP payments to THE would not be able to reach the reform’s target goal 30% in any near future. This suggests that the government investment (i.e., AGHI and CGHE) and social investment (i.e., SHE) collectively play an important role here. In order to have a sustainable improvement, none of them is dispensable.

In the results section, we note that the ratios of OOP to THE and DPI may change in different directions. The reason is that when a country’s health reform is based on fee-for-service payment methods, it might exacerbate the problem of cost inflation (Yip and Hsiao 2009). That is, THE and OOP payments usually will grow much faster than GDP or DPI during the reform. As a result, the ratio of OOP payments to DPI could increase despite that the ratio of OOP payments to THE is decreasing. Since the estimated average growth rate of THE in China is much higher than that of GDP (19% vs. 10%), this is likely to happen and our analysis of scenario IV above actually captures such a possibility.

As THE and OOP payments could grow much faster than the GDP or DPI during the reform, the only possible way to reduce the ratio of OOP payments to DPI seems to improve individual incomes through strategies such as increasing the ratio of DPI to GDP.
If the ratio DPI to GDP could rise to 60%, then the ratios of OOP payments to DPI in China would consistently stay below 3.71% and reach 2.48% in scenario II (complete reform), which is close to the average of the OECD countries.

However, we should note that our analysis above is based on the DPI to GDP on average. If the increased DPI was primarily allocated to the rich groups, an increase in the DPI to GDP ratio on average does not necessarily mean a better income distribution, in particular for the poor. Fortunately, China’s current income distribution plan is to narrow the income gaps between the poor and the rich (Hu Jintao 2012). Therefore, an increased DPI to GDP ratio should mean a better income distribution for the poor.

**Model validation and assessment of China’s new health reform in 2009**

When we initiated this study, the 2010 Chinese Health Statistical Bulletin has not been issued. It was published recently and contains the 2009 health statistics in China (Ministry of Health 2011a). It reports that the 2009 THE, GHE and SHE in China are 1754.19, 481.63 and 615.45 billion RMB, respectively. This additional information provides us with an opportunity to validate our prediction models and assess the progress of the China’s new health reform.

By comparing the observed and predicted values of THE and SHE in 2009, we see that our predictions are very accurate. The percentage deviations are only 2.35% and 0.1%, respectively. This implies that SHE increased as expected, and hence the true path of
China’s health reform is likely to be among scenarios I (without AGHI), II (complete reform) or III (underinvested CGHE).

In fact, the observed ratio of OOP to THE in 2009 is 37.5%, smaller than that in 2008 but still much higher than 30%; the observed ratio of OOP payments to DPI in 2009 is 4.58%, even higher than that of 2008, i.e., 4.52% (Figure 3). This is exactly the situation of exacerbated cost-inflation that could happen as mentioned above. In order to visualize this situation, we put the 2008-09 observed OOP-to-THE and OOP-to-DPI, and the 2009 estimated OOP-to-THE and OOP-to-DPI of the aforementioned three possible scenarios, i.e., scenarios I (without AGHI), II (complete reform) or III (underinvested CGHE), in Figure 3. A closer look at this figure reveals that the observed OOP-to-THE and OOP-to-DPI ratios are sandwiched by the estimated values under scenarios I (without AGHI) and III (underinvested CGHE), conforming with our model predictions above. So, what do the new data in 2009 suggest? We explore these new data and also draw upon additional relevant data sources to arrive at the following implications.

[Insert Figure 3 here]

The first implication is that the government is likely to underinvest during the reform. The new data show that the materialized GHE in 2009 is only 481.63 billion from the government report (Ministry of Health 2011a), a much smaller investment than what would have been expected under a fully invested health reform (Table 1). To understand why this underinvestment occurred, we need to analyze the health decentralization in
China. GHE in China is financed by both the central government and local governments, and in particular, local governments bear the major responsibility. Prior to 2007, local governments have financed over 90% of the total government health fiscal expenditure; since 2007, the central government has significantly boosted its investment, while local governments do not seem to slow down in their health expenditures according to relevant data released by the Chinese Ministry of Finance. During the China’s new health reform, the additional 850 billion RMB health investment (AGHI) is also co-financed by the central government and local governments, each responsible for 330 and 520 billion, respectively (The State Council 2009).

However, the local government health expenditure heavily depends on its fiscal revenue. Due to uneven economic development, there is a huge variation in the fiscal revenues among the 31 provincial governments of China. For example, in 2009, the per capita fiscal revenues in Shanghai and Beijing are 13452 and 11958 RMB, respectively. However, in the west region of Gansu, Guizhou, Qinghai and Tibet Provinces, they are only around 1000 RMB.

In order to subsidize these poor local governments, the central government in China has already had a differentiated payment method/formula which takes the local government’s financial strength into account. Use the New Cooperative Medical Schemes (NCMS) mentioned earlier as an example. In 2009, the total subsidy per capita by all levels of governments is 80 RMB. In the less-developed central and western regions, the
central government pays 40 RMB per capita; in the eastern regions with strong economy, the central government pays no more than 15 RMB per capita; in some well-developed regions such as Shanghai, the central government does not subsidize at all.

The problem, however, is that even such a differentiated subsidizing mechanism is still not enough. For some local governments, they also need to pay up to 40 RMB per capita in order to fulfill their commitment, but investment at such a level is still very difficult, if not impossible, for many of the poor regions which barely maintain their fiscal balance. The ensuing discussion elaborates on this point.

From the Chinese Government Work Report (The State Council 2010), the whole central governmental fiscal expenditure in 2009 on health is 127.7 billion RMB, of which the CGHE of the central government is only 6.35 billion RMB. The rest 121.35 billion RMB is transferred from the central government to local governments and a majority of this transferred fund is infused in the AGHI. If we follow the previous assumption that the AGHI by the central government would be evenly invested over 34 months during the reform, then the investment amount is expected to be 97 billion RMB in 2009, which is smaller than this transferred fund. Hence, the central government is likely to have fulfilled its investment as planned. This, however, together with the aforementioned fact that the total GHE has been heavily underinvested, implies that the local governments must have heavily underinvested in either their share of CGHE or AGHI. Because of their under-investments, the OOP payments could not reach the predicted results of scenario II
and II(A) (see Tables A and B in the Appendix), even when the true SHE has increased slightly faster than predicted in 2009. Therefore, to reduce the share of OOP payments in THE and achieve the goals of the reform, it is essential to ensure fully invested Government Health Expenditures, and the local government’s contribution requires a special attention.

The second implication is related to individual income distribution. Our analysis above shows that the real growth rate of THE and OOP in 2009 is 20.7% and 12%, respectively, higher than that of GDP (i.e., 10%). That is, cost-inflation indeed occurred. However, the ratio of DPI to GDP in 2009 is 42.2% which has been kept at the same level of 2008 (i.e., 41.4%). As a result, the ratio of OOP to DPI has not decreased but increased in 2009.

To explore more, we look into how this ratio changes in different income groups. Using data from the China Statistical Yearbook 2010 (National Bureau of Statistics of China 2010), we group the population based on incomes (lowest 10%, low 10%, lower middle 20%, middle 20%, upper middle 20%, high 10%, highest 10%). We find that the ratio of OOP to DPI among the low 10%, lower middle 20% and high 10% income groups has improved, but other income groups, especially the lowest 10%, has increased (see Figure 4). Indeed, the per capita OOP payments of the lowest 10% income group has increased from 323.9 to 362.6 RMB; this growth rate is 11.9% and much higher than the average growth rate 8.9% across all income groups. One possible explanation is that when
the poorest get coverage, they may choose to consume more health services which they
cannot afford before. Because the total expenditure can only be partially reimbursed for up
to 50% by their health insurance, the OOP payments of this poorest group is likely to
increase. Considering their extremely low annual DPI which is only 5253.23 RMB
(approximately 800 US dollars) in 2009 (National Bureau of Statistics of China 2010), it is
not too surprising to see that the ratio of OOP to DPI among the poorest group has even
increased in 2009 despite the reform. Therefore, as a policy implication, special attention
needs to be paid for these very poor populations during the reform, and perhaps more
subsidies are needed for these populations.

[Insert Figure 4 here]

As a result of low individual income levels, what makes health care even more
unaffordable in China for some individuals is that basic living needs like food and housing
consumes a very large proportion of their DPIs. This can be affirmed by the large Engel's
Coefficients in China (36.5 and 41 in the urban and rural areas, respectively) (National
Bureau of Statistics of China 2010). Hence, to improve personal health care affordability
in China, it is crucial to increase the ratio of DPI to GDP and thus improve individual
income levels. This conclusion is also backed up by our additional analysis of historical
data from the China Health Statistics Yearbook 2010 (Ministry of Health 2010) and the
omitted here). We find that the correlation between the DPI-to-GDP ratio and the
OOP-to-DPI ratio during 1978-2008 is -0.53, indicating that, if people’s disposable income increases, their health burden decreases in general.

**Implications for other developing countries**

Since many developing countries share similar economic and social characteristics, our observations and findings in China can also have useful implications for these countries. First, OOP payments are still the principal source of health care financing (≥50% of total health expenditures) in many developing countries (World Health Organization 2010). In order to reduce the OOP payments, it is important for these governments to increase their investments on health care. However, in the past two decades, many developing countries have been enthusiastically embarking on the path of decentralization (Asfaw et al. 2004). As a result, local governments which lack of fiscal revenues are likely to underinvest, as we observed in China.

Second, in most developing countries, the ratio of DPI to GDP is much lower than that in developed countries. People have more rigid needs such as food, housing and education competing against health care needs for limited personal incomes. In many occasions, residents in these countries must confront the painful choice between health services and other basic living needs. So during the health reform, it is also crucial to improve the resident’s disposable income and raise their affordability for health services.

**Limitations**
Our analysis leads to a conclusion that the governments underinvested than expected during the reform. However, due to lack of necessary data, we cannot identify the source of such underinvestment (e.g., whether this is due to the underinvestment in AGHI, i.e., one time government top-up, or in CGHE, i.e., regular budget allocation, or in both). We will investigate this issue when more recent and detailed data become available. By analyzing these new data, we would be able to make more specific policy suggestions regarding government investments.

Our analysis also shows that the income distribution has a significant impact on the OOP-to-DPI ratio. However, it is based on the average DPI-to-GDP ratio across all income groups. This might lead to some bias, among which the poor income group’s situation requires more attention. The Chinese central government now has a plan to narrow the income gaps between the poor and the rich (Hu Jintao 2012). How the new health reform and this new income distribution policy initiative would affect the income distribution among different income groups and how such changes would affect the personal, especially the poor people’s, affordability for healthcare in China are very important research questions in the near future.

**Conclusion**

In order to lower the shares of OOP payments in both THE and DPI during the health reform, government investments and income distribution are two critical aspects. Since no quick adjustments can be made to the income distribution, to increase direct government
investment in the health sector seems a more reliable option. However, as discussed above, local governments may underinvest if the health care budget did not come directly from the central government. Since the central government’s health expenditures do not seem to “crowd out” local governments’ health expenditures, our first policy suggestion is that, if a (developing) country embraces health fiscal decentralization, the central government needs to bear more or even a major financial responsibility in the reform and it needs to assist local governments to fulfill their investment. Second, as a long term strategy, the income distribution should be adjusted and individual incomes, in particular those of the poor, should be improved. Only so, the DPI can possibly increase faster than the GDP and THE, and cost-inflation would not be a problem during the reform.

Looking forward, the total health expenditures in China as well as in other developing countries may need to be contained to ensure sustainable improvement. Although we do not emphasize this in the main body of this paper, it must be alerted that the current growth rate of THE doubles that of the GDP in China. Future research is needed to investigate how THE can be controlled in a developing country like China which strives to improve its health care system in a period when economy also grows fast.
References


Figure 1  Estimated ratios of OOP payments to THE in China: 2009-2011.

Figure 2  Estimated ratios of OOP payments to DPI in China: 2009-2011.
Figure 3 The observed and estimated OOP-to-THE and OOP-to-DPI ratios.

Figure 4 The ratios of OOP to DPI among different income groups in 2008-2009.
Appendixes:

Table A  Estimated ratios of OOP payments to THE in China: 2009-2011(billion RMB).

<table>
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<th>Year</th>
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<th>CGHE</th>
<th>AGHI</th>
<th>SHE</th>
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<td>340.74</td>
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