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# The role of social health insurance in health financing system - a global look and a case study for China

Xiao Xian Huang

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Université d'Auvergne Clermont-Ferrand I  
Faculté des Sciences Économiques et de Gestion  
Centre National de la Recherche Scientifique  
Centre d'Études et de Recherches sur le Développement International (CERDI)

## **The role of social health insurance in health financing system – a global look and a case study for China**

## **Le rôle d'assurance maladie sociale dans le système de financement de santé - un regard global et une étude de cas pour la Chine**

Thèse Nouveau Régime  
Présentée et soutenue publiquement le 9 Juin 2011  
Pour l'obtention du titre de Docteur en Sciences Économiques

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# Résumé

**I**l est admis qu'avoir une mauvaise santé est une des causes principales de pauvreté, particulièrement dans les pays à faible et moyen revenus. Une des raisons de ce constat est une absence de protection financière. L'objectif de cette thèse est de discerner le rôle que l'assurance maladie pourrait jouer dans l'organisation du système de protection financière de la santé. La thèse se compose de deux parties. La première partie aborde les problèmes liés au financement de santé d'un point de vue global. Le chapitre 1 apporte des discussions théoriques sur trois thèmes: 1) les spécificités des risques de la consommation médicale qui rendent la gestion du risque par l'assurance maladie privé difficile, 2) le rôle du gouvernement et du marché dans la répartition des ressources de santé. 3) les options pour l'organisation du financement de la santé. Le chapitre 2 présente une comparaison statistique sur la performance des systèmes de financement de la santé entre des pays à contextes socio-économique différents. Les discussions sont menées autour de trois aspects du financement de la santé: la disponibilité des ressources, l'organisation du financement de la santé, et la couverture de la protection financière. La deuxième partie qui comporte trois chapitres étudie l'évolution du système de financement de la santé dans un pays donné: la Chine. Le chapitre 3 présente l'histoire du système de financement de la santé en Chine depuis 1950. Il nous aide à comprendre les défis dans le financement de la santé suscités par la réforme économique. Le chapitre 4 porte sur une étude empirique de la répartition de la charge financière de la santé en Chine dans les années 1990. Il illustre les résultats directs de la baisse du financement public et de l'augmentation des paiements directs sur le bien-être de la population. Le chapitre 5 présente la réforme de l'assurance maladie lancée par le gouvernement depuis la fin des années 1990. L'objectif est d'estimer l'impact de la mise en œuvre du nouveau système rural d'assurance médical (NRMCS) sur les activités et la structure financière de ces hôpitaux. Une analyse d'impact est réalisée sur un échantillon de 24 hôpitaux dans la préfecture de Weifang, au Nord de la Chine. Nous concluons que le système d'assurance maladie permet un partage des responsabilités financières entre prestataires de services, patient-consommateurs et acheteurs de services. Elle inclut à la fois les agents publics et privés dans la contribution au financement de santé, ce qui rend chaque partie plus responsable vis-à-vis de son comportement en raison des risques qu'il doit assumer du fait de la consommation médicale. Cependant, il est nécessaire de noter que l'assurance maladie sociale n'est qu'une option parmi d'autres systèmes de financement de la santé. La mise en œuvre de ce système exige un certain niveau de développement socio-économique. L'assurance maladie ne conduit pas systématiquement à une meilleure performance du financement de la santé si elle n'est pas accompagnée de réformes quant au paiement au fournisseur ou au système de prestation de services. L'engagement du gouvernement et des capacités institutionnelles sont également des facteurs clés pour le bon fonctionnement du système.

**Mots clés :** système de financement de la santé, assurance maladie sociale, pays en transitions, Chine, dépense de santé

**Codes JEL:** D61, D63, H43, H44, H51, H75, I 15





# Abstract

**I**t has been widely recognized that poor health is an important cause of poverty, especially among the low- and middle- income countries. One of the reasons is the absence of public financial protection against the medical consumption risk in these countries. This Phd dissertation is dedicated to discern the role that health insurance could play in the organization of health financial protection system. The dissertation is composed of two parts. The first part discusses the problems linking to the financing to medical consumption from a global point of view. Chapter 1 brings theoretical discussions on three topics: 1) the specialties of medical consumption risks and the difficulties in using private health insurance to manage medical consumption risks. 2) The role of government and market in the distribution of health resources. 3) The options for the organization of health financing system. Chapter 2 conducts a statistical comparison on the performance of health financing systems in the countries of different social-economic background. The discussion is carried out around three aspects of health financing: the availability of resources, the organization of health financing, and the coverage of financial protection. The second part of the dissertation studies the evolution of health financing system in a specific country: China. Three chapters are assigned to this part. Chapter 3 introduces the history of Chinese health financing system since 1950s. It helps us to understand the challenges in health financing brought by economic reform. Chapter 4 carries out an empirical study on the distribution of health financing burden in China in the 1990s. It illustrates the direct results of the decline of public financing and increase of direct payment. Chapter 5 presents health insurance reform that launched by the government since the end of 1990s. An impact analysis is conducted on an original dataset of 24 township hospitals in Weifang prefecture in the north of the China. The objective is to estimate the impact of the implementation of New Rural Medical Cooperation System (NRMCS) on the activities and financial structure of township hospitals. At last, we conclude that social health insurance (SHI) permits a sharing of health financial responsibilities between the service provider, the patient-consumer, and the service purchaser. It can not only involve both public and private agents into the collection of funds for health financing system, but also make each party more accountable due to the risks they bear from the result of medical consumption. Meanwhile it is necessary to note that SHI is just one option among others to organize health financing system. The implementation of SHI requires a certain level of social-economic development. SHI does not systematically bring better performance on health financing if it is not accompanied by the reforms on provider payment or on service delivery system. Government commitment and institutional capacity are also key factors for the good function of the system.

**Key words:** health financing system, social health insurance, countries in transition, China, health spending

**JEL Codes:** D61, D63, H43, H44, H51, H75, I 15



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# Glossary

CHI - Community-based Health Insurance  
CIT - Country in Transition  
CTP - Capacity to Pay  
DRG - Diagnosis Related Grouping  
FFS - Fee for Service  
FSU - Former Soviet Union  
GDP - Gross Domestic Products  
HIC - High Income Country  
LIC - Low Income Country  
LMIC - Lower-Middle Income Country  
MIC - Middle income countries  
MSA - Medical Saving Account  
NHS - National Health System  
NIS - Newly Independent State  
OECD - Organization for Economic Cooperation and Development  
OOP -Out-of-pocket payment  
PHC - Primary Health Care  
PHI - Private Health Insurance System  
PHS - Public Health Spending  
SES - Social Economic Status  
SFRY - Socialist Federal Republic of Yugoslavia  
SHI - Social Health Insurance System  
THS - Total Health Spending  
UMIC - Upper-Middle Income Country  
UNICEF - United Nations Children's Fund  
URSS - Union of Republic Socialist Soviet  
WDI - World Development Indicator  
WHO -World Health Organization



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# Introduction

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**T**his thesis is about the financial risks associated with medical consumption and the options for a country to organize its health financing system. Social health insurance is at the center of our discussions.

Health consumption is associated with great uncertainties. These uncertainties make health spending unpredictable. On the other hand, health is an important determinant of human wellbeing. Poor health does not only reduce life expectancy but also deprive the individual from leisure and productive activities. Sometimes it may even concern the dignity of human life (World Health Organization, 2008). The crucial meaning of health makes the consumption on medical treatment imperative. However, according to economic law, individual's capacity to consume depends on his capacity to pay. Only affordable needs are considered as demands on the market (Begg et al., 2003). A question then emerges: how to reconcile the conflict between high needs for medical consumption and low capacity to pay?

Medical market is not the only market where consumption needs and capacity to pay are in conflict. However, the medical market gains much more attention of the government than any other commercial goods and services. One argument was put forward by Michael Grossman. In his seminal work "The Human Capital Model of the Demand for Health" (Grossman, 1999), the author explained how health problem will transform into economic losses for an individual as well as for a country. Health is an important determinant of productivity. Poor health reduces both the time available for work and the productivity of individual during the work. As consequence, it reduces products. For a country, the poor health status of its population will reduce the country's general productivity and thus its wealth. The crucial meaning of health calls for the engagement of government.

Another argument for the intervention of the government is based on social justice. The right for health is a basic entitlement of which all humans should have (Universal Declaration of Human Rights, 1948, Article 25<sup>1</sup>). Society could not accept to condition individual's chance for surviving on its capacity to pay. Government, in this case, should modify health resources allocation so that those in most needs of medical services would not be excluded from the system because of insufficient capacity to pay.

Before going further into the discussion, several distinctions are necessary. First, access to medical services is one of the determinants of health, but it is far from the only one. There is complex interrelationship between a country's economic condition, the development of health sector, and health status of the population. It is proved that the elements which are out of the control of the health sector, such as individual's social-economic status (SES) or environmental factors, have also significant influence on people's health status (Patrick et al. 1988; Feinstein, 1993;

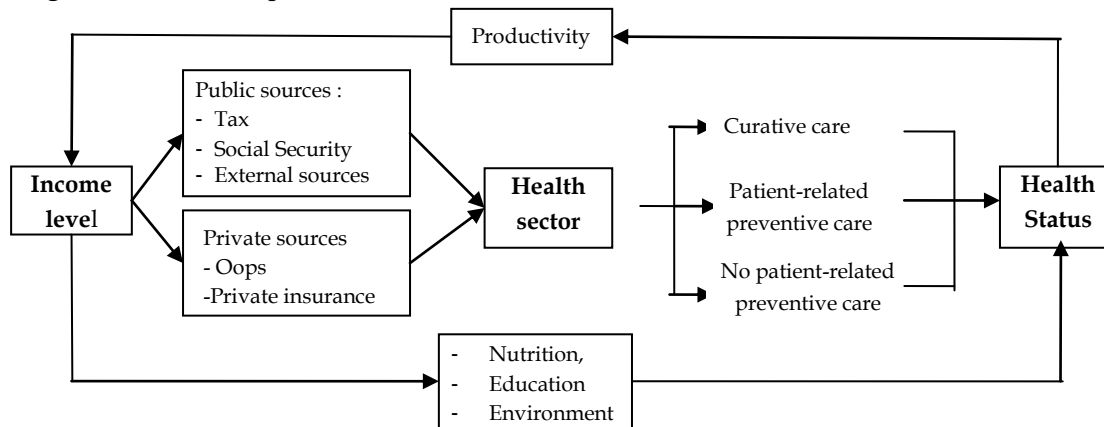
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<sup>1</sup> United Nation's online document: <http://www.un.org/en/documents/udhr/>

Filmer and Pritchett, 1997; Schnittker, 2004, Terris, 1994; Connelly, 2004). These elements are more closely linked to the country's economic conditions than the development of health sector per se.

Economic level can influence health status in two ways. First, they decide the availability of inputs for health sector and consequently influence the country's ability to deal with disease threats. Second, they affect other environmental parameters, like education and sanitation, which change the individual's short-term and long-term health risks. Health status in return influences the country's economic development level by affecting the productivity of its labor force. (Cf. Diagram 1)

**Diagram 1** Relationship between income, health service, and health status.



Source: drafted by the author

Bearing this complexity in mind, our discussion will focus on the accessibility of medical services for people in need and the impact of medical consumption on household's financial condition. Other elements, although are also very important, will be considered as given.

Second, health services are quite heterogeneous. According to the externality of the services, they can be divided into public health services and personal health services. The former holds important positive externality. Individual consumption of public services will considerably increase the welfare of the whole community (Feinstein, 1993). Vaccination against infectious diseases, for example, reduces not only the risk of infection of the treated individual but also decline the risk of his neighborhood. Personal health services, in contrast, create little externality. They, most of which are curative care, principally treat personal health problems.

It is commonly accepted that the public sector should play the main role in the provision of public health services, firstly because important social gains can be expected from the consumption of public health services. Secondly because the market mechanism may not exist or is insufficient to answer the needs of society in terms of medical consumption, owing to the fact that individuals might ignore their social responsibility and consequently underestimates the importance of this kind of the consumption.

In contrast, the role of the public sector in the allocation of curative medical services is much more controversial. On the one hand, the advocators for market competition argue that the social gains from the consumption of curative medical services are equal to personal gains. Market mechanism alone can make the demand and offer meet. On the other hand, the opponents

emphasize the importance of health to human life. It is difficult to accept the idea of conditioning the access to the medical services on the individual's capacity to pay (Culyer, 1983). In this case, how to deal with the relationship between the public and private sector? In this study, a major effort will be put on the analysis of curative medical market.

Third, the accessibility of medical services, at least partly, depends on how medical resources are allocated. The allocation can be conducted through two mechanisms: market mechanism and government intervention. Market mechanism relies on the "invisible hand", market price, to divert the resources to their economically most efficient use. Government intervention applies the "visible hand", regulation and administration, to distribute the resources in favor of social benefits. A fundamental assumption is that public agents search for social interests while private agents look for self-interest.

Fourth, the allocation of medical resources consists of two aspects: the delivery of services and the financing to consumption. The former decides the production of medical care. The latter concerns the allocation of medical products. Government intervention can take different forms and degrees. It can influence both service delivery and consumption or just influence one aspect. When public sector is in charge of both the delivery and financing of medical care, the allocation of resource is predominated by government intervention. If, in contrast, both the delivery and financing of medical care are carried out by the private agents, the allocation is predominated by market rules. In most of the cases, however, the responsibilities are shared between public and private agents. Therefore, although our discussion will be focused on health financing system, service delivery system needs to be taken into account.

Based on these distinctions, our discussions will carry out in the following way. The thesis is composed of two parts. Part I discusses insurance mechanism and its role in a country's health financing system in a general way. Part II focuses the analysis on Chinese health system to see how the system evolved during the period of economic transition and what impact that the social health insurance reform brought to this system.

Chapter 1 of Part I brings theoretical discussions on the function of medical insurance, the advantages and inconveniences of market allocation and government intervention, and the options for the organization of health financing system. In the section 1 of Chapter 1, we will begin our discussion with an analysis on the characteristics of medical consumption risks. This analysis allows us to identify the needs for risk management due to health events. Then the insurability of medical consumption risks will be discussed in more details. This discussion highlights the difficulties in coping health spending risks with private insurance mechanism. It evokes investigation on the role of the government.

There are hot discussions on the responsibilities of the public sector in the allocation of medical services (Culyer, 1983; Besley et al., 1994; Eggleston et al., 2008). As mentioned previously, health depends on multiple factors. The access to medical goods and services is only one of them. Nevertheless, governments all over the world accord great attention to the organization and delivery of medical goods and services, especially in the period of economic prosperity. It is because the meaning of medical industry exceeds simple health promotion. It also reflects the solidarity of a society, defends the stability of a region or a country, and contributes to poverty alleviation (Eggleston et al., 2008).

However, the institutional capacity of the government and the efficiency of public intervention are questioned in many researches, especially for the cases of low- and middle-income countries (Ferranti, 1985; Filmer et al., 1998; EQUITAP, 2005; Ensor and Weinzier, 2007). Effect of public spending is often absent in the low- and middle-income countries (Filmer et al., 1998). EQUITAP (2005) studied eleven Asian territories and found that beside of Hongkong, all other Asian countries' public spending were more or less pro-rich.

These controversial proofs evoke the debate on the role of government in medical distribution. In the section 2 of Chapter 1, we will compare the conveniences of market allocation and government intervention. This comparison allows us to clarify the challenges lying in the design of health financing system for the countries of different economic, cultural, and institutional contexts. They help us to understand the choice of a country for its health system, as well as the reasons why, with similar health spending, different countries obtain totally different health outcomes.

If neither market allocation nor government intervention offers ideal solution for medical resource allocation, whether could we combine the two options? Third-party payment system offers an opportunity to share medical spending burden between public and private sectors. It permits to disconnect the payment for medical service from its consumption, collect funds across the target population, and share medical consumption risks between service provider, patient-consumer, and third-party payer.

Section 3 therefore presents the options for third-party payment system and the way in which a third-party system realizes the re-allocation of health risks among different agents on the medical market. Four kinds of third-party payment system will be compared. They are private health insurance system, state-funded health system, social health insurance system, and community-based health insurance system. The comparison of these four systems highlights the importance of taking the country's context into consideration when choosing health financing system.

After the above discussions which are mainly based on theoretical reasoning and reviews of literature, in Chapter 2, we study health financing systems over the world based on statistical analyses. The researches in this part will be carried out around three aspects of health financing system: the availability of health resources; financial efforts and health outcome of different health financing systems, and feasibility of universal coverage.

As mentioned previously, economic development level of a country is a crucial determinant of its health outcome. Therefore, the countries in our sample will be at first divided into four income groups: the high-income countries, the upper-middle income countries, the lower-middle income countries, and the low income countries. Both inter- and intra-income group comparisons will be carried out to distinct the effect of economic development from that of health system per se. A particular attention will be put on countries in transition.

The cases of countries in transition (CITs) draw our attention because of the numerous social health insurance reforms launched in these countries since their economic transition. Since the early 1990s, some 32 countries in Asia, Central and Eastern Europe, and the former Soviet Union – representing almost a quarter of the world's population – have been making the transition from

a centrally planned economy to a market-oriented economy. Regardless the diversity of countries' backgrounds, they are confronting common challenges in their health systems, including the decline of protection coverage, inequality in the access to health services, impoverishment due to medical spending, and the stagnation of health outcome. Ensor and Thompson (1998) found that 23 out of 26 CITs in their study were implementing or discussing the introduction of social health insurance (SHI). Why these countries want to move to the SHI system? What problems they expect SHI to solve? After about 20 years of economic transition, what changes can be observed in these countries' health system and their health outcome? The answer for these questions will provide empirical proofs on the conditions for the good function of third-party payment system.

A major lesson we can draw from the analyses in Part I is that the design of health system depends on each country's economic, social, cultural and institutional backgrounds. It is difficult to offer propositions which are pertinent for all kinds of the countries. Therefore, in Part II, our study will focus on a particular country --- China.

There are several reasons why China is an interesting case for a detailed study. First, China is the biggest country in transition in terms of population. By holding one fifth of world population, it plays a non negligible role in the maintenance of world health. Regardless the amazingly high economic growth achieved during its reforming period, China is characterized by increasing inequalities and decreasing coverage of social protection. According to World Health Report 2000 (World Health Organization, 2000), China ranks the 188<sup>th</sup> out of 191 countries as regards to equity in health care financing, whereas in the period of command economy it hold world reputation for the equity and cost-efficiency of its health system. It is therefore interesting to understand why, regardless economic prosperity, Chinese health financial system became unequal. The answers may give lessons to other countries which are in the phase of economic growth on the necessity to reserve their social protection.

Second, China's health system has experienced the period of central planning, then the period of marketization, and nowadays the period of re-socialization. This context permits us to compare central planning and market allocation for the same country. This comparison provides complementary information to the previous cross-country study which could not completely control for country specificities, such as cultural and traditions, which may influence the relationship between the government and people.

Third, China is a country in transition. It shares similar conflicts between public and private sectors as other transition economies. On the other hand, Chinese economic transition was carried out in a gradual way without violent political mutation. Socialism and Communism remain the main guidance of government strategies. The commitment of government in keeping health facilities in the public sector and assuring universal accessibility of basic health services makes it more urgent to solve the equation of equal opportunity for medical consumption and unequal income distribution. Chinese experience therefore can inspire other countries in transition to extend gradual reform measures to social security system.

Fourth, since the end of 1990, the Chinese government launched a series of social health insurance reforms which aim to re-establish social network of health security. Great improvement can be observed specially in rural regions. The rural health insurance reform was launched in 2003. Until 2007, the coverage of New Rural Cooperative Medical System (NRCMS) has already

attended 99.79 percent of rural residents (Ministry of Health, 2008). This striking improvement is to large extent attributed to the engagement of government. Heavy subsidizes are allocated to NRCMS to raise the insurance protection to desirable level without exacerbating farmers' health financial burden. However, if the moneys injected by the government on the medical market are absorbed by inflation, government investment will not induce essential amelioration of access to medical service, let alone health outcome. It is therefore crucial to study the eventual impact of NRCMS on people's utilization of medical services.

Based on the above reasoning, studies in Part II will be carried out in the following way. Chapter 3 explains the mutation of health system under the influence of economic reform. The performance and problems of the public health system under the period of command economy are analyzed in details. Chinese health system gained international reputation by having swiftly improved people's health status at relatively low costs. Nevertheless, this system totally relied on central planning held also numerous problems which, under the command economy, were hidden because the government had predominant control over country resources.

However, market oriented reforms released the energy of private sector, which is translated into a rapid flow of resources from public to private sector. On the one hand it brought China more than 30 years of economic prosperity. The annual growth rate of Gross Domestic Product (GDP) is estimated at about 9 percent per year since 1979 (Chinese Statistic Yearbook, 2009). On the other hand, these reforms caused profound perturbations in health sector (Hillier and Shen, 1996; Mend et al, 2008). The out-of-pocket (OOP) payment became the main health financial source. EQUITA (2007) found that in 2000 OOP payment accounted for 60 percent of total Chinese health expenditure, ranked the fifth highest out of 14 Asian countries selected in their study. High OOP payment is associated with high incidence of catastrophic spending. EQUITA (2007) estimated that China suffered the third highest catastrophic spending risks among the 14 countries.

Chapter 4 conducts an empirical study to analyze the distribution of health spending burden and its impact on household income in the years of 1990s. The 1990s are the intermediate period of Chinese health system reform. Before the 1990s, health reform was oriented by marketization. The low coverage of public insurance, the high proportion of OOP in total health spending, and the unequal access to medical services observed in the 1990s are the direct results of marketization. The low performance of health system after the marketization made government to think about "re-socialize" health financing system. Since the end of 1990s, a series of reforms were launched aiming at correcting the inequalities in access and financing to health services observed in the 1990s. The study of Chapter 4 therefore will offer an important reference for our study in the Chapter 5.

Chapter 5 studies the procedure of health insurance reform and its impact on service delivery. Three major insurance reforms will be presented. The new health insurance system will be compared with that in the period of command economy. This allows us to discern changes. Then, a review of literature will be conducted on the effects of insurance reform on Chinese health system. This lecture allows us to identify what we know about the reform and what we still need to know. And finally, an impact analysis will be performed to identify the impacts of the implementation on NRCMS on the activities and financial situation of township health centers in the Weifang prefecture. The Generalization of the double-difference method will be used to

exploit the quasi-experimental characteristic of our dataset. Numerous identification tests will be conducted to valid econometric results. Heterogeneous impacts will also be tested to complete interpretation.





**Part I.**

**Insurance and  
Health Financing System**



# Management of medical consumption risks and health resources distribution

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## I. Medical consumption risks and their costs

To understand the role of health insurance in medical consumption, it is relevant to begin with an analysis on the financial risk of medical consumption. Here we define medical consumption as individual's consumption of curative medical services and drugs. Preventive care, being public goods, is not discussed here. In this section, we discuss three questions: 1) what are the characteristics of the uncertainties faced by the individual in their consumption of curative medical care? 2) What's the impact of these uncertainties on the welfare of the individual and society? 3) Can insurance protect individuals against these uncertainties?

### 1.1. The characteristics of medical consumption risks

#### 1.1.1. What is "risk"?

Definitions for risk are multiple. In economy, Frank Knight (1921) defined the *risk* as "present in a situation where an action can lead to several different, mutually exclusive outcomes each of known probability". Statisticians will probably associate risk with Wald's (1950) theory's definition of risk as "the sum of expected cost of experimentation and expected loss due to wrong terminal decisions". Karl Borch (1967) gave risk a more precise measure for the convenience of actuarial calculation: one half of the mean deviation. These definitions, even being different in the measurement of risk, agree on two points. 1) An event with risk is an uncertain event in the sense that we are not 100 percent sure whether it will happen or not. 2) Risk is measurable uncertainty, which means the probability of the incidence of risky event is known.

#### 1.1.2. What are the risks relating to the consumption of medical care?

The demand for curative medical care occurs in the event of sickness. The utility of medical consumption is not the pleasure gained from the consumption of products per se but rather the satisfaction for the result of consumption, i.e. the amelioration of health status. Medical consumption contains therefore two uncertainties: the uncertainty for the incidence of sickness and the uncertainty for the effectiveness of medical treatment.

The incidence of sickness is uncertain. Although we can identify the factors which influence the probability of getting sick, such as living conditions and individual's health concerning behaviors, the occurrence of illness episode is generally a random event. This uncertainty decides the demand for curative medical care is unpredictable.

The effectiveness of medical consumption is uncertain. Multiple factors may influence the result of medical treatment. Some of them may be due to the complexity of human body and the limit of medical knowledge. Others may link to the behaviors of patients, such as the individual's ability to correctly follow the treatment or the physician's capacity or willingness to choose most efficient treatment (Arrow, 1963).

## **1.2. Welfare losses due to the uncertainties of medical consumption**

### **1.2.1. Cost issued from the unpredictability of health spending**

As mentioned previously, the demand for medical care is normally unpredictable due to the uncertainty of the incidence of sickness. Without any prepayment arrangement, the patient needs to pay medical care on the spot. An illness episode is then transformed into a financial shock for the individual.

When medical spending is costly, it may cause great welfare losses. If the individual needs to pay medical care by his own resources, his capacity to answer this demand will depend on his budget constraint. The needs for medical care could be urgent. If the budget constraint is big, the individual may be forced to either abandon the medical treatment or borrow money. The former increases the risk of health deterioration. The latter could be costly or even impossible, especially for the poor. A case study in Tanzania pointed out that borrowing money is a problem for poor women, because they are the least trusted group to be capable to earn enough money to cater for their families and pay debts ((Mamdani and Bangser, 2004). That is one of the reasons why in the developing countries, in case of needs, people turn more often to their social network for help than seek for rescue on the financial market (Fafchamps and Gubert, 2007). For some people, the social network is not available either. A study of Swiss Agency for Development and Cooperation found that in Tanzania people living on the margins of society – street boys, migrant workers and sex workers – have neither financial supports from formal institutions nor from social network (SDC 2003). In addition, borrowing money for the sake of medical treatment would not directly increase the production and thus has low financial return. Financial institutions are therefore reluctant to accord loan.

When the needs for financing become crucial due to the nature of illness shock, the individual would have to borrow money at high cost, by usury for example. To avoid this embarrassment, the individual can also make precautionary saving. This, however, means he will have to reduce the investment in production or the consumption of other welfare goods and services even in the absence of illness. The uncertainty of the occurrence of illness therefore constitutes an additional cost for the individual.

### **1.2.2. Losses of utility due to risk aversion**

Risk aversion explains the mental cost of uncertainty. Uncertainty is considered as a cost because it causes anxiety and reduces individual's satisfaction for the result. In order to calculate the losses of utility due to risk aversion, we need to at first define utility in an uncertain circumstance.

### Expected Utilities

The theory of expected utility, developed by Neumann and Morgenstern (1944) and Savage (1954) offer a way to estimate the utility with uncertainty. When a rational individual needs to make a choice in an uncertain environment (which means he is not sure about the results of his choices) his estimation would be based on expected utility (EU). Imagine a situation where an individual needs to choose among several actions. Suppose the outcome vector contains n variables. We denote these variables as  $\bar{x}_i$  ( $i = 1 \sim n$ ). Each outcome  $\bar{x}_i$  is associated with an occurrence rate of  $p_i$  such that  $\sum_{i=1}^n p_i = 1$ . The expected utility (EU) is then defined as following:

$$EU = \sum_{i=1}^n F(p_i)U(\bar{x}_i). \quad [I.1]$$

$F(.)$  is the probability transformation function, and  $U(.)$  is the utility function. This function means that the expected utility is the sum of the utilities of all potential outcomes weighted by their incidence.

### Risk Aversion

Suppose that a rational individual faces two choices concerning the way he spends his wealth, one with certainty and the other without. Suppose also that the expected final wealth brought by the choice with uncertainty equals to the final wealth brought by the choice with certainty. According to the individual's preference between the two choices, they can be grouped into following three categories. If the individual prefers the one with certainty to the one without, then he has a *risk-aversion attitude*. If he is indifferent between the two choices, he is *risk neutral*. And if he prefers the choice with uncertainty, then he is *risk seeking type*. In insurance theory, the individual is supposed to be risk-aversion type.

### The loss of utility due to the uncertainty

Suppose there are two possible results issuing from one action, X1 and X2. The incidence of each result is 50 percent. The utilities associated with these results are  $U(X1)$  and  $U(X2)$  respectively. Then the expected utility of this action would be:

$$E(U) = 1/2*U(X_1) + 1/2*U(X_2) = \frac{U(X_1)+U(X_2)}{2} \quad [I.2]$$

Now suppose that another action brings a certain result of  $\frac{X_1+X_2}{2}$ . The utility of this result would be  $U(\frac{X_1+X_2}{2})$ . The distance between  $\frac{U(X_1)+U(X_2)}{2}$  and  $U(\frac{X_1+X_2}{2})$  is called loss of utility due to the uncertainty. (See Annex I.1 for detailed demonstration)

## II. Insurance – a financial tool for risk arrangement

Insurance is an important financial tool to reduce the cost of risk. In general, it is a contract according to which “in exchange for the payment of a right (or a premium), a specialized organization (the insurer) agrees to offer the holder of the contract (the insured) the fixed services in case of the occurrence of a predefined event to which the insured is probably exposed”. (Dror and Preker, 2003)

## **2.1. How does the insurance work?**

The idea of the insurance is to offer a mechanism to transfer financial risks from those who are willing to get rid of it for some prices to those who find it profitable to take on the risks at such prices (Arrow, 1963). The risk-aversion-type individual will seek for the insurance, because he prefers the situation with certainty to the one without, even if he needs to pay a certain price for it. The insurance premium, nevertheless, should not be higher than the cost that the individual estimates for the target risks.

Insurance reduces the cost to copy risks thanks for the pooling of risks. In a pool of idiosyncratic risks, some risks will be realized while others not. On the other hand, all participants need to pay premium regardless whether the insured event occurs. The premiums from those who hadn't encountered with damages would be used to finance the losses suffered by those who received damages due to the realization of insured risks. As the occurrence of risky events is stochastic, no one knows who will be the one that receives or offers help. This encourages everyone to participate in hope of receiving financial assistance in event of insured damages. (cf. Annex I.3 for theoretical reasoning). On the other hand, this working model means that the individual can get back his capital only when the predetermined risk is realized. This is an important distinction between the insurance and other risk managing ways, say precaution saving.

## **2.2. What kinds of risks are insurable?**

### **2.2.1. Conditions required for the calculation of actuarial cost of risks**

In an insurance contract, the object of transaction is the potential financial damages induced by the realization of predetermined risks. Two important aspects to discuss in the contract are therefore the risks to insure and its price.

A risk is insurable when and only when its cost is calculable. To be calculable, the insured event should be observable and measurable. The event is observable means that the occurrence of event can be identified in an objective way. We cannot assure happiness, for example, because happiness is a subjective conception and cannot be objectively observed. The events are measurable means they should be quantifiable in terms of the cost and the incidence of the damages.

The calculation of the actuarial cost of risk is based on the law of large numbers. It is a statistical theorem postulating that the sample average of random variables will approach the theoretical average as the number of random variables increases. According to the law of large numbers, the insurance should include a sufficiently large number of independent occurrences to guarantee a statistically accurate estimation on the distribution of probability of the risks. It implies two additional conditions for the insurability of risks: the stochastic nature of insured events (Cf. Box I.1 for more details) and the availability of large number of observations.

**Box I.1** The characteristics of a stochastic event

- *The event should be possible.* The occurrence of the event is neither impossible nor 100 percentage sure.
- *The risk should not be speculative.* The realization of the risk is not favorable to the insured.
- *The event should be imaginable.* It is possible to imagine, even in an imperfect way, the negative consequence of the event.
- *The risk should be exogenous.* The event is not expected. Consequently, we cannot determine its realization before the signature of the contract. Nevertheless, the realization of risk can result from an action conducted by the insured without intention or malice.
- *The risk should be future.* The insurance cannot cover the risk already realized at the moment of the signature of the contract.
- *The risk should not be presumed.* The risk should not be the one that has been anticipated according to the indicator of the conjunction, nor should it be the case of correlation or anticipation.

Source: Adapted from Dror and Preker (2003)

**2.2.2. The conditions for the transaction of insurance**

Suppose that the individual is free to choose whether or not to enroll to an insurance scheme. The establishment of insurance contract is a bargaining procedure between the insured and the insurer. For the insured, the insurance premium should be sufficiently low that his final wealth with certainty, deducting the premium should be no less than the expected wealth with uncertainty. For the insurer, in contrast, the insurance premium should be high enough to pay the total cost of the insurance, including the expenditure of reimbursement; administration cost; and a margin of security.

1) The consideration of the customers

The dual theory of risk, developed in the years of 1980s (Schoemaker, 1982; Yaari, 1987), combines the theory of expected utility with individual's attitude toward risks to illustrate the reasoning of insurance customer.

The theory requires two premises:

- The individual has an increasing utility function of wealth with a decreasing marginal value. ( $U' > 0$  and  $U'' < 0$ )
- The individual gives a score from 0 to 1 to the risks of which the probabilities are ordered from 0 (not possible) to 1 (100 percent sure). This classification is shown by a function of distortion.

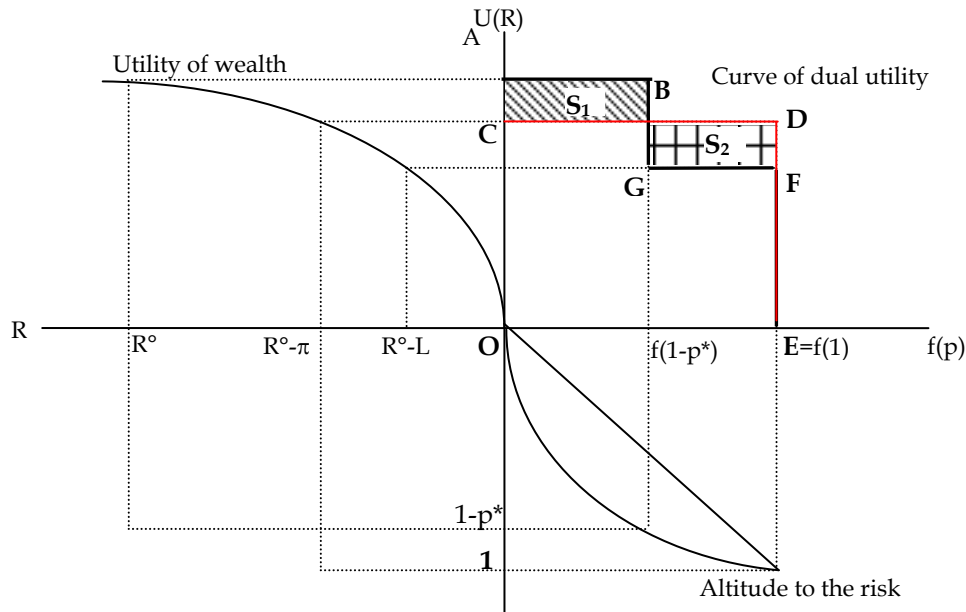
Suppose than an individual dispose an initial wealth  $R^0$ . If he gets an accident, his wealth will decline to  $(R^0 - L)$ . The probability of getting an accident is  $p^*$ . If he wants to buy an insurance



against this damage, his final wealth will stable at  $(R^\circ - \pi)$ .  $\pi$  is the insurance premium. The utility of wealth follows the utility function shown in the north-west part of the Graphic I.1.

The curve on the south-east side of the graphic shows the individual's attitude toward the risk. If this curve falls on the diagonal, it means the individual is risk-neutral. If the curve is above the diagonal, it means the individual is a risk-searching type, because the uncertainty makes him value more his wealth. In contrast, if the curve is under the diagonal, it means that the individual is a risk-averse type, because the existence of risk will reduce his judgment on the value of wealth.

**Graphic I.1 The dual theory of risk**



- $R^\circ$  -- Initial wealth
- $L$  -- Potential loss with probability of  $p^*$
- $\pi$  -- Insurance premium
- $f(p)$  - Transforming coefficient of the wealth when there is a probability of damage
- — without insurance; — with insurance

Source: Dror and Preker (2003)

The surface on the north-east side of the graphic shows the final utility that the individual gives to his wealth taking into account of the risk. Without insurance, his final utility will be the surface of ABGFEO. With insurance his final utility will be the surface of CDEO. The difference of the two is  $(S_1 - S_2)$ . If  $S_1 - S_2 > 0$ , it means the utility of wealth without insurance is bigger than with insurance. The individual will not adhere to the insurance. If  $S_1 - S_2 = 0$ , he is indifferent to buy the insurance or not. If  $S_1 - S_2 < 0$ , he will buy the insurance. Other things equal, higher premium or lower probability of risk will increase the surface of  $S_1$ . Larger potential loss or stronger aversion to risk will increase the surface of  $S_2$ .

To sum up, the customer will prefer to have insurance when

- The insurance premium is low
- The probability of the occurrence of the insured events is high
- The potential loss due to the insured event is important,

- *The individual has a strong risk-aversion attitude*

2) The consideration of the insurer

On the insurer side, the most important question is how to ensure the solvability of the insurance fund. Higher premium or more reserve funds will increase the insurer's capacity to cope with high financial risks (see Annex I.2 for the reasoning). However, the rise of premium will discourage the customer. In order to attract the individual, the insurer needs to keep the premium at a relatively low level. Given the premium, two factors will influence the solvability of the insurance fund: the characteristic of the insured risks and the characteristic of the insured population.

- *The insured risks should be diversified and independent*

The diversification of risks implies that all the insured risks would not happen at the same time. The insurance enforces individual's capacity to cope with risks by transferring resources from those who didn't bear damages to those who did (cf. Annex I.3 for detailed reasoning). At a given moment, the lower is the proportion of the insured claiming reimbursement, the more there are resources to help those in needs. The diversification of risks reduces the likelihood that different insured events occur at the same time and thus enforce the capacity of the insurance to cope with financial risks.

The independence of risks supposes that the realization of certain risk would not influence the incidence of other risks in the same insurance pool (Dror and Preker, 2003). It is the premise for the calculation of actuarial premium. It allows the insurer to add up individual risks.

- *The problem of adverse selection*

People are exposed to different levels of risks. Lots of factors may influence the magnitude of risk. Some of them are environmental, such as fog weather for the risk of route accident, drought for the risk of fire, or the working conditions for the risk of work accident. Others are rather personal, such as old age for the risk of death and health concerning behaviors for the risk of falling sick.

Correspondingly, the insurance cost of the high-risk people is higher than that of the low-risk people. Rothschild and Stiglitz (1976) theoretically proved that proposing uniformed insurance scheme to people exposed to different levels of risks would break the equilibrium of insurance market. The low-risk individuals would always be attracted by opting out of the insurance scheme equilibrium. As consequence, the proportion of high-risk individuals in the insurance pool increments and thus augments the cost of insurance. As the insurance contract fixes the insurance premium for a given period, the insurer would not be able to modify the premium in according to the cost. The solvability of insurance would be threatened if the actual cost of insurance exceeds the predetermined premium.

In order to maintain the sustainability of the insurance scheme, the insurer needs to propose discriminated insurance schemes to the low-risk and high-risk customers. If the two are perfectly identifiable, then the new equilibrium would be obtained by proposing less restrict conditions for

low-risk customers and more restrict conditions for high-risk ones. However, the problem is that the insurer cannot always identify the risk type of the customers due to the asymmetric information. The potential customer knows always better the risks he is exposed to than the insurer does. In contrast, the potential customer disposes all the information on the insurance contracts that the insurer offers to different risk-types customers. Both the high- and the low- risk individuals will be attracted by the more generous insurance scheme. The high-risk individuals would therefore hide their real risk type and try to adhere to the low-risk insurance pool. This kind of behavior is called "adverse selection". The problem of adverse selection would also drive to the failure of insurance scheme (Rothschild and Stiglitz, 1976).

To sum up, all risks are not insurable. Only those which answer the technical conditions and be economically attractive could be transacted on the insurance market. Then, are medical consumption risks insurable?

### **2.3. Insurability of medical consumption risks**

Medical insurance proposes financial compensation in the event of insured diseases. The compensation rules vary according to the importance of medical spending. The target risk is therefore the medical spending induced by the occurrence of insured diseases.

#### **2.3.1. Are medical spending risks measurable?**

##### *- Observability*

The medical spending can be observed. The disease pattern of the target population could be quantified based on the historical data. The level of health spending for given disease is observable at health facilities. The collection of information is possible, albeit expensive.

##### *- Randomness*

The occurrence of sickness is normally a random event. It can arrive to any individual, so it is possible. It is an unwilling event because it reduces the individual's welfare, so it is not speculative. It is imaginable in the sense that the financial and economic losses of a sickness are measurable before the incidence of sickness. Sickness is not anticipated. An individual could not plan the occurrence of illness shock, even if he can built up or destroy his health in long term by adapting favorable or unfavorable health-concerning behaviors (cf. Box I.1 for the criteria for randomness).

The effectiveness of medical treatment, in contrast, is not totally random. For a same disease, medical treatments may vary tremendously across regions or even between health facilities. The uncertainty on the efficiency of medical treatment stem from the complexity of human body, the difficulties in observing physician's efforts, the lack of necessary knowledge or information for an appropriate judgment. Some of these elements are subjective, such as the patient's choice on health provider, physician's efforts. These elements make it difficult for the insurance company to calculate the actuarial cost of the medical spending risk. The insurance therefore cannot directly ensure that the individual got efficient medical treatment. As medical spending depends, in part, on the efficiency of medical treatment, it is difficult to predict medical spending.

Another element that influences medical spending is the price-effect of insurance. As the insurance reduce the direct payment of the patient-consumer, the latter could be less precautious about his health concerning behaviors or more motivated for medical consultation (Marshall 1976). Physicians may also incited to over-prescribe, as the capacity to pay of the patient-consumer is enforced with insurance. As consequence, medical spending will be driven up.

One way to reduce these uncertainties issued from subjective elements is to share health spending risks between the insurer, the patient-consumer, and the service provider. As each part would be motivated to control medical spending under his charges, the final total medical spending would be reduced. Measures include letting hospitals bid for insurance contract, determine a list of insured services and drugs, modifying provider payment, or applying co-insurance rules.

### **2.3.2. Are medical spending risks marketable?**

#### *- The independence and the diversification of medical spending risk*

Whether medical spending risk is independent depends on the nature of diseases which caused the medical spending. Communicable diseases are not independent risks. Having someone carrying hepatitis A in the neighborhood, for instance, would considerably increase the likelihood that others catch it. The realization of a particular risk therefore may rapidly spread to the whole community or region and becomes a public risk. Non-communicable diseases, in contrast, are relatively independent. The fact that someone got cancer, for example, would not directly increase the likelihood of infection for the others in his neighborhood.

Communicable diseases are not diversified, because they increase the common risk of infection. Non-communicable diseases, in contrast, can be diversified if the target population is heterogeneous. Numerous studies find close relationship between people's health status and their living conditions, education levels and socio-economic status (Kabubo-Mariara et al., 2008; Currie and Hyson, 1999; Dressler et al., 1998; Feinstein, 1993; Williams, 1990). In order to guarantee the diversification of risks, it is favorable to construct an insurance pool which contains a population with large demographic and social economic variation.

#### *- The discrimination of risks*

The discrimination of risks is questionable in the domain of health, because it will cause social exclusion in protection system. If insurance premium is set in function of the risk type of the target population, it means people in poor health would pay higher cost for the insurance. At the same time, this group of people is also often found in great financial hardship due to their health problem. As result, those who are in most urgent need of health insurance would be excluded from the system. Given the importance of health to human wellbeing, it is unacceptable to enforce the inequality in the access to medical services.

In practice, health information is difficult to get. First, in many countries, patient's medical information is considered as private and protected by law. As the insurer normally does not know the disease history of the insurance customer, it is difficult for him to identify the risk type of the customer. Second, health status is not always directly observable. Medical diagnosis

requires special knowledge that the insurer does not necessary have. The collection of this kind of information may be costly, because the insurance needs to pay experts and equipment. The increase of insurance cost will push up the premium and make the insurance less attractive, which will further opt out low-risk insurance customers. As discussed previously, if the insurer fails to distinguish the risk type of the insurance customer, it will lead to the failure of market equilibrium. On the other hand, if the insurer adapts discriminatory policy to treat customers with different risks, high risk people need to pay more, because their risks are more costly. Private insurance therefore would impose unequal access to insurance system.

To sum up, not all health risks are marketable. And even for those that are marketable, the sustainability needs of private insurance may lead unequal access to financial protection. If private health insurance is not the best option to ensure accessibility of medical services, maybe we should revisit the way that medical resources could be distributed. In the next section, we discuss the two major methods of resource allocation: market allocation and government intervention.

### **III. The role of market and government in the distribution of medical resources**

Most of the governments in the world are heavily engaged in the distribution of medical resources. This is firstly because health is considered as an essential determinant of human well-being and health services are considered as the merit goods to which everybody should have the entitlement (United Nation, 1948). The second argument is that the health of a population is a key factor of productivity. This is supported by Grossman's seminal work "On the Concept of Health Capital and the Demand for Health" (Grossman, 1972), in which health is considered as an important component of human capital. Government is therefore expected to insure that the access to medical resource should be equal to everyone regardless of his social background and the distribution of medical resources maximize health outcome. What's the role of government on the medical market then? Should government stay out of the market or should it directly replace market allocation? We will discuss the inconveniences of these two options.

#### **3.1. Problems of market allocation**

Market allocation relies on the indication given by price. Neoclassical theory predicts that when the market is perfectly competitive, the obtained equilibrium would be Pareto-efficient, which means no movement away from the existing equilibrium will make someone better off without making others worse off (Begg et al., 2003). By supposing that social welfare is the sum of individual welfare, the neoclassical theory believes that market allocation will lead to the maximization of social welfare. However, on the market of medical services, several factors impede the maximization of social welfare.

##### **3.1.1. Asymmetric information**

One of the fundamental assumptions for competitive equilibrium is equal access to information. However, on medical market, this is not the case. The consumption of medical care asks for specialized knowledge which the service provider possesses but the patient-consumer normally does not. This unequal access to the information is called "asymmetric information".

Due to asymmetric information, when an individual goes to see a medical professional, he does not only buy medical goods and services from the latter, but also delegate the decision of medical consumption to him. In another word, the medical professional is at the same time the one who chooses which medical goods and services to buy and the one who sells them. This kind of transaction relationship is referred to as “principal-agent relationship” (See Box I.2).

Agency theory supposes that both the patient and the physician look for their self-interests. The patient-consumer (the principal) cannot directly observe the physician (the agent)’s efforts. The agency problem arises when the agent’s interest diverges from that of the principal. The patient-consumer’s objective is to restore his health, while the physician searches to maximize his income.

**Box I.2 Agency Theory**

The principal-agent relationship is the one in which one party (the principal) delegates work to another (the agent), who performs that work. This relationship is established in form of the contract according to which the agent is supposed to behave in the best interest of the principal. The agency theory studies the conditions which drive this cooperation into failure.

Agency problem arises under two conditions. 1) The desires or the goals of the principal and agent conflict; 2) the principal cannot verify whether the agent has behaved appropriately due to the asymmetric information. Under these conditions, two kinds of problems will emerge: moral hazard and adverse selection. *Moral hazard* is “the use of inside information to exploit the other party to a contract” (Begg et al. 2003, pp. 187). Here it means the agent is shirking because he believes that the principal will not discover his lack of effort. *Adverse selection* occurs “when individuals use their inside information to accept or reject a contract.” (Begg et al. 2003, pp. 188) Here it means the agent hides his real skills or abilities, because the principal cannot completely verify these skills or abilities either at the time of hiring or while the agent is working.

One of the solutions of agency problem should be to reduce information gap. This could be done by the principal investing in the collection of information, such as enforcing budgeting systems, reporting procedures, relying on the boards of directors, and adding layers of management.

Another solution is to align the interest of the agent with that of the principal. The agent’s interest is the benefits he can obtain from the operation of mission. The principal, on the other hand, search for the benefit he can obtain from the result of mission. Therefore, if the agent’s income is connected with the result of mission, then he has interest to do his best effort to obtain the principal’s objective. This kind of contract is called outcome-based contract.

However the outcome-based contract will increase the risk born by the agent and consequently reduce the attraction of the contract for him. In addition, all the efforts are not measurable. It is then argued that when the behavior of the agent is observable and can be estimated by additional information, the behavior-based will be preferable to the contract-based contract.

Source: drafted by the author based on Eisenhardt (1989)

The agency problem depicts two kinds of agent behaviors which harm principal's interest: moral hazard and adverse selection (See Box I.2 for details). On the medical market, one of the examples of moral hazard is that the physician prescribes unnecessarily expensive medical goods and services. An example of adverse selection may be that an uncompetitive physician is reluctant to refer the patient to other health institutions. The agency problem therefore reduces the efficiency of the use of medical resources.

Agency problem require two premises: the asymmetric information and the divergence of the interests of the principal and the agent. One fundamental solution should be making up the information gap. However, the acquisition of knowledge takes time, energy and money. The occurrence of ill shock is unpredictable and the demand for medical services may be urgent. It is impossible to ask the patient to possess necessary medical knowledge to judge the behavior of physician at the moment of sickness. A feasible alternative is to ask an independent third-party to supervise the behaviors of the physician on behalf of the patient-consumer. The effectiveness of this supervision depends on the cost of information, the measurability of the performance and efforts, and the third-party's commitment to defend the interest of the patient-consumer.

Another element that enforces physician's effort is his professional conscience. Social respects that the physician gains from a well-done work will make him willing to obtain the best result for the patient. However, the judgment of social value is subjective and changeable. A physician with good professional consciences will still have the feeling of injustice if he judges that his income does not reflect the value of his work. He might think that his efforts are not appropriately recognized by the society. Consequently, he would be discouraged to make further efforts (Gauri, 2001).

The third way to increase the performance of market allocation is to align physician's interest with that of patient by modifying the economic incentives of the physician. (cf. Box I.2) Numerous studies found that provider payment could considerably change the efficiency of health system (Gauri, 2001; Eggleston 2001). Different provider payment may modify the share of medical consumption risks between the patient-consumer and the service provider. Fee-for-service payment (FFS), for example, put all the medical consumption risks on the shoulder of the patient-consumer. The physician, on the other hand, is exempted from the result of medical treatment. This reduces the accountability of the physician to the patient. On the other hand, FFS links the physician's income with the sale of services and thus incites over-prescription. FFS has therefore cost-inflation effect. Enveloped global budget, in contrast, puts the pressure for cost-containment on the physician. The latter is responsible for the medical spending exceeding contracted budget. The side-effect is that the physician will be motivated to refer complicate cases to other health institutions.

### **3.1.2. Inefficiency of market allocation in terms of health outcome**

Welfare efficiency issued from the allocation of medical resources is not identical to economic efficiency. The utility of medical consumption does not come from the satisfaction obtained by consumption per se but from the eventual amelioration of health outcome. The efficiency of the allocation of medical resources, therefore, should be measured in function of health outcome relating to inputs. The allocation of medical resource is efficient when, given medical inputs, health outcomes are maximized; or given health outcome, medical inputs are minimized. Market

allocation, however, is driven by economic interests. It steers resources toward agents who obtain the highest profits with given inputs or who pay the lowest cost to obtain given profits.

Economic interest is not necessarily in accordance with social needs for health. Medical services which bring high profits are not necessarily those which create most health outcomes. The preventive care, for instance, is more cost-efficient in the sense that it reduces the incidence of diseases at relatively low cost. However, as it treats risks which are not realized at the moment of service consumption, the consumer is more sensitive to prices than to needs (Feinstein, 1993). Curative care, in contrast, treats realized sickness. The cost of treatment increases with the severity of diseases, meanwhile patient's demand for medical services becomes also more urgent. In this case, the patient would be less sensitive to service prices. In another word, the price elasticity of demand for medical services declines when diseases are severer and services become more expensive. If the income of service providers is in proportion of the sale of services, they would prefer to offer curative services, albeit higher social benefits that cost-efficient preventive care could bring.

### **3.1.3. Social justice**

Health is crucial for human life and welfare. The right to survive is a fundamental entitlement of human being which should not be conditioned on the social, economical, cultural, or religious backgrounds (Weston 2006). The society has the responsibility to defend these rights when the individual alone cannot ensure them.

Under market allocation, the availability of medical service depends on individual's capacity to pay (CTP) rather than on his medical needs. The poor will therefore face higher financial obstacles in the access to medical services due to lower capacity to pay than the non-poor. On the other hand, the poor faces higher health risks than the non-poor, because they live more often under bad sanitation conditions, receive lower education, or suffer the problems of malnutrition due to insufficient foods (Gilleskie and Harrison, 1998; Patrick et al., 1988; Schnittker, 2004; Fotso and Kuate-Defo, 2005). Market allocation would therefore exclude the people in most needs of medical services out of medical system.

In addition, poor health could have more serious consequence on the welfare of poor people. First, the poor family has tighter budget constraint. If the sick person is the main income-winner of the family, it will reduce household's consumption on essential goods and services, such as food, shelter and education. This further reduces household's welfare (Xu K., 2003). Second, high health spending could also force poor families to borrow money and increase household's future financial charges. Health problem therefore forms a vicious circle which drives the vulnerable into deeper poverty (Meessen et al., 2003; Mcleod and Kessler, 1990)

There are evidences that the policies which promote social justice generally get mass understanding. Fong (2001), for example, reviewed the literature and concluded that people are not only concerned about whether they get what they deserve, but also whether the others get theirs. Other studies confirmed that people tend to support the redistribution when the economic hardships suffered by part of the population are caused by the conditions that beyond the choice of the individual (Kluegel and Smith, 1986; Piketty, 1995; Gilens, 1999). Government is therefore expected to intervene into the allocation of medical services to defend social justice.



### **3.2. Problems of allocation by government**

Government use public institutions to exert public policies. When market mechanism fails to optimize the allocation of resources, public institutions are then put forward as remedy. Public institution can allocate resources according to centrally designed development plan. The mobilization of resources is realized in an administrative and bureaucratic way.

The efficiency of public intervention in obtaining optimal resource allocation relies on following assumptions. First, people who are in charge of public institutions have “good will” to serve public interests. Second, public institutions arrive to identify the “needs” of the individual and make “reasonable choice” for the society. And individuals hold same preferences and tastes and profit public services in similar way. Third, public institutions possess enough resources to answer social demands. None of these assumptions is realistic.

#### **3.2.1. Altruism assumption for public agents**

In economic theory, the public agent is supposed to defend social benefits and the private agent pursue self-interests. However, persons who are in charge of public institutions are not substantially different from those who are engaged in the private sector. Letting public institutions to allocate resource is in fact to allow a small group of people to decide the welfare of the others. This practice is under the hypothesis that people in charge have the “good will” of searching the best solution for the society. However as Smith pointed out in his seminal work “The Wealth of Nations” (Smith, 1976[1776]), it cannot be expected that people help each other out of sheer good will. “Where help is given, selfish motives lurk behind it.” Man in the neoclassical economics models is utilitarian, rational, and individualist. He chooses his behavior in function of self-interest (Etzioni, 1988).

People with different social-economic backgrounds have different priorities for their needs. Interest conflicts arise when people who make decision come from the social elites while people who will be mostly affected by the decision belong to the masses. This is problematic for the development of social programs. The poor normally profit more from social programs than the better-off in the sense that the former gets more marginal gains from these programs than the latter (Coughlin, 1990). However, as it is the people in the latter group who make the decisions on public investment, the decision-maker would be more attracted by the programs which bring more benefits to the better-off than social programs.

One way to enforce the consideration of the decision-maker for the needs of the masses is to involve the latter into the decision-making procedure or to link the personal interests of the decision-maker to that of the masses, by giving the latter the right to vote for example. However the good function of this system requires a well-developed democratic system and a transparent information system. This could be costly to construct. Even if institutional conditions exist, it is still a challenge to unify the opinions of the masses, because the preferences of individuals are heterogeneous and the consensus may be just not available.

Another way to make the decision-makers more accountable to the masses is to enforce ethical education. The sociologists argue that “if the norms and other social contracts so require, individuals may act against their own economic or other interests.” (Kangas, 1997) However, the

influence of moral reasoning on the individual's decision depends on numerous factors. (Etzioni, 1988; Coughlin, 1990; Hudson and Jones, 1994; Kangas, 1997; Bowles, 1998; Rutledge and Karim 1999;) Etzioni (1988), for example, found that the effect of ethical reasoning on the individual's decision increases when the social bonds are strengthened within a group. Kangas (1997) and Bowles (1998), on the other hand, pointed out that people's beneficence or the willing to help others is endogenous. It may change with the circumstance and the social influence (Kangas, 1997), or with extrinsic incentive and economic organization (Bowles, 1998). Rutledge and Karim (1999) argued that institutional enforcement is important when people are at lower moral reasoning, while the social judgment becomes major motivation for altruism when people obtain a higher moral reasoning.

These studies show that the "good will" is not an inherent quality of people, but rather a quality that needs social and institutional efforts to build up. Ethical motivation should be accompanied by an underlying control mechanism which imposes strong compensation and punishment rules to enforce the commitment of the decision-maker to the public.

### **3.2.2. Public institution's capacity to identify the "needs"**

One argument for public intervention is that market fails to allocate resources in function of needs. However, whether public institutions do better than market depends on to what extent they answer target population's needs. So the capacity of public institutions to define and pursue local needs directly influence the efficiency of public intervention (Φvretivet, 1996).

There are, nevertheless, two fundamental challenges in the identification of needs. First, the collection and interpretation of information are costly and difficult. Second, the criteria for choice are subjective and cannot represent the preferences of everybody given the heterogeneity of individuals.

The cost of information collection includes the investment in staff and material, the additional administration cost, the cost issued from the renovation of systems to confirm the needs of the registration of information. These costs may not be ignorable for the countries which have restrictive public budget and low efficient administration. Sometimes, the information may just be not available or credible if a well-developed registration system is absent. In China, for example, during the period of "Great Leap Forward" many data on production were exaggerated by the local government in order to show a better political performance. The use of these data may lead to biased conclusion.

The reading of information is as challenging as its collection. The extraction of essential message out of abundant and complicated data requires high capacity of synthesis and specialized knowledge. In addition, in most of the time, the interpretation of message is rather subjective and thus influenced by personal preference. All these difficulties constitute the sources of misunderstanding.

The measurement is as possible as the criteria can be established. The choice of criteria is also complicated. One assumption for the efficiency of public intervention is that individuals, regardless of their heterogeneity, value social services in the same way so that everybody profits equally from these services. However, in reality, individuals are unlikely to have same preference

according to their age, sex, personality, and social-economic background. It is therefore impossible to set standard criteria to represent the priorities of everyone. Replacing individual choices by collective ones will force part of the individuals to abandon their special needs to confirm collective norms. This consequently reduces individual's welfares.

Even if consensus are available, the subjectivity of certain criteria also pose question. The measurement of health status, for example, is troublesome because the criteria of good/bad health are difficult to set. It is argued that self-reported health status should be used to measure health status, because health concerns also the way in which people appreciate their life. However, people's perceptions for health vary according to their social-economic context (Bulter et al., 1987; Zempléni, 1988; Idler and Benyamini, 1997; Gilbert and Soskolne, 2003). People with more education, for instance, may be more sensible to their health problems than those with less education. People who still need to solve basic surviving problems, like foods and shelter, may not feel the same needs for medical consumption as those with better living conditions. It is then suggested to use objective measures, like clinical diagnosis, to measure health status. The data, however, are partial because they involve only those who have gone to see a doctor.

One way to help public institution to identify individual needs is to reduce the distance between the authority and concerning population through decentralization. Theoretically, two advantages should be expected by letting local government to find out local people's needs. First, as the local government is closer to the target population, it will be easier to observe population's wants and preferences. Second, as the social bond between the government and population is stronger in local place, the former will be more responsive to the expectations of the latter (Tiebout, 1956).

However, the experiences of the low- and middle-income countries show rather controversial evidences. It is found that the local governments do not necessarily have more access to the information nor are more responsive to the population's needs for several reasons. First, although it might be easier for the local government to collect the information, it does not necessarily dispose the technical and expert support to interpret the information. Second, if the appointment of local government is taken in a delegation way, the local government will be more motivated to answer the expectation of its supervisor than that of it population. Third, the local government may not have all the authority to adjust service to local needs as it wishes (Khaleghian, 2003).

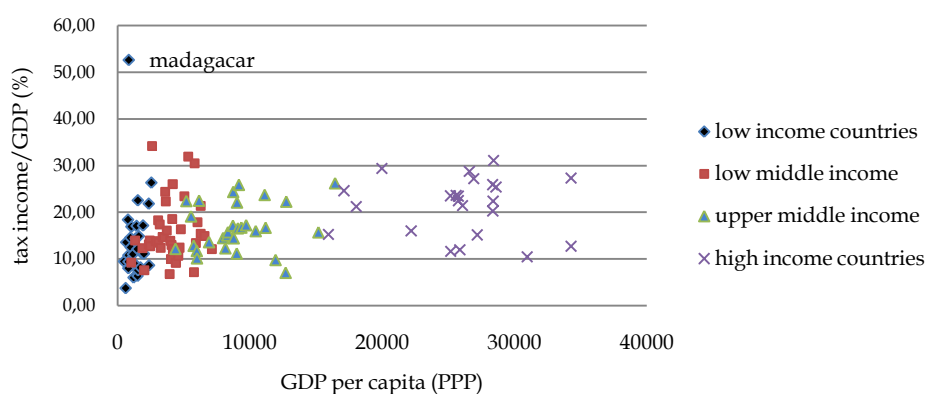
### **3.2.3. Capacity of public institution to collect resources**

In order to redistribute resources, public institutions need at first possess these resources. The extent to which the government has control over national resources depends at first on country's political and economic structures. The government of countries with central-planned regime (or communist regime) has highest control over national resources. The availability of resources for each sector depends on the economic development level of the country and the priority that the government gives to the sector. The Former Soviet Union countries (FSU), for example, gave low priority to health sector, because it is considered as "non-productive" sector. As consequence, although the country established public health system to provide free medical care, these services remained rudimentary (Tragakes and Lessof, 2003).

Nowadays most of the countries in the world have adopted market economic regime under which the allocation of resources is mainly conducted by private agents through market mechanism. The function of public institutions is confined to defend public interests and promote social welfare. By adapting fiscal system, public sector shares national wealth with private sector. Fiscal revenues decide the size of public funds. It can be measured by the share of tax income in the GDP.

Figure I.1 compares tax income level, in percentage of GDP, by income level of the countries. No correlation can be detected between the country economic development level and the tax share in GDP. In another word, the public control over the country's wealth does not depend on the country's economic level.

**Figure I.1.** Share of tax income in GDP, by income groups



Data source: World Bank "World development indicator (WDI) 2006"

Besides of this official indicator, the size of informal sector also needs to be taken into account. The activities engaged in the informal sector generally "escape, or are excluded from the institutional system of rules, rights, regulations and enforcement penalties that governs those agents engaged in formal production and exchange" (Feige, 1990). In another word, the activities in the informal sectors will not be shown in the statistic registration.

A big informal sector may impose serious problems for the development of social protection program. The sustainability of social program depends on the gap between its income and expenditure. If the government tries to spread protection system to the whole population while only require the employees in the formal sector to pay for the system, people would be encouraged to adapt free-ride behavior by shifting to the informal sector. This would drive the program into financial hardship. If, in contrast, the government attaches the entitlement with the contribution status, the people in the informal sector would be deprived of protection system. This reduces the effectiveness of the protection.

The size of informal sector depends at first on the country's economic development level. By analyzing the economic structure of 76 countries in the period of 1989 to 1993, Schneider and Enste (2000) found that the proportion of informal activities in total economic activities is about 35 percent to 44 percent in the low-income countries; 21 percent to 35 percent in the middle income countries; and less than 15 percent in the high income countries.

The size of informal sector also reflects a country's institutional capacity. The informal sector is constituted of the activities which escape government's regulation. So the enforcement of administrative system, including the development of audit control, the stipulation of laws and rules, and the amelioration of information system, will increase the cost of fraud and discourage the evasion (Schneider and Enste, 2000).

The institutional capacity depends then on the enforcement of command. The enforcement contains two aspects: the encouragement for good behaviors (B) and the punishment for bad ones (C). The encouragement may be, for example, the recognition and appreciation of efforts, economic compensation for good performance, or work promotion. The punishment consists of the losses of all the above benefits, or more severe sanction like the loss of job.

The efficacy of enforcement depends above all on the extent to which good/bad behaviors are detectable ( $\rho_1$ ). If there is high risk of getting bad intention revealed, it will discourage the individual to shirk. The efficacy of enforcement depends also on the probability that the bad behavior be punished once detected ( $\rho_2$ ). The cost of non-compliance (E) is then:

$$E = (B+C)*\rho_1*\rho_2 \quad [I.3]$$

The higher is this cost, the more likely people will comply. (Ensor and Weinzierl, 2007)

The above discussion shows the dilemma of medical resources allocation. Market failure and the conflict between social justice and economic interest on medical market call for the engagement of the government in the allocation of resources. However, the effectiveness and efficiency of government intervention depends on institutional capacity and political regimes which vary considerably across countries and regions. If neither market nor government can solve the problems of medical resource allocation solely, is it possible to combine the efforts of the two parties? The essential question is how to align the patient-consumer's capacity to pay to his health needs. If the government can correct the inconveniences of market at upstream, it could be possible to profit market's advantage as efficient resource distribution mechanism. For example, the government may redistribute financial resources to align the patient-consumer's capacity to pay to his health needs. This concerns a specific topic – health financing system. In the next section, we will discuss how a country could organize its health financing system.

#### **IV. Options for health financing system**

The way in which a country organizes its health financing system depends on its social-economic context. Some of these parameters are exogenous to health sector. The economic development level, for example, decides total resources available in the country. Higher income countries have more resources than lower income countries in absolute term. Correspondingly, they could spend more on health. The size of informal sector influences the efficiency of fiscal system and consequently the government's control over national resources. The openness of a country influences the availability of foreign capital, which could be considerable for small economy.

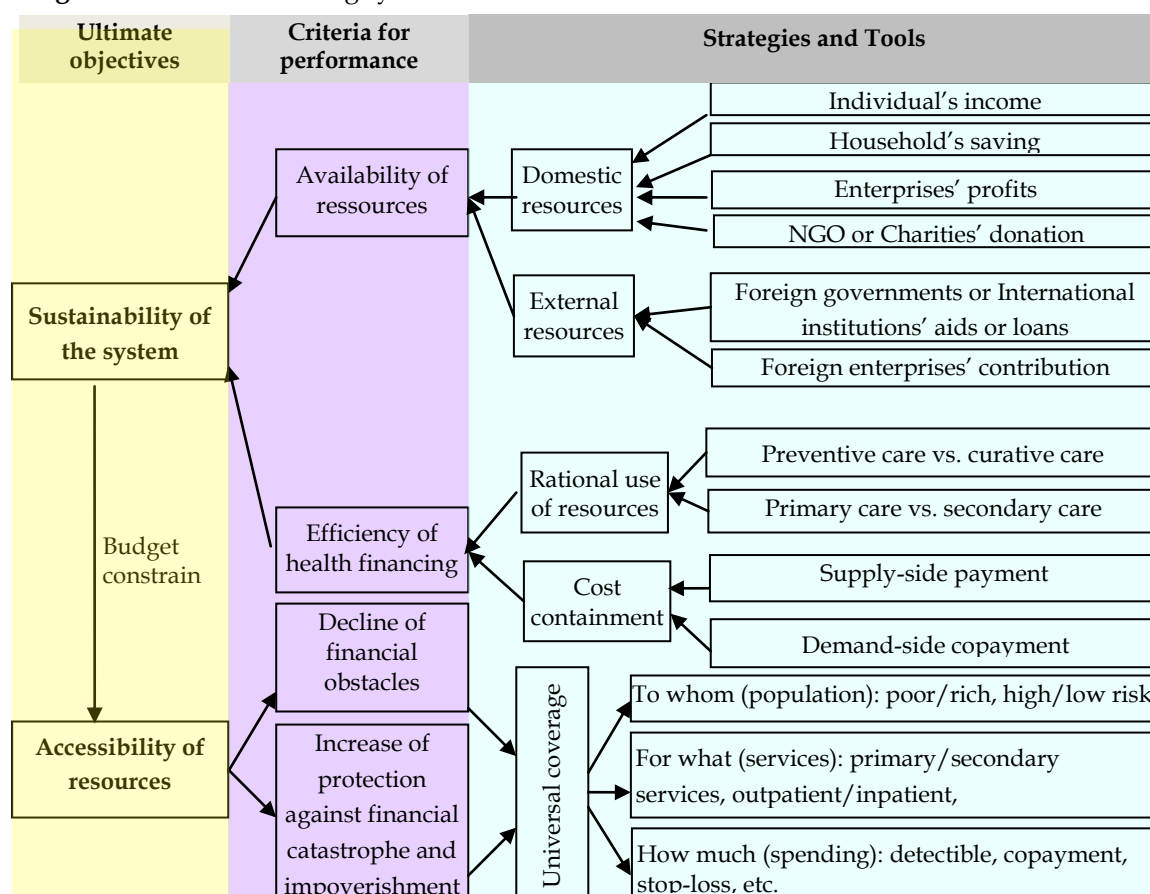
There is, nevertheless, some consensus on the objectives that a health financial system should pursue. World Health Organization (WHO), in its World Health Report 2000, described these objectives as following:

“The purpose of health financing is to make funding available, as well as to set the right financial incentives for providers, to ensure that all individuals have access to effective public health and personal health care. This means reducing or eliminating the possibility that an individual will be unable to pay for such care, or will be impoverished as a result of trying to do so.”

-----WHO 2000, page 96

This description underlines three key aspects of a health financing system: the availability of resources, the efficiency of health financing, and the coverage of protection against financial catastrophe and impoverishment. The first two aspects guarantee the sustainability of the system and the last one promote the accessibility of medical resources. The final performance of health financing system depends on the harmony of all three aspects (Diagram I.1).

**Diagram I.1** Health financing system



Source: drafted by the author

Our previous discussion showed that there are great uncertainties in the consumption of medical services. These uncertainties constitute a cost for the individual. In addition, if medical services and drugs are paid directly by the individual at the moment of consumption, the access

to medical services will depend on the patient's capacity to pay. Given the importance of health to individual's wellbeing, it is difficult to accept the idea of relying patient's access to medical service on his financial capacity rather than on his health needs.

By introducing a third-party payment system, it is possible to separate individual's access to medical service from its capacity to pay. A third-party payment system contains three steps: the collection, pooling, and re-allocation of funds. The collection of funds separates the payment for medical services from medical consumption. The pooling of funds permits to mix health spending risks and to add up individuals' capacity to pay. The re-allocation of funds permits to modify purchasing power in function of medical needs. In this way, it transmits resources from those who have them to those who need them. In addition, as the third-party payer purchases services on behalf of the collectivity of patient-consumers, it can enforce the negotiation power of the latter. By imposing different provider payments, the third-party payer could re-distribute medical consumption risks between the patient and physician and consequently hold both parties accountable to the system. In the next section, we will develop these ideas.

#### **4.1. Contribution of third-party payment to the fairness of health financing system**

##### **4.1.1. Among the insured population --- the transfer of funds from the rich to the poor and from the healthy to the sick**

One of the objectives of third-party payment system is to distribute medical resources in function of health needs rather than purchasing power. Meanwhile, medical services have costs and it needs to be paid in one way or another. How should these costs be distributed across the population depends on the value judgment of a society. WHO (2000) explained the principle of fairness of health financing in two dimensions: the horizontal and vertical equalities. The former advocates that the individuals with the same health situation should be treated equally regardless of his SES. The latter contends that the marginal loss of utility due to the loss of income should be the same for the whole population.

The principle of fairness implies two transfers of health financing funds: from the healthy to the sick and from the rich to the poor. According to horizontal equity, health resources should be distributed in function of health needs. In another word, people with more serious health problems should be able to get more medical services than those who have less serious problems. Based on vertical equity, health spending burden should be distributed in a progressive way according to the CTP of the individual, often represented by salary or income. The argument is that assuming income marginal utility is decreasing, the rich loses less utility in paying one additional dollar for health than the poor does.

Government can realize the redistribution of revenue through fiscal system. Two options for collecting public funds for medical consumption: general taxes income or payroll taxes income. Wagstaff (2007) argued that general taxes income is fairer than payroll tax income in collecting health funds. First, the former taxes all kinds of revenues, including labor income and wealth income; while the latter taxes only labor income. However, people who gain wealth income are generally in better economic situation than those who gain labor income. Basing health contribution on labor income implies that the poor would contribute more than the rich. Second, the contribution to SHI is often set in proportion of income with an upper-limit. It means that

people whose salary exceeding the upper-limit will contribute less, in terms of the percentage of their salary. The general taxes income system may also set upper-limit for the taxes on income, but generally not for the taxes for consumption. Under the assumption that the richer people consume more, it can, at some extent, compensate the regressive nature of income taxes. Third, payroll taxes construct a direct linkage between health contribution and insurance benefits. It is politically difficult to persuade the rich to contribute more than the poor in absolute term, whereas they probability have lower chance to get ill. General taxes income, however, does not directly correlate with insurance benefits. It is therefore easier to realize the transfer of funds from the rich to the poor. To sum up, the payroll tax seems to be more regressive than general taxes.

#### **4.1.2. Sharing of responsibilities of medical treatment between patient-consumer, insurer, and service provider**

##### **Risks sharing in a third-party payment system**

Under a third-party payment system, medical services are purchased in a collective way by a third-party payer who represents the common interests of patient-consumers. The third-party payer can transfer part of health consumption risks from the patient-consumer to the services provider by collecting health funds from the former and then purchase medical services from the latter. As the third-party payer represents a group of patient-consumers, he has bigger negotiation power than individual patients and therefore can impose certain transaction rules on the service provider. Provider payment is the key element which makes it possible to transmit medical consumption risks (Culter and Zeckhauser, 2001).

The provider of medical services can be paid in two ways: prospectively or retrospectively. Prospective payment is a payment mechanism in which reimbursement rates of insurance are set for a given period, prior to the circumstances giving rise to actual reimbursement claims. Any failure to meet targets should result in the penalty of lack of payment or the lack of a bonus payment to the provider and thus constitutes a risk for the latter (Eggleston, 2000). Retrospective payment, in contrast, is a payment mechanism in which the provider is reimbursed at the moment of service consumption. The reimbursement depends on the actual costs of medical treatment. The financial risks of medical treatment are totally born by the services purchaser (i.e. the third-party payer or the patient-consumer). According to Cutler and Zeckhauser (2001), the income of the service provider could be calculated by the following formula:

$$\text{Provider payment} = R + r \text{ Cost}_{\text{ins}} \quad [1.4]$$

“R” represents prospective payment; “Cost<sub>ins</sub>” represents actual medical spending that the insurer is engaged to reimburse; “r” represents the percentage of medical cost paid in retrospective way. If R>0 and r=0, the risk of the medical consumption would be totally born by the physician. If R=0 and r=1, the risk would be totally born by the third-party payer. If R>0 and 0<r<1, the risk would be shared between the third-party payer and the physician (Cutler and Zeckhauser, 2001).

The uncertainty of health expenditure born by the physician is the difference between the actual medical costs covered by the insurance and the reimbursement that the provider could receive from the insurer:



$$\text{Risk}_{\text{provider}} = \text{Cost}_{\text{ins}} - (R+r\text{Cost}_{\text{ins}}) = (1-r) \text{Cost}_{\text{ins}} - R \quad [I.5]$$

The patient-consumer pays insurance premium for potential medical consumption. In this way, he transfers part of the uncertainties of medical consumption to the third-party payer. However, the insured still need to pay part of health spending out-of-pocket according to the coinsurance policy of insurance scheme. The patient-consumer therefore bears the costs of medical consumption which remains under his charges. Suppose “ $\text{Cost}_{\text{tot}}$ ” indicates the total medical expenditure that the patient-consumer needs to pay. Then the risk born by the patient-consumer is the difference between the total medical expenditure and the medical expenditure covered by the insurance:

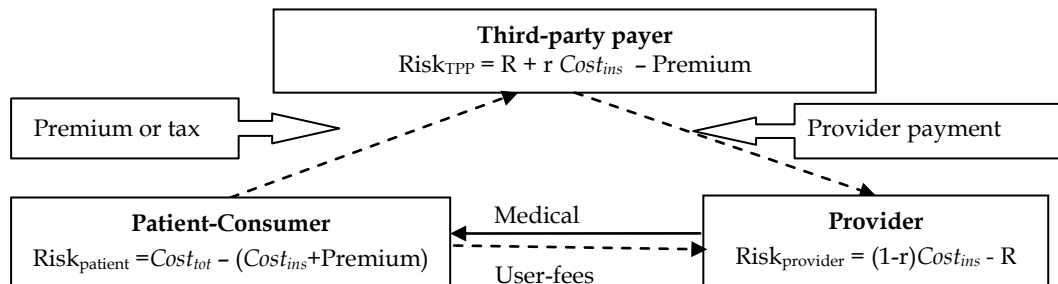
$$\text{Risk}_{\text{patient}} = \text{Cost}_{\text{tot}} - (\text{Cost}_{\text{ins}} + \text{premium}) \quad [I.6]$$

The third-party payer also bears some risks stemming from the potential deficit between the premium (or taxes) income and medical reimbursement

$$\text{Risk}_{\text{TPP}} = R + r \text{Cost}_{\text{ins}} - \text{Premium} \quad [I.7]$$

Diagram I.2 illustrates the final distribution of medical consumption risk among the three parties. The party which bears the biggest risks will be most motivated to control medical cost. In contrast, the party which arrives to shift the risk to the others will be less accountable.

**Diagram I.2** The risk sharing in a third-party payment system



- Arrow in dash line indicates the flux of financing of health services
- Arrow in solid line indicates the flux of delivery of health services
- The items in *italic* are the uncertain medical spending

Source: draft by the author

### The coalition of services purchaser and provider

Once having collected insurance funds, the third-party payer needs to keep reimbursement costs below the budget. The third-party payer can either purchase medical services on the market, or produce his own service provision. In the first case, the purchaser and the provider are independent to each other. Market competition will spur services provision to the best efficiency. In the second case, the third-party payer directly controls the cost of service production. The service provider belongs to the third-party payer. This situation is called purchaser-provider coalition. The direct consequence is that the consumption risks that were formerly shared by the two independent parties are now put together.

$$\begin{aligned} \text{Risk}_{\text{insur+prov}} &= R + r \text{Cost}_{\text{ins}} - \text{Premium} + (1-r)\text{Cost}_{\text{ins}} - R \\ &= \text{Cost}_{\text{ins}} - \text{Premium} \end{aligned} \quad [I.8]$$

In this case, the third-party payer bears low risk because both the insurance cost and premium can be predetermined. This, nevertheless, does not necessarily imply an efficient services provision. The motivation of the third-party payer for higher performance of service provision depends on his relationship with the patient-consumer. If the patient-consumer can freely choose whether to enroll to insurance and to which insurer he'd like to enroll, the insurer should bear the pressure to improve the attractiveness of insurance package. It means more health benefits with given costs. On the contrary, if the patient-consumer is forced to enroll and has no choice on insurer, then the insurer bears no market pressure from the consumer to improve the performance of medical services provision.

## 4.2. Comparison of different health financing systems

According to the status of third-party payer, health financing system can be classified into State-funded health system, Social Health Insurance system (SHI), Community-based Health Insurance (CHI), and Private Health Insurance system (PHI). Under the first three health financing systems, the third-party payers are public or collective institutions. Under PHI system, the third-party payer is a private agent. If no third-party payer is available, the patient should directly pay medical services out of pocket. A summary of the characteristics of these systems can be found Table I.1.

**Table I.1** Comparison of different health payment system

System	Financial Sources	Concerned population	Collection of Funds			
			Sustainability of funds		Fairness of financing	
			Sufficiency	Stability	Contribution relates to CTP*	Contribution relates to health status
State-funded	General Tax Income	Whole Population	Yes	No	Yes	No
SHI	Earmarked Taxes	Employees in Formal Sector	Yes	Yes	Yes	No
CHI	Flat-rate Premium	Community Members	No	No	Yes	No
PHI	Premium	Adherents	Yes	Yes	No	Yes
Direct Payment	User Fees	the sick	No	No	No	Yes

System	Risk Pooling			Service Purchase		
	Risk pool	Administra-tion cost	Exigency on the governance	Linkage with the consumer	Allocation of resources is driven by the demand on	
					Supplier-side	Consumer-side
State-funded	National wide	Low	High	Weak	Yes	No
SHI	By professions or regions	High	High	not automatically strong, but can be built up	Depends on provider payment	Yes
CHI	By communities	High	Low	Strong	No	Yes
Private Insurance	By insurance company	High	High	Strong	Depends	Yes
Direct Payment	No pool	No cost	No	-	No	Yes

\* CPT: Capacity to pay, which can be measured either by the total income, or by the discretionary income (income net of the spending on the essential foods).

Source: compiled by the author

#### **4.2.1. Private health insurance versus public health insurance**

Both private and public health insurance system propose a third-party payment system. However, the for-profit nature of private agent decides that, under a PHI system, social solidarity would not be a primary concern. The idea of transmitting funds from the low-risk to high-risk people and from the rich to the poor will make the better-off reluctant to adhere. In order to attract low-risk clients, private insurance propose discriminatory contracts which set premiums in function of the risk-types of clients. As result, those who are in most needs of protection (the poor or the high-health-risk people) would be more often excluded from the protection system. Therefore the private health insurance would not reduce the inequality in the access to health protection system and to health services.

Public health insurance, whatever at state or community level, applies the idea of social solidarity. The vulnerable should be kept inside of the system with the help of the better-off. Based on this idea, the same benefits are proposed to all the adherents of the insurance, regardless of their contribution level. The principal of solidarity is accepted by insured population either because it is an obligation, like the case of State-funded system and SHI, or because the insured feels concerned due to social linkage, like the case of CHI (Gottret and Schieber, 2006).

#### **4.2.2. State-funded health system versus social health insurance system**

The difference between State-funded health system and SHI comes from their financial sources. Under state-funded health system, medical spending is financed out of general taxes incomes. When it is associated with public health provision, it is referred to as National Health System (NHS). It is the case of, for example, UK's health system. However, it can also combine with private health provision, like the health system of Canada. SHI generally gets its financial sources from earmarked taxes, typically payroll taxes. It is independent of government's general budget. The participation to the SHI is often compulsory for the target population. The insurance contribution is shared between employers and employees and thus constitutes a labor cost.

Although both financial systems are at national level and generally collect their funds through the government's fiscal system, several characters needs to be distinguished between them. First, compared to state-funded system, the SHI has a relatively stable financial resource. Under the state-funded system, health sector needs to compete with other sectors for public funds. The SHI, in contrast, has independent budget and has no need to compete with other sectors. Nevertheless, both systems are under the influence of economic fluctuation and demographic evolution.

Second, it is easier to extend the insurance coverage to the whole population with the state-funded system than with SHI. Under the state-funded system, health spending is financed out of government budget. The tax-payer is not always aware of the cost of insurance they pay and therefore less sensible to the question of whether insurance benefits correspond to contribution. In addition, as the state-funded system does not base insurance entitlement on contribution status, there is no problem of the identification of target population.

The SHI, in contrast, require a direct connection between the payment of contributions and the receipt of medical care benefits. This connection makes it easier for the insurance-consumer to

compare the cost and benefits of the insurance. The attractiveness of the insurance scheme thus may influence the rate of compliance with registration and contributions of the target population. The connection of entitlement with contribution also imposes the problem of identification. The countries where there is a big informal sector will have more difficulties to implement SHI because the employees in the informal sectors are not identifiable and thus would be excluded from the protection system.

Third, if health services are delivered by public health facilities, SHI funds call for more accountability than state-funded system in medical purchasing decision. Under the state-funded system, the government is at the same time the purchaser and provider of medical services. There is no incentive to keep service provider accountable to the patient consumer. SHI is fed by the contributions of the insured. Even if the adherence to insurance is compulsory, the latter can still choose to not comply with the law if he judges the cost of compliance is too high. The insurer is therefore more motivated to control medical costs and supervise the quality of services. The patient-consumer can enforce the accountability the service provider by imposing pressures on the insurer.

Nevertheless, the efficiency of SHI purchase may be reduced by the low negotiation power of the insured. SHI institution monopolizes health insurance market. The fact that the insured generally has few choices on the insurer releases the latter from competition pressure. In addition, the participation is compulsory which means the insured cannot easily opt out. This further reduces the insurer's accountability toward the insured (Wagstaff, 2007).

A common problem can be faced by both state-funded system and SHI system is the coalition of purchaser and provider. It can be the case when the state-funded system is associated with public health provision or SHI constructs its own health service provision.

Under the state-funded system with public health provision, medical spending is financed out of the government's general taxes income and medical services are provided by public facilities. The relationship between the third-party payer and the provider of medical services is that of the Ministry of Finance and the Ministry of Health. The sufficiency of medical funds depends on the availability of public resources and the priority that the government gives to the health sector.

If public budget is not sufficient to answer population's health needs, the government may have two solutions. It can either reduce the production cost of services by controlling the cost of inputs (labor and capital), or cut public health expenditure by diminishing the coverage of public health protection. Under command economy, prices are controlled by the government. It can therefore reduce the price of labor and capital in an administrative way (Kornai and Eggleston, 2001). Under market regime, the allocation of resource is oriented by market prices. The public sector needs to compete with the private sector for limited inputs. As the price is exogenous (assuming that the market is competitive), it is difficult to fill up the gap between the demand and the supply by controlling input costs. The shortage of public resource, in this case, results in the shrink of public protection (the decline of " $Cost_{ins}$ "). It can be translated into the increase of user-fees and/or the deterioration of the quality of public provision (Figueras et al., 2004; Leive and Xu, 2008). The deterioration of service quality is the major cause why the patient by-passes cheap public health institutions for more expensive private ones (Gauthier and Wane, 2008).

SHI funds, compared to state budget, are more independent and thus bear higher financial pressure. However, it does not necessarily imply the purchaser-supplier split. In the Latin American countries, for example, the SHIs provide directly the health services by building their special hospitals and polyclinics and engaging doctors and other health personnel on salaries (Roemer 1986). In this case, health provision is an integrate part of SHI system.

As discussed previously, if insurance participation is imposed to the individual and the latter has not much choice on insurance companies, SHI institutions will not bear competition pressure from the individual. In this case, the insurer would decide insurance benefits exclusively in function of the financial capacity of insurance funds. For example, if the insurance fund is insufficient to answer medical needs, rather than spur service provider for better performance, the insurer would just reduce insurance coverage. This is harmful for the system, because even if the law imposes insurance enrollment on the individual, the latter would still choose not to comply to the regulation if he judges the cost of participation is too high. The non-compliance rate would be even higher if the cost of non-compliance is low. That is one of the reasons why in a country where there is large informal sector and low effective regulation system, SHI would be difficult to apply (Gottret and Schieber, 2006).

To sum up, both state-fund system and SHI system could induce the coalition of purchaser and provider. If it is the case, the equilibrium of a third-party payment system would be broken because the financial risks of medical consumption will be tilted to the patient-consumer. The latter therefore will be most motivated to control medical costs. As the consumption decision of the patient-consumer depend on the suggestion of the service provider, the coalition of purchaser and supplier will cause the low efficient use of health resources.

#### **4.2.3. Community-based Health Insurance versus Social Health Insurance**

The coverage of public protection depends above all on the availability of public funds for health protection. According to the experiences of the low- and middle-income countries, when the public resource is not sufficient, the poor and the high-health-risk people are often fund excluded from the protection system (Figueras et al., 2004). CHI arises to offer this group of population a minimal protection.

CHI, as its name indicated, is a kind of self-protection issued from a community linkage. Gottret and Schieber (2006) describe the “community” as “a group of people who share common characteristics”. These characteristics can be geographic, professional, or religious. There is a strong sense of solidarity within the group. The contributions and benefits are often identical for all the members regardless of their income level or health status. CHI funds are managed by the community. The participation is voluntary.

CHI is considered as an intermediary tool to increase social health protection in the countries which do not yet possess necessary conditions to extend the SHI or the state-funded health system to the whole population. Experiences of some developed countries, like Japan and Germany, show the possibility of transforming the CHI into SHI when the economical and institutional conditions are acquired (Wysong and Abel, 1990; Wagstaff, 2005).

Nevertheless, compared to the SHI, the CHI suffers from several restrictions. 1) Limited budget. As the members of CHI often face economic hardship, the premium is generally set at a low level. Restrictive budget limits the benefits that the CHI fund can propose. The CHI therefore cannot essentially exempt its members from high health spending risk. 2) Small size of risk pool. The size of the CHI depends on the size of the community. As the community is constructed on the basis of a certain social linkage, it is restricted by the geographic distance. The small size of risk pool implies narrow scale of risk-sharing, which increases the cost of risk coverage and thus further reduces the effectiveness of protection. 3) The adverse selection. The participation to the CHI is voluntary. So it suffers the problem of adverse selection as the private insurance does.

In brief, the CHI has the advantage of offering some protection to the unreached population, i.e. "those for whom service availability and social protection does too little to offset the health consequences of social stratification." (WHO 2008b, page xvi) However, it is an ineffective health protection tool, because it offers only incomplete and insufficient protection at relatively high cost.

## V. Conclusion and discussion

This chapter at first discussed financial risks of medical consumption for the patient. It put forward the necessity of risk management. Insurance as a tool of financial risk management was then studied. The difficulties linking to private health insurance and the importance of health for human wellbeing bring the question on whether medical resources should be distributed by market or by government. The inconveniences of each distribution system were then discussed. Regardless the complexity of the question, it seems plausible to believe that third-party payment system permits to distribute medical resources by taking into account of medical needs rather than exclusively in function of capacity to pay. Different options of third-party payment systems were then studied in more details.

Medical consumption contains great uncertainties. These uncertainties constitute an additional cost for the individual. Insurance is an efficient way to transfer the resource from low-risk person to high-risk person. It will reduce the average costs of risks. However, the insurer, as a private agent, can only propose coverage for the insurable and economically attractive risks. The conditions for the insurability make the calculation of actuarial costs possible. And the conditions which evoke commercial interests for risk transaction bring the birth of insurance market.

Medical consumption risks contain random and non-random elements. The occurrence of illness shock, for instance, is a random event; while the final medical expenditure depends on several non-random factors. Adverse selection between the insured and insurer and moral hazard between the service provider and insurer makes it expensive and complicated to insure medical consumption risks. These difficulties may discourage private insurer to insure health spending risks.

Without health insurance or other intervention, the financial accessibility of medical services will depend on the capacity to pay of the patient. This evokes questions on the efficiency and social justice of this resources distribution. Medical market has some inherent problems which drive to the failure of market allocation. The agency problem caused by asymmetric information would reduce the efficiency of resource allocation by inducing over-prescription. The allocation

of resources by economic criteria would result in unequal access to medical resources in detriment of the poor and consequently reduce total health outcome. Social justice also requires to privilege health needs to economic interest in terms of the access to medical resources.

Government intervention, on the other hand, is as effective as the institutional capacity permits. The public agents are supposed to privilege public interests to self-interest and therefore capable to steer resource allocation in favor of public interests. However, people who work in the public sector are not essentially different from those in private sector. Without economic incentives, alternative motivations need to be found to promote efficiency. Under market mechanism, individuals can express their preference by voting on feet. If medical resources are distributed by government, it is much more difficult for the individual to make his voice heard. Even if the individual arrive to express their preferences, the consensus could be difficult to obtain given the great heterogeneity of the society. Submitting individual's decision-making power to a public institution would force certain social group to reduce their welfare.

In general, public institutions may effectively realize the predetermined allocation target in the countries where 1) the public funds are available and sufficient; 2) the formal market is well developed so that the informal sector is small; 3) the information is available and transparent; 4) the regulation rules are clearly defined and firmly defended; and 5) the concept of democracy is widely implemented in the mind of people. In contrast, if the country does not possess these conditions, government intervention may result in the low efficiency and the low responsiveness of public services.

The presence of financial management organization on the medical market requires for third-party payment system. Third-party payment system is a kind of prepayment mechanism. The financial protection is realized in three steps: collecting, pooling and redistribution of health funds. In these procedures, the contribution to the health expenditure and the consumption of medical services are separated, which makes it possible to re-allocate health financing burden and redistribute medical services across the population. The principal of fairness of health financing is one of the most applied value judgments for the re-allocation of health resources. It permits the funds shifts from the rich to the poor and from the healthy to the sick. It is expected that, by applying risk-sharing and social solidarity, health outcome could be maximized with given health resources.

A third-party payment system can not only protect the patient-consumer against health financing risk, but also increase the efficiency of the whole health system. This is done by redistributing the health financing risk among the consumer, supplier, and third-party payer. The party which bears the highest risks will be most motivated to increase the efficiency of medical consumption. The party which arrives to shift risks to the others will, in contrast, be less motivated to increase the efficiency of the use of medical resources.

The reallocation of the responsibilities for the health spending risk is realized by modifying the consumer payment and supplier payment. The former concerns the way in which the consumer directly and indirectly pay for medical spending. The latter concerns the question of how to converge the interests of the health provider to that of the consumer and the third-party payer. As the third-party payer represents collective interests of the consumers, it is important

that he remains accountable to the consumers. However, his accountability is challenged by the coalition of supplier and purchaser.

The coalition of supplier and purchaser per se does not necessarily reduce the efficiency of medical service provision as long as the purchaser is motivated to defend the interests of the consumer. The problem is the lack of the incentives for the third-party payer staying accountable. Under the state-funded system, the government gets pressures from the masses in function of the election cycle. The effectiveness of this regime depends on the power of democracy. Under the insurance system, the third-party payers' pressure comes from the potential market competition. The negotiation power of the consumer vis-à-vis the insurer depends on to what extent the former has the free decision on their insurance choice.

Compared to direct payment, third-party payment allows of the sharing of health consumption risk across the covered population. Two public prepayment systems, the state-funded system and the SHI, seem to have some advantages to extend health protection system to the whole population relative to CHI and private insurance. There is no obvious conclusion on the advantages of SHI versus state-funded system. The choice depends more on the country's social, economic, institutional and cultural contexts than the systematic advantages of the two financial options per se. The great heterogeneity of the countries makes a general conclusion impossible. In Chapter 2, we will at first analysis the actual practices of health financing system across the countries by distinguishing them by the income level. Then an accent will be put on the case of the countries in transition, because they are the countries which face fieriest conflicts between the former central planed regime and the actual free market regime.



## Annexe I.1 The value of insurance

The value of insurance can be illustrated by an example of lottery. Suppose that an individual wants to participate in a lottery. He needs to pay price  $X$  to get the lottery. There are two possible results. If he lost, his wealth would reduce to  $X_l$ . The corresponding utility of this wealth is  $U(X_l)$ . If he won, his wealth would increase to  $X_h$ . The corresponding utility is then  $U(X_h)$ . Denote the probability of loss " $\rho$ ", the probability of win is then " $(1-\rho)$ ". To simplify the analysis, suppose that the chance of win and loss is 50 to 50, i.e.  $\rho=50$ percent (cf. Graphic 1)

The player's expected final wealth at the end of the game is

$$E(X) = \rho X_l + (1-\rho)X_h = (X_l + X_h)/2 \quad [\text{AI.1}]$$

The expected utility gain of the lottery is

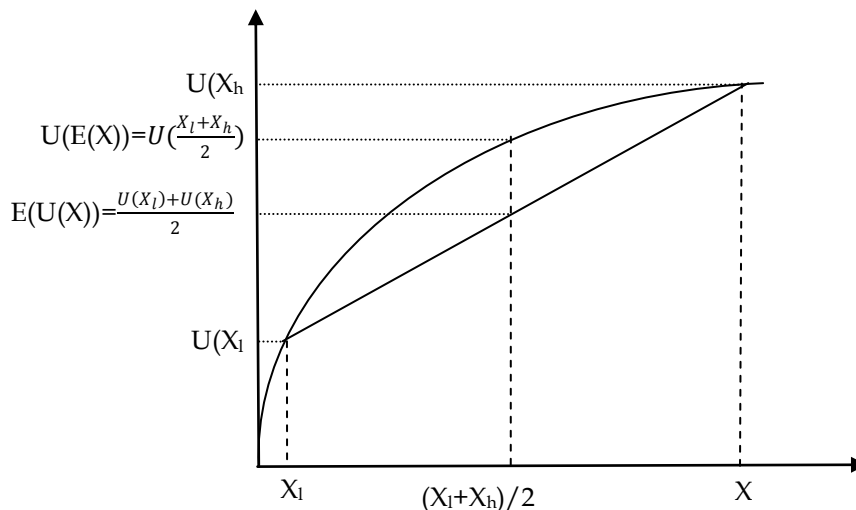
$$E(U(X)) = \rho U(X_l) + (1-\rho)U(X_h) = [U(X_l) + U(X_h)]/2 \quad [\text{AI.2}]$$

If the individual could get, with certainty, same sum of money as the expected final wealth after the game  $(X_l + X_h)/2$ , the utility of this wealth would be

$$U(E(X)) = U((X_l + X_h)/2) \quad [\text{AI.3}]$$

Suppose that the individual is risk-averse type. Then, as illustrated in the Graphic A.1, with same sum of final wealth, the expected utility gain of the lottery is inferior to the utility of wealth with certainty, i.e.  $E(U(X)) \leq U(E(X))$ .

**Graphic IA.1** The utility of a same sum of wealth with or without certainty



The insurer proposes an insurance contract to the individual which guarantees that whatever the result of lottery, the individual will be able to get a sum of money equivalent to  $E(X)$ . As  $U(E(X)) > E(U(X))$ , this proposal is attractive for the individual. But at what price the individual would be willing to pay for this insurance contract?

The assumption is that after the payment for insurance, the individual's financial utility gain should not be lower than the expected utility of participating in the lottery. Suppose the premium of the insurance is  $P$ . Then, we got

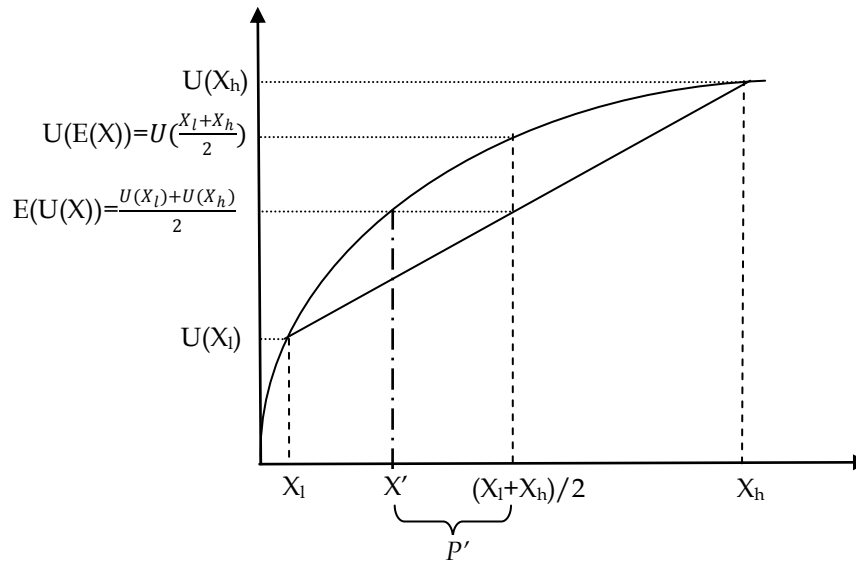
$$U(E(X)-P) \geq E(U(X)) \quad [A1.4]$$

$$\rightarrow U\left(\frac{X_l+X_h}{2} - P\right) \geq \frac{U(X_l)+U(X_h)}{2}$$

The maximal price ( $P'$ ) that the individual would be willing to pay is the one which equalize the equation 1.4.

$$U\left(\frac{X_l+X_h}{2} - P'\right) = \frac{U(X_l)+U(X_h)}{2} \quad [A1.5]$$

**Graphic IA.2** The value of insurance



## Annex I.2 Factor of safety for the insurer

Factor of safety is a term describing the structural capacity of a system beyond the applied loads or actual loads. Essentially, how much stronger the system is than it needs to be for a given load. Here, it indicates to what extent the insurance fund can support the loss beyond the expected average.

Suppose that the monetary cost of a risky event is  $X$ .  $s$  is a random element.  $\rho$  is the incidence of the event.

$$X = E(X) + s = X * \rho + s \quad [\text{AI.6}]$$

With 
$$s = \begin{cases} X - X * \rho & \text{if the event happens} \\ -X * \rho & \text{other wise} \end{cases}$$

The actuarial premium that assures the mathematical mean of this cost is  $r = E(X)$

There are two other costs that an insurance company should consider: the administration cost  $\mu$  (in percentage of premium) and a margin of security  $\alpha$  (in percentage of premium). So the total cost should be  $(1 + \alpha + \mu) r$ .

The annual result of insurance activities is a random variable  $b$ . Its mean value is:

$$E(b) = (1 + \alpha + \mu) r - r - \mu r = \alpha r \quad [\text{AI.7}]$$

Its variance is  $s^2$ , which measures the extent to which the final result of the insurance activities can be deviated from the mean value.

Set the accumulate fund of the insurance to be  $M$ . The final insurance fund at the end of year is  $M + \alpha r$ . It could cover the possible unexpected loss of  $\beta s$ .  $\beta$  is the factor of safety

$$\beta = \frac{M + \alpha r}{s} \quad [\text{AI.8}]$$

When the insurance covers  $n$  independent persons for an identical risk, the average premium is  $PR = n \cdot pr$ ; the variance is  $S^2 = n \cdot s^2$ . In this case, the factor of safety  $\beta$  can be expressed as follow

$$\beta = \frac{M + \alpha \cdot nr}{s \sqrt{n}} \quad [\text{AI.9}]$$

The larger is  $\beta$ , the safer the insurance fund will be. Other things equal,  $\beta$  will be higher if the insurance company has a higher reserve fund  $M$ , a higher premium  $r$ , or a higher margin of security  $\alpha$ . These, however, will reduce the attractiveness of insurance to the insurance customer. The insurer can also keep  $s$  low, which means to include a large number of observation and get accurate estimation of  $\rho$ .

### Annex I.3 Advantages of pooling independent risks

Suppose now there are two individuals A and B participating in the lottery. Their risks are independent, which means the possibility of win for one is independent of that for the other. Suppose that for each individual his chance of loss  $\rho$  is 50percent and that of win  $(1-\rho)$  is 50percent. If they play the game separately, their total expected utility will be

$$\begin{aligned}
 U_{tot\ 1} &= \frac{1}{2}(U(X_l) + U(X_h)) + \frac{1}{2}(U(X_l) + U(X_h)) \\
 &= U(X_l) + U(X_h) \qquad \qquad \qquad [AI.10]
 \end{aligned}$$

If the two individuals put their chances together and share the final gain equally, there would be four possible results. 1) Both of them lose, their wealth will decrease to  $X_l + X_l$  and each will get  $X_l$ . The possibility that they got this result is 25percent ( $\rho*\rho=50\text{percent}*50\text{percent}$ ); 2) both of them win, their wealth increases to  $X_h + X_h$  and each will get  $X_h$ . The possibility of this result is 25percent ( $(1-\rho)*(1-\rho)=50\text{percent}*50\text{percent}$ ); 3) One of them win, the other lose. Then their wealth will be  $X_l + X_h$  and each get  $(X_l + X_h)/2$ . The probability of this result is 50percent.

A \ B	Win	Loss
Win	$U(X_l) + U(X_l) ; 25\%$	$U\left(\frac{X_l+X_h}{2}\right) ; 25\%$
Loss	$U\left(\frac{X_l+X_h}{2}\right) ; 25\%$	$U(X_h) + U(X_h) ; 25\%$

The total expected utility of A and B

$$\begin{aligned}
 U_{tot\ 2} &= \frac{1}{4}(U(X_l) + U(X_l)) + \frac{1}{4}U\left(\frac{X_l + X_h}{2}\right) + \frac{1}{4}U\left(\frac{X_l + X_h}{2}\right) + \frac{1}{4}(U(X_h) + U(X_h)) \\
 &= \frac{1}{2}U(X_l) + \frac{1}{2}U\left(\frac{X_l+X_h}{2}\right) + \frac{1}{2}U(X_h) \qquad \qquad \qquad [AI.11]
 \end{aligned}$$

Compare the results with or without pooling risks, we get:

$$\begin{aligned}
 U_{tot\ 2} - U_{tot\ 1} &= \left[ \frac{1}{2}U(X_l) + \frac{1}{2}U\left(\frac{X_l+X_h}{2}\right) + \frac{1}{2}U(X_h) \right] - [U(X_l) + U(X_h)] \\
 &= \frac{1}{2}\{U\left(\frac{X_l + X_h}{2}\right) - [U(X_l) + U(X_h)]\} > 0
 \end{aligned}$$

For both individuals, pooling risks is more profitable than separating risks.



# The Challenges of Health Financing around the World and the Particularities of Countries in Transition

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## I. Introduction

After the theoretical discussions on medical consumption risks and different patterns of health financing systems, we will see, in this chapter, how well these health financing systems work in reality. Countries of different income level face quite different challenges from health financing. It is therefore necessary to group countries in function of their economic development level. Both inter- and intra-group comparisons are meaningful. The former permits to see how economic development influences health financing; and the latter investigates the efficiency of different health financing systems among the countries at similar development level. An accent will be put on the case of countries in transition (CITs). As they have experienced or are experiencing the mutation from a command economy to a market-oriented economy, the conflict between government intervention and market allocation would be most acute. It is therefore interesting to see how these countries solve ethical dilemma brought by economic reforms in the domain of health.

According to the definition of World Bank in 2004, the countries in our sample are classified into four income groups: low-income countries (LICs) with a Gross National Income (GNI) per capita equal to \$825 or less, middle-income countries (MICs) with a GNI per capita between \$825 and \$10,065, and high-income countries (HICs) with a GNI higher than \$10,065. The MICs are further divided into upper-middle income countries (UMICs) and lower-middle income countries (LMICs) with a midline of \$3,256 (WDI, 2005).

According to the classification of Health Systems Resource Guide (2006), CITs refer to countries in Asia, Central and Eastern Europe, and former Soviet that have moved or are moving from centrally planned economy to market-oriented economy. This transition is not necessarily accompanied with the mutation of political regime. According to the origins of economic transition, the CITs can be divided into three categories: the newly independent states (NIS), the reunified countries, and the countries in economic transition without political mutation. The *first* category mainly refers to 13 Eastern-European countries that became independent after the collapse of Former Soviet Union (FSU) in 1991 and the 4 South-European countries that were separated from the Socialist Federal Republic of Yugoslavia (SFRY) in 1991. These countries experienced the mutation in terms of both political and economic regime. The *second* category is represented by the former German Democratic Republic (East Germany) which rejoins the Federal Republic of Germany (West Germany) in 1989. The German Democratic Republic was under the central planned economy. It adapted market economy after the reunification. This country will not be included in our analysis, because after the reunification the data of East-

Germany are mixed with that of West Germany. It is therefore difficult to get independent data to analysis the situation of East Germany after the reunification. The third category concerns the countries which are conducting their economic transition without violent political mutation (CIT\_ECO). It concerns 6 Eastern-European countries and 6 Asian Countries. (Table I.2)

**Table I.2** The list of countries in transition

Country name	Income Class	Origin of Transition	Country name	Income Class	Origin of Transition
<i>European Countries</i>			<i>European Countries</i>		
Albania	LMIC	CIT_ECO	Estonia	UMIC	NIS_SU
Armenia	LMIC	NIS_FSU	Romania	UMIC	CIT_ECO
Azerbaijan	LMIC	NIS_FSU	Ukraine	LMIC	NIS_FSU
Belarus	LMIC	NIS_FSU	Russian Federation	UMIC	NIS_FSU
Bosnia and Herzegovian	LMIC	NIS_SFRY	Serbia & Montenegro	LMIC	NIS_SFRY
Bulgaria	LMIC	CIT_ECO	Slovakia	UMIC	NIS
Croatia	UMIC	NIS_SFRY	Slovenia	HIC	NIS_SFRY
Czech Republic	UMIC	CIT_ECO	Tajikistan	LIC	NIS_FSU
Georgia	LMIC	NIS_FSU	<i>Asian Countries</i>		
Hungary	UMIC	CIT_ECO	Cambodia	LIC	CIT_ECO
Kazakhstan	UMIC	NIS_FSU	China	LMIC	CIT_ECO
Kyrgyzstan	LIC	NIS_FSU	Laos	LIC	CIT_ECO
Latvia	UMIC	NIS_FSU	Mongolia	LIC	CIT_ECO
Lithuania	UMIC	NIS_FSU	Vietnam	LIC	CIT_ECO
Poland	UMIC	CIT_ECO			
Republic of Moldova	LMIC	NIS_FSU			

Note:

CIT\_ECO - Countries in economic transition without political change;

NIS\_FSU - Newly Independent states separated from the former Soviet Union;

NIS\_SFRY--Newly independent states separated from the Socialist Federal Republic of Yugoslavia

Source: compiled by the author based on Health Systems Resource Guide (2006)

The CIT are mostly found in the middle and low income country groups. Among 30 CITs listed in Table I.2, 6 are LICs, 12 are LMICs, 11 are HMICs, and one is HIC (Slovenia). Do they share common challenges in health financing as other countries of similar economic level? We will answer this question by comparing CITs with other countries by income groups.

Regardless of their diversified economic, social, and cultural contexts, the CITs share quite common problems in their health system, most of which are issued from economic transition. Under the influence of the Former Soviet Union, they commonly had adapted a central planned health provision system --- Semashko Model (cf. Box I.3 for an introduction of Semashko Model). Under the communist regime, no market price was available. The allocation of health resources was realized in a bureaucratic way in function of a predetermined central plan. As the government had total control over national resources, it could easily mobilize resources toward the sectors in needs. Health sector was an integrated part of command economic system and principally financed out government budget.

The transition from central planned economy to market oriented economy brings two fundamental changes. First, market prices replace administrative commands and become the main indicator of resource allocation. Second, the private sector grows up quickly and absorbs an increasing part of national resources. Both changes weaken government's capacity to mobilize national resources. As health system was heavily relied on public resources, the most urgent question was then how to find alternative resources to make up the shortage of public financing meanwhile reserve equal access to basic health services. More than half of the CITs have implemented or are implementing the SHI system to adapt to market economy. The discussion in the following sections would help us to understand why SHI is an interesting alternative for them.

**BoxI.3 Soviet Public Health System – Semashko Model**

After World War II, many Eastern European and Asian countries established their health system following the Soviet Public Health System, or Semashko model, named after its creator. This health system has several distinct characteristics

- State monopoly. The system put emphasis on the centralized control of the state. The health spending is included into the national social and economic development plans. The distribution of resources occurred mainly in a direct, physical form, allocated by bureaucratic decisions regarding input quotas, material allocations and staffing quotas.
- Bureaucratic centralization. All health care personnel became employees of the centralized state, which paid salaries and provided supplies to all medical institutions. Decisions regarding personnel and resources devoted to health are done in a hierarchical way. The emphasis of health investment was put on the control of infectious disease and the delivery of health care on the workplace.
- Free access to basic public health services. Population benefited from a relatively comprehensive and effective system of basic public health services.

The Semashko system is guided by the national conception of public health which led to extensive epidemiological monitoring networks, a focus on “sanitary” medicine and the institution of systematic checks on the health of children and workers. The focus on infectious diseases led not only to extensive preventive measures but also to the creation of an enormous bed capacity which allowed for the isolation of infectious cases. However, the epidemiological shift of the 1960s saw the government unprepared psychologically and lacking adequate infrastructure to respond.

The Soviet system, in spite of a number of flaws, represented a very real achievement. It succeeded in conquering communicable diseases; it made comprehensive health care services available to a huge population, parts of which lived in sparsely populated areas; it provided a basis for community health activities including mandatory immunization and periodic health checks; and it fostered a generation committed to solidarity in health care provision.

Source: adapted by the author from Tragakes and Lessof (2003) and Kornai and Eggleston (2001)

Health financing system is composed of three functions: the collection, the pooling and the re-allocation of funds. The following parts of this chapter will be organized in accordance with



these three functions. Section 2 studies the availability of health resources across the different countries. A country's economic development level directly decides the availability of resources. A low-income country which is in shortage of resources in absolute term will not be able to answer all the health needs of its people, whatever the health financing pattern is. Our analysis will therefore begin by a cross-country comparison on the availability of health resources among the countries with different income levels. The objective is to identify the economic constraints that the countries at different development levels need to take into account when we discuss the organization of their health system. At the end of the section, the situation of CITs will be compared with the rest of the world. The objective is to see whether the endowment of CITs is different from other countries at similar economic development level.

Health resources are rare. That is why it is important to organize resource allocation in an efficient way. In Section 3, we address this question through two concrete subjects: provider payment and referral system. The discussion will begin with a review of literature on the advantages and difficulties in implementing prospective provider payment and referral system. Then a bivariate statistical analysis will be conducted based on 141 World Bank member states. Comparisons will be carried out inter- and intra-income groups to identify the correlation between health inputs, outcomes, and economic development level. Third, two groups of countries will be discussed in more details: the OECD countries and the CITs. For OECD countries, health inputs and outcomes will be compared among three health financing systems: National Health System (NHS), Social Health Insurance (SHI) and Private Health Insurance System (PHI). Then the transition of health financing system in the CITs will be addressed. And SHI system will be compared with NHS among the CITs to highlight the conditions for the implementation of SHI.

CIT countries had constructed national health system (NHS) under the period of command economy. Many countries realized universal coverage with NHS. The transition from SHI to NHS poses the question whether SHI would be as effective as NHS in realizing universal coverage. Section 4 discusses the difficulties of obtaining universal coverage with SHI system. The design of health protection system should consider the questions of who to cover (coverage of population), for what (coverage of services), and for how much (coverage of spending). The dilemma rises when resources are insufficient to answer needs. The challenges in the realization of universal coverage through the extension of SHI will be discussed in more details.

## **II. The availability of resources for health sector**

A country can finance its health system by both domestic and external resources. Domestic sources mainly consist of the wealth of individuals/families/employees and the profits of employers/corporate entities. External sources include the donation or loan of foreign NGO, companies and governments (Diagram I.1, Chapter 1).

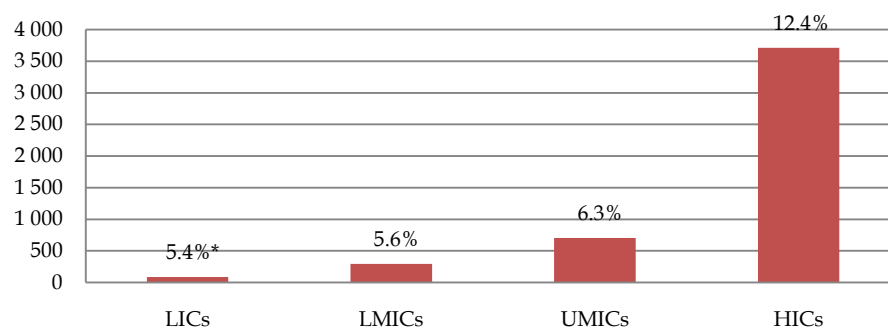
To what extent one country is capable to answer the needs of their health sector depends on three factors: economic development level, disease burdens, and the priority that public and private agents give to health sector. The first factor decides the potential availability of resources for health; the second reflects the needs for medical resources, and the third decides how well these needs will be eventually answered.

The indicators of the structure of health financing include per capita health spending in PPP international dollar (THS p.c.), the share of total health spending in gross domestic products (THS/GDP), the share of government spending in total health spending (PHS/THS), and the share of out-of-pocket payments in the total health spending (OOPs/THS) (Filmer et al., 1998). THS p.c. and THS/GDP are two ways to measure health spending level. THS p.c. shows the absolute overall level of consumption of health goods and services by the population. It can be used to compare health spending across the countries of different income groups. THS/GDP is a relative index which shows the share of national income devoted to health care without any information on the absolute magnitude of these resources. This indicator allows to comparing health financial efforts of each country whatever their income scale. PHS/THS shows government's control over health resources. A larger share of public spending indicates a higher decision power of the government on the allocation of health resources. Finally, OOP/THS reveals the proportion of direct payment in total health spending. As discussed in the previous chapter, OOPs condition patient's medical consumption on his capacity to pay. It does not allow risk-sharing and financial assistance based on social solidarity. This kind of health financing is particularly disadvantageous for the poor. A high share of OOPs in total health spending therefore implies, at certain extent, highly unequal distribution of health financing burden across the country.

## 2.1. Unequal distribution of health resources at global scale

The disparity of health spending is tremendous across different income groups. The high income countries spent considerably more on health than the low income countries. According to the data of World Bank (World Development Indicator, 2006), in 2005, the average health spending per capita, after having adjusted by international exchange rate, is \$27 for low income countries (LICs), \$86 for low-middle income countries (LMICs), \$373 for upper-middle income countries (UMICs), contrasting to \$3886 for high income countries (HICs). The spending gaps between the HICs and low- and middle-income countries range from 10 times to 144 times. Even among the low- and middle-income countries, the difference is also remarkable. The health spending per capita of upper middle income countries is 4 times higher than that of the lower-middle income countries and 14 times higher than that of the low income countries. This great disparity shows substantial differences in the budget constraints faced by these countries.

**Figure I.2** Health expenditure per capita by income group in 2005 (PPP int. \$)

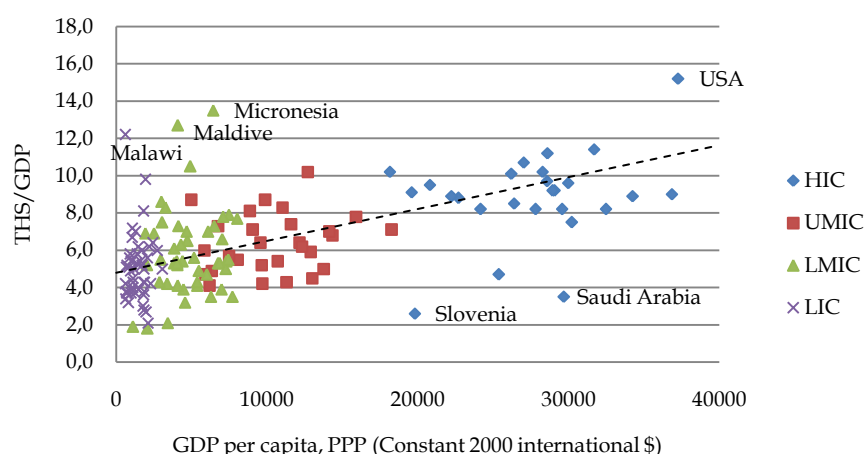


\* Share of health expenditure in GDP

Data source: World Health Statistics 2008 - Global Health Indicator, WHO.

The health spending of the higher income countries is not only high in absolute term but also in relative term compared to their income. On average, in 2005, the middle- and low-income countries spend 5 to 6 percent of GDP on health, while the HICs spend more than 12 percent (Figure I.2). Figure I.3 displays a positive correlation between GDP health spending ratio and GDP per capita. This observation conforms to the study of Poullier et al.(2002) which, by doing a simple regression in logs of health expenditure on income, found an elasticity of 1.2 for the health spending comparing to the income. Concretely it means a 1 percent difference between countries in income is associated with a 1.2 percent difference in health spending. The increase of medical consumption is therefore quicker than that of the income.

**Figure I.3** The share of health spending in GDP by GDP per capita and by income groups in 2005



Note: Dash line is the regression line.

The bivariate regression equation is  $\text{THS/GDP} = 0.0001\text{GDP p.c.} + 5.0729$  with  $R^2 = 0.2678$

Data source : data of health expenditure come from World Health Statistics 2008 - Global Health Indicator, WHO. Data of GDP come from World Development Indicator (WDI) 2007, World Bank

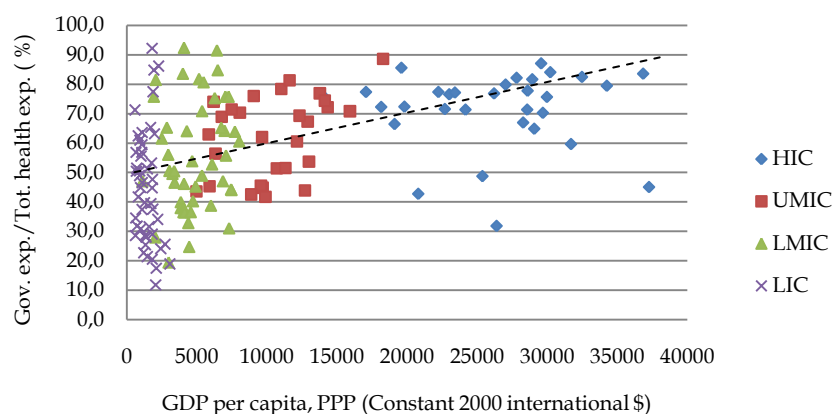
The skewed distribution of health spending indicates that economic development level is an essential determinant of health spending. The data, nevertheless, also suggest the existence of non-economic determinants on health spending. Regardless of the general ascending trend of health spending across income groups, the outliers which violate the assumption on the correlation between health spending efforts and income level can be found in all kinds of income groups (Figure I.3). Malawi, for example, is a low income country, but spends 12 percent of its GDP on health; while Slovenia, a high income country, uses less than 3 percent of its GDP on health. Among the HICs, the lowest health spending ratio is found in non-OCED countries. Many of these countries gathered their wealth thanks to the exportation of nature resources, especially the petrol. The economic growth in these countries is not associated with the same level of social development as that could be observed in the industrialized OCED countries. This answers why regardless of the abundance of their national wealth, their health spending ratio is even lower than most of the low-and middle-income countries. These observations indicate that a country's health spending mode is not only an economic issue, but also a social, cultural, and political issue. It is therefore essential to take the country's context into account in the design of health system.

As discussed in Chapter 1, market allocation cannot automatically attain all social objectives. Government intervention is then required to defend social justice and promote the equal access to

medical services. To what extent the government can ensure a public health system which provide adequate basic public and personal health services, protect the poor, and facilitate risk pooling depends above all on the quantity of resources controlled by the public sector.

As illustrated in Figure I.4, the lower income countries, in general, also have lower share of public spending in total health expenditure. In 2005, public spending on average accounted for 60 percent of total health expenditure in the HICs, 53 percent in the UMICs, 45 percent in the LMICs, and only 26 percent in the LICs (World Health Statistic, 2008). This descending trend indicates that the governments of lower income countries would have more difficulties in mobilizing health resources to pursue social objectives of their health system. The average share of public health spending in the middle-income countries, nevertheless, is close to that of the high-income countries. This implies that the governments tend to play a more important role in health system when economic conditions are improved.

**Figure I.4** The share of government expenditure in total health spending (in 2005)



Note: Dash line is the regression line.

The estimated regression equation is  $PHS/THS = 0.0009 \text{ GDP p.c.} + 48.059$  with  $R^2 = 0.21$

Data source : data of government expenditure in total health spending come from World Health Statistics 2008 - Global Health Indicator, WHO. Data of GDP come from WDI 2007, World Bank

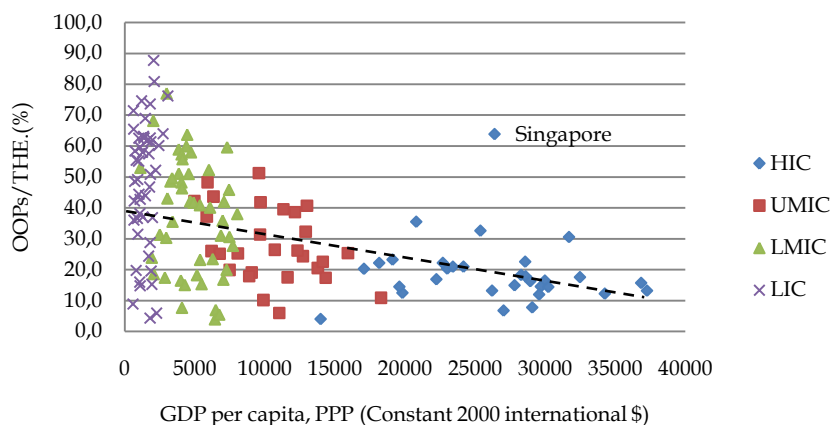
Comparing the percentage of public spending in total health spending within each income group, it can be noticed that the variation of this indicator is higher in the lower income groups. The standard deviation of public spending share is 13 for HICs, 14 for UMICs, 18 for LMICs, and 19 for LICs. Numerous countries in middle- and low-income groups are found holding similar public spending share as that of the HICs. The interpretation of this phenomenon, nevertheless, requires more reflections. As mentioned at the beginning of this section, a higher share of public spending in total health expenditure indicates a stronger control of the government on resources allocation. This is a double-edged sword, because the effectiveness of resource allocation in maximizing social benefits and promoting equal access to essential medical services will depend on the commitment and capacity of the government. If the government defends public interests, especially that of the most vulnerable, and has the capacity to allocate the resources in an efficient way, the government's control over the resource allocation can lead to the extension of financial protection and the equalization of the access to medical services. If, in contrast, the government fails to identify the most efficient strategies for resource allocation or privilege the interests of the

better-off, the public control over the health resource will enlarge the inequality in the access to health services.

The effectiveness of public spending in the middle- and low- income countries has been investigated in numerous studies (Filmer and Pritchett, 1997; Filmer, Hammer, and Pritchett, 1999; Filmer 2004; EQUITAP, 2005; Gwatkin et al., 2005). EQUITAP (2005) studied public health spending in 11 Asian countries and concluded that these spending are more often pro-rich than otherwise. The study of Filmer and Pritchett (1997) mentioned that the linkage between public spending and the progress of health outcome is absent in most of the middle- and low-income countries. Gwatkin et al., (2005) investigated the inequality in the access to public health services inside of 56 middle- and low- income countries. They found that the rich 20 percent use more often medical services than the poor. If public spending implies transferring health financial sources from the poor to the rich, a higher share of public spending will not be a beneficial for the poor (Ferranti, 1985). These studies suggest that it is more urgent to ameliorate the effectiveness of public spending than purely increase public resource.

The shortage of public spending relative to total demand for health spending can be made up by the private sector in two ways: either in form of the prepayment (for example, the premium for private health insurance) or in form of direct payment (typically, the out-of-pocket purchase at the moment of consumption). The former permits a certain level of risk sharing and consequently increases the individual's capacity to deal with health financial risks. However, in practice, the private insurance has only limited development in the world relative to out-of-pocket purchase. Among the 183 countries cited in the WHO data 2008, only 20 countries use the private insurance as the main form of private payment<sup>2</sup>.

**Figure I.5** Share of out-of-pocket spending in total health expenditure (in 2005)



Note: Dash line is the regression line. The estimated regression equation is  $OOP/THE = -0.001GDP + 44.04$  with  $R^2=0.25$

Data source : data of OOPs in total health spending come from World Health Statistics 2008 – Global Health Indicator, WHO. Data of GDP come from WDI 2007, World Bank

<sup>2</sup> We consider private insurance as the main form of private payment when its share in total private health spending exceeds 50 percent.

OOPs, as a major form of direct payment, are criticized by conditioning the access to health services on patients' capacity to pay and do not permit any financial risk sharing among a group of people. It results in unequal distribution of health financial burden across the population and disfavors particularly the poor and the sick (WHO, 2010). The share of OOPs in the total health spending (OOPs/THS) indicates the extent to which the individuals are exposed to health spending risk. Lower income countries are found relying more on OOPs. In 2005, the share of OOPs in the total health spending is on average 29 percent for HICs, 36 percent for UMICs, 48 percent for LMICs, and 55 percent for LICs (Figure I.5).

Singapore is the only HIC of which OOPs spending share exceeds half of total health spending. It is because Singapore has the tradition to construct protection system on personal saving. The medical saving account (MSA) is compulsory for all the citizens. On the other hand, public health provision ensures the quality and price of medical services. Although this system does not allow funds transfer across the population, it permits the individual to smooth health spending over time. A health financial assistant system and an insurance fund for catastrophic health spending are equally available to cover the low income population and high health risk. In addition, Singapore is a country with small income gap. This avoids the system to induce great inequality in the access to medical services (Eiff et al., 2002).

To sum up, great disparity in terms of the availability of health resource can be found among the countries with different income levels. The lower income countries have much restrictive budget constraints on health spending than the richer countries. Nonetheless, there are also evidences that the choice of health system can go beyond economic constraints. This, nevertheless, should base on a country's cultural and institutional background.

Concerning the structure of health spending, lower income countries are often associated with a lower share of public spending. Public health spending is expected to increase the effectiveness of health spending and equalize the access to health services across the population. However, in practice, the contrary is observed. Public health spending is often found to be pro-rich. The observed low public health spending share therefore could be due to the lack of public resource or the resistance of mass population to transfer service purchasing power to the government.

## **2.2. Needs for medical spending across the income groups**

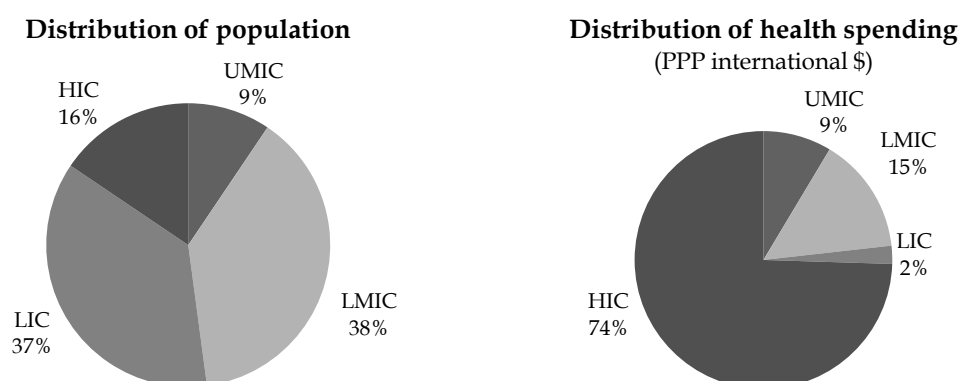
Factors which influence the disease burden of a country include demographic elements, such as the size, the growth rate, and the structure of population, and epidemiological patterns, like the main cause of death or the main disease burden (communicable or non-communicable diseases). Larger population, higher share of aged people in the population, and the transition from communicable diseases to non-communicable ones bring higher demand for medical spending.

### **2.2.1. Demographic elements**

The inequality of health resources distribution in the world is striking when the population is taken into account. Other things equal, larger population has higher demand for health resources. However, in reality, health resource is heavily skewed to the HICs where the population is

relatively smaller than that in the middle- and low-income countries. In 2005, HICs hold only 16 percent of world population, but consume 74 percent of world health resources, while the LICs who have 37 percent of world population use only 2 percent of world health resource. The LMICs hold about the same share of world population as the LICs but consume 15 percent of health resources, five times more than the LICs. Nevertheless, the proportion of health resources that the LMICs consume remains largely below the proportion of their population in the world. For the case of the UMICs, the share of their consumption in global health resources seems correspond to the share of their population in the world, 9 percent vs. 9 percent (Figure I.6).

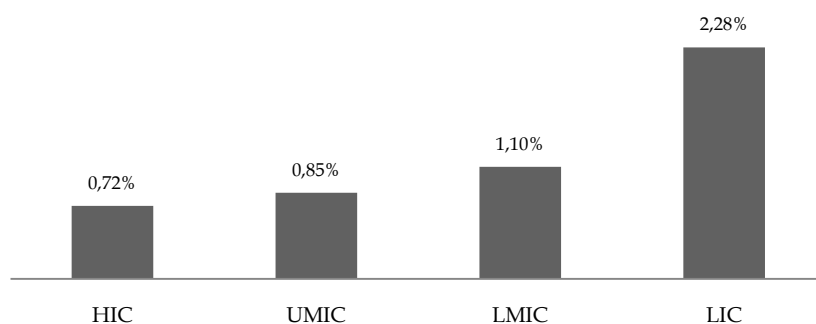
**Figure I.6** Distribution of world population vs. distribution of health resources by income groups in 2005



Data source : data of government expenditure in total health spending come from World Health Statistics 2008 - Global Health Indicator, WHO. Data of GDP come from WDI 2007, World Bank

The growth rate of population indicates the future health burden. As illustrated in Figure I.7, the population grows quicker in the lower income countries than in the higher income countries. The biggest difference can be observed between the LICs and the rest of the world, 2.28 percent for the former against about 1 percent for the rest. The population growth rate in the MICs is close to that of the HICs. It suggests that economic growth is associated with a decrease of population growth rate.

**Figure I.7** Growth rate of population by income group (in 2005)

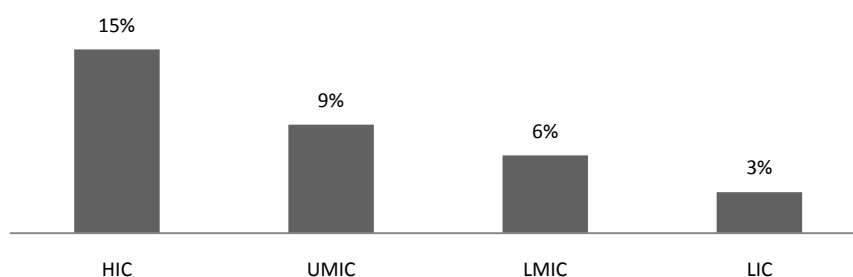


Data source : WDI 2007, World Bank

People at different stage of life do not face the same health risks. In the young age, people are more vulnerable to the infectious diseases, like measles, diabetes, influenza, etc. During the

working age, they may face risks in relationship with work, like accidents and injuries. In the old age, they generally face more threats from the chronic diseases, like cancer, cardiovascular diseases, arthritis, hypertension, Alzheimer's disease, etc. A higher percentage of aged population reflects a higher demand for chronic curative healthcare.

**Figure I.8** Percentage of population aged more than 65, by income group (in 2005)



Data source : WDI 2007, World Bank

The amelioration of economic condition seems contribute to longevity. According to Figure I.8, the share of population aged more than 65 increases with income classes. This is because the economic development is often associated with better education, ameliorated sanitary conditions, and/or more access to basic medical services. These changes promote good health and longevity. On the other hand, they also imply the transition of disease patterns.

### 2.2.2. Epidemiological transition

A country's epidemiological pattern gives a concrete idea about the types and the costs of medical services required. The report of WHO (2008) presented WHO's estimation on the actual diseases patterns in the world as well as its evolution in the future 30 years. In absolute terms, larger population corresponds to higher incidence of death. The shares of the population hold in the high-, middle- and low-income countries are 16 percent, 47 percent, and 37 percent respectively, while the shares of incidences of deaths in each income group are separately 13 percent, 40 percent and 45 percent. The deaths in low income countries, nevertheless, represent a higher share in the world than its population does, which refer to a more urgent needs for health investment than other income countries.

The costs of medical treatments vary in function of diseases. In general, the transmissible diseases which are caused by bad living conditions, like the TB, malaria, or by bad knowledge of healthy behaviors, like HIV/AIDS, can be considerably reduced by applying effective preventive measures. Preventive measures not only are cheaper than curative care, but also can produce positive externality in the sense that it avoids the diffusion of communicable diseases. The non-communicable diseases, on the contrary, are more expensive to treat and ask for more complicated technical supports. In addition, they generally concern to personal health, and thus have marginal externality. Therefore, in general, the unit cost of treatment for non-communicable diseases is much higher than that for communicable diseases.

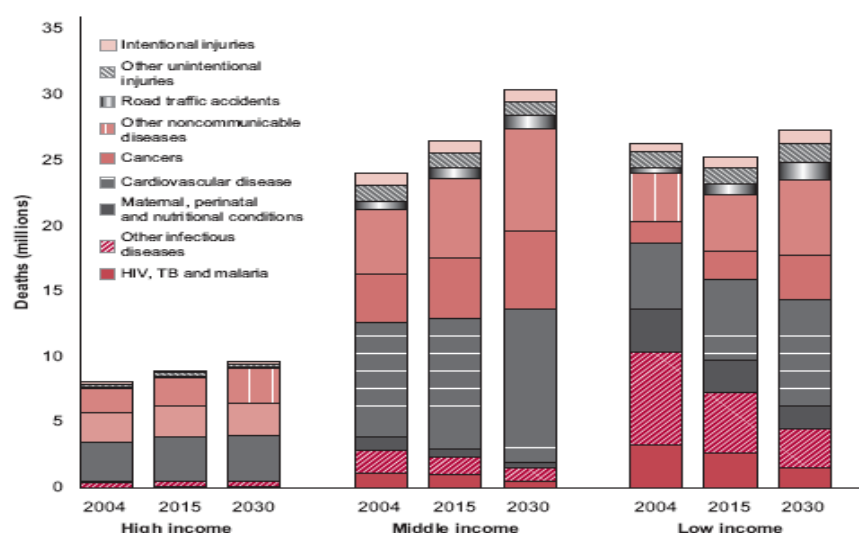
Epidemiological transition is closely linked to social-economic development. Phillips (1994) for example proposed a model which contains three stages in function of society development: 1)



the age of pestilence and famine; 2) the age of receding pandemics; and 3) the age of degenerative and human induced diseases. The first two gave way to the last one in the early era of the twenty century. "These three stages were thought to be sequential and to occur concomitant with the developments of medical science and improved living conditions which accompanied industrial modernization" (Philips, 1994, page vii). The globalization brings additional challenges to health transition. Many emerging countries suffer at the same time the mortality and morbidity caused by infectious diseases, so-called "the diseases of poverty", and chronic diseases, so-called "the diseases of affluence" (Cook and Dummer, 2004).

Given the influence of economic development on epidemiological transition, WHO (2008) estimated diseases patterns by income groups (Figure I.9). The essential threats faced by the HICs are non-communicable diseases linking to the aging of population. In 2004, three most important causes for death in the HICs were the cancer, cardiovascular diseases, and other non-communicable diseases. The transmissible diseases were almost eradicated. Natal conditions for mothers and children were good enough to guarantee a high survival rate. Other infectious diseases might exist, but were strictly controlled and caused only a very small part of deaths. WHO predicts a similar disease pattern for the HICs in the next 30 years.

**Figure I.9** Projected death by cause for high-, middle-, and low-income countries



Source: The report of "World Health Statistics 2008", World Health Organization, pp. 29  
[http://www.who.int/whosis/whostat/EN\\_WHS08\\_Full.pdf](http://www.who.int/whosis/whostat/EN_WHS08_Full.pdf)

The disease pattern of middle-income countries is moving toward that of the high-income countries. The non-communicable disease is becoming the main causes of death. The infectious diseases have small but still non-negligible effects. Some countries, like Namibia, South Africa, and Bosnia, are largely infected by the HIV/AIDS diseases, which declines their life expectancy far below the average level of other countries with similar income. Given the economic growth of this group, WHO predicted that the deaths caused by the infectious diseases would continue to decrease, but the non-communicable diseases would expand quickly and offset the reduction of death due to infectious disease. Therefore, in general, the number of deaths was expected to continue increasing in the next 30 years.

The low-income countries are still seriously threatened by transmissible diseases. In 2004, for instance, more than half of the deaths in the LICs are caused by infectious diseases and bad birth conditions. As most of the serious chronic and non-communicable diseases are activated at the old age, the relatively short longevity of the people in the LICs may not give enough time space for the development of non-communicable diseases. The incidence of non-communicable diseases is therefore lower in the LICs than in other countries. Nevertheless, with the amelioration of living condition, life expectancy in the LICs will extend which would leave more development space for non-communicable diseases. WHO, for example, predicted a decline of total deaths on 2015 for low-income countries thanks for the decline of the infectious diseases. However this progress would be traded off by the increase of non-communicable diseases in 2030.

Melslé and Vallin (2007) pointed out that epidemiological transition alone is not sufficient to predict the disease burden in the future. It is necessary to take the society's reaction into consideration. In another word, how the society answers health problems will also influence the evolution of future disease pattern. This interaction is described by the concept of "Health transition". The authors highlighted that the evolution of health status will follow successive cycles of divergences/convergences induced by the appearance and generalization of major breakthroughs in health technologies and strategies. Therefore, in the long term, the evolution of health status contains non-negligible uncertainties.

To sum up, the distribution of health resources in the world does not correspond to the demands and the needs of the population. The HICs which hold 16 percent of world population and 13 percent of world death consume 74 percent of world health resources (measured in PPP international dollar), while the LICs which hold 37 percent of world population and 43 percent of world death consume only 2 percent of world health resources. The MICs, nevertheless, show the evidences that this inequality can be reduced with the economic growth.

The world population is experiencing an aging procedure. Correspondingly, the diseases pattern shifts from the communicable to non-communicable ones. According to the estimation of the WHO, the epidemiological transition will not significantly change the incidence of death in the coming 30 years, but the cost of medical treatment per unit does. In another word, there will be a generally ascending trend of medical costs issued from the transition of diseases pattern, even if the resources were used in an efficient way.

### **2.3. Competition of health sector with others sectors for resources**

The eventual investment in health sector depends not only on the demands but also on the willingness to invest in the sector. Regardless of the universal recognition of the importance of health to human life, people with different social-economic statues (SES) or countries at different development levels have different priorities to the use of their resources. The individuals who are still under the threat of hungry or shelter, for instance, will not privilege the problem of health before the survival problems being resolved. The countries which are facing the great challenges of development and poverty may prefer to use the rare resources in the productive sectors rather than health sector, because the former increases directly national wealth which allows the country to answer the primary needs of its people and creates the possibility to invest in health sector in the future.

If the ultimate objective of health investment is to ameliorate health status, there is then another challenge. Many factors which influence health outcome are lying outside of health system. Curtis (1988) for example found that hygiene behaviors of women in Malange were affected by elements in the domains of economy (such as income and living standard), politics (on employment, education, and local development), culture, climate, and demography. Deaton (2003) explored the theoretical basis and empirical evidence for a connection between inequality and health. He concluded that income inequality, even if is not a direct determinant of health per se, could be closely correlated with many social-economic factors which affect health, such as education, wealth, control, or rank. This is true in both developed and developing countries. Banister and Zhang (2005) found that factors such economic development, government opening policy, rate of illiteracy had significantly contributed to the decrease of mortality in China since 1981. Balia and Jones (2007) found that British premature mortality was influenced by life style and social-economic status of the individual. These studies proved the importance to develop the society in general rather than solely focus on health sector to improve health. This argument on the other hand encourages government to privilege the investments in education or economy to those in health sector.

If health spending is financed out of public general budget, health sector needs to compete with other sectors for limited public resources. The poorer is the country, the more sever this competition would be. First, the resources are rarer in absolute terms in the poorer countries than in the richer ones. Second, the poor countries have generally higher demand for economic investment due to the lack of infrastructure and the growth of market. This leaves even less resources in the domain of social welfare. Third, in the poor countries, other needs concerning the welfare of people are also urgent, such as the education and the protection against unemployment. In addition it is widely proved in the literature that the promotion of education will contribute to health progress (Smith, 1999; Adamsa et al., 2003; Boyle et al., 2006). It means that health sector needs not only to compete with productive sectors but also with other social sectors. According to the data of WHO, in 2005, the share of general government expenditure on health in the total government expenditure is 5.2 percent for LICs, 6.2 percent for LMICs and UMICs, and 13 percent for HICs.

#### **2.4. Challenges faced by countries in transition (CIT)**

CITs are generally found in the low- and middle-income countries. 23 out of 30 CITs countries in the list of table I.2 are middle income countries. The population of the CITs accounts for 60 percent of the population of the LMICs, 40 percent of the UMICs, and 29 percent of the whole world.

The proportion of population aged over 65 is higher in CITs relative to the average of corresponding income groups, which reveals a higher potential disease burden. Health spending per capita in the CITs is equally higher than the average of income group. However, the share of health spending in GDP of the CITs is close to the average of income group, which means the higher health spending observed in CITs comes rather from a higher GDP they have relative to income group average than from a higher health spending efforts (Table I.3). The governments of poorer CITs give lower priority of public investment to health. The share of public spending on health in total government spending of CITs is slightly lower than the group average of the LICs and the LMICs but higher than the group average of the UMICs.

Inside of each income group, the CITs' government, regardless of their historical predominant influence over resources allocation, does not always show a higher control on health resources relative to the average of corresponding income groups. The low public control seems results from high economic constraints. In the LICs and LMICs groups, the CITs' government hold lower share in total health spending than the group average, while in the UMIC they have a higher share than the average.

Given CITs' historical communist regime, the low share of government health spending might be the result of the shortage of public financing. The CITs are shifting from the command economy to market economy. Under the command economy, health provision was entirely carried out by public agents and financed out of government budget. Economic transition quickly drove financial resources from public sector to private sector. However, many social institutions, including health facilities, remain in the hand of the government. The decline of public financing directly results in the financial hardship of public health institutions, which in return leads to the deterioration of the quality of public health services in the CITs (Figueras et al., 2004).

**Table I.3** Availability of health resources in CIT versus world general levels, by income groups (in 2005)

	Population ages 65 and above (percent of total)	Per capita total expenditure on health (PPP int. \$)	Total expenditure on health as percent of GDP	Per capita government expenditure on health (PPP int. \$)	General government expenditure on health as percent of total government expenditure	General government expenditure on health as percent of total expenditure on health
<b>CIT</b>						
LIC	4.4 (1.1)	127 (58)	5.2 (1.1)	44 (27)	7.0 (2.5)	37.7 (21.2)
LMIC	11.8 (3.9)	437 (194)	6.5 (1.8)	244 (148)	9.6 (4.4)	50.44 (19.00)
UMIC	14.9 (1.8)	938 (300)	6.1 (1.2)	692 (285)	12.0 (1.6)	72.1 (8,55)
<b>Global</b>						
LIC	3.4 (0.98)	76 (46)	5.2 (2.15)	36 (31)	9.3 (6.25)	45,4 (20,71)
LMIC	6.5 (3.74)	328 (196)	6.2 (2.76)	197 (152)	10.3 (4.1)	58,1 (19,55)
UMIC	9.0 (4.69)	706 (513)	6.2 (1.85)	459 (249)	11.3 (3.18)	64,4 (13,65)

Note: in the parentheses are the standard errors.

Data Source: World Health Statistics 2008 - Global Health Indicator, WHO and WDI 2007, World Bank

## 2.5. Concluding Remarks

.In this section, we discussed the availability of health resources for the countries at different development level. The distribution of medical resources is quite unequal across the world. Substantial difference in the availability of health resources can be observed between middle- and low-income countries and the HICs. The HICs' health spending per capita is on average 10 times

higher than UMICs, 45 times higher than LMICs, and 144 times higher than LICs. On the other hand, 92 percent of world deaths are found in the middle- and low- income countries. The tremendous difference in the availability of resources contrasting to disease burden indicates that the low- and middle- income countries could not set the same objectives for their health financing system as the HICs do. The truth is that, in the middle- and low-income countries, all the health needs could not be answered. The priorities need to be set.

Demands for health resources are increasing. It is true for all the countries whatever their economic development levels. People's sensibility to their health needs increases with the amelioration of economic conditions. Higher income countries spend also a larger share of their income on health. This observation indicates that the health needs are not constant. It evolves with people's social-economic conditions. There is, therefore, a potential ascending trend concerning the demands for health services. In addition, world population is aging. The disease pattern is shifting from the communicable ones to non-communicable ones. As the latter is more expensive to treat than the former, this transition will cause cost inflation on the supply of health services.

Comparing the share of regional population in global population with the share of health spending in global health spending, it can be noticed that it is the group of LICs which possess the least health resources. However, in terms of the incidence of deaths, it is the group of middle-income countries which face highest challenge. First, this group holds nearly half of the world population. High intensity of population implies high incident of diseases. Second, these countries are experiencing the transition of diseases pattern which results in an intrinsic rise of medical costs. Although it can be expected that investment in health augment with economic development, the increase of medical cost result from the transition of disease pattern will continue to increase the number of deaths in this region in the next 30 years. Third, these countries are in the full process of economic development which induces high demands for the investment in all kinds of social and economic sectors. It indicates a more violent competition for resources between health sector and other sectors.

The CITs are principally found in the group of middle income countries. Their health spending is above all conditioned by their economic development level. Public spending in CITs seems lower than the average level of the corresponding income groups. The gap between health spending needs and public health financing is made up by private spending. The decline of public financing for health implies a potential conflict between the public health provision and the private health finance. If public health facilities need to look for financial resources from the private sector, will they still be able to pursue public objectives? Otherwise, if public health facilities continue to getting finance from the government, how to ensure the efficiency of services provision given the huge budget constraints?

### **III. Efficient organization of health financing system**

The rarity of resources makes the efficiency issues especially important. Efficiency addresses the question how money can carry medical resources to their most efficient uses so that the maximal health outcomes could be obtained with minimal cost. This question can be further divided into two more concrete questions. First, whether financial methods give appropriate incentives to the patient-consumer and the service-provider so that necessary and only necessary

medical needs are to be answered? Second, when the resources is insufficient to answer all the demands, whether the priority of financing is given to the most cost-efficient services? The first question concerns the idea of efficient purchase of services; the second question discusses the rational use of health services. In this section, we will at first discuss these two aspects in a theoretical way, then take a global look at health financing systems in the world. Next, the health systems of the HICs will be discussed in more detail. At last, we highlight some problems of CITs' health system.

### **3.1. Efficient purchase of services - provider payment**

As mentioned in previous section, medical spending bears an intrinsic ascending pressure due to demographical and epidemiological transition. The aging of population and the shift of disease pattern from acute and communicable ones to chronic and non-communicable ones makes the rise of health spending an inevitable trend. However, there is another source of health cost inflation which is issued from the agency problem and thus represents irrational resources use (Smith et al., 1997). As discussed in Chapter 1, the agency problem in medical consumption is stemmed from the asymmetric information between the physician and the patient. Driven by personal interests, the physician tends to over-prescribe, which makes health consumption higher than necessary.

As the origins of agency problem is the asymmetric information and the divergence of interests between physicians and patients. As information is often difficult to collect and sometimes not available, especially when it concerns personal behaviors, a more practical way is to align physician's interests to that of the patient and thus encourage the physician to automatically behave in favor of the patient. This could be done by modifying provider payment.

According to the difference between the moment that medical services are consumed and the moment that the health service provider is funded, provider payment can be distinguished in two categories: retrospective and prospective payments (cf. Chapter 1). Retrospective payment occurs, as its name indicates, after medical consumption. A typical form of retrospective payment is fee-for-service. In this case, health service provider has major influence on the nature and quality of health services but faces little responsibility to financial consequences. Prospective payment, in contrast, pays the service provider in a contract approach which sets some prospective agreement between purchaser and provider regarding the terms and conditions of payments. This approach imposes some financial responsibilities to health service provider (cf. Chapter 1, section 4.2.2, also Oxley, 1995; Langenbrunner and Liu, 2005).

Different provider payments impose different economic incentives to the physician. A payment which is based on the duration of work rather than the results of the work will incite the physician to shirk. The study of Lewis et al. (1996), for example, investigates the efficiency of public health institution in Dominican Republic where the staff physicians are paid by salary, a duration-based payment, and the hospitals are reimbursed in a retrospective way. They found great inefficiency in the management of public hospital. The budget is 50 percent higher than the actual cost of services and the staff physicians' actual work accounts for only 12 percent of the contracted time. The authors argued that the origin of the problem was the inappropriate incentives faced by managers and providers - "no accountability for physician or nurse performance, no rewards for extraordinary efforts nor punishments for inadequate or nonexistent

performance, low and undifferentiated salaries, no management control over staff, no returns for effective or efficient management" (Lewis et al., 1996, pp. 604).

If the low efficiency of health services provision is due to the low connection between the incomes of health workers and the performance of their works, the solution then should be to base the provider payment on the performance. Eichler and Levine (2009) define performance-based incentives as "monetary payments or other material rewards that are provided on the condition that one or more indicators of performance change, that predetermined targets are met, or both." (Eichler and Levine, 2009, page 18)

The problem is that the choice of indicators for performance is not easy. First, the effectiveness of medical treatments depends on numerous elements which are out of the control of the physician. If the measurement of health outcome does not take these elements into consideration, it will discourage the physician to make efforts. For example, contracted physicians could be reluctant to work in the remote regions due to concerns that targets would be difficult to reach (Gauri, 2001). Second, the measurement of performance is possible only when the information is available. The absence of information can be due to the fact that there is no needed data, or physician's effect is unobservable, or the performance is not measurable. Even if the information were available, the collection of information would require for strong political and management supports as well as the existence of a sound informing and reporting system. Both, nonetheless, are demanding missions even for the developed countries (Eldridge and Palmer 2009). Third, there is danger that the choices of indicators for performance will disproportionately skew a provider's focus. Constrained by the measurability of the indicators, some factors of performance, such as the responsiveness of the hospitals, may not be included into the measure of performance. If the provider is exclusively driven by the performance indicator, this omission will cause them to ignore the aspects of quality which are not considered as indicator (Rai, 2001).

The main objective of provider payment is to control medical cost without discouraging health workers or degrading the quality of health services. Numerous factors may influence the medical cost of a target population, such as the size of population, diseases pattern, medical services most needed, or the cost of these services. Given the difficulties in fixing the precise and comprehensive criteria for performance, an alternative way is to fix the budget in function of one or several parameters and leave the health service provider to find out the best combination of medical treatments.

The problem, nevertheless, is that these provider payments are always associated with unexpected side-effects. The capitation, for example, fixed the price that the insurance pay per person, whatever the actual number of medical visits of the target population and the cost of these treatments are. The physician is then encouraged to reduce the incidence of the disease by promoting the use of preventive care. The side-effect is that, as the price is fixed per unit, the physician may sacrifice the quality of services for lower cost of treatment. It is therefore also important to set measures to control the quality of services by, for example, linking the continuity of the insurance contract to the performance of the physicians (Van Vliet, 2006; Iversen and Lurås, 2000). Another example is case payment. It fixes the cost by disease and leaves the hospital to choose the best combination of needed services. A most often mentioned example of case payment is the Diagnosis Related Grouping (DRG). With this payment, the hospital is not motivated to overuse the services. The side-effect, however, is that the hospital codes patients into

groups with a higher point value for more reimbursement (Gilman, 2000; Mikkola et al., 2002; Serdén et al., 2003; Johanna et al., 2010). Global budget gives the highest autonomy of management to health institutions. The problem is that the budget is always based on the historical records. Health institutions are then motivated to maintain the rise of the medical expenditure to enlarge the budget (Feldman and Lobo, 1997). (cf. Box I.4 for definitions of different provider payments).

**Box I.4** Provider payments (Definition)

- \* Fee-for-services (FFS): Health Care providers are reimbursed based on specific items provided. In broad terms, FFS also includes itemized charges for medical products and drugs.
- \* Capitation: The provider is paid a periodic fixed amount per insured person, and in return is responsible for the provision of a defined package of health services.
- \* Salary: payment is based on the time worked.
- \* Daily payment or per diem: Reimburse the institution providing inpatient services a fixed amount for each inpatient day regardless of the actual use of services, drugs and medical products.
- \* Case payment: Third party payers pay a fixed amount per case regardless of the actual types and quantities of services provided. An example of case payment is DRG (Diagnosis Related Grouping)
- \* Line budget: The provider is paid an amount per period (usually per year) for defined responsibilities of services provision; the total amount is broken down into several items, such as salaries, drugs, equipment maintenance and the like, and the regulations prohibits the managers from switching the funds among the line items, unless approval is provided by the funding agency. The amount is based on the historical budgets plus some inflation factors.
- \* Global budget: Providers are paid a fixed amount for a given period of time for providing specified services, and can make discretionary use of the budget
- \* Performance-related pay (PRP): It means that payment is directly linked to the performance of health care providers (specially used for the payment of individual practitioners)

Source: Liu 2003.

The side-effects of various supplier payments push researchers and policy-makers to look for non-economic incentives to complement economic ones. Moral education can modify people's value judgment and change the orientation of behaviors (Coughlin, 1990). In the years of 1960s and 1970s, the government of the communist countries had successfully motivated health professionals to work for the mass interests by putting great accent on the ideological indoctrination. The ideological campaign did cultivate a population which values professionalism and altruism. However, with growth of market, economic incentives put the ideological issues on question. The enlargement of income inequality finally turned value judgment from altruism to egoism (Figueras et al., 2004).

Other non-financial elements like professional opportunities, possibility for technical progress, recognition for the efforts of health workers, and geographic attachment may also



motivate health professions. Fort and Voltero (2004), for example, found that the antenatal and postpartum care performance of health providers in Armenia is strongly associated with having the practical knowledge and skills to use everyday tools of the trade and with receiving recognition for their work, as well as having performance feedback. Vujicic et al. (2004) investigate the motivation for migration of doctors in Samoa. They found that in addition to financial incentives, factors like long working hours, overburdened workloads, and a large number of family members living overseas are also important motivation for migration. WHO (2006) highlighted the importance of ameliorating working conditions and offering opportunities for continuing education, training and professional development in motivating health workers in the remote regions. All these experiments suggest government should combine non-financial motivation with financial ones to enforce health workers' accountability.

In the low- and middle-income countries, the good function of provider payment is conditioned on several factors. *First, the availability of a reliable information system.* Efficient provider payment asks for high technical supports and a well developed information system, which are often absent in the low- and middle-income countries. The investments in technology and information exclusively for health use are costly. The low- and middle-income countries may not be able or are reluctant to pay for them. However, with the development of internet and telecommunication, there is hope that communication technique in low- and middle-income countries catch up high income countries' level in a short time (Tan and Edejer, 2000; Rouvinen, 2006). The use of IT technologies may reduce the cost of information collection and facilitate the construction of information system in the low- and middle income countries.

*Second, sufficient negotiation power of the third-party payer on the medical service market.* It is largely depended on the funds that are under the control of third-party payer. As discussed in the Section 2, the governments of lower income countries spend smaller share of public budget on health. Due to the deficiency of public financial sources, only part of the population, medical services and/or health spending could be covered. The gap between demands and public supply of medical service would be filled up by private resources in a formal or informal way. The partial coverage of insurance schemes reduces the negotiation power of third-party payer vis-à-vis the service provider, because the latter can compensate the potential income losses from the contracted services by the gain from the non-contracted services. A too short list of DRG payment, for instance, will incite hospitals to divert the patient from lower quoted services to higher quoted services or from quoted services to no-quoted services (Ginsburg and Moon, 1984). The capitation, if covering only the primary services, will expedite the referral of patients to the unnecessary secondary and tertiary services, which consequently increases the total cost of medical treatment. If the contracted salary of the health professionals at public health institution is too low, the latter will increase the informal practices or ask for under-table payment to compensate the formal income (Gaal et al., 2006). To sum up, when the public financing is insufficient and health insurance package is not comprehensive, the provider payment may evoke unexpected side effects on the behaviors of the health services provider.

*Third, supplier and purchaser split.* In the low- and middle-income countries, more often than not, the government or SHI funds are at the same time the main purchaser and provider of health services (Jack, 2000; Leive and Xu, 2008). As discussed in Chapter 1, the coalition of purchaser and provider does not necessarily lead to inefficient health provision as long as patient-consumers arrive to make their voice heard. This is true when the consumers have the choices on their

insurers or their governments. The former asks for a well-developed market mechanism and the latter requires for a well-developed democratic regime. Both, however, are challenging tasks for the low- and middle-income countries (Gottret and Schieber, 2006). If, in contrast, the consumer has no counterpart control on the third-party payer, the coalition of purchaser and provider will put all the financial risks of medical consumption on the consumer side. This will induce over-prescription.

Compared to the state-funded financing system, SHI theoretically permits to separate the budget of insurance from that of government general budget. For a country which is predominated by public provision of medical services, this separation makes the provider and purchaser to bear independent financial pressure and rely more on the satisfaction of the patient. However, it is often observed in Asian countries' health insurance reforms that the SHI is initiated and found by the government (WHO, 2005; Obermann, et al., 2006; Lee et al, 2008;). Even if SHI funds are officially independent of the government's budget, the latter are the biggest stakeholder of SHIs. It means that the government has fundamental influence on the strategies of SHI schemes. In this case, whether will the public service purchaser still be efficient? This is the subject that we will discuss in more details in Part II for the case of China.

### **3.2. Rational use of services - develop referral system and enforce the quality of primary healthcare**

When the resource is insufficient, the rational use of available resources becomes crucial for the maximization of health outcomes. As mentioned previously, health services are heterogeneous. Some of them concern public health, others concern more personal health. Certain aim at reducing the potential health risks, certain aim at maintaining health status and others aim at restoring health damage issued from illness shocks. The rationalization of use of medical services addresses the question of the priorities of medical consumption.

According to the stage of sickness into which medical treatment intervenes, it can be classified as primary, secondary and tertiary care. Primary care is the first contact that the patient may have with a health professional, for example at clinic or with a general practitioner. The diagnostic is based principally on physician's professional knowledge, normally without the assistance of medical equipment. Secondary care is typically offered in a hospital setting by medical specialists. The diagnosis and treatment are performed by specialized equipment and laboratory facilities. Tertiary care is characterized by intensive care units, advanced diagnostic support services, and highly specialized personnel<sup>3</sup>.

The more the techniques associated with medical equipments is advanced, the more the treatment will be expensive. The cost of medical treatment increases dramatically when one passes from primary care to secondary care, and secondary to tertiary. In order to control medical expenditure, it is important to avoid the use of higher level services for the diseases that can be treated at lower level care (Mariñoso and Jelovac, 2003). That is why most of the developed countries construct a referral system to filter medical demands. Under this system, when

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<sup>3</sup> Cf. Online medical dictionary : <http://medical-dictionary.thefreedictionary.com/tertiary+health+care>

someone gets sick, he enters into the health service system by consulting at a clinic or to a general practitioner. The latter will make primary diagnosis and judge if it is necessary to refer the patient to the higher-level health institutions. The general practitioner plays the role of “gatekeeper” of health services system who “filters” the unnecessary medical consumption (Cervantes, et al., 2003).

Regardless of the obvious benefits of health referral system in reducing the cost of health treatment, this system is either absent or of bad function in the low- and middle-income countries (Atkinson et al., 1999; Murray and Pearson, 2006). One of the reasons is the unequal quality of medical treatments at different levels of health facilities. In the HICs, the qualification for general practitioners is as restrict as that for specialists. The differences of services at three levels of health institutions come mainly from associated technical supports and medical equipments. Higher level health facilities generally have more advanced equipments which permit them to diagnose more complicated diseases. In the low- and middle-income countries, in contrast, the hierarchical levels of health facilities are often considered as a reference for their quality. The primary health care refers to “primitive” rather than “primary” care. The low quality of primary health care facility can be perceived by the lack of equipment, medicines and qualified health workers (Akin et al., 1995; Jeffery and Jack, 2001)

Numerous studies proved that demands are responsive to the quality (Lavy et al., 1994; Mwabu et al., 1993; Gauthier and Wane, 2008). By investigating individuals’ bypassing behavior in the health sector in Chad, Gauthier and Wane (2008) found that when patient can afford medical services, they will bypass low-quality facilities for more expensive facilities in exchange of better quality of services. The studies of the World Bank also confirm that the underuse of the public health institutions is principally due to the poor quality of services (World Bank 1994 and 1997).

Due to the mistrust to the quality of services at first level health facilities, people in middle- and low-income countries are found often to by-pass the primary health centers when seeking health care, going straight to the hospital outpatient department, thus both overburdening the hospital and under-using the health centers (Barnum and Kutzin, 1993; Holdsworth et al., 1993).

The development of primary care is recognized as a crucial issue for health promotion in the low-and middle income countries. WHO chose primary health care as the core subject of its World Health Report in 2008 (WHO, 2008b). In this report, WHO called for additional efforts of both health professionals and politicians to promote the use of primary health care (PHC). It identifies PHC as an essential solution for today health problem and universal coverage of health security system as the method to obtain equal access to primary healthcare.

### **3.3. Bivariate analysis on the relationship between health inputs and outputs by income groups**

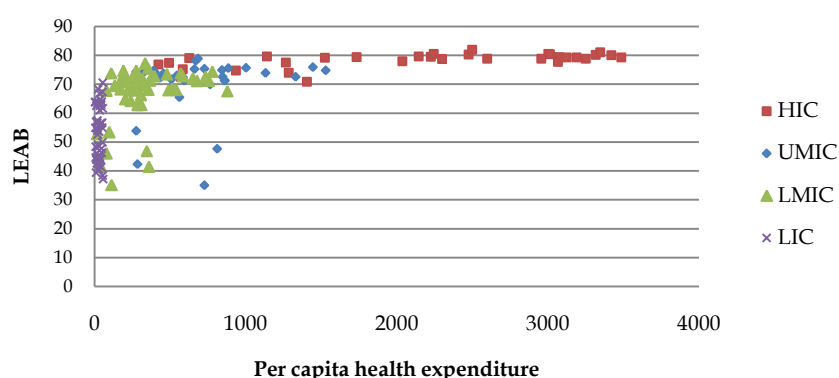
Here by looking at the simple correlation between health financial inputs and outcomes, we try to get more direct understanding on whether the amelioration of health status is closely related with spending in health sector. In the following discussions a bivariate analysis will be carried out across income groups as well as among the countries in the same income group to identify the relationship between health inputs, outcomes, and economic development. The data

come from World Bank’s online dataset – World Development Indicator (WDI) 2007. The main studied year is 2005.

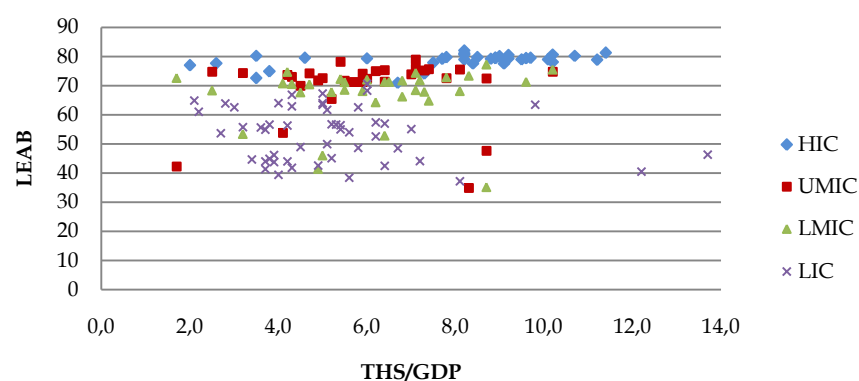
A country’s health status depends not only on the performance of health system, but also on other elements outside of the control of health sector. These elements are conditioned by the country’s economic development level. To examine the efficiency of health investment, it is necessary to take into account of the economic development level of the countries in comparison. The following discussion will therefore be conducted in function of the four income groups (i.e. HIC, UMIC, LMIC, and LIC).

A common used indicator of health outcome is the “Life Expectancy At Birth” (LEAB). Health inputs is measured in monetary terms by two indicators: Per capita health expenditure (in PPP international dollar) and health spending to GDP ratio. We use both indicators to see 1) the correlation between the availability of health resource and health outcome, and 2) once having controlled for economic scale, whether GDP health spending effort will change health outcome.

**Figure I.10a.** LEAB vs Per capita health expenditure in PPP int. \$ (in 2005)



**Figure I.10b** Relationship between life expectancy at birth (LEAB) and the share of THS in GDP (in 2005)



Data source : World Health Statistics 2008 – Global Health Indicator, WHO.

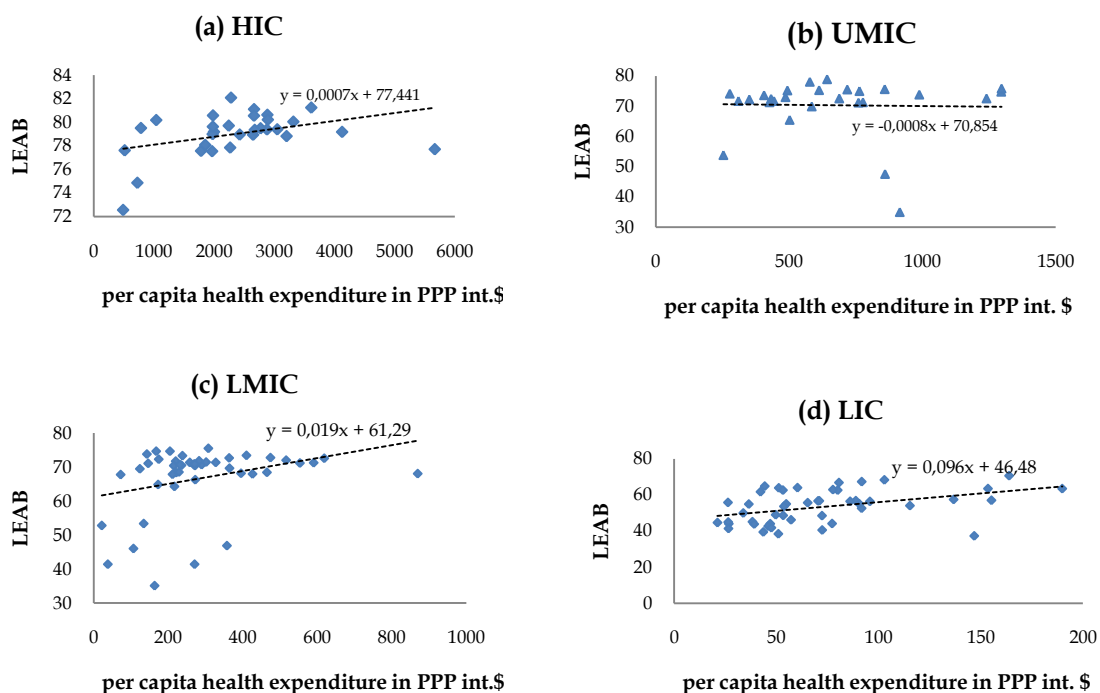
Economic development level is turned out to be an important factor of health. According to Figure I.10 a and b, higher income groups have generally higher life expectancy. The HICs have attained an average LEAB of about 80 years old. The average LEAB of middle income countries is

close to that of the HICs. However, there are several outliers in these groups which show particularly lower performance than other countries in the groups. They are the countries which suffer high epidemiological threats, especially HIV/AIDS. The LICs have significantly lower LEAB than the countries in other income groups. These countries are still suffering from the diseases caused by bad living condition and poor access to qualified basic health services (Poullier et al., 2002).

The biggest LEAB gap among countries with similar health expenditure is found in the LICs; and the greatest disparity of health expenditure with similar LEAB is found in the HICs (Figure I.10a). It indicates that in the LICs, the effectiveness and efficiency of health expenditure in prolonging life expectancy varies a lot from one country to another. Among the HICs, in contrast, life expectancy has attained such a level that additional health expenditure would not significantly prolong it any more. Nevertheless, health expenditure may still considerably change the quality of life.

GDP health spending efforts, measured by THS/GDP, varies considerably among the countries in same income group (Figure I.10b). There is no clear correlation between THS/GDP and LEAB inside of income group. Nevertheless, higher income countries seem spend higher share of income on health than lower income countries and have generally longer LEAB than lower income countries.

**Figure I.11** The per capita health spending in PPP int. \$ and Life Expectancy at Birth (LEAB), by income groups (in 2005)



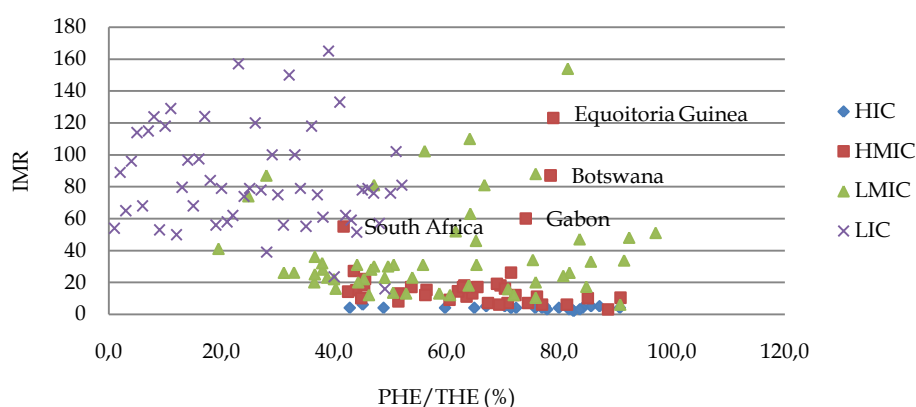
Data of per capita health expenditure are obtained by multiply THS/GDP with per capita GDP, in PPP int. \$  
Data source : WDI 2007, World Bank

Figure I.11 looks in more detail the correlation between LEAB and health spending. It can be noticed that the marginal effect of health spending on LEAB is higher in lower income groups.

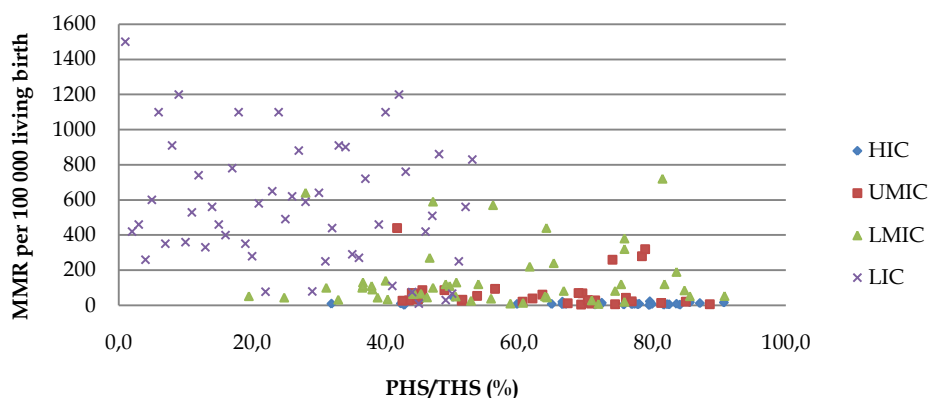
The regression line of UMIC group is drawn down by outliers and shows negative correlation between health spending and LEAB. However, we cannot conclude that health spending is inefficient in the UMICs, because the low LEAB of outlier countries are due to their particular epidemical problems.

Infant mortality rate (IMR) and Mather Mortality Rate (MMR) are also useful indicators for the effectiveness of government intervention, because these indicators are heavily influenced by the accessibility and the quality of basic health services. As in most of the low- and middle-income countries the basic health services are provided by the public sector, it allows us to estimate the effectiveness of public health spending (Filmer and Pritchett, 1997). Figure I.12a and b compare separately IMR and MMR and in function of the share of government health expenditure in total health expenditure. The two indicators showed quite similar pictures. The inter-group comparison suggests that both IMR and MMR are lower in higher income group. The most significant differences are found between LIC and the rest income groups, which indicate that IMR and MMR are closely linked to the poverty. It is, nevertheless, hard to distinguish whether this better performance of higher income countries is due to a significantly higher public health investment or a better performance of public spending.

**Figure I.12a** Infant mortality rate (per 1000 living births) in function of government expenditure in percent of total health expenditure (in 2005)



**Figure I.12b** Mother Mortality Rate (per 100 000 living births) in function of the share of government expenditure in total health spending (in 2005)



Data source : IMR come from WDI 2007, World Bank; PHE/THE is calculated by the author based on WDI 2007; MMR come from WHO et al. 2010.

More information on the effectiveness of public health spending is to be found through the intra-group comparison. It can be noticed that among the countries at similar economic development level, there is no significant correlation between government health spending and health outcome indicators (IMR and MMR). The interpretation of this observation needs to take into account of the context of each group. For the HICs, the infant mortality and mother mortality has already been reduced to a very low level. The remaining infant mortality can be considered as the residue which is related to the uncontrollable elements, such as medical accidents or the biological constraints which public services can do little about. For UMIC and LMIC groups, the observations are biased by several outliers, like South Africa, Botswana, and Gabon where the HIV/AIDS reduces seriously the quality of life, even at young age. For LICs, the most distinct character is that there is large heterogeneity in both health outcome and government spending efforts. On the one hand, countries with similar government spending ratio obtain strikingly different IMR and MMR outcome. For instance, for the countries of which the government expenditure accounts for about half of total health spending, the IMR varies from 53 to 165 per 1000 living births and the MMR varies from 350 to 1100 per 100 000 living births. On the other hand, the countries with similar health outcome may use quite different government spending efforts. For example, Nigeria and Mozambique both have an IMR of 100 per 1000 living births. However, the shares of government expenditure in total health spending in these two countries are 31 percent and 64 percent respectively. The four countries with MMR of 1100 per 100 000 living births (Uganda, Tanzania, Uzbekistan and VietNam), the share of government expenditure in total health spending varies from 29 percent to 68 percent. This great heterogeneity suggests that in the LICs, both the level and the efficiency of government spending are important factors for the amelioration of health for children and mother.

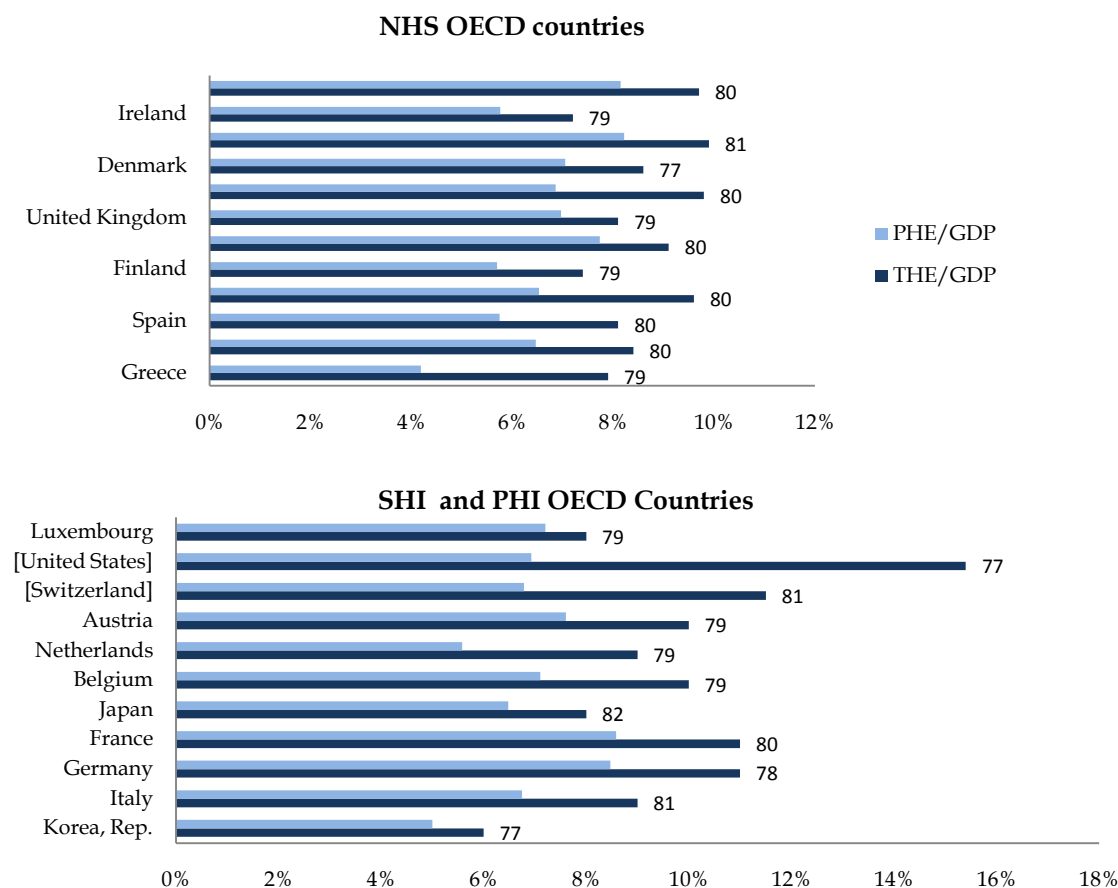
This conclusion confirms the study of Filmer and Pritchett (1997). The authors measured the impact of public spending on IMR in more detail and found that 95 percent of variation of IMR is explained by the factors not related to health sector policy. Meanwhile, cross-national differences in the efficacy of the public sector mean that public spending on health does not always translated into a larger supply of effective health services. The authors identified three factors which influence the efficacy of public spending: the cost effectiveness of public spending, the net impact of additional public supply, and public sector efficacy.

It is worthy to note that the accurate measurement of the efficiency of health system call for more complicated methods, such as Data Envelop Analysis (DEA) or stochastic frontier. A review of literature on these methods as well as examples of their application can be found in Dukhan (2010). Based on a sample of 103 low- and middle-income countries, Dukhan (2010) highlighted several points: 1) There are two kinds of inefficiencies: inefficiency in obtaining predetermined objectives and inefficiency in organizing inputs. They may not necessarily be found in the same country. That is why different political measures should be adapted to ameliorate efficiency in different countries. 2) Both the countries with relatively large health spending and with relatively small health spending could be efficient. 3) In the low- and middle-income countries, the correlation between public health spending and efficiency appears to be negative. This conclusion emphasizes the importance of ameliorate the efficiency of public spending rather than purely increasing the quantity of public spending. 4) Using health insurance as a major tool of health financing seems contribute to the increase of efficiency.

### 3.4. The financial efforts and health outcome among the HICs

The three health financial patterns typically used in the HICs are National Health System (NHS), Social Health Insurance (SHI), and Private Health Insurance (PHI). Figure I.13 compares the performance of these three systems among the 23 selected OECD countries, of which 12 are covered by the NHS, 9 countries are under the SHI, and 2 countries, the US and Switzerland, are under PHI system. The health outcome is measured by the LEAB.

**Figure I.13** Comparison of financial effort and health outcome among OECD countries in 2005



Note: the numbers at the end of the bars are the LEAB of each country.

The countries are arranged by their GDP per capita in an increasing order from bottom to top.

Countries in parentheses are covered by PHI.

Data sources: World Health Statistics 2008 – Global Health Indicator, WHO

**Table I.4** Statistical characters of health spending and health outcome of OECD countries

Country	Obs	THS/GDP		PHS/THS		OOPs/THS		LEAB (y)	
		Mean	s.e	Mean	s.e.	Mean	s.e.	Mean	s.e.
NHS	12	8.65%	0.0095	75.43%	0.1195	18.35%	0.0690	79.5 years	1.0
SHI	9	9%	0.0162	78%	0.0761	14%	0.0653	77.6 years	5.7

Data sources: World Health Statistics 2008 – Global Health Indicator, WHO

All the countries have attained a similarly high level of life expectancy with an average of 79 years old. With given LEAB, the variation of health spending shows above all the difference in the efficiency of health spending. The two public financing patterns, NHS and SHI, are widely used in the developed countries. Both have successfully extended health protection to the whole



population. By contrast, the two PHI countries, US and Switzerland, have not realized universal coverage.

Compared to the OECD countries that are covered by public health insurance, the two PHI countries show great inefficiency in their health financing system. They spend on average 13 percent of their GDP to obtain a health outcome which costs their OCED partners less than 9 percent of their GDPs.

The NHS countries and the SHI countries have quite similar health spending and health outcome. On average, health spending accounts for 8.6 percent of GDP for SHI countries and 9.1 percent of GDP for NHS countries. T-test shows that the mean difference of the two groups is not significant (p value is close to 0). The deviation of health spending is 0.009 and 0.016 for the two groups respectively, which show signs of a slightly higher heterogeneity in health spending among SHI countries than among NHS countries. The average LEAB is 80 for NHS countries and 78 for SHI countries.

At the beginning of this chapter, we mentioned that many CITs have replaced or are replacing NHS system with SHI. One of the arguments is that the latter can contribute to the split-up of public purchase and provision of health service, which will be favorable for the amelioration of health spending efficiency. The experience of OECD, however, showed that NHS countries in fact can control health cost as efficient as SHI countries. A key element that needs to be taken into account is the governance of the country. As discussed in Chapter 1, public institutions can solve market flaws by distributing resources in function of centrally decided plan. This, however, demand a high government commitment and institutional capacity. According to the estimation of World Bank's Worldwide Governance Indicator 1996-2008<sup>4</sup>, the average rank of government effectiveness of the OECD countries is 91 percent, against 63 percent in UMICs, 38 percent in LMICs, and 22 percent in LICs. The high effectiveness of the governments of OECD countries may in part explain the good performance of NHS.

There is no clear evidence on whether NHS represents more or less financial fairness than SHI systems. General taxes revenue is argued to be a more progressive financial source than the payroll tax, because the latter often imposes a cap on the taxable income and thus profits more the wealthier (Wagstaff, 2007). On the other hand, payroll tax is expected to form a more stable public health financial source because it exempts health sector from the competition for resources with other sectors (Gottret and Schieber, 2006). According to Table I.4, the SHI countries have indeed a smaller standard error in their public health spending (in percentage of GDP) than the NHS countries which implies a higher stability of resources.

Public financing is not necessarily associated with public health provision. Nevertheless, there is sign that in the countries with SHI system private participants are more often engaged in health provision. Among the 12 OCED countries with NHS, only Canada provides health services entirely by the private sector. Two other countries, Australia and New Zealand, have a public-private mixed health provision system. The rest NHS countries are dominated by public health provision. Among the 9 SHI countries, 6 out of 9 have public-private mixed health provision. Two

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<sup>4</sup> <http://info.worldbank.org/governance/wgi/index.asp>

countries, Republic of Korea and Netherlands, are dominated by the private provision. Only Italy constructed public health provision system (Besley et al., 1994; DiPiero, 2004).

To sum up, compared to the public health financing systems, the PHI systems appear to be much more expensive. This justifies the theoretical predictions in the previous sections that private health spending will increase the medical costs. Between NHS and SHI, there is no significant difference in health financing efforts or in health outcome. The NHS, nevertheless, shows a more control on public health service provision, while the SHI allows more flexible participation of private sector.

### **3.5. The challenges faced by the CITs in term of efficiency**

CITs are the low- and middle income countries which face most violent conflicts between central planning and market allocation. The analysis in the Section 2 showed that countries in transition face quite similar health resources constraints as other low- and middle-income countries. However, one distinct character of the CITs is that they all face the challenge of adapting the former public health system to market economy, including changing the role of government, re-constructing the financial relationship between the public and private sector, and maintaining health status albeit economic instability in the period of transition.

In Chapter 1, the dilemma between market allocation and government intervention has been discussed in a theoretical way. The difficulties are originated from the conflicts between economic efficiency and social justice, as well as the conflicts between self-interests and collective benefits. The importance of health to human life and the market failure issued from asymmetric information require the participation of government to defend social interests. However, administrative constraints (the effectiveness of the regulation and the governance, for instance), the difficulties in maintaining the accountability of the public system (the divergence of the interests between the decision maker and the decision taker), and the heterogeneity of individuals' preferences put the efficiency of public intervention on question. The failure of central planned economic in the CITs give good example on the difficulties in maintaining the equilibrium of resource allocation in an administrative way.

In this section, we investigate the actual health financial structure in the CITs by taking into account the historical characters of their health system. The idea is to clarify the problems faced by this group of countries and the role of SHI in the period of economic transition.

#### **3.5.1. Historical elements**

Under command economy, health resources are allocated in a central planning way. The efficiency of this health system depends on the government's capacity to correctly capture the national health needs. In the short period after World War II, the most important health threats in the former communist countries come from the infectious diseases which were mainly caused by bad living condition and poor health knowledge. The governments of the communist countries like China and Russia, put emphasis of health policy on the prevention of infectious diseases and the diffusion of basic health knowledge (Wen and Hays, 1976; Tragakes and Lessof, 2003). The mass population was widely involved into the supervision and prevention of diseases. This strategy successfully increased Russia's life expectancy from 43 years in 1938 to 64.3 years for

males and 73.4 for female in 1965, comparing to in France 59 years and in the United States over 63 years in 1938 and 67.5 and 66.8 for male, and 74.7 and 73.7 for female in 1965 (Tragakes and Lessof, 2003). Public health provision in the period of command economy did particular efforts to realize universal access to basic health services. According to the estimation of the United Nations Children's Fund (UNICEF), in the early 1980s the immunization rate in the Eastern European Communist Countries was the highest of all regions<sup>5</sup>.

However, a fundamental precondition of central planned system is the predominant control of government over national resources. In the end of 1980s, the European communist countries are encountered with the economic and political instabilities, which result in the collapse of Union of Republic Socialist Soviet (URSS) as well as of political mutations other Eastern-European countries.

The political perturbation caused great economic recession in the Eastern-European countries at the beginning of the transition. All the countries split of the URSS encountered negative growth rate at the beginning of 1990s. In Asia, by contrast, the economic transition was carried out in a rather gradual way. Nevertheless they were also influenced by the political instability in Europe due to their close commercial relationship. According to WDI data, China's GDP growth dropped from 11 percent 4 percent between 1988 and 1989; and that of Lao PDR was negative in 1987 and 1988.

A common figure of these transitions is that the market mechanism replaced central planning and became the main channel of resource allocation. Correspondingly, national resources were shifting from the public sector to the private sector. Although the economic reforms were mainly conducted in the productive sectors, its influence gradually penetrated into non productive sectors and eventually caused deep perturbation in social protection system. At least two elements issued from the economic transition contribute to the difficulties faced by the health financing system of CITs after the economic reform: the shrink of public funds and the increase of the cost of health inputs.

1) *The shrink of public funds.*

Government's influence on resource allocation is conditioned on the resources possessed by the public sector. Under the command economy, all the national products were turned over to the State Treasury and re-allocated by the government in function of development plan. The government had predominant control on the distribution of resources. Under the market economy, in contrast, national resources are shared between the public and private sector through fiscal system. The share of government's tax revenue in the GDP indicates the size of the national resources that directly under the control of the government.

Regardless their historical reputation of centralization, the tax revenues of CITs' governments nowadays account for a relatively low share in their GDP. According to the WDI 2007, in the years of 1990s, the average share of government's tax revenue in the GDP was about 12 percent for LICs, 16 percent for MICs, 20 percent for HICs, versus 12 percent for the CITs. As

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<sup>5</sup> Cited from <http://www.unicef.org/sowc96/region6.htm>

the health system in the CITs was entirely funded on public resources in the period of command economy, the shrink of government income directly resulted in the shortage of public health financing.

2) *The increase of the cost of medical inputs.*

Under the command economy, the needs of health services production were answered in a bureaucratic way by the government directly allocating inputs to the health sector. No market price was available to measure the costs of medical inputs. Under the market economy, in contrast, the government needs to compete with the private sectors for limited inputs resources. The allocation of resources is guided by market prices. As market prices are rather exogenous elements which depend on market competition rather than government planning, it increases the difficulties of the government to control the cost of health services production. On the other hand, the policy of price liberalization induced strong inflation, especially in Soviet bloc countries. "Poland, Slovenia, Albania, Bulgaria and Romania all experienced at least one year from 1990 to 1993 when consumer price inflation exceeded 200 percent; Estonia, Latvia and Lithuania all had one year with inflation around 1000 percent; and Russia, Ukraine and Kazakhstan experienced at least one year when inflation was above 2000 percent" (Svejnar, 2002, page. 10). Even if the inflation gradually fell down later on, the risen prices of raw material and labor force had already caused big gap between public financing and medical costs.

Health reforms in the CITs then need to answer the question of how to adjust health financing to the characteristics of market economy. Many countries carried out SHI reforms in hope to gather supplementary resources for health sector and introduce market competition to increase efficiency of service provision and eventually reduce medical costs. In the following parts, we compare the CITs with SHI with those without to see what kinds of CITs have adapted SHI and whether SHI brought higher performance in their health sector. The discussions will be carried out in three angles: health financing structure, the provision of health services, and the modification of supplier payment.

**3.5.2. The financial structure of the CITs after the economic transition**

Table I.5 summarizes health financial structure of the CITs in 2000 as well as the ranks of their overall health system performance in the WHO's World Health Report 2000. Constrained by the availability of data, 25 CITs out of 32 are listed in the Table. WHO identifies three main objectives of a health system: better health, more responsive services, and fairer distribution of health financial burden. The "overall health system performance" is a weighted indicator which combines the estimations on all the three objectives. The distribution of weights is as following: health 50 percent; responsiveness 25 percent; and financial fairness 25 percent. According to whether or not the economic transition is accompanied with violent political change, the CITs are divided into two categories: the countries in economic transition without political mutation and the newly independent countries. This distinction aims at controlling the impact of violent political change on health outcome.

The performances of health systems vary considerably among the CITs. Hungary ranks highest among the CITs, 15th out of 189 WHO member states. It is an upper-middle income country with SHI system. It spends 7.8 percent of GDP on health which is higher than the UMICs'

average. The OOPs accounts for 26 percent of total health spending, which is lower than UMICs' average, 33 percent. Cambodia ranks lowest in the group, the 174th out of 189. It is a low income country with NHS system. It spends 6.4 percent of GDP on health, three quarter of which is paid in form of OOPs. This OOPs share is above the LICs' average. The simple comparison between the two extreme countries shows some correlation between the choice of health financing system, health spending and economic development level.

Comparing the performances of health systems by regions, the Asian CITs have poorer performance than the Eastern-European Countries, probably due to the lower economic development level. By income group, the CITs have about the same median rank as that of the corresponding income group. This indicates that the economic transition character of these countries is not systematically beneficial or harmful to their health system relative to the non-CITs.

The CITs have a longer average life expectancy than the non-CITs of the same income level. It is true for all the income groups. The average LEABs of the CITs and that of the corresponding income group are as following: 63 years versus 52 years for LICs; 71 years versus 67 years for LMICs; 72 years versus 70 years for HMICs. The performance of health system is measured by three parameters and the health outcome is only one of them. This relatively long LEAB suggests that the main problems of the CITs' health systems do not come from the unsatisfactory health outcome but rather the lack of responsiveness of system and the unfairness of health financing.

15 out of 25 CITs have chosen SHI system after the political and economy reforms. The choice of health financing system seems closely linked to the country's economic development level. All the upper-middle income CITs have chosen SHI as the public health financial source. All the low-income CITs, in contrast, have kept NHS. As far as the lower-middle income CITs are concerned, 3 out of 8 have implemented or are implementing the SHI system, the remainders kept the NHS system. This observation confirms Gottret and Schieber (2006)'s remark that the SHI "often begins in lower-middle income countries, and expansions to universal coverage generally occur during periods of strong economic growth." (Gottret and Schieber, 2006, Page 9).

Regardless of their historical reputation for comprehensive public health provision, the share of public health spending in total health spending in the CITs after the economic transition appears rather low. For the LICs and LMICs groups, the CITs' average public health spending share is lower than the group average; while for the UMICs, it is higher than the group average.

As discussed in Chapter 1, when the shortage of public financing cannot be filled up by reducing the cost of inputs, an alternative solution is to reduce the coverage of public protection. One way to do this is to charge the user-fees at the public health institutions. Therefore, the direct result of the decline of public health financing is the increase of OOPs.

The share of OOPs in total health spending in the CITs varies from 10 percent to 79 percent. The NHS countries generally have a higher average share of OOPs than that of the SHI countries, 49 percent versus 28 percent. Among OECD countries, the average share of OOPs in total health spending was 18 percent for NHS countries. This observation confirms the idea that under the NHS, the comprehensiveness of health system is conditioned on the availability of public resources for health. The governments of OECD countries have stronger capacity to finance health expenditure. Their NHS therefore provides a relatively comprehensive health services. The

**Table I.5** The structure of health financing of CITs in 2000

	Overall health system performance	LEAB	Income group	Health Financial System <sup>a</sup>	PHS p.c. (PPP int. \$)	THS p.c. (PPP int. \$)	THS/GDP (%)	PHS/THS (%)	OOPs/THS (%)
<i>Countries in Transition without political mutation</i>									
Hungary	15	72.0	UMIC	SHI	941	813	7.8	70.8	26.3
Czech Republic	48	75.0	UMIC	SHI	1 280	3 421	7.1	88.6	9.7
Poland	50	74.0	UMIC	SHI	585	840	6.2	69.3	30.0
Albania	55	74.7	LMIC	SHI	142	390	6.5	40.3	63.6
Romania	99	71.0	UMIC	SHI	357	581	5.5	70.3	25.9
Bulgaria	102	72.0	LMIC	NHS	444	651	7.7	60.6	40.9
China	144	70.3	LMIC	SHI+NHS	122	258	4.7	38.8	59.0
Mongolia	145	65.1	LIC	NHS	87	457	4.3	77.5	14.0
Vietnam	160	69.1	LIC	NHS	57	48	6.0	25.7	63.6
Lao PDR	165	53.7	LIC	NHS	16	348	3.6	20.6	61.9
Cambodia	174	55.6	LIC	NHS	41	45	6.4	24.2	75.3
<i>Newly Independent Countries</i>									
Croatia	43	73.8	UMIC	SHI	1 329	1 001	7.4	81.3	13.9
Slovenia	47	76.0	HIC	SHI	1 445	4 724	8.5	72.4	11.5
Slovak Republic	62	74.0	UMIC	SHI	843	1 130	7.0	74.4	10.6
Belarus	72	68.0	LMIC	NHS	353	515	6.6	75.8	13.4
Lithuania	73	71.0	UMIC	SHI	507	862	5.9	67.3	26.1
Estonia	77	71.0	UMIC	SHI	734	846	5.0	76.9	19.9
Ukraine	79	67.9	LMIC	NHS	315	488	7.0	52.8	46.9
Bosnia and Herzegovin	90	73.6	LMIC	SHI	113	779	8.8	58.7	48.2
Latvia	105	70.0	UMIC	SHI	323	860	6.4	60.5	43.9
Azerbaijan	109	72.5	LMIC	NHS	221	193	5.4	24.8	64.1
Russian Federation	130	65.3	UMIC	SHI+NHS	78	561	5.2	62.0	30.0
Kyrgyz Republic	151	68.6	LIC	NHS	167	113	6.0	39.5	48.8
Tajikistan	154	63.4	LIC	NHS	1 329	67	5.0	22.8	78.8
<i>World Average by Income Group</i>									
LICs	154*	52.4			76	36	4.2	45.4	65.0
LMICs	108	66.6			328	197	4.6	58.1	51.7
UMICs	70	70.0			706	459	6.2	64.4	32.9

Note: LEAB - Life Expectancy At Birth; THS - Total Health Spending; GDP - Gross Domestic Production; PHS --- Public Health Spending;

<sup>a</sup> The NHS and SHI are distinguished by the share of social security in public health spending. When the social security spending predominant the public health spending, the system is identified as SHI. If the government spending is predominant, it is then NHS. If the share of social security spending is between 40 percent and 60 percent, the financial system is considered as mixture (NHS+SHI).

\* The number is the median rank of each income group to reduce the impact of outlier.

Data source: data on health system performance rank are from World Health Report 2000 (WHO, 2000). Other data come from World Health Statistics 2008 - Global Health Indicator, WHO.

CITs with NHS, in contrast, are generally low- or low-middle income countries. Their governments have restrictive budget constraints. Public resources are insufficient to answer total medical needs. In this case, the government would reduce the coverage of NHS by imposing user fees.

To sum up, with the economic transition, the CITs tend to adjust their health financial structure in function of the constraints imposed by the economic development level. All the indicators show a closer linkage of health financing with the countries' economic level than with their characters issued from the former communist regime. The SHI seem appealing among the CITs which have attained the economic conditions for its implementation. Given the economic level, the SHI involves more participation of private sector and brings better performance of health system than the NHS.

### 3.5.3. Health provision in the CITs

Health provision in CITs is abandon compared to the world average. Table I.6 illustrates the provision of health service by two commonly used indicators: the number of physicians per 10 000 population and the number of hospital beds per 10 000 population. *Comparing by region*, the average density of physician in the South-East Asian CITs is the triple of all South-East Asian countries average. Even in Europe, regardless of great income gap, the density of physician in CITs is close to the European average, 28 versus 32 physicians per 10 000 population. As far as the hospital beds are concerned, South-East Asian CITs' average is also triple of all South-East Asian countries' average. European CITs' hospital beds are close to European country's average. *Comparing by income group*, the over-provision of health services among the CITs is even more remarkable. In LIC and LMIC groups, CITs' Physician density and hospital beds density are 3 to 4 times of LMIC average. In UMIC group, CITs' physician density is 1.3 time of UMIC average and hospital bed density is the double of UMIC average.

**Table I.6** Health provision in the CITs comparing to the world average in the 2008\*

	Physician (density for 10 000 population)		Hospital beds (per 10 000 population)	
	CIT	World	CIT	World
South-East				
Asian	17.2	5.1	39	11
European	28.3	32.5	65	63
	CIT	World	CIT	World
LIC	13.4	3.7	42	15
LMIC	27.3	9.7	51	18
UMIC	31.5	23.6	71	39

\*In function of the latest available information, the group averages are calculated by the data dated between 2000 and 2008.

Data source: WHO 2010, Health for All Database

These indicators, nevertheless, give only idea about the quantity of medical inputs, but not how they are used. In the former communist countries, the health services were mainly provided by state-owned hospitals. The definition of hospital, nevertheless, was not the same as that in the western countries. Under the Semashko model (Cf. Box I.3), the health referral system was constructed in a hierarchical way by establishing health facilities at each administrative level. The levels of hospitals vary from the most specialized facilities in capital cities to extremely basic

facilities in rural areas. So the number of hospital beds cannot give any information on the equipment and the services which are attached to these beds. Tragakes and Lessof (2003) reports, for example, that in Russia Federation, due to the lack of public financing, 45 percent of hospitals lack shower and bath facilities; 15 percent of rural hospitals lack running water.

The relatively high provision of health services is due to the health strategies under the command economy. Under the Semashko model, great efforts are put on the beds and personal number with a strong bias toward the hospital. "The focus on infectious diseases led not only to extensive preventive measures but also to the creation of an enormous bed capacity which allowed for the isolation of infectious cases" (Tragakes and lessof, 2003, page 24) . The over-provision of health services indicates that the primary mission in the CITs is not to increase new investment in health sector, but to use the existing resources in a more efficient way.

One way to increase the efficiency of resource use is to construct an efficient referral system. It means to promote the preventive measure and filter out the unnecessary demands for hospital services. Under the Semashko system, the health facilities at lower administrative level charge, among others, to refer the patients in need to higher level of health facilities. However, in order to control the cost of medical service provision, the quality of primary care has long-term been artificially reduced to a rudimentary level. The basic health stations are often managed by the low qualified health workers. It is estimated that in Russia Federal 30 percent of initial contacts are referred to higher levels of care contrasting to 8 to 10 percent in European model, which reflects a lower medical treatment capacity in the former case (Tragakes and Lessof, 2003). As a result people tend to tie the administrative level of the health facilities to the quality of their services and become reluctant to use primary health care.

It is expected that the SHI could divert medical consumption toward the primary health care by proposing better reimbursement in the primary health care institution. However, even without insurance reimbursement, the primary health care in these CITs is generally not very expensive. The price incentive therefore cannot compensate the mistrust of the patient consumer on the quality of services. Another way to manage the medical care is to modify the provider payment so that the health provider will voluntarily optimize the use of health resource. The SHI may have the advantage in acting as a relative independent third-party payer which facilitates the introduction of performance-based provider payment.

#### **3.5.4. Provider payment in the CITs**

Service purchasing under the command economy was characterized by the supplier-side input planning. The investments in the production of medical service were reimbursed in a retrospective way. The line-item budgeting system was used by all the countries under the Semashko model (Dixon et al., 2004). The cost of health services was calculated on the basis of historical records plus a factor of inflation. The financial risk for performance was therefore totally undertaken by the government out of public budget. Public health institutions were therefore relieved from financial pressures. This reduced their economic incentives to improve the performance of health provision. Health professionals were mainly government employees who gain the salary income. As mentioned above, the salary is based on the duration rather than the quality of work. This kind of payment does not incite the doctors to increase the efficiency of work. Due to the shortage of public funds, health professionals were often underpaid, which



further lowers the motivation for better performance. The lack of financial responsibility on the side of hospitals and the low economic incentives on the side of health professionals induce low efficiency of health provision in the communist countries in the years of 1980s (Ensor, 1993).

Economic transition puts the public provision of health services on question. It is argued that, if the origin of the inefficiency is the lack of the connection between the suppliers' revenue and their performance, then the solution should be to base the provider payment on the performance. One way to do it is to replace the line item payment by the capitation, per-diem and per-case payment.

Most of the CITs indeed recognize the problem of line item payment and move toward the performance-based payments. Only 2 out of 19 European CITs listed in the Table I.7 kept the line item payment. The mostly frequent alternative is the payment per case. There is trend that the payment mode is moving toward the global budget which have the advantages of being easier to calculate, promoting the use of primary care, and more flexible for the health provider (Kornai and Eggleston, 2001).

**Table I.7** Hospital payment system in European countries in transition

	Financing system	Line item	Per diem	Per case	Global budget
Albania	SHI				X
Armenia	NHS			X	X
Azerbaijan	NHS	X			
Bosnia and Herzegovina	SHI				Developing
Bulgaria	NHS			X	Developing
Croatia	SHI		X		Developing
Czech Republic	SHI			X	X
Estonia	SHI		X	Developing	
Georgia	SHI +NHS			X	X
Hungary	SHI			X	
Kyrgyz Republic	NHS			X	
Latvia	SHI		X	Developing	
Lithuania	SHI			X	
Poland	SHI			X	
Romania	SHI			X	X
Russian Federation	SHI+NHS		X	X	X
Slovak Republic	SHI		X		Developing
Slovenia	SHI			X	?
Ukraine	NHS	X			

Data source: information for the mode of payment comes from Dixon et al., 2004; information for health financing system is summarized by the author based on the WHO 2008 data.

The innovation of provider payment is more often found in SHI countries than in NHS countries. All the SHI countries have moved to the performance based payment, while 2 out of 5

NHS countries have kept line item payment. Nevertheless, the fact that the application of performance based provider payment can also be observed in the NHS countries implies the SHI system is not the necessary condition of the reforms for supplier payments.

The SHI is argued having some advantages over the NHS system in separating the financial responsibilities between the service consumer and provider. As the SHI is independent of the government general budget, it can concentrate on the financial protection for the consumer. The idea is to put the state-owned health facilities under the market competition on the one hand, and offer public financial assistance to the most disadvantaged consumer on the other hand, so that the market competition will be used to increase the efficiency of service provision, and the public financial protections will guarantee the access to the services. This strategy is also called “making the money to follow the patient” (World Bank, 2008b). It is worth to note that the independence of SHI is conditioned on the sustainability of its budget. If SHI encounter deficit, it still has to seek for subvention from the government budget and thus lose its independence.

However, will it really increase the efficiency of service provision to ask the state-owned health facilities to look for financial resource from the consumer? Health markets in the CITs were under the public monopole. Even after the economic reform, vast majority of the health facilities, at least officially, maintained public ownership. The introduction of market competition is often reduced to the simple commercialization of public health facilities. By charging user-fees at public health facilities, the government transfers the financial pressure to individuals. However, as long as the patient-consumer has no choice on their health services providers, this transmission will just increase the out-of-pocket payment to medical services and increase the inflation pressure for medical costs without inducing efficiency gains. It is particularly the case when the services are paid in a fee-for-service form. In Czech Republic, for example, the adoption of fee-for-services as the predominant method of health service payment at the beginning of 1990s results in an increase of health spending by almost 40 percent between 1992 and 1993. This phenomenon forced Czech policymaker to replace FFS by global-budget payment in 1997 (Kornai and Eggleston, 2001).

The market competition asks for great number of participants on both the consumer and supplier sides. However, if this is done by establishing numerous public health facilities at the same level and in the same region, it will cause the duplication of public investment and the waste of public resources. To cultivate market competition, it is necessary to introduce private agents into the market. The relationship between the public and private agents on the medical market directly influences the efficiency of market competition. If the relationship between the public and private services providers is competitive, the participation of the private provider probably increases the financial pressure of the public provider and consequently forces the latter to ameliorate performance. If, on the other hand, the relationship between the public and private providers is complementary or supplementary, then the participation of private provider can be expected to augment the quality or the responsiveness of health services, but not necessary the efficiency of public provision. The essential challenge for this strategy is how to avoid the for-profit private agent diverting the resource allocation away from the optimal solution in terms of social health needs.

To sum up, the CITs are revisiting their health system, trying to construct a medical consumption which corresponds to their economic conditions. The CITs with better economic

development level tend to adapt SHI as their main public financial source for medical consumption. The most important determinant of health system performance remains the economic constraints faced by CITs. Given the economic level, the SHI system seems associated with a better performance than NHS. The performance gain may link to a more active participation of private sector and a relative facility for the reform on the supplier payments. Nevertheless, the reform of financial system alone is not enough to increase the efficiency of services provision. The reforms on the role of public and private sectors in the provision of health services and the amelioration of the quality of primary care are also the key issues on the agenda of the policy-maker.

### **3.6. Concluding Remarks**

Effective provider-payment and referral system can increase the efficiency of health system. However, their implementation requires strong technical and institutional supports. The economic incentives associated with each kinds of provider-payment are multiple. It is necessary to take country's context into consideration when choosing appropriate provider-payment. Reconciliation sometimes needs to be found when the conditions for optimal solution are absent. A key precondition for the good function of referral system is the strict control on the quality of medical practitioners, because one of the main reasons for the failure of service referral is the poor quality of services at first-level health facilities. Government should also put more accents on the investment of PHC to promote equal access to basic services.

Preceding analysis showed that economic development level is one of the most important determinants of health status. On the one hand, this is because economic development is the premise of the amelioration of numerous factors which directly influence health status of a population, such as nutrition, sanitation, and education. On the other hand, it also decides the availability of health resources.

The HICs has generally better health status than the low- and middle-income countries, but also has a more efficient public health financing system. Most of them have realized universal coverage with either NHS or SHI. A comparison of health system among the OECD countries shows that NHS and SHI have quite similar performance, while PHI has much higher cost-inflation effect. NHS countries seem have more facility to control public health spending than SHI countries, while SHI countries have a higher share of private sector on the health market.

The study of CIT, however, shows quite different story. The NHS system seems associated with higher share of private payment and less efficient health outcome. This is above all because the CITs which keep NHS system are generally LICs or LMIC countries, while the CITs with SHI system are LMIC or UMIC. Another advantage of SHI compared to NHS in the CITs is that it encourages innovation in the payment system. The shift from line item payment to prospective payments, such as per diem, per case or global budget, contributes to the cost containment.

The comparison of NHS and SHI among OECD countries and CITs shows that there is no absolute conclusion on the efficiency of one system relative to the other. It depends on country's economic development level and institutional capacity.

#### **IV. Challenges in obtaining universal coverage through SHI system**

The ultimate objective of health financing system is to make health services accessible for those who are in need. Concretely, it is expected that the individual will not be forced to abandon the treatment due to the lack of ability to pay, nor will he fall into poverty trap as a result of having paid for medical expenditure. The concept of “universal coverage” is then developed to describe a target situation where everyone has an “access to the full range of personal and non-personal health services they need, with social health protection.” (WHO 2008b, page 25)

Universal coverage, nevertheless, does not mean that all medical costs should be paid out of public funds. Both private and public financing are necessary to optimal allocation of resources. Public spending can guide resources towards the population which are in most medical needs and minimize the social costs of health by promoting public health. Private spending can make the patient-consumer more rational on his medical consumption, increase the physician’s accountability toward the patient-consumer, and make service provision more responsive to personal needs. That is why in the HICs which have realized universal coverage, the share of OOPs still accounts for about 20 percent of total health expenditure (WHO 2008, Health for All Database).

An essential question is then how to delimit the financial responsibilities of public agent vis-à-vis private agent. The World Health Report 2008 (World Bank, 2008b) identified three dimensions to measure the coverage of public expenditure on health:

- Breadth: who is insured?
- Depth: which benefits are covered?
- Height: what proportion of costs is covered?

The answers to these questions need to take the budget constraints of public sector into consideration. Preceding discussion has highlighted the substantial gap in the availability of health resources between low- and middle-income countries and HICs. This means that in absolute term, the low- and middle-income countries have not enough resources to answer all medical needs. The coverage of public health financing would not be as comprehensive as in the HICs.

The restrictive budget constraints faced by the governments of middle-income countries incites them to replace state-funded system by social health insurance as a major way to finance public health spending. One argument is that SHI allows government to share the total cost of insured health care with various social partners (Gottret and Schieber, 2006). However, using SHI to realize universal coverage is not without problem neither (Wagstaff, 2007; Carrin, 2002). For the countries covered by SHI system, there is a direct connection between the status of contributor and that of beneficiary, even if the level of protection does not necessarily in proportion with contribution. This connection imposes several challenges in the realization of universal coverage relative to the state-funded system. First, under the insurance system, the question of identification could impede the extension of coverage; while under the state-funded system, there is no need for identification. Second, under insurance regime, as the insured can directly compare the benefice with the contribution, they are more exigent on the benefits and the credibility of the scheme. Under the state-funded system, as the health spending is financed out

of general budget, the tax-payers are not necessarily aware of the medical costs they have paid in form of taxes. As consequence, they are much less sensible to the link between the benefits and the cost of health financial protection. Third, the problem of fragmentation is more important under the insurance mechanism than under the state-funded system, because of the independence of different insurance pools.

In the following parts, we will discuss these challenges in more details. Section 4.1 analyzes the difficulties in identification. Section 4.2 discusses the question of attractiveness of SHI package from two dimensions: the services to cover and the proportion of medical cost to reimburse. The solutions for the problems evoked in Section 4.1 and 4.2 lead to the discussion on the necessity of adapting discriminate strategies for different cases. However the fragmentation of insurance market would also cause confusion. Section 4.3 then addresses this question. Section 4.4 use the context of CITs to illustrate the dilemmas imposed by previously discussed contradictions.

#### **4.1. Identification problem**

Under the state-funded system, the beneficiary status of health protection is based on the citizenship. The identification of the target population is relatively easy. Under the insurance system, however, the benefits are restricted to those who contribute. The coverage of insurance depends on the number of contributors. If the government wants to use SHI to realize universal coverage, the first question is then whether it is possible to make the whole population contribute.

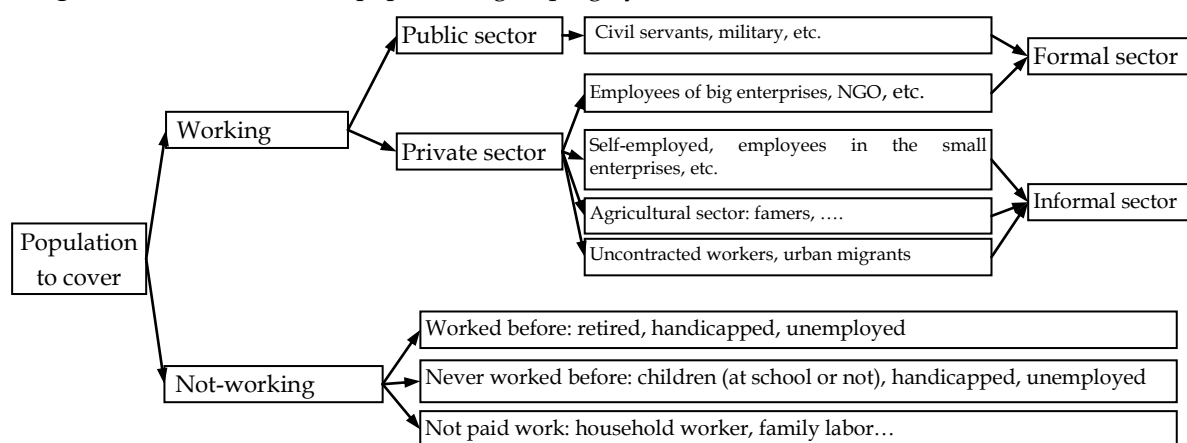
The participation to SHI is often set compulsory to avoid the problem of adverse selection. However, the effectiveness of regulation depends on the individual's arbitrage between the cost of compliance and that of non-compliance. Among costs of compliance, there are insurance contributions and the constraints on medical consultations; and among the costs of non-compliance, there are the potential medical spending that is otherwise covered by the insurance, the probability of being detected escaping the obligation, and the probability of being punished once being detected, the punishment. (Ensor and Weinzierl, 2007). Therefore, when the adherence to the health insurance is imposed by the authority, the rate of compliance will, at least partly, depend on the institutional capacity of enforcement.

One essential question for the enforcement is whether the non-compliant behavior will be captured. This largely depends on whether the potential contributors are identifiable. The contribution can be collected by individual, household, or work unit. SHI is based on the idea of collecting contributions by work units. The challenges then include detecting all the working population and finding a way to collect the contribution of not-working population.

As shown in the Diagram I.3, the whole population can be divided into those who are actually working and those who are not. The working population engages either in the public sector or in the private sector. The private sector can be further divided into formal and informal sectors. The activities engaged in the informal sector generally "escape, or are excluded from the institutional system of rules, rights, regulations and enforcement penalties that governs those agents engaged in formal production and exchange" (Feige, 1990). The not-working population contains three categories: those who have never worked; those who are not working anymore, and those who are working but not paid (such as household workers).

As the identification problems vary in function of the working status of the target population, the strategies of the extension of insurance coverage should be different too. The most identifiable population is those who are actually engaged in the formal sector (public or private). When the population is identifiable, the rate of compliance is higher because the risk of being detected illegitimate behavior is higher. Therefore for this group, the effectiveness of regulation is relatively high. The insurance can be set compulsory to increase the participation. In addition, as the fiscal system is relatively well constructed in the formal sector, it is easier to use the existing fiscal system to collect insurance contributions. This will considerably reduce the administrative cost of the implementation of SHI system (Gottret and Schieber, 2006).

**Diagram I. 3** The structure of population grouping by economic status



Source: drafted by author

For those who are not currently working, but have family relationship with working population, the strategy of coverage extension is to reach them through this linkage. Concretely, for the households who have at least one family member working in the formal sector, the insurance coverage can extend to the rest of the family member through the working member. One precaution is that the working member may cheat on the number of dependants in order to take the advantage of the insurance. The duplicate reporting may also emerge when there is more than one working family member (WHO, 2005). One solution is to ask for additional premiums for supplemental adherence. This will discourage the household to cheat or duplicate. On the other hand, the additional premium should be low to incite voluntary participation. Otherwise, it would be difficult to impose the insurance to this population, because the government does not directly control the income sources of the non-working population, especially in the countries where social protection systems, such as the pension and unemployment insurance, are underdeveloped or even absent.

Insurance premiums for not-working population which haven't connection with working population need to be collected from the concerned individual rather than through enterprises. Economic behaviors of the individual are more difficult to trace than that of the enterprise, especially in the countries where the fiscal system is weak (Aguilar and Campuzano, 2009). If insurance participation were impulsive, the cost of administrative and bureaucratic controls for compliance would be much higher than in the case for formal employees (Ensor, 1999). It is therefore suggested to leave the choice of insurance to the individual. The extension of insurance coverage then depends on the attractiveness of insurance package (Nguyen and Knowles, 2010; Dror et al., 2007). The adherence decision of this group of people will also be influenced by the

peer effect issued from the experience of the household member(s) who is (are) covered by the insurance. If this experience is positive, it will facilitate the acceptance of insurance by the rest of the family member. Otherwise, if the experience is negative, it will impede the others to adhere. It is then important to build up the credibility of the insurance scheme (Allegri et al., 2006; Sepehri et al., 2009; Nguyen and Knowles, 2010).

The biggest obstacle in the extension of insurance is the population engaged in the informal sector. As mentioned above, their activities often escape government regulation. It is therefore difficult to impose the obligation of insurance participation to them because the detection of non-compliance to the registration and contribution of insurance is low effective, even if possible. The mostly used form of health insurance for this population in the low- and middle-income countries is CHI (Criel et al., 2008). It regroups people by their social linkages. These linkages contribute to the establishment of trust between the insurer and insured. It also makes the concept of social solidarity easier to accept (Zhang et al. 2005; Mladovsky and Mossialos, 2008).

Nevertheless, two elements will impede people to participate. 1) The households are so poor that even a small premium may appear too important comparing to their budget. 2) Benefits depend on premium income. As the CHI premium is often set at a low level, the insurance benefits sometimes are so restrictive that the household consider the insurance does not add enough value to change their actual situation and thus reluctant to participate (Ensor, 1999). For the first difficulty, the government may offer financial assistant to the extremely poor by, for instance, paying their CHI membership out of general budget. This strategy, nevertheless, face the challenge of identification of the poor. The error of exclusion of poor and inclusion of non-poor are frequently observed in the low- and middle-income countries (Jrujillo et al., 2005; Wagstaff, 2007). For the second difficulty, due to the budget constraint, it cannot attract the participants by increasing the insurance benefits. Nevertheless, it can enforce the participants' trust by involving the community into the management of the insurance pool. If the economic condition allows, the government can also give subsidies to encourage the participation.

#### **4.2. The attractiveness of the insurance scheme**

Under the SHI, a predetermined sum of money is raised for explicit use. The contributor is aware of the cost of insurance and corresponding benefits. On the other hand, the SHI, as any other public health financing plans, holds the objective of involving the most vulnerable into the protection system. This asks for a transfer of funds from the healthy to the sick and from the rich to the poor. In another word, the better-off will contribute more than they can expect to benefit. The comparison between the costs and the benefits will then make them reluctant to participate to the insurance scheme.

The low- and middle-income countries commonly face the shortage of resource. Given public budget constraint, if the government aims at maximizing the breath of insurance (i.e. maximize the coverage of population), the depth and height of the insurance have to stay at low level which means only a limited number of services and scale of health spending would be covered.

#### **4.2.1. The depth of insurance coverage: primary health care (PHC) vs. secondary and tertiary health care**

World Bank in its World Health Report 2008 recalls the low- and middle-income countries to make efforts to realize universal access to primary health care (WHO, 2008b). However, in practice, privileging insurance reimbursement for primary health care (PHC) is a difficult task for several reasons.

*First*, conflicts can be found between the cost-efficiency of medical interventions and the preference of the insured. It is widely admitted that the primary care is the most cost-efficient health services. Theoretically, in order to reduce the general medical cost of the covered population, the SHI should provide more generous benefits for the use of PHC. However, the PHC treats the diseases which are often linked to the bad living condition or poor medical knowledge and therefore influence more the poor than the better-off. On the other hand, according to the principal of fairness of health financing, the better-off is expected to contribute more than the poor in absolute term to equalize health financial burden (measured in proportion of income) across the population. If insurance reimbursement privilege PCH, it means that the better-off will contribute more and benefit less. This reasoning will make the better-off reluctant to adhere to the insurance.

*Second*, the PHC are often cheaper than the secondary and tertiary care. The insurance reimbursement will not essentially change the insured's health financing burden if the patient still need to pay the main costs of secondary and tertiary care. Therefore, an insurance package without reimbursement for expensive health care is not interesting for the insurance consumer.

*Third*, imposing a list of insured services may distort physicians' medical treatment decisions. The hospitals may, for instance, tend to over-prescribe more expensive non-insured services to make up the income losses due to the underpaid insured services. If the insured services are more cost-efficient than the non-insured ones, this will artificially shift the medical consumption from more efficient services to less efficient ones.

*Forth*, the complexity of medical treatment makes it difficult to explicatively choose a set of services to guarantee the basic medical needs of the population. A medical intervention may be appropriate and efficient for one patient but not for another. As the patient may be reluctant to pay for the services that are not in the insurance list, the physician sometimes needs to choose less effective treatment to answer the patient's requirement. If the list of services is too short, the patient will often be asked to pay for additional fees. This will evoke the resentment of insured for the insurance scheme and consequently reduce the compliant ratio.

The solution for these dilemmas would not be simple. But one idea should be to include both primary and secondary services into insurance package. On the consumer side, insurer can use different reimbursement tariff to encourage or discourage the utilization of services; and on the provider side, to impose prospective provider payment to make physician more accountable. The differentiation of reimbursement ratio would raise the question on the extent to which an insured is effectively protected from financial losses due to health. We then address the question of co-insurance policy.



#### 4.2.2. The height of insurance: co-insurance policy

There are several motivations to set co-insurance policy. First, by asking the patient to directly pay part of medical services, it can make the patient aware of the cost of medical services and consequently choose rational medical consumption. Second, by differentiating reimbursement ratio, insurance can incite or discourage the insured to consume certain kinds of medical treatments. Third, in the low and middle income countries, co-insurance policy is also used to limit the responsibility of the insurer in case of catastrophic spending.

##### **Box I.5** Definition of the terms of patient payment

###### *Deductible*

The deductible or excess is the portion of any claim that is not covered by the insurance provider. It is normally quoted as a fixed amount and is a part of most policies covering losses to the policy holder. The deductible must be "met", that is, paid by the insured, before the benefits of the policy can apply.

###### *Copayment*

A copayment, or co-pay, is a flat amount of money paid for a medical service by an insured per visit.

###### *Coinsurance*

Coinsurance indicates how an insurer and an insured will share the costs of a bill that exceeds the insurance policy's deductible up to the policy's stop loss. It is expressed as a percentage or pair of percentages of the medical spending in the predetermined interval.

###### *Stop-loss*

Once the insured's out-of-pocket expenses equal the stop loss, the insurer will assume responsibility for 100percent of any additional costs.

###### *Reimbursement ceiling*

It is a flat amount of reimbursement at which once is attained it is the insured who will assume responsibility for 100percent of any additional costs.

Source: Webster's New World™ Medical Dictionary, 3rd Edition, 2008

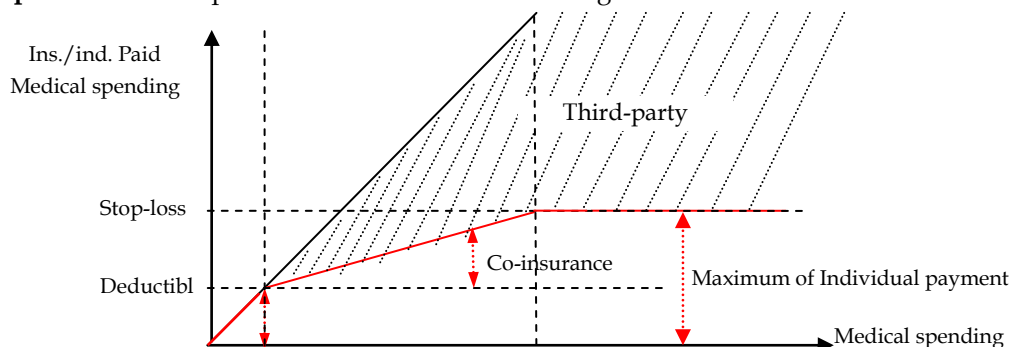
The primary interest of the insurance is to reduce the cost of health financial risk. Medical spending becomes a financial risk when it is likely to put the household into financial hardship. The more expensive medical treatment costs, the higher is the financial risk it brings to the patient. On the other hand, huge health spending is rare. If the insurance protects only important health spending, the individual in good health would think they can never profit insurance benefits and therefore reluctant to participate. Therefore, an insurance police normally distinguishes three levels of health spending: small, medium, and huge health spending. The criteria for the classification, however, are set by each insurance scheme.

Insurance scheme generally asks the individual to pay small health spending out-of-pocket. The "deductible" is the amount of health spending that the insured needs to meet before enjoying insurance benefits. For the amount of health spending exceeding the deductible, the insurance at first applies a co-insurance rate which requires the insured continue paying a certain proportion of health spending until the health spending attain a ceiling line. In the HICs countries, this ceiling line exempts the insured from the payment of exceeding health spending. So it is called

“stop-loss” line. The health spending exceeding “stop-loss” line is entirely paid by the insurance. However, in the low- and middle-income countries, the ceiling line exempts the insurer rather than the insured from health spending payment. This is for the purpose of limiting the loss of insurance. In this case, the ceiling line is called “reimbursement cap” (See Box I.5 for definition of insurance terms).

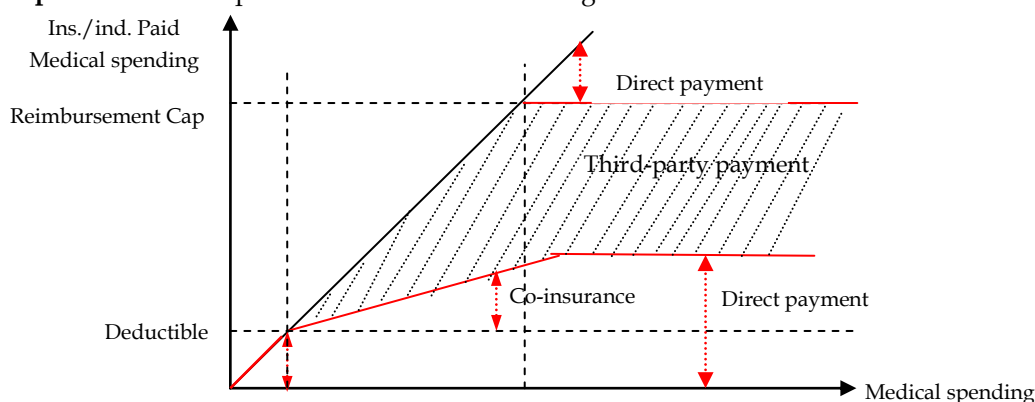
The height of insurance coverage varies tremendously according insurance policies. Graphic I.2a and b illustrate the sharing of medical costs between the insurer and the insured. The part in shadow is the medical spending that would be paid by the insurer. And the blank part under the 45° line is the medical spending that would be paid by the insured. In graphic I.2a, the eventual huge health spending risks are taken by the insurer. The insured then can predict his maximal health spending. In the graphic I.2b, in contrast, it is the insured who take the huge health spending risks, and the insurer who can predict the maximum of losses. In another word, when the insurance does not exempt the insured from the payment for huge health spending, it does not totally remove the uncertainty of health spending from the insured. In this case, insurance offers only a certain level financial assistance which releases the insured’s health spending burden. The effectiveness of this financial assistance, however, depends on the level of deductible and co-insurance rate.

**Graphic I.2a** Health protection scheme without ceiling of reimbursement



Source: adapted from Cutler and Zeckhauser, 2001

**Graphic I.2b** Health protection scheme with ceiling of reimbursement



Source: drafted by the author

The choices of the thresholds are not easy, especially when the budget is narrow. As discussed previously, the diseases which induce high health spending occur rarely. The most

frequent diseases are much cheaper to treat. The rise of detectible will considerably reduce the proportion of people getting reimbursed. This consequently discourages the insurance-customers who are in good health. A low co-insurance rate makes reimbursement marginal compared to total health spending. This will discourages the insurance-customers who are in needs of medical spending, especially when huge health spending will still be on the shoulder of the insurance-consumer. On the other hand, given the limited budget, if the reimbursement for small health spending increases, it will reduce insurance's capacity to protect individual for important health spending. This goes against the initial objective of the insurance. In practice, the medical insurance in the low- and middle-income countries are often criticized to be too narrow with a high detectible and a restrictive reimbursement ceiling. Limwattananon et al. (2007), for example, still detected important incidence of catastrophic health spending after the implementation of the universal coverage in Thailand. This also explains why the implementation of SHI requires that the country attains a certain economic development level.

### **4.3. The fragmentation of insurance regime**

Under the state-funded system, health funds are eventually pooled at national level. The coordination of the allocation of medical services among the regions is done in an administrative way. The transfer of funds from richer region to poorer region is realized in form of government subsidies. Under the insurance system, if insurance pools are constructed by regions, a transfer system should be available to equalize the financial capacity of each insurance pool. Otherwise, each insurance scheme's capacity to cover health risks will depend on its own funds. There is great heterogeneity across regions in terms of disease pattern and economic development level. The objective of universal coverage is to offer equalized access to basic health services to the whole population. A great challenge is then to construct a mechanism which permits to transfer the funds across insurance pools without arousing resentment from the insurance pools which are found more often the donor rather than receiver of funds. The difficulties will be higher if the country faces important income inequality across the regions and professions, as is often the case for the emerging middle-income countries (Gottret and Schieber, 2006).

If insurance funds are pooled by profession, then the heterogeneity of population will also make the cooperation among insurance pools difficult. As mentioned above, due to the identification problem, insurance schemes might be differentiated by working status. These insurances schemes have quite variant budget constraints. The SHI, for instance, collects the contribution from the most productive sector and thus can raise important funds and propose attractive benefits. The CHI, in contrast, aims at the population that is often excluded from the other protection system due to their low capacity to pay. It can therefore raise quite limited insurance funds and consequently has much more budget constraint for insurance package. It is therefore difficult to raise the protection level of CHI to that of SHI.

In practice, it is hard to make the well endowed insurance pools voluntarily transfer funds to the less endowed insurance pools. A second-best solution is that the government offers subsidies out of general budget to the less endowed insurance pools. Health financing reforms in the Asian countries commonly hold this characteristic. The government initiates the reform, accords important subsidizes, and exerts restrict control on the management of funds (WHO, 2005). This, on the other hand, questions the independency of insurance as the third-party payer.

To sum up, SHI does not necessarily facilitate the realization of universal coverage. It requires the country to satisfy certain economic conditions, including the level of economic development, the size of informal sector, the enforcement of regulation and administration. The coverage of insurance concerns three dimensions. When resources are insufficient relative to health needs, the priorities needs to be set. It is recognized that there is urgent needs in the low- and middle-income countries to involve the poor into the health security system. The idea is then to extend insurance to maximum of population, while allow to keep insurance benefits at a relatively low level. It means to choose limited services to cover and ask the patient continue to share part of medical spending in an out-of-pocket way. However, the preference of individuals depends on their social-economic context. The well-off may not have the same priority as the poor. As SHI hold social responsibility to promote equal access to medical services, the challenge is then to find an insurance package which appeals to both the poor and the well-off.

#### **4.4. The challenges for the CITs to obtain universal coverage through SHI**

Regardless the doubts about the effectiveness of SHI in realizing universal coverage, 23 out of 32 CITs have implemented or are implementing the SHI in attempt to re-establish a health protection system which extends to the majority of the population. However, whether SHI can help these countries to realize universal coverage depends above all on these countries' social economic characteristics. According to the above discussion, there are at least three conditions that are crucial for the success of SHI. 1) The economic development. 2) The predominant size of formal sector relative to the informal sector. 3) The possibility to merge different insurance pools. We now look at the case of CITs in function of these aspects.

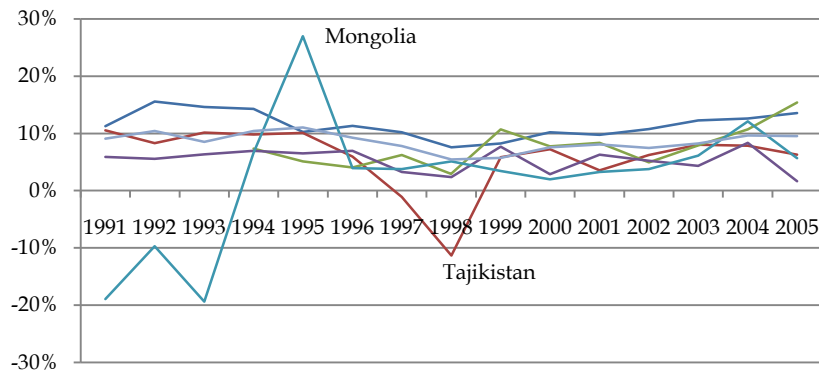
##### **4.4.1. Economic development**

The first condition for the implementation of SHI is high economic growth. The CITs seem having entered into a period of economic prosperity. Figure I.14.a-c illustrates the economic growth of the CITs in the period of economic transition. The European CITs commonly experienced negative growth rate at the beginning of economic reform due to the violent political mutation in the end of 1990s. Comparing to European CITs, the Asian CITs' economic, in spite of several outliers (such as Mongolia<sup>6</sup> and Tajikistan), grows in a relatively stable way. This is because their economic reforms are generally conducted in a gradual way without violent political mutation. For both the Asian and European CITs, the economic fluctuation calmed down at the end of 1990s. The average annual growth rate is stabled at round 8 to 9 percent in the years of 2000s. This growth rate is high relative to the median of economic growth rates of corresponding low- and middle-income countries in the same period, which are around 5 to 6 percent (WDI, 2007).

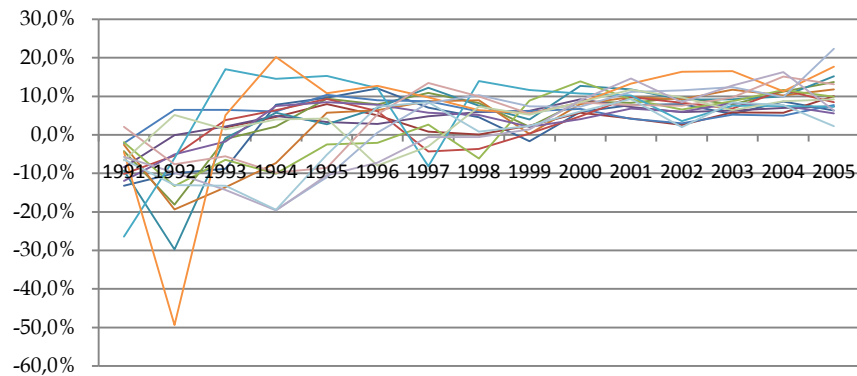
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<sup>6</sup> The economic recession observed at the beginning of 1990s at Mongolia is due to the country's close commercial reliance on Union of Soviet Socialist Republic (USSR). The collapse of the latter push Mongolia's economic into great difficulties in the years of 1990 to 1991.

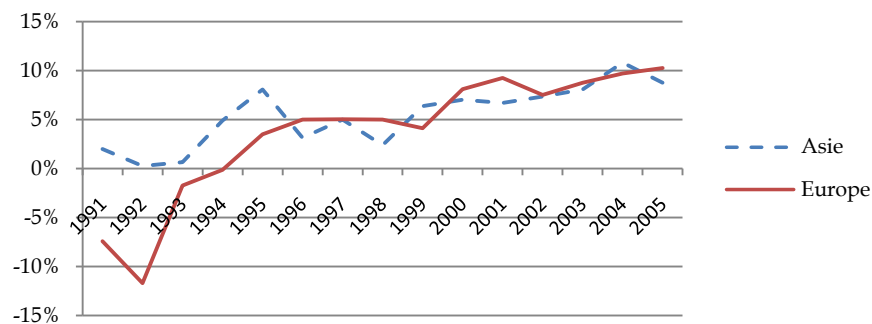
**Figure I.14 a.** Economic growth rate of Asian CITs (1990 – 2005)



**Figure I.14 b.** Economic growth rate of Eastern-European CITs (1990 – 2005)



**Figure I.14 c.** Average economic growth rate of Asian and European CITs (1990-2005)



Data source: WHO 2008, Health for All Database

**Table I.8** GINI coefficients of the selected CITs at different stages of economic transition

Country Name	Income group	1987-1989*	1992-1994	1999-2001
Kyrgyz Republic	LIM	26,01	53,7	32
Belarus	LMIC	22,76	21,6	30,35
Ukraine	LMIC	23,31	25,71	28,96
Bulgaria	LMIC	23,43	30,8	34,34
Thailand	LMIC	43,84	46,22	43,15
Czech Republic	UMIC	19,4	26,55	n/a <sup>□</sup>
Slovak Republic	UMIC	19,54	19,49	n/a
Lithuania	UMIC	22,48	33,56	31,85
Latvia	UMIC	22,49	26,99	37,665
Croatia	UMIC	22,78	n/a	28
Estonia	UMIC	22,97	39,5	35,8
Hungary	UMIC	23	27,94	26,85
Romania	UMIC	23,31	28,2	30,25
Russian Federation	UMIC	23,8	n/a	45,62
Poland	UMIC	26,21	32,39	34,465
World Average				
	UMIC	34.92	40.15	40.75
	LMIC	40.34	43.41	42.48
	LIM	39.95	43.11	40.41

Note: <sup>□</sup> n/a: means not available

Data source: WDI 2007, World Bank, \* the average of the three years

Income inequality will increase the difficulties of mixing the poor and the well-off in the same insurance pool, because it means a greater divergence of interests between the two groups and more transfer of funds from the well-off to the poor. Table I.8 lists the evolution of GINI coefficients at different stages of transition for the CITs of which the information is available in WDI 2007 dataset.

In the period of communist regime, the CITs had highly egalitarian income distributions. The Gini coefficient of Central and Eastern Europe ranged from 19 in Czechoslovakia and Slovenia to 26 in Poland in the late 1980s. The most unequal CIT was found in Asia. Thailand had a Gini coefficient of 44. However, other countries generally hold a Gini coefficient of less than 26.

At the beginning of economic transition, most of the CITs saw their income inequality enlarged. 11 out of the 15 countries in Table I.8 have a Gini coefficient higher in the 1992-94 period than that in the 1978-89 period. About half of the countries arrive to reduce the GINI in the later stage of the reform, while other half see their income gap continue to grow. The income distribution is generally more egalitarian in the European CITs than that in the Asian CITs. According to WDI 2007, in 2002, the average GINI coefficient was 32 for the Eastern-European CITs versus 37 for the Asian CITs. In the end of 1990s, the income inequality of CITs is in line with other countries of similar economic development level.

To sum up, the CITs begin to enter into a relatively stable stage of transition. Their high economic growth gives a good condition for the development of SHI. The CITs generally have a lower level of income inequality than the other countries in the same income group. The economic transition composes an opportunity as well as a challenge for the reduction of income inequality in these countries. It can be expected that the stabilization of social and economic

environment will contribute to the equitable development of these countries. This, however, will not be systematically done but depends on the country's development strategy. In general, the CITs seem to have favorable economic environment for the implementation of SHI.

#### **4.4.2. The informal sector**

Large informal sector in the CITs imposes the most important challenge for these countries for the extension of SHI. It is difficult to measure the exact size of informal sector due to the lack of data. However there is reason to believe that CITs hold big informal sector. The size of informal market is important when the size of formal market is limited. In the period of CIT, resources were distributed by central planning. Market mechanism was either absent or of very limited size. Economic reform permitted market to grow up. However CIT countries' relatively short history with market mechanism implies that, at least at the beginning stage of the market economy, the size of market would be small and the legislations and regulations remained to be desired (Svejnar, 2002). On the other hand, important resources are shifting from the public sector to the private sector. Market is required to absorb these resources. As the size of formal market was small at the beginning, a part of private resources have to flow into informal sector (Heinze and Olk, 1982; Feige, 1990)

This reasoning indicates two things. 1) At the beginning of transition, the size of informal sector is big due to the underdevelopment of the formal sector. 2) It can be expected that the size of the informal sector be reduced with the growth of formal market and amelioration of legislations. This can partly explain why most of the CITs that have implemented SHI are the countries that have attained upper-middle income level.

#### **4.4.3. Possibility of unifying different insurance pools**

Whether it is conceivable to integrate different insurance pools into one depends on the economic heterogeneity of these pools. Several elements linking to the characters of transition may increase this heterogeneity: decentralization of fiscal system, urban/rural development gap, fragmentation of health system.

Fiscal decentralization is one of the components of economic reform. It is for the purpose of increasing the autonomy and responsibility of the local government. With the decentralization, the social charges which relate to local development are financed out of local government's budget. As the revenues generated by SHI are limited, local governments are often forced to continue funding health care through local budget (Figueras et al., 2004). The development of SHI depends on local economic level. The decentralization therefore enlarges the inequality of health protection across the regions and consequently impedes the unification of different insurance schemes.

Another obstacle is the urban/rural inequality. During the period of command economy, the governments of CITs put accent on the development of industry. Due to the lack of resources, the agriculture sectors were sacrificed for the needs of industrial sectors. The direct result of this strategy is the dual economic structure: a well developed industrial sector exists side by side an underdeveloped agricultural sector. Correspondingly, the living levels and infrastructure enjoyed by the urban and rural population are substantially different. Regarding to health sector, it is

reflected by much higher physical and financial obstacles faced by the rural population compared to urban population in the access to the health services. As rural and urban regions have totally different endowments, it should be difficult to mix the rural insurance pool with the urban one.

The size of rural population can be captured by its proportion in total population. The lower developed economy is normally associated with higher share of rural population. It is nevertheless expected that the share of rural population will decrease with industrialization and urbanization. As shown in the Table I.9, the average proportion of rural population is 69 percent for LICs, 46 percent for LMICs, and 36 percent for UMICs. This distribution is similar to that among world income groups, which indicates that the economic development level is a more important determinant of population structure than political regime.

**Table I.9** Percentage of rural population by income groups in 2005

		Rural population ( percent of total population)	
		World	CIT
UMIC	Mean	35,74	35,52
	(SE)	(19,76)	(7,06)
LMIC	Mean	46,41	45,84
	(SE)	(17,45)	(13,69)
LIC	Mean	68,59	69,35
	(SE)	(12,89)	(14,00)

Data source: WHO 2008, Health for All Database

A third element which impedes the realization of universal coverage is the fragmented administrative structure of health system. The CITs often hold very complicated administration structure linking to the communist regime. Chinese health system, for example, is under the leadership of the state council. In addition to Ministry of health which is the health sector specific administrative body, 8 other ministries are also involved in financing and delivering of health services<sup>7</sup> (Liu and Yi, 2004). The Russian Health System is also under the control of five administrative departments: the Ministry of Health system, the mandatory health insurance system, the san-epid system, the parallel systems, and the Russian Academy of Medical Sciences (Chernichovsky and Potapchik, 1999).

The fragmentation of the administration prevents the system from operating as a single national system. It asks for the coordination of different ministries which might hold different objectives in their operations. It increases administration cost and reduces the transparency of the information, which consequently decreases the efficiency of the system. It also evokes the resistance from the interest groups which benefit from the former fragmented system.

To sum up, economic development is an important premise for the unification of health insurance pools in the CITs. However, institutional change would be an even more demanding

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<sup>7</sup> They are: Ministry of labor and Social Security, State Food and Drug Administration, General Administration of Quality Supervision, Inspection and Quarantine, Ministry of Civil Affairs, National Population and Family Planning Committee, Ministry of Finance, National Development and Reform Commission, Other Ministries (Ministry of Defense, Ministry of Public Security, Ministry of Education, Ministry of Transportation, Ministry of Railway, State Office of Posts and Telecommunication, etc)



challenge. The engagement of government in the development of health insurance is indispensable, especially when it concerns the diminution of financial capacity gap among different insurance pools. However, it is also important to guarantee the independence of health insurance institutions relative to other administrative sectors so that health insurance could pursue its predetermined objectives.

#### **4.5. Concluding Remarks**

Regarding to the objective of obtaining universal coverage with SHI system, three questions are addressed in particular: the identification of contributor, the choice of insurance coverage, and the unification of fragmented market. Identification problem is issued from the imperfect development of market economy, including weak regulation system and large informal sector. It reduces the compliance rate for insurance enrollment and encourages free-ride behaviors. Due to the shortage of insurance funds, the priority of reimbursement needs to be found. It is a dilemma to choose between privileging small but frequent diseases and privileging important but rare diseases. Regarding to the unification of insurance pool, the difficulties stem from great income gap observed in the low- and middle-income countries. The larger is the income gap, the more difficult it is to persuade the well endowed insurance pools to finance the less well ones. To sum up, SHI might be a way to realize universal coverage, but its good function requires for a well established market mechanism with adequate resources and a relatively egalitarian society.

After more than 20 years of transition, the economies of CITs have entered into a relatively stable phase with high growth rate. However, income inequality is increased as well. The promotion of PHC still needs important supports from the government. SHI might be a solution for the decline of public protection and the increase of OOP payment. However, to finally realize universal coverage, the efforts need to put on the construction of balanced development strategy.

### **V. Conclusions and discussions**

In this chapter, we compared health resources, health burdens and health systems around world. The discussion has highlighted the substantial gap in the availability of health resources between low- and middle-income countries and HICs. This means that in absolute term, the low- and middle-income countries have not enough resources to answer all medical needs. The coverage of public health financing would not be as comprehensive as in the HICs. Nevertheless, by choosing appropriate priority of health financing, it is still possible to maximize health outcome with given resources.

The poor are more often excluded from health system due to payment difficulties. In order to promote equal access to medical services, public spending then should favorite the poor. The basic health services are highly cost-efficient, especially for the LICs where the infectious diseases are still the main causes of death. Given the budget constraint, the government of low- and middle income countries then should promote the equal access to basic healthcare.

However, the reality is quite contradictory. Gwatkin et al. (2005), for example, investigates the gap in the use of basic medical services between the poor and non-poor household in 56 low- and middle-income countries. They found that the richest 20 percent households use more often

all the cited basic medical services<sup>8</sup> than the poor. This inequality in the access to medical services at least partly contributes to the inequality in infant mortality observed in this region.

Problem emerges when public resource is insufficient to answer all the demand for health services. The experience of the low- and middle-income countries proved that the shortage of public financing brings two results: 1) the deterioration of the quality of public health services; 2) the boom of private informal sector (Jack, 2000). The former forces the patient-consumer to bypass the cheap public health facilities for more expensive private care. The latter increases the individual's health spending charge in an informal way. Both drive to the decrease of quantity and the deterioration of quality of the public health service provision.

The CITs countries share the same difficulties linking to economic development level as other low- and middle-income countries do. However, their economic mutation brings additional challenges. Health systems in CITs were formerly based on the state funds and public provision. As medical services are set free or at low cost for all the population, there is no need to identify the target population. During the period of transition, the public funds shrank considerably in a relatively short time. As no alternative financial protection had yet established, many households were found totally exposed to health financial risks. OOPs became the main health financial sources. The public health provision loses its sense of ensuring the accessibility of health service to the whole population. These phenomena are commonly observed in the years of 1980s among the CITs (Ensor, 1999).

There are urgent needs to re-establish health security system. Two options are available. The first is to keep former public health provision system and increase public funds by levying additional general taxes. The second is to replace state-funded system with SHI in hoping to collect additional funds for health sector and make health system more accountable. However, the large informal sector observed in the low- and middle-income countries limited insurance funds. Contributions (payroll taxes) from the formal sector do not either automatically easier to collect than other taxes due to the low compliance rate. Based on the preceding comparison of CITs which have implemented SHI with those which kept NHS system, it can be induced that the final share of public spending in total health expenditure depends more on the country's economic development level than health financing system per se.

The popularity of SHI among CITs, nevertheless, can be explained by the memory about the inefficiency and low responsiveness of the public health provision under the command economy. It makes the higher income CITs reluctant to keep the former NHS system. The SHI constructs an innovative option which brings the hope of an amelioration of the efficiency and quality of the system by, at least theoretically, involving variant stakeholders into the health financing system. All the upper-middle income CITs and half of the lower-middle income CITs have replaced the NHS by SHI.

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<sup>8</sup> The cited services include antenatal care, oral rehydration therapy, full immunization, medical treatment of acute respiratory infection, attended delivery, medical treatment of fever, modern contraceptive use (women).

For the countries which are covered by SHI system, there is a direct connection between the status of contributor and that of beneficiary, even if the level of protection does not necessarily in proportion with contribution. This connection imposes several challenges in the realization of universal coverage relative to the state-funded system. First, under the insurance system, the question of identification could impede the extension of coverage; while under the state-funded system, there is no need for identification. Second, under insurance regime, as the insured can directly compare the benefice with the contribution, they are more exigent on the benefits and the credibility of the scheme. Under the state-funded system, as the health spending is financed out of general budget, the tax-payers are not necessarily aware of the medical costs they have paid in form of the taxes. As consequence, they are much less sensible to the link between the benefits and the cost of health financial protection. Third, the problem of fragmentation is more important under the insurance mechanism than under the state-funded system, because of the independence of different insurance pools.

In the second part of the thesis, we will focus our discussion on a specific country: the People's Republic of China. As one of the biggest countries in transition, China is reforming its health financial system by establishing a universal social health insurance system. Some of the difficulties encountered by the government during reform may be representative and the lessons could be instructive for other countries in transition.

## **Part II.**

# **Chinese Health System in Transition and the Impact of Reform**



## I. Country's background

### 1.1. General presentation

The People's Republic of China (the PRC, for short), covering an area of 9.6 million km<sup>2</sup>, is the third biggest country in the world in terms of surface area. Twelve countries share frontier with P.R. of China: North Korea, Russia, Mongolia, Kazakhstan, Kirgizstan, Pakistan, India, Nepal, Bhutan, Burma, Laos, and Vietnam (Figure II.1).

**Figure II.1** Map of P.R. of China



Source: online [http://library.thinkquest.org/07aug/01105/China/china\\_map.gif](http://library.thinkquest.org/07aug/01105/China/china_map.gif)

With about 1.3 billion population, the PRC is the most populated country in the world. The country experienced a period of high population growth in the 1950s-1970s. The natural growth rate<sup>9</sup> attained 2.6 percent in 1970 (Chinese Health Statistic Yearbook 2008). The population growth put great pressure on the country to maintain people's living level. In 1979 the Chinese government adopted "One-Child" policy which encouraged couples to have no more than one child. Chinese natal rate reduced from 3.3 percent in 1970 to 1.8 percent in 1979. Until 2005, the natal rate was stagnated at 1.2 percent (Chinese Health Statistic Yearbook 2008). Correspondingly, the growth rate of population decreased to 0.64 percent in 2005, which was inferior to the median of LMICs (Table II.1).

Thanks to the policy of Nine Year Compulsory Education, China's education level has considerably progressed. The illiterate ratio, which was estimated at about 80 percent of

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<sup>9</sup> Natural growth rate = natal rate - mortality rate. It reflects the net growth rate of population.

population in 1949, reduced to 22 percent in 1990 and 6.7 percent in 2000 (1990 and 2000 Population Census of the PRC).

**Table II.1** A general glance at the country (in 2005)

Indicators	China	Median of LMICs
Population (millions)	1300	4.2
Annual population growth rate (in percent)	0.64	0.97
GDP per capita, PPP (constant 2000 international \$)	6012	4517
Gini coefficient	47	40
Prevalence of undernourishment (in percent of population)	12	9
Tuberculosis cases detected under DOTS (in percent)	80	66
Life expectancy at birth (years)	71.8	71
Infant mortality rate (per 1000 live birth)	23	26
Health expenditure per capita (current US\$)	71	106
Total health expenditure (in percent of GDP)	4.7	6.1
Public health expenditure (in percent of GDP)	1.79	3.55
Hospital beds (per 1,000 people)	2.45	2.58
Number of physician (per 1,000 people)	1.51	1.12

Data sources: World Development Indicator 2008, World Bank

## 1.2. Government and administrative hierarchy

The Chinese Communist Party (CCP for short) has been the only ruling party since the foundation of the PRC in October 1st, 1949. Nevertheless, eight other political parties assist the CCP in its administration. Most of them represent academic and business sectors. The Chinese People's Political Consultative Conference (CPPCC) is the political organization through which parties and people from all walks of life participate in the democratic consultation of national affairs.

Vertically, China has five administrative hierarchies. One central government leads four levels of local government. Local government advances through province, prefecture or municipality, county, and township as the geographical area of jurisdiction decreases. 27 ministries are organized by the State Council. Each ministry has its local bureaus which are under the dual leadership of the local authority and the corresponding office, bureau or ministry at the next higher level. The village is the smallest grass-root administrative unit. It is under the supervision of the township government, but is not included in the governmental hierarchy. The rural population resides mostly in the village or township, while the urban population resides in the county and above.

Horizontally, at provincial level, the country is composed of 23 provinces, 4 municipalities, 5 autonomous regions, and 2 special administrative regions. Beijing is the capital of the country, with a population of about 11 million (Chinese Statistic Yearbook, 2008).

## 1.3. Economic situation

China is the biggest emerging country. In 2005, it is ranked the fourth biggest economy in terms of total GDP by the World Bank. The economic growth has kept a consistently high level,

about 9.8 percent per year in the last 30 years (Chinese Statistic Yearbook, 2008). The poverty is considerably reduced. The percentage of population living with less than \$1 per day dropped from 64 percent in 1981 to 10 percent in 2004 (World Development Indicator, WDI for short, 2008).

In contrast, the living standard of Chinese people remains relatively low and unequal. In terms of GDP per capita, China is still classified as a LMIC with a GDP per capita of \$6012 in 2005<sup>10</sup>(Table II.1). Chinese income inequality is greater than that of LMICs in general. The Gini coefficient was 47 for China against 40 for the median of LMICs group in 2005 (Table II.1). High inequality has negative impact on population's health. The Chinese prevalence of undernourishment, for example, was higher than that of LMICs median, albeit a relatively high income level.

#### **1.4. Evolution of health status**

Chinese health status had experienced a quick amelioration in the years of 1960s and 1970s. In 1960, Chinese Life Expectancy at Birth (LEAB) was 36 years and IMR was 150 per 1000 live births (WDI, 2008). In 20 years (from 1960 to 1980), Chinese LEAB was raised to 67 years and the IMR was reduced to 49 per 1000 live births (WDI, 2008). However, the health progress seemed to stagnate after the 1980s. In the following 20 years (from 1980 to 2000), LEAB stayed at around 70 years and IMR reduced only 16 units, from 49 to 33 per 1000 live births (WDI, 2008). China's health status is now close to the median of LMICs, LEAB has slowly increased until 71.8 years in 2005 against 71 for the median of LMICs. The infant mortality rate is 23 per 1000 live birth against 26 for group median (Table II.1).

To sum up, China is a big country in transition. It has won remarkable economic growth in the last 30 years. However, large population and relatively weak economic bases still impose great challenges in raising people's living level and health status. Chinese health progress was remarkable in the period before 1980s. However, there is evidence that the health progress slowed down during the period of economic transition. To better understand these changes, we discuss below the social-economic mutation caused by the market-oriented reforms.

## **II. History of economic transition**

At the foundation of P.R. of China, the Chinese Communist Party (CCP) re-constructed the country under a socialist regime with command economy. Two important characteristics marked this regime: nationalization and social property. With the idea of nationalization, all resources belong to the state. Enterprises were only production units. They remitted all profits to the government and received in return investments from the latter. The government redistributed social resources according to centrally planned development strategies. No private transaction was allowed. With the idea of social property, no private property was encouraged. The labor force was oriented by mass interests rather than self-interests. In return, it is the responsibility of the state and communities to guarantee individuals' security. An independent "Public Wellbeing Fund" was set at each work unit to finance the workers' welfare needs, such as education,

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<sup>10</sup> Adjusted by Purchasing Power Parity in constant 2000 international dollar



housing, and health (Liu and Wang, 1991). Under this regime, the labor force was underpaid in nominal terms, but enjoyed a relatively comprehensive welfare system.

Since the end of 1978, a series of economic reforms have been launched in attempt to shift the country from central planned economy to market-oriented economy. These reforms contained three key aspects: 1) *the marketization and the growth of the non state-sector*. In rural areas, it concerned the replacement of collective production system by household production responsibility system. In urban areas, it took three forms: the privatization of state-owned enterprises (SOEs) with poor performance; the autonomy of SOEs with good performance; and the creation of private enterprises. 2) *The fiscal decentralization*. It re-defined the relationship between the central and local government. Ever since, the local government needs to ensure the expenditure for local development by its own budget. It is known as “eating in the separate kitchen”. 3) *The opening of market*. It includes the price liberalization and the opening policy as regard to international trade and foreign investment (Ma, 2000).

### **2.1. Marketization and growth of the non state-sector**

At the end of 1970s, first sprouts of the market economy grew in the rural areas of Anhui, a province in the east of China. Some agricultural brigades signed production contracts with their members, according to which the households, once having met the production quota, were allowed to sell the exceeding products on a free market and keep the profit. This is the germ of the “Household Responsibility System”. The fundamental change, compared to the “Collective Production System”, is that the individual rather than the collectivity is held responsible for the profits and losses of production. The production ever since is closely linked to the self-interest of farmers.

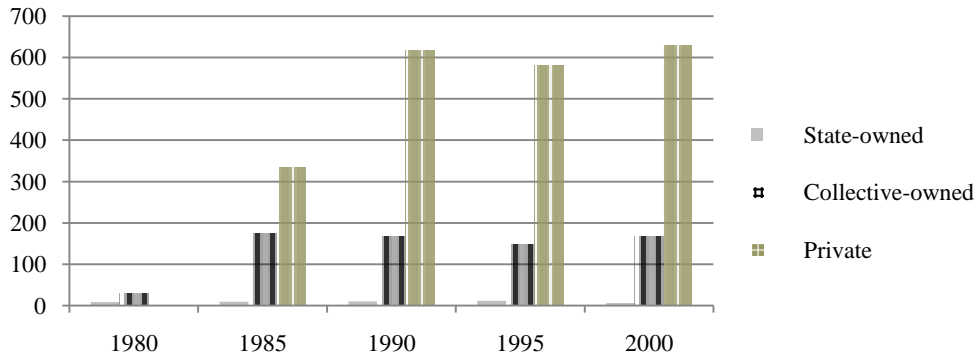
The efficiency gain from the household responsibility system was remarkable. The growth rate of gross agricultural output value increased from 1.7 percent in 1977 to 9 percent in 1978 (China Statistic Yearbook 1983). The central government recognized the advantages of shifting financial responsibilities from central to local managers. The practices were quickly replicated in the rest of the country during the 1980s.

In urban areas, the focus of reform was put on the status of state-owned enterprise (SOE). The idea was to give more management autonomy and financial responsibility to the SOEs. In 1978, a pilot program was launched in Sichuan Province to expand enterprise autonomy in six selected enterprises. Similar to the reform in rural areas, the selected enterprises, when produced more than the state-set quota, were allowed to keep the exceeding profit. Following the success of the pilot program, in 1980, the experiment expanded to 6,600 large- and medium- sized SOEs, which accounted for 60 percent of the national budgeted industrial output and 70 percent of national industrial profits (Wu, 2004).

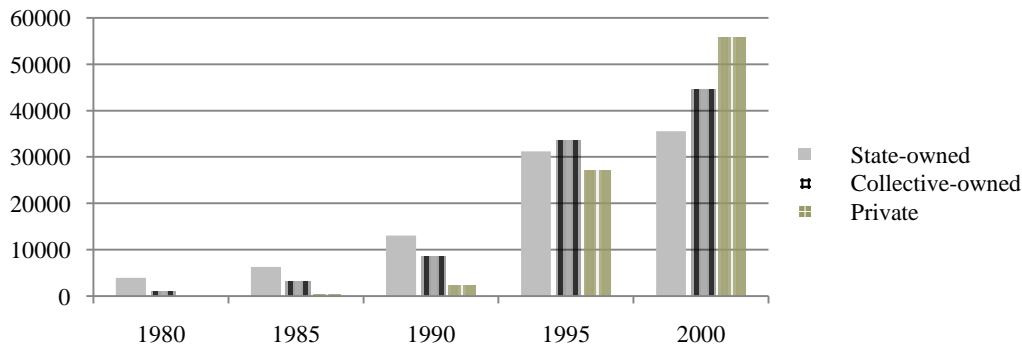
In parallel, the government also released the control on the creation of private enterprises. The number of private enterprises radically increased during the 1980s. By 1980, only 400 private enterprises were registered in the national account (Chinese Statistic Yearbook 1981). This number had climbed to 5 million or 65 percent of total enterprises in 1985 and 8 million or 78 percent of total in 1990 (Figure II.2a).

If the period of 1980s was marked by a tide of the creation of private enterprises, the period of 1990s was characterized by the escalation of the value of their outputs. Comparing Figure II.2 a and b, it can be noticed that in the 1980s the output of private enterprise accounted for no more than 10 percent of GDP, albeit the rapid increase of their number. By contrast, in the 1990s, the number of private enterprises merely changed, meanwhile their production rose to 41 percent of GDP. This evolution indicates that the market turned from quantitative to qualitative development.

**Figure II.2a** Number of industrial enterprises by ownership (10 000 units)



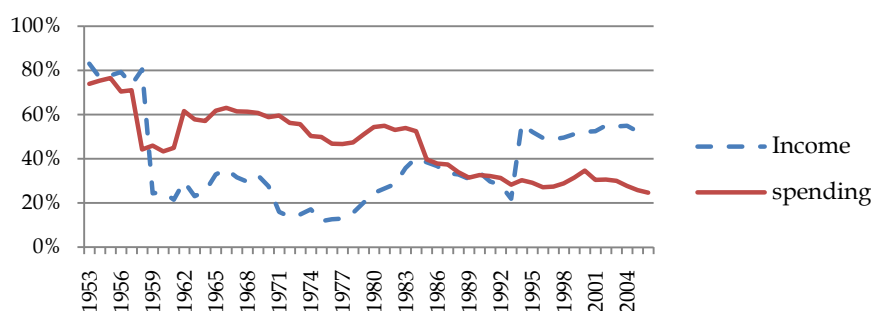
**Figure II.2b** Gross industrial output value by ownership (10 million Yuan)



Data source: Chinese Statistic Yearbook 2001

## 2.2. Fiscal decentralization

Before 1980, China's fiscal system was characterized by high degree of centralization. The taxes and profits were at first handed out to the central government and then re-allocated to the local government in function of centrally developed planning. Local government was only the regional branch of the central government. It executed central fiscal policies and had little budget autonomy. As illustrated in Figure II.3, before 1980s the fiscal revenues collected by central government represented around 25 percent of total revenues, while its expenditure took more than 50 percent of total. This shows proof that the revenues collected by local government were used by central government.

**Figure II.3** The proportion of central government income/spending in total

Data source: Chinese Statistic Yearbook 2007

This fiscal system allowed central government to divert national resources toward the domains which were identified as strategic. However, it did not encourage local government to take initiatives to develop local economy. As the budget of local government mainly depended on the allocation of the central government, the development of each province relied rather on its relationship with central government than on its economic potentials. In addition, the local government bore low pressure to keep budget balance as long as they got subsidies from the central government. As a result, the local government was more motivated to construct a good relationship with their superior than to develop local economy (Ma, 2000).

In order to optimize the use of local resources and enforce the commitment of local government to regional development, a series of fiscal reforms were launched since the early 1980s. The main idea was to separate the central-local fiscal budget. The most important reform concerns the establishment of tax assignment system in 1993-94. The new system devised the tax bases of the central and local government in function of tax categories. Both the central and local government need to ensure its expenditure by its own fiscal income (Ma, 2000).

In order to guarantee the independence of central/local budgets, the central government also made a major effort to establish its own revenue collection bodies. The share of the revenues of central government in total jumped from 22 percent in 1993 to 56 percent in 1994 (Figure II.3). On the other hand, the government expenditure gradually shifted from the central to local government. The share of local government spending in total public spending rose from 45 percent in 1978 to 74 percent in 2004 (Figure II.3). The expenditure for public health and social security were henceforth fallen under the charge of local government (Uchimura and Jütting, 2009).

The 1993-94 fiscal reform established a clearly defined financial relationship between the central and local government. As local authorities now have more autonomy in collecting and using taxes incomes, they show more enthusiasm and commitment for local economic development. On the other hand, as regional development now relies considerably on the local budget, the government of poor regions has much more difficulties in financing public service than that of rich regions. This, in return, imposed the risk of the enlargement of disparities across regions.

### **2.3. The opening of market**

In line with the economic liberalization inside of the country, China also gradually opened its market to the rest of world. From 1979 to 1984 four cities in the province of Guangzhou and Fujian were chosen as exclusive experimental plots for opening policy. They are so-called Special Economic Zones (SEZs). After 1984, 14 other coastal cities were chosen to enjoy the preferential policies to develop importation and exportation sectors and attract foreign investment. Since 1992, many inland cities applied centrally or locally designed preferential policies to either construct trade relationship with opening zones or directly attract foreign investment (Gao and Lu, 1992).

The opening policies, in addition to other reforms, contributed to economic prosperity. The average annual growth rates of GDP by province are 2 percent, 17.5 percent and 42 percent for the periods of 1984-88, 1988-92, and 1992-96 separately (Chinese Statistic Yearbook, 1985, 1990, 1993, and 1997).

## **III. Social mutation brought by market-oriented reforms**

With the economic reform, the ideological issues gave way to economic needs. The rights on private property were recognized by the government and protected by law. The market allocation gradually replaced central planning and became the main rule for resource distribution. These changes caused rather confusing results on social aspects. It is reflected in the decrease of social protection and the increase of inequality.

### **3.1. Decrease of social protection**

#### **3.1.1. Change of work unit**

Under the central planned economy, the government built welfare system on the basis of work units. In addition to production activities, the work unit was also in charge of the provision of necessary social services, such as education, health, culture, and sport. In urban areas, the main work units were the public institutions and SOEs. The welfare of urban employees, as well as their dependents, was therefore either financed by the government budget or by the "Public Welfare Fund" of SOEs. In rural areas, the population was grouped by agricultural communes. Each commune ensured the welfare expenditure of its members by its "Public Welfare Fund" (Wen and Hays, 1976).

The economic reforms fundamentally changes the way that social life is organized. The work unit is not anymore the organizer of social life but simply production unit. In urban areas, private enterprises did not have the obligation to offer comprehensive social protection to their employees. Due to the decrease of government subsidies, the SOEs in financial difficulties were unable to maintain the welfare service of their employees. And for the SOEs in better financial situation, the intense market competition also made them reluctant to offer comprehensive welfare services. In rural areas, the household production responsibility system changed the financial link between farmers and their communes. Under the collective production system, the commune controlled all agricultural products. In return, it ensured the welfare needs of farmers. Under the household production system, the farmer needs only to fill contracted quota and has

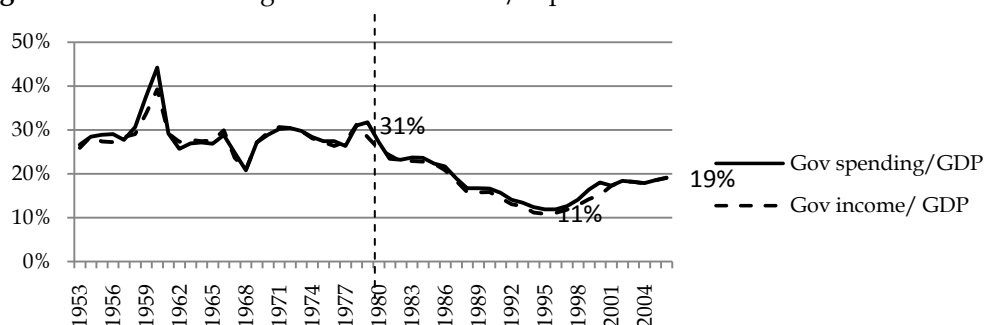
discretion on exceeding products. In return, the household ever since needs to ensure welfare needs by its own budget.

### 3.1.2. Decline of public resources

As the consequence of privatization, public resources are considerably reduced. As illustrated in Figure II.4, before 1978, the government revenues accounted for more than 30 percent of GDP. During economic reforms, the share of government income in GDP continued to decline and reached the bottom of 11 percent in 1994. The reform of tax assignment system in 1994 allowed the government to stabilize and then gradually increase the fiscal income in the following years. The fiscal income rose from 11 percent of GDP in 1994 to 19 percent in 2004 (Figure II.4). This level is close to the average of the OECD countries in the same year, 21 percent (WDI, 2008).

The government spending depends strictly on its revenues. Few budget deficits can be observed in the last 50 years (Figure II.4). The decline of government income during the period of economic reform directly resulted in the reduction of public expenditure. The government expenditure fell from 32 percent of GDP in 1978 to 12 percent of GDP in 1995 before re-climb to 18 percent in 2000. This decline of public spending was due to both economic reforms and the government's willingness to withdraw from the market. As social protection system was mainly financed out of public budget, the decline of public spending would result in the cut of government subsidies for health services.

**Figure II.4** The share of government revenue/expenditure in the GDP



Data source: Chinese national statistic yearbook 2008

## 3.2. The increase of inequality

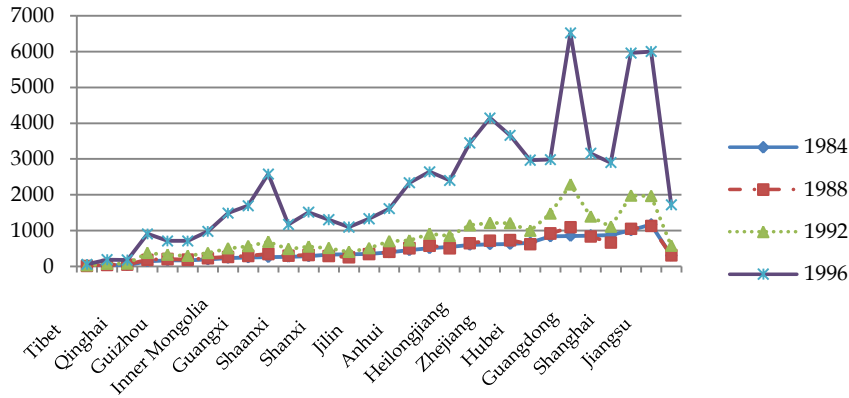
Although the economic growth was striking in the last 30 years, GDP per capita increased 50 times in nominal term and 10 times in real term (Chinese statistic yearbook 2008), the fruits of the economic prosperity are distributed in an increasingly unequal way among different regions and social groups.

### 3.2.1. Disparity induced by regional policy

The regional preferential policy enlarged economic gap between coastal and inland provinces. Guangdong, for example, is the province where three out of four SEZs are found. Its GDP growth has been among the most rapid ones since 1984. In contrast, remote west provinces,

like Qinghai, constantly suffer from both the low level and low growth rate of development. The GDP gap between Guangdong and Qinghai increased from 19 times in 1984 to 33 times in 1996. The most important difference in provincial GDP was observed in the 1992-96 period when the opening policy was extended to inland cities (Figure II.5).

**Figure II.5** GDP by province in 1984, 1988, 1992 and 1996 (100 million Yuan)



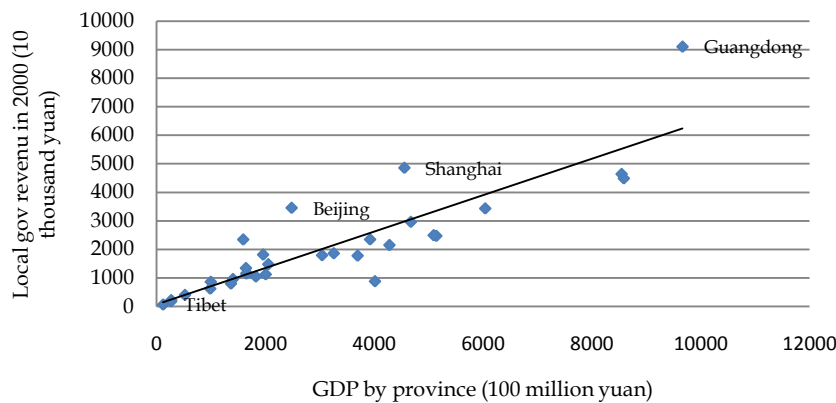
Data source: Chinese statistic yearbook 1985, 1990, 1993, and 1997

Note: The provinces are ranked by their GDP in 1984, the year when the opening zone was enlarged for the first time

The budget of local government directly depends on the development of local economic. Figure II.6 displays clear correlation between local government revenues and provincial GDP. The budget gap is striking. The government revenue of Guangdong, for instance, was 169 times higher than that of Tibet in 2005.

The local governments' capacities to collect revenue are different too. For example, Guangdong (the first economic opening zone), Shanghai (the most important economic center), Beijing (the capital) have higher local government revenues than other provinces at similar economic development level. As the provision of public goods and services are mainly financed by local budget, this inter-regional disparity indicates that local government will not be able to offer the same level of public social services.

**Figure II.6** GDP and local government revenues by province in 2000

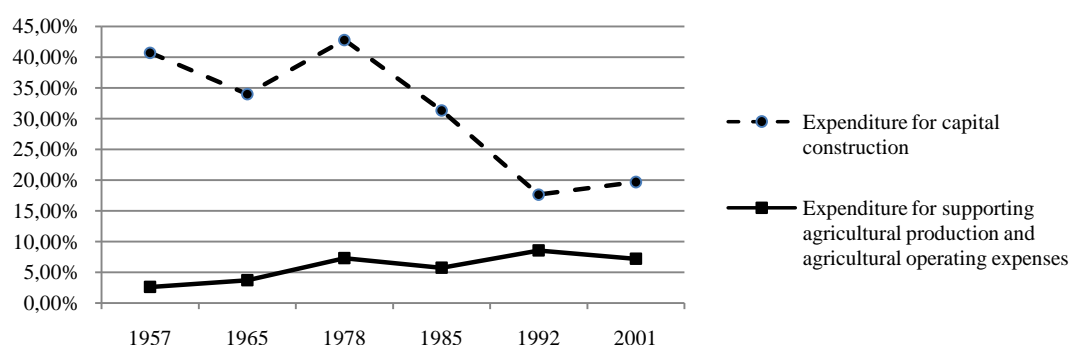


Data resources: Chinese Statistic Yearbook 2001

### 3.2.2. Urban-rural disparity

China is an agricultural country with about 65 percent of rural population in 2005 (World Health Organization online country data<sup>11</sup>). The development of agricultural sector is crucial for the survival of a country like China who has one fifth of world population to feed. However, since the foundation of PRC, the agricultural sector has always been sacrificed in favor of the industrial sector. As can be observed in Figure II.7, before 1978, around 40 percent of government expenditure was put on the capital construction against less than 10 percent for the agricultural sector. Sharp decline of government investment on capital was observed after 1978. This is mainly due to the privatization and the change of government role on the market. Nevertheless the government spending in industrial sector continues to be 2 to 3 times higher than that in agricultural sector.

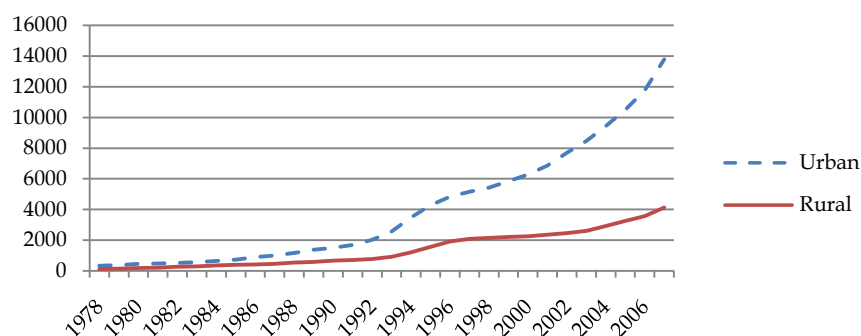
Figure II.7 Government expenditure on industrial and agricultural sectors



Data source: Chinese statistic year book 1981 and 2002.

The direct result of the skewed public investment is dual economy, i.e. a modern capital intensive industrial sector co-exists with a relatively underdeveloped labor intensive agricultural sector. The contribution of the agricultural sector to the GDP decreased from 46 percent in 1955 to 11 percent in 2007, while that of the industrial sector climbed from 24 percent in 1955 to 49 percent in 2007 (Chinese Statistic Yearbook 2008).

Figure II.8 Evolution of urban and rural household income per person per year since 1978 (Yuan)



Source: Chinese Statistic Yearbook 2008

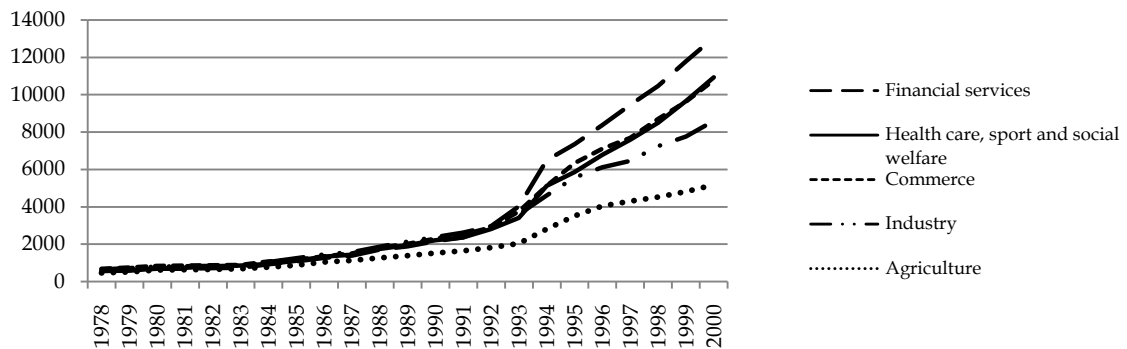
<sup>11</sup> <http://apps.who.int/ghodata/>

Although the disparity between urban and rural areas stem from the industrialization which initiated before economic reform, it is considerably enforced after the reform. As shown in Figure II.8, the income fork between urban and rural area has enlarged constantly since 1978. The urban-rural income ratio increased from 1.8 in 1982 to 3.3 in 2006. This implies an enlargement of the gap of living level between rural and urban residents.

### 3.2.3. Disparity of income by professions

An important factor of economic reform is price liberalization, including the price of labor force. As shown in Figure II.9, from 1978 to 1992, the income inequality was mainly reflected in the income gap between rural and urban residents. However, since 1992 wages in different sectors diverged quickly. The opening policy connected Chinese markets with international ones. The prices of inputs and outputs which answer the needs of international market climb quickly. According to Figure II.9, from 1992 to 2000, the wages in tertiary sector, such as financial services (increased 2.8 times<sup>12</sup>), health services (increased 2.5 times), and commerce (increased 2.4 times), augmented most quickly, followed by the industrial sector (1.9 times) and agricultural sector (1.8 times).

**Figure II.9** Evolution of annual wages by sectors since the economic reforms (Yuan)



Source: Chinese Statistic Yearbook 2001

To sum up, with economic reforms, the financial responsibility for social protection gradually shifted from central government to local government and from local government to individuals. On the other hand, income inequality is also enlarged among regions and individuals. This change implies that China carries a growingly unequal social protection system. Under this context, we will discuss in more details the changes occur in Chinese health system and its impact on people's well being.

This part of thesis is organized in the following way. Chapter 3 presents Chinese health system before economic reform and analyzes the evolution of health system following economic transition. Chapter 4 studies in more details health spending burden in the years of 1990s, the period during which public health financial system was most perturbed by economic reforms. Chapter 5 focuses on health insurance system reform since 2000. It represents the major components of reforms; compares new system with former one; and lastly conducts an empirical

<sup>12</sup> All wages are calculated at 2000 constant price.



study on the impacts of new rural cooperative medical system on the activities and financial structure of township health centers in the Weifang prefecture.

## Chinese Health System in Transition

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**A**t the foundation of PRC, the health system of the country was seriously damaged by the war. The health status of population was poor. In 1949 there were 3670 health institutions in total, 0.15 hospital beds per 1000 population, and 0.67 doctors per 1000 population. The life expectancy at birth was 35 years, the infant mortality rate (IMR) was 200 per 1000 living birth, and the maternal mortality was 15 per 1000 population. The infectious diseases were the main causes of death (Chinese Health and Statistics Digest 1981).

During the period of 1949 to 1970s, the emphasis of the government in health sector was put on the construction of public health delivery system. From 1949 to 1952, the number of hospitals increased from 2600 to 3540 and that of clinics increased from 769 to 29050. In the following ten years (1952-1962), the number of hospitals and clinics was further increased by 6 times (Chinese Health and Statistics Digest 1981).

Comprehensive public health protection systems were established on the basis of work units. In urban areas, it concerned the Government Insurance Scheme (GIS) for the employees of the government and the Labor Insurance Scheme (LIS) for the employees of State-owned enterprises (SOEs). In rural areas, it concerned the Cooperative Medical System (CMS) for the farmers of agricultural communes. According to the estimation of the World Bank (1997), in the middle of 1970s, the total urban population and more than 90 percent of rural population were covered by state or community based health insurances.

During the 30 years prior to economic reform, the PRC witnessed outstanding health progress despite of low income level. The life expectancy increased from 35 years in 1949 to 67 years in 1980 and the IMR reduced from 200 to 49 per 1000 living birth. This progress was obtained with extremely low cost. The medical spending accounted for about 1.5 percent of government spending, or 8 Yuan per capita (Chinese Health Statistic Yearbook 1987).

However, the economic reform since 1978 has caused profound repercussions in health sector. The challenges came from the shortage of public financing, the increase of medical cost, and the decrease of insurance coverage.

Reforms in health sector were launched in 1985. At its initiate stage, the focus of these reforms was put on the hospital system. The primary objective was to clarify the financial relationship between the government and hospitals. This was done by the government according more management autonomy to the hospitals in return for more budget accountability.

Hospitals were asked to be self-sufficient for their running expenses. The financial pressure pushed hospitals to gradually turn away from their social engagement and become more and more an economic entity. At the same time, public health protection system was weakened due to the reforms of privatization and decentralization. The coverage of health protection system

declined to about 30 percent of population in the middle of 1990s (World Bank 1997). Health spending burden shifted from the government to the individual. The share of out-of-pocket payment in total health spending rose from 20 percent by 1980 to 59 percent by 2000 (China National Health Account Report, 2005). The inequality in health financing was striking. According to the report of the World Health Organization (2000), China is ranked 188th out of 193 countries on the dimension of fairness of financial contribution.

Correspondingly, health progress slowed down since 1990s. According to World Bank's data, the IMR rate reduced only one unit from 45 to 44 per 1000 living birth in the first half of the 1990s and 44 to 37 in the second half. The immunization rate against measles dropped from 98 percent in 1990 to 85 percent in 2000.

Problems brought by the commercialization of hospitals drew attention of the government at the end of 1990s. A new wave of reforms was launched to revisit the system in a more comprehensive way. Re-establishing a universal health insurance system is a major content of the actual health reform.

In order to understand the objectives and challenges of the present social health insurance reform, it is useful to begin with a consideration of the period of planned economy as the present challenges has its roots in events before the economic transition. In this Chapter, we present Chinese health system structure stemming from the communist regime and its evolution during economic reforms.

## **I. Chinese health system in the period of command economy (1949-78)**

Chinese health system under the period of central planned economy was characterized by public provision of services at all government levels, public financing in urban areas, and community financing in rural areas. Public health activities put high-priorities on disease surveillance, mass immunization, health education, and environmental monitoring and improvement (Wen and Hays, 1976).

### **1.1. Structure of public health delivery system**

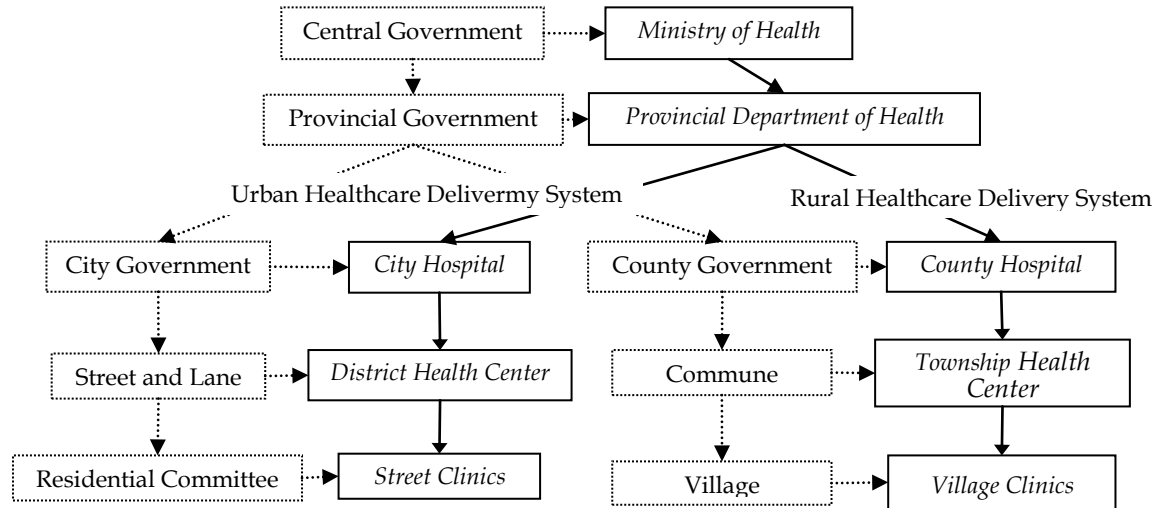
#### **1.1.1. From the point of view of administrative hierarchy**

In the period of central planned economy, Chinese government developed an integrated health system which aimed to provide free medical services for everyone. Under this system, health care was delivered by publicly owned health facilities which were organized in function of administrative hierarchy. Practically no private practice was allowed. The basic structure of this health delivery system has not changed nowadays.

The public delivery system of health services was organized by the Ministry of Health and aimed at the majority of population. Inside of this system, two parallel three-tier medical networks were constructed for urban and rural people respectively. In rural areas, the tiers consisted of village clinics, township health centers, and county hospitals or above. In urban areas, they were street health stations, community health centers, and district hospitals or above (cf. Diagram II.1). The majority of hospitals were found in the urban place. The government had the

ownership over the health facilities at township or above level. Village health stations, in contrast, were owned by the agricultural community. Public health facilities were under the double supervisions of the corresponding administrative-level government and the higher level health authorities (Eggleston et al., 2008).

**Diagram II.1** Public healthcare delivery system and the corresponding administrative levels

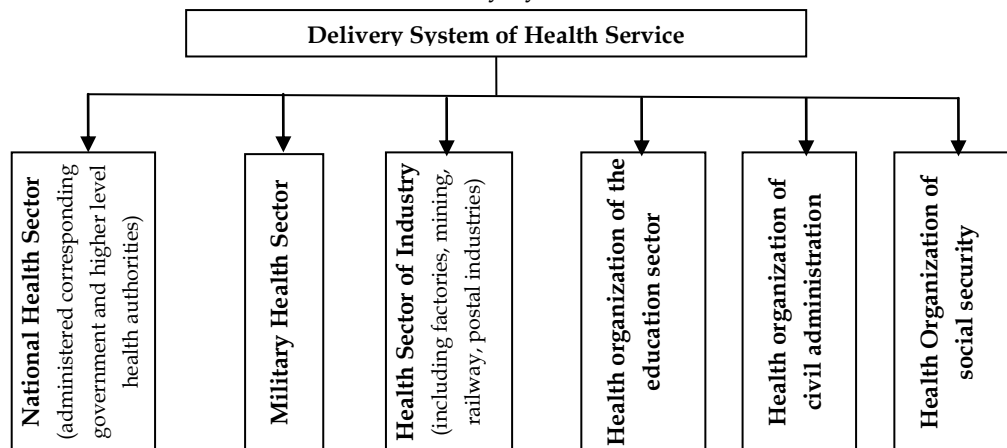


Source: Drafted by the author

Notes: the solid lines indicate the hierarchical structure of health system; the dash line indicates the corresponding administrative level.

Parallel to this Public Health System, there were also several health services delivery systems for specific regimes, such as Military Health Sector for the soldiers, Health Sector of Industry for the employee of the industry sectors (like factories, mining, railway and postal industries), as well as the health organizations for the education sector, civil administration sector and public security sector (Diagram II.2).

**Diagram II.2** Structure of health service delivery by sectors



Source: drawn by the author based on Liu and Wang (1991)

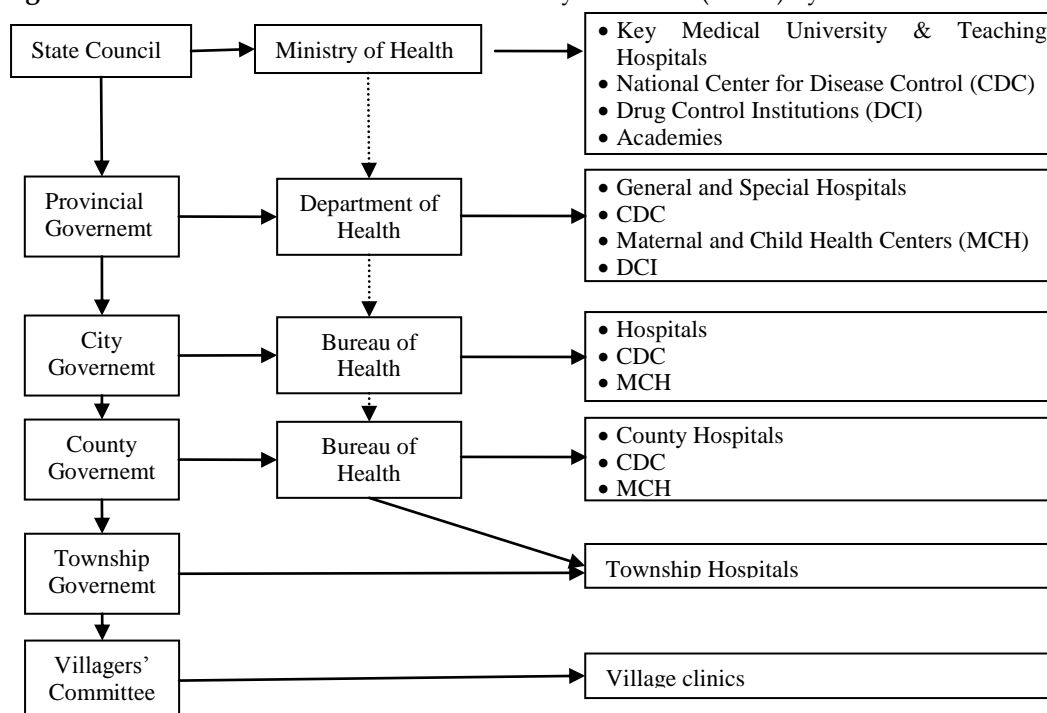
The delivery system of each regime had its own financial resources. The Health Sector of Industry was financed and operated by SOEs. Other special health sectors were financed and administrated by the corresponding ministries (Liu and Wang 1991). These parallel health systems provided medical services to the employees of SOEs or ministries who own them, but

also to the general population. Finally, hospitals of MOH, military, SOE and other enterprise were all found providing similar services in an uncoordinated manner. This constituted a potential source of waste in the sector (Liu and Wang 1991, Lindelow, 2004).

### 1.1.2. From the point of view of the category of health services

Health care is not homogenous commodity. Different medical services are associated with different economic characteristics. Preventive care, for example, creates important positive externality and thus is cost-efficient for the society. However, as it treats the potential health risk rather than actual illness problem, people are not always conscious about the necessity of preventive care and thus reluctant to pay for it. It is argued that, in this case, the government needs to take main responsibilities for services delivery in order to guarantee social gains. The curative care, in contrast, engenders few positive externalities. But it aims at present health problems. The individual is aware of the urgency of medical treatment and thus is more willing to pay for it. The responsibility of the government then should be to ensure that the individual will not be forced to abandon the health service due to the budget constraint or will not fall into the poverty trap due to medical expenditure. It is therefore useful to group health services and apply different policies to optimize the resource distribution (Gertler and der Gaag, 1990; Feinstein, 1993).

**Diagram II.3** Affiliated institutions of the Ministry of Health (MOH) by administrative level



Source: Liu and Yi (2004).

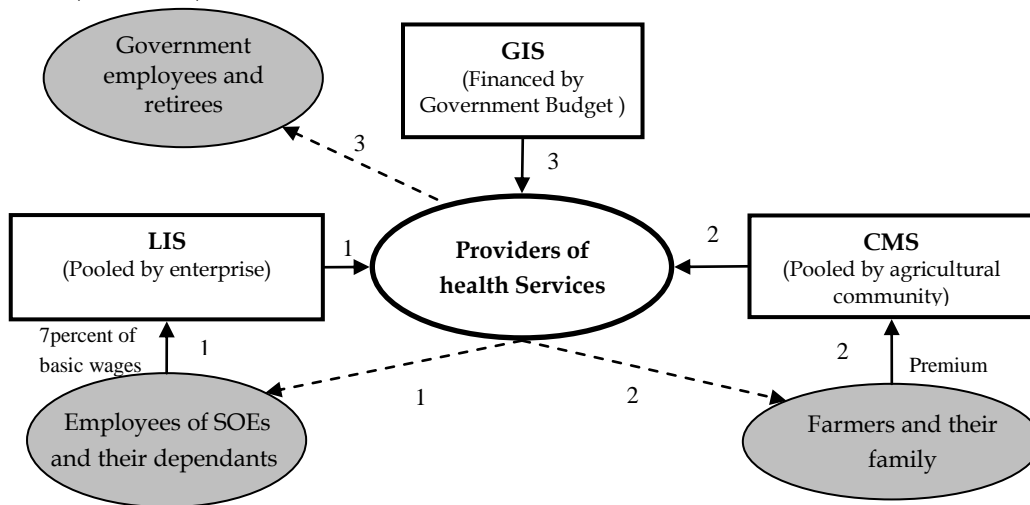
In the period of command economy, Chinese health services have been divided into following main categories: curative care, disease control, maternal-child health care (MCH), and traditional Chinese medicine (TCM). As can be seen in the Diagram II.3, the Ministry of Health organized separate departments to deliver different health services. Each department had its administrative bureau and health facilities at local level to ensure the execution of centrally planned policies. It is worth to note that the government did not set special health facilities to

deliver preventive care in township or village. The supervision and prevention of epidemics were undertaken by township hospitals and villages clinics.

## 1.2. The structure of health financing system

According to the nature of work units, three categories of health financing schemes can be identified: the Government Employee Insurance Scheme (GIS), the Labor Insurance Scheme (LIS) and the Cooperative Medical System (CMS). The first two mainly covered urban population and the last one was proposed to the rural population (cf. Diagram II.4).

**Diagram II.4** Organizational chart of the Chinese Health Financing System before the economic reform (1949-1978)



Note:

- The plain arrow indicates the financial flux in the health system.
- The dashed arrow indicates the health services flux.
- The numbers distinguish the exchange circle of money and services.

Source: compiled by the author.

GIS, introduced in 1952, was a state-founded health insurance scheme financed by government general revenues and pooled at national level. It covered government employees, college teachers and students, and military. The beneficiary could receive largely free outpatient and inpatient services at designated hospitals. These hospitals, mostly public, would be reimbursed by GIS based on the government-regulated fee schedule (Liu, 2002).

LIS was a self-insured scheme set by enterprises. The labour Insurance Act in 1951 mandated that the state-owned enterprises (SOE) with more than 100 employees must provide LIS. Each SOE retains 7 percent of wages<sup>13</sup> to construct a Public Welfare Fund which financed, among others, the medical expenditure. The Public Welfare Fund was self-sufficient. The deficit would be made up by the enterprise's post-tax profits. The employees covered by LIS had free access to medical services. Their dependant, nevertheless, needed to pay 50 percent of their medical cost out of pocket (Liu and Hisao, 1995). According to Chinese Health and Statistics Digest, the two health insurance systems covered 80 percent of urban population in 1979.

<sup>13</sup> This proportion was raised to 11-14 percent in the 1980s.

CMS was a mutual assistance scheme organized at village level. CMS had two main financial sources: insurance premiums from members of agricultural brigade and matching welfare funds from rural collective. Individual pays 0.5 to 2 percent of his annual income to the community. And collective welfare fund finances 30 to 90 percent of total medical expenditure of the village. CMS offers free medical services at village health stations. When patients needed to be referred to upper-level hospitals, the outpatient and inpatient fees were reimbursed as long as it was under the reimbursement cap. Nevertheless, the patient needs to pay for registration fees and expenditure exceeding the cap (Wen and Hays, 1976). According to Chinese Health and Statistics Digest, the CMS covers about 90 percent of the rural population in 1979.

During the first 30 years since the foundation of the PRC, government did great effort to rebuild and expand the human and physical capacity of health sector. According to Table II.2, between 1950 and 1978, the total number of health facilities was increased by 19 times. The number of medical professionals increased 3 times for the doctor and 11 times for the nurses. The most important growth was found in the number of hospitals and quantity of laboratory tests. The former rose by 223 times and the latter 422 times. We also observe the increase of the use of Western Medicine which implies a relatively open policy toward outside.

**Table II.2** Development of health sector from 1950 to 1978

	1950	1978	1978/1950
<b>Health institution (unit)</b>	<b>8915</b>	<b>169732</b>	<b>19</b>
Hospitals	288	64311	223
- At and Above County Level	288	8841	31
Sanatoriums	60	389	6
Clinics	3356	94395	28
Specialized Prevention & treatment Centers & Stations	30	887	30
Sanitation and Anti-epidemic Institutions	61	2989	49
Maternity and Child Care Centers	349	2571	7
Medicines and Chemical Reagent Test Labs	2	844	422
Research Institutes of Medical Science	3	219	73
Other Institutions	2174	3971	2
<b>Medical Technical Personnel(10000 persons)</b>	<b>55.5</b>	<b>246.4</b>	<b>4</b>
Doctor	38	103.3	3
- Doctor of TCM	28.6	25.1	1
- Doctor of Western Medicine	4.1	35.9	9
- Paramedics of Western Medicine	5.3	42.3	8
Senior and Junior Nurses	3.8	40.7	11
Number of doctor per 1000 population (person)	0.67	1.93	3
<b>Number of beds (10000 units)</b>	<b>11.9</b>	<b>204.2</b>	<b>17</b>
Hospitals	10	184.7	18
- At and Above County Level	10	109.3	11
Sanatoriums	0.6	5.1	9
Other Health Institutions	1.3	13.2	10
Number of beds per 1000 population (units)	0.15	1.07	7

Note: cf. Annex II.1 for the definition of health institutions

Data source: China Yearly Macro-economic Statistic (National) <http://chinadataonline>

One particularity of Chinese health services delivery system in this period is that pharmacies were an integrated part of health facilities. The health facilities of some work units even produced their own drugs to treat patient. It was an important way to control medical costs (Wen and Hays, 1976).

Comparing to other LMICs, Chinese health resources in this period was characterized by the abundant labor force and relatively low capital investment. In 1978, the number of doctors per 1000 population was 1.93 against 1.34 per 1000 of LMICs average. The number of beds per 1000 population, albeit its important growth, remained lower than LMIC average, 1.07 against 5.25, (WDI 2008). This result reflects government's intention to compensate capital penury by relatively cheaper labor force.

Until the end of 1970s, China had obtained outstanding health progress despite low income level. The life expectancy increased from 35 years by 1949 to 67 years by 1980 and the Infant Mortality Rate (IMR) reduced from 200 to 49 per 1000 living birth.

The progresses in health and health sector were achieved with very low cost. In the period of the first Five Year Plan (1953-1957), the government health expenditure accounted for 1.1 percent of total government expenditure and 0.31 percent of GDP. Health expenditure increased gradually in following years but remained small. In the period of the fifth Five Year Plan (1975-1980), just before economic reform, it accounted for 2.2 percent of total government expenditure and 0.62 percent of GDP<sup>14</sup> (Chinese Health Statistic yearbook 1987).

### **1.3. The Elements which contribute to the success of Chinese health system in this period**

#### **1.3.1. Pertinent orientation of health policies**

When the Chinese Communist Party came into power, China had experience more than 11 years of wars. The infectious and parasitic diseases were the main causes of death. Bad living conditions and the lack of sanitary measures in daily life were the origins of massive infectious disease (Worth, 1973). In September 1949, on the first Executive Council of the Ministry of Health, the government set four principals to guide health work: 1) aiming at the needs of the workers, peasants and soldiers; 2) privileging the preventive care; 3) combining the Chinese traditional medicine (CTM) with Western medicine; and 4) integrating the health work into the mass movements (Chinese Health Statistical Digest, 1987).

According to these guidelines, great efforts were put on the development of preventive health care system and the extension of services to the mass population. Drastic epidemic control measures were implemented, particularly in the cases of tuberculosis, typhoid fever, typhus, malaria and cholera. Between 1950 and 1978, the number of sanitation and anti-epidemic institutions increased 49 times, and that of the Maternity and Child care center increased 7 times (cf. Table II.2). At grassroots level, preventive care was delivered by clinics inside of work units or agricultural collectivities. Between 1950 and 1978, its number increased 28 times.

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<sup>14</sup> This calculation does not include the expenditure for free medical insurance.



In the 1950s, the idea of integrating public health objectives into the mass movement was translated into national wide campaigns against the parasitic and infectious diseases, involving environmental clean-ups, inoculation programs at the local level, the introduction of free health care within the communes in the late-1950s (Cook and Dummer, 2004). The sanitary conditions were considerably ameliorated in a short time. The combination of CTM and Western medicine contributed to the control of medical cost, especially at first-level health facility. Chinese traditional pharmacology bases the drug production on the raw materials which can be found in the nature, such as herbs and plants. And its fabrication asks for just rudimentary elaboration, such as spoiling in the water. Therefore its fabrication requires low costs. As the drug expenditure was one of the main running costs of health stations, wide application of CTM considerably reduced their operating cost.

These policies answered the most urgent health and sanitation needs of the population. They show the advantages of central planning in organizing public programs when the policies are appropriately orientated.

### **1.3.2. Efficient health professionals**

#### **A) Low cost semi-doctors for primary healthcare**

In order to control labor costs, the government trained a group of semi-doctors to assist the delivery of primary health care. They were, by origin, the farmers or the employees of their work units. Once chosen, they received several months of medical training which permitted them to deal with sanitation matters and hygiene, provide traditional herbal remedies and medical practices including acupuncture (Wen and Hay, 1976). They were also responsible to detect more serious diseases and refer patients to upper level health facilities (Cook and Dummer, 2004). They worked at health stations set by their work unit in part time but got main income from their productive activities rather than medical ones. These semi-doctors are called “bare-foot” doctor in rural areas and “red guard soldier” in urban areas.

As semi-doctors worked side by side with the target population, they could efficiently supervise the infectious diseases and diffuse medical knowledge. On the other hand, they did not induce high additional cost for the government nor for their work unit. Instead of offering several years of medical formation, the government organized only short term training for semi-doctors and encouraged the latter to completing their formation in a “learning by doing” way. The medical work of these semi-doctors was paid at the same tariff as their productive activities, which allowed their work units to deliver basic medical services at very low cost (Zhu, 2008). The successful examples of similar practices can also be found in other communist countries in the same period, such as the Former Soviet Union and Vietnam (Bloom, 1998; Tragakes and Lessof, 2003).

#### **B) Strong professional consciousness**

People in the period of command economy were professional and altruist. Workers in all sectors were driven by their ideological belief of which mass orientation was an important content. Respects gained from a well-done work and self-satisfaction obtained from feeling useful to the masses constructed the main motivations for work. This explained why, even without any

economic incitation, health professionals had strong commitments to serve the masses. Wen and Hays (1976) described that the “questions as ‘Who should be a doctor?’, ‘What fee should be charged?’ and ‘Should prevention come first?’ are answered by relating the questions to what would be in the best interest of the masses.”

The strong commitments of health professionals were the key solution for the agency problem in health sector. As the providers of health services put mass interest above their personal interest, the asymmetric information would not induce moral hazard because the interest of the agent (the physician) converged to that of the principal (the patient).

This experience is very instructive for today’s questions on the motivation and performance of health workers. Nowadays, the major discussions are focused on how to use monetary (such as salary or bonus) and non-monetary interests (such as professional opportunities or special trainings) to incite health professionals. Both are based on the idea of increasing personal interests. The problem is that different people have different personal interests which are not always observable, but external incitation needs to set common and observable criteria. If incitation does not fit each individual’s personal interest, it would bring unexpected second-effects on individual’s behavior. In the period of command economy in China, people were motivated by mass interests rather than personal interests. It ensures that everybody move in the same direction. It demonstrates the role of social value in solving economically unsolvable puzzle.

### **1.3.3. Principals of self-financing and self-sufficiency for insurance funds**

The principles of self-financing and self-sufficiency were applied to LIS and CMS. The sustainability of each insurance fund directly depended on the financial capacity of the work unit which owned it. The financial pressure incited each work unit to control the medical cost.

The accent of cost control was put on the efficiency of services use. Take CMS as an example. Several measures were applied to increase efficiency. First, the central and local governments encouraged the commune to carry out public health campaign and use preventive measures to reduce the health risks of the population. Second, the commune urged its ill members to get timely treatment, because the severer was the diseases, the higher medical spending would be required. Third, in order to reduce the drug expenditure, the commune used local resources to fabricate traditional and herbal drugs. Lastly, bare-foot doctors ensured that only patients who could not be treated at local health stations were to be referred to upper-level health facilities. To sum up, with health financing pressure, the collectivity was motivated to search for most cost-efficient uses for their health resources (Wen and Hay, 1976; Liu and Wang, 1991).

In the period of command economy, the LIS was estimated covered 10-12 percent of population and the CMS covered 80 percent. In total, the two insurance schemes covered more than 90 percent of population. The efficient use of these funds, therefore, made major contribution to the general cost containment.

To sum up, the success of Chinese public health system in the 1950s and 1960s shows the efficiency of central planning when the good willing of the government is present; the objectives of public programs are appropriately defined; and the social environment favorites the alignment of personal interests to public ones. A key factor for this harmony is the ethical education. Lots of

economic puzzles stem from people's willingness to pursue self-interest. The unremitting ideological indoctrination imposed by the Chinese government steered the masses toward a common objective -- constructing a strong communist country. The income equality and the principal of public property also reduced the power of economic incentives over people's behavior. Self-interest was judged in terms of social value rather than monetary one. The convergence of social value led to the convergence of individual behaviors.

#### **1.4. Problems lying behind the system**

##### **1.4.1. Ambiguous definition of responsibilities in the service delivery system**

First, the provision of preventive care was mixed with that of curative ones at first-level administrative divisions. On the one hand, at county or above administrative level, the government recognized the different natures of preventive and curative care and intentionally set separate health facilities to deliver these services. On the other hand, at township or village levels, the preventive and curative care was delivered by the same health facilities (township hospitals or village clinics). The government's initial intention was to reduce administration costs and give more flexibility to local health facilities in managing service delivery. However, in practice, this strategy made it difficult to monitor the quantity and quality of services that were actually delivered (Liu, 2006).

Second, the selling of drugs was mixed with their prescription. The profit from the sale of drugs constituted an important part of hospital's business income. This is troublesome due to the agency problem. As the patient does not have necessary knowledge to judge the prescription of the physician, the latter could be incited to overprescribe when his income is connected with the sale of drugs.

Third, the delivery of health services was overlapping. The upper-level health facilities, such as city hospitals, could also offer primary medical consultation as the first level health facilities. This created a potential competition between the upper- and lower-level health facilities. As lower-level health facilities were less well equipped than upper-level ones, the patient would prefer to seek medical consultation at upper-level health facilities in hoping to receive better services, even if the problem could be solved at lower-level facilities.

In the period of command economy, these problems were covered by massive social political movements. People orientated their efforts by social value rather than personal economic interests. The concerns with the masses ensure the convergence of personal and public interests. However, with the development of market economy, individual's value judgment would be more and more influenced by economic interest. As the economic interest is not always in accordance with the social interest, the effectiveness and efficiency of public health system should be revisited.

##### **1.4.2. The low economic incentives from provider payment and pricing system**

On the provider side, under command economy, the government financed the majority of investment (capital and labor) in health sector. The capital investments were allocated in function of the country's development plan. Medical professionals were considered as government employees and paid by salaries which were set in function of the working time and seniority of

the physicians (Meng et al., 2004). The hospitals executives were appointed by the government with the criteria which were not necessarily medical or managerial. The prices of health services were artificially set below their costs to guarantee the accessibility of services. The government therefore did not incite hospitals to improve performance.

#### **1.4.3. Unequal qualification of health professionals across health facilities**

On the one hand, the semi-doctor reduced the cost of medical labor; on the other hand, it also resulted in the unequal qualifications of health staffs at different level health facilities. Higher level health facilities have better trained and more experienced medical staff, while lower level health facilities were equipped with rudimentarily trained medical staff. Consequently, people associated the quality of services with the administrative level of health facilities.

Recent studies show that the qualification gap among medical staff at different health facilities remains large nowadays. A study of three city hospitals in Jinan, for example, found 50 percent of the doctors had received undergraduate education and 46 percent graduate education (Yu et al. 2004). In contrast, a study of 58 community health centers in Jiangsu Province found that only 12 percent of health workers had received a university education, and senior health professionals were rare (Wang et al. 2002). In Hebei, at township health centers, 41 percent of health workers had graduated from high school, while 30 percent had only a primary school education (Zhang and Qiao 2002). Although these studies were carried out in the different provinces in China, they show a clear degradation of the quality of medical staff from upper to lower-level health facilities.

In the period of command economy, regardless the poor qualification of health workers at first-level health facilities, this health delivery system efficiently answered the most urgent medical needs. Two elements should be highlighted. First, main causes of death in this period were the infectious and parasitic diseases which could be efficiently controlled with basic medical knowledge (Cook and Dummer, 2004). Second, there was close cooperation between the lower and upper-level health facilities. Upper-level health facilities often sent qualified doctors to assist the work at lower-level health facilities. Grassroots health workers also regularly received following up training from upper-level health facilities. In another word, the semi-doctors did not work independently. They were an integrated part of a more comprehensive medical network (DeGeyndt et al. 1993). However, with epidemiological transition, the basic medical knowledge will not be sufficient to treat more complicated diseases. And the privatization of village clinics, following the economic transition, will change the relationship between upper and lower level health facilities and consequently ruin the cooperation.

#### **1.4.4. The fragmentation of health protection system**

Health protection system was fragmented by profession and region. GIS was financed out of government budget and thus had the strongest financial capacity. There was no direct connection between contributions and benefits (cf. Diagram II.4, circle 3). As consequence, people covered by GIS were incited to over-consume. It was estimated that wasteful medical expenses of GIS accounted for 20–30 percent of its health expenditures in the years of 1980s (Liang, 2003). LIS and CMS, in contrast, were self-sufficient insurance pools. Economic conditions of each SOE or agricultural collectivity directly determined the financial capacity of its insurance pool.

Correspondingly, benefits offered by these insurance schemes were more restrictive than those offered by GIS.

The government controlled the cost of labor and capital as well as services prices. LIS and CMS could therefore offer relatively comprehensive protection with low expenditure. However when the economic structure of the country changes, these insurance schemes will show their weakness in offering financial protection due to the lack of risk-sharing and the instability of their funds.

Fragmented health insurance market also hampered the labor flow. As the medical protection was directly linked with the work unit of the insured, people with comprehensive insurance coverage will be reluctant to change the work in fear of losing the insurance benefits. Under the command economy, this constraint did not impose problem, because the allocation of labor was controlled by the central government and individual could not discretionarily change the work anyway. However, with the economic reform and liberation of labor market, this protection system will hinder the labor movement and impede the optimal allocation of labor force (Zhang, 2003).

## **II. Evolution of health system in the period of economic transition (1978-2000)**

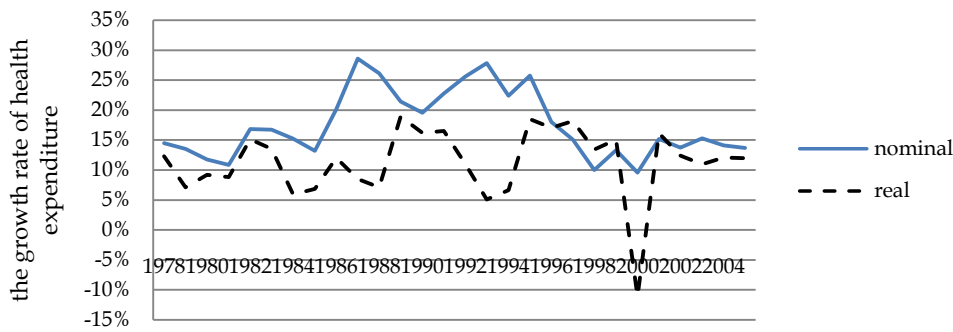
The transition to market economy has produced major economic and social dislocations for Chinese people. As mentioned in the introductory overview, the most important mutation of Chinese society brought by economic reforms was the change of the concept of work unit and the divergence of public and individual interests. Bearing these changes in mind, we discuss now the evolution of health sector following the economic reforms.

### **2.1. The increase of health expenditure**

In the period of command economy, Chinese health system gained international reputation by offering comprehensive public health services at extremely low cost. Until 1978, the total health expenditure accounted for less than 3 percent of GDP. The growth rate of health expenditure per capita was 3.1 percent per year in the period of 1952-78 (Chinese Health Statistic Digest, 1987).

Since the economic reform, Chinese health expenditure increased quickly. The share of health expenditure in GDP climbed constantly from 3 percent in 1978 to 4.6 percent in 2006. The total nominal health expenditure increased 89 times between 1978 and 2006 with an average growth rate of 18 percent per year. Once controlled for inflation, the growth rate was about 11 percent per year in this period which was higher than the growth rate of GDP estimated at 9 percent per year (Chinese Health Statistic Yearbook, 2008; Chinese Statistic Yearbook, 2008).

The economic expansion largely contributed to the increment of medical cost since 1978. Figure II.10 illustrates the nominal and real growth rate of health spending since 1978. The distance between the two curves shows the part of growth rate induced by inflation. The most important distance can be found in the period of 1985 to 2002 during which the reforms in health sector was mainly oriented by marketization (cf. Section 2.3).

**Figure II.10** The growth rate of nominal and real total health spending (at 2000 constant prices)

Data source: Chinese Health Statistic Yearbook, 2008

With the development of reform, the power of resources allocation shift from the government to the market. The government lost the control of medical expenditure on both the supply and demand sides. By studying the expenditure of social health insurance, Liu and Hsiao (1995) found that, in the 1980s, the prices of medical material and equipment increased by 55.7 percent, or an average of 6.5 percent per year; the cost of labor in the health sector increased by 96.2 percent and the annual rate of increase was 10.1 percent. In the four years following 1981, the general price of health services increased about 27 percent.

Comparing to other countries of similar income-level, China in pre-reform period was a relatively low spender of health services for its income level. However since the economic reform, China is catching up with other countries in terms of health expenditure. By 2000, Chinese health expenditure in percentage of GDP is higher than India, Indonesia or Sri Lanka; about average for countries in transitions (lower than most eastern European countries, but higher than most of the republics of the former USSR and other Asian countries); and less than high-income OECD countries (Eggleston et al., 2008).

## 2.2. The decentralization of public health spending and the increase of OOPs

The rise of medical expenditure is accompanied with a shift of health spending from central to local government, and from local government to individual. Due to the decentralization, the local government is now responsible for the financing of public spending on social welfare. Until 2000, 98 percent of public health spending comes from local government budget (Chinese Statistic Yearbook, 2008). As a result, the developments of health sectors are differentiated according to the economic level of each region.

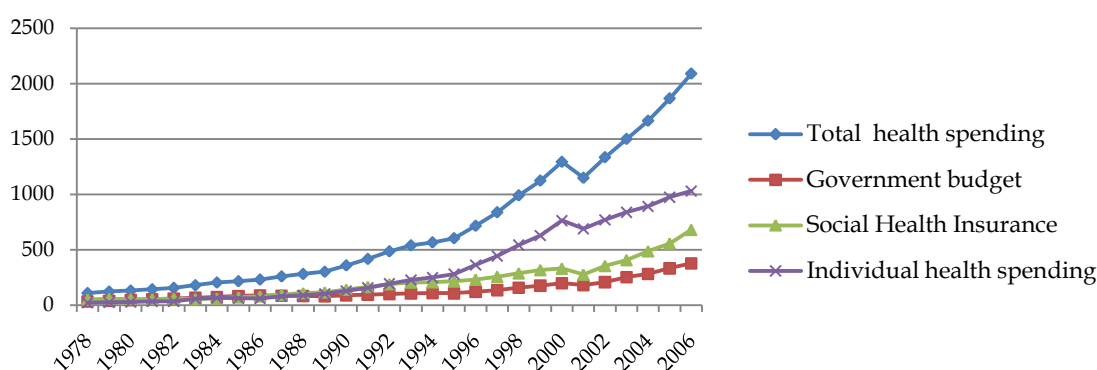
During economic transition, the government tried to maintain its health spending. The share of health spending in government's total expenditure climbed from 3.1 percent by 1978 to 6.6 percent by 1992 before gradually turning down to 4.6 percent by 2006. However, due to the general decline of government budget and the even faster climb of medical costs, public spending turns out to be insufficient to finance total health expenditure. The share of government spending in total health expenditure reduced from 80 percent by 1978 to less than 40 percent by 2001 (China Health Economics Institute, 2009).

The financial gap induced by the lack of public financing is made up by the individual spending. Between 1978 and 2006, the medical spending of the individual climbed from 0.23

trillion Yuan to 103 trillion Yuan, with an average annual growth rate of 15 percent (China Health Economics Institute, 2009). According to Figure II.11, since the end of 1980s, individual health spending exceeded government and health insurance spending and became the most important health financing sources. The share of individual spending in total health expenditure increased from 20 percent by 1978 to 61 percent by 2001.

In China, the private expenditure is paid out-of-pocket. No private health insurance was available until the end of 1990s (Eggleston et al., 2008). As already noted, out-of-pocket payment is an unequal and inefficient health financing source, because it does not allow to redistribute the purchasing power in function of medical needs, nor does it profit the risk sharing across the population. The increase of the share of individual health spending implies the reduction of health financing efficiency (Van Doorslaer et al., 2005; Shen and McFeeters, 2006, Wagstaff et al. 2009).

**Figure II.11** Evolution of total health expenditure and its sources (100 million Yuan, at 2000 constant prices)



Data source: China Total Expenditure on Health Report (2009)

### 2.3. The marketization of public health facilities -- the 1985 health reform

In the period of command economy, the government financed the quasi-total expenditure of public hospitals (Eggleston et al., 2008). During the economic transition, due to the shortage of public funds, the government financing was cut to cover only basic personnel wages and new capital investment, which in total approximate to 25-30 percent of hospital expenditure in the 1980s (Hsiao, 1995). The public hospital faces increasing pressure to keep up with the ascending medical cost.

This financial pressure forced the government to look for alternative sources for public health system. Since 1985, the government launched a series of health reforms which aimed to give a larger degree of financial independence to the public hospital (See Box II.1). Hospitals ever since are asked to finance their operating expense from their business income. The government continues paying the salaries of hospital employees. The level of salary, nevertheless, is rigid relating to inflation and general evolution of salary (Lim et al., 2004). A bonus payment system was introduced since the 1980s to encourage greater productivity and efficiency. The main criteria in this bonus system were the revenue generated by the provision of services and prescription of

drugs (Liu et al. 2003). This system of bonus inside of hospital drives to over-prescription (World Bank, 1996).

**Box II.1** Chinese hospital reforms between 1985 and 2000

The reform in health sector was officially put on the agenda of the government since 1985. Until the end of 1990s, the reform was concentrated on hospital transformation. The objective was to accord more management autonomy to public hospitals in exchange of more financial independence of the latter.

The reform from 1985 to 1992 is characterized by the government setting preferential policies to encourage the development of alternative financial sources for hospital deficits. In 1985, the State Council announced five strategies for health reform: 1) developing contracted responsibility systems; 2) carrying out paid spare-time services; 3) modifying user-fees for curative medical services; 4) introducing user-fees for preventive health care; and 5) encouraging health institutions to develop commercial activities, such as drug stores or medical factories, to finance the hospital's running expenditure ( Chinese State Council, 1989). In this period, the main idea was to cross-subsidize the cost of medical services by the income from hospital's non-medical activities.

From 1992 to 2000, the government, encouraged by the success of SOE reforms, continued orienting the hospital reform toward commercialization. In September 1992, the State Council issued an official document, "Several Suggestions on Deepening Health Reforms", which clearly stated that the hospital should become self-sufficient work unit which finance its operation expense from the business income. The government subsidies are ever since confined to the infrastructure investment and payment of basic salaries. The hospital needs to self-finance its daily operating expenses (except salaries). In this period, hospitals were allowed to gain profits from the sale of drugs and the offer of high-tech diagnosis.

Source: drafted by the author based on Wang (2008)

Business income became an important financial source of health facilities. Take income structure of health facilities in 2007 as an example, as shown in Table II.3, the share of business income in hospital's total income is higher than 50 percent for all health facilities except for the stations of sanitation control and the Centers for Disease Control (CDC). For the health facilities which principally deliver curative services (i.e. hospitals, health centers, and clinics) the business income accounts for more than two third of their total income. For the patient-related preventive healthcare, like Maternal and Children Health and Special Disease Control, business income is also the predominant income source. Only for the no-patient-related preventive health care, such as the infectious disease control and sanitation control, government subsidies remain the principal financial source. And still, the business income accounts for one third of their total income.

The 1985 health reform only modified the financial sources of public hospitals but did not fundamentally change their ownership. Until 2007, 70 percent of county or above level hospitals and almost total township and district hospitals are state or collective-owned (Chinese Health Statistic, 2008). The government keeps the ownership over the hospital. It retains the authority on the appointment of health staff. Staffing is fixed, based on the number of beds. The executives of hospitals cannot fire any worker nor offer real promotions (Hsiao, 1995). Therefore, the hospital faces the situation where, on the one hand, it is asked to be self-sufficient for the expenditure of daily operation; on the other hand, it cannot modify inputs to improve efficiency. In this case, the



hospital's budget deficit has to be made up by inducing more medical consumption rather than by improving productivity. However, the government subsidies continue to decrease since 1980s, and account, now for only 10 percent of township hospital's income and less of 5 percent of county hospital's income.

**Table II.3** Income structures of different health facilities in 2007

	Government Subsidies	Business Income
Hospitals	8 %	92 %
Health centers	22 %	78 %
Clinics	9 %	91 %
Stations of Maternal and Children Health	18 %	82 %
Stations of Special Disease Control	38 %	62 %
Centers for Disease Control (CDC)	57 %	43 %
Stations of Sanitation Control	68 %	32 %

Data source: Chinese Health Statistic Yearbook 2008

The majority (95 percent) of health facilities are non-for-profit. However, without the financial support of the government, their behaviors are oriented by economic interest due to the financial pressure for survival, the increasing cost of medical services, and the great opportunities to gain important profit. When the economic interest of hospitals is in conflict with that of the patient or the collectivity, the agency problem emerges. Over-provision is detected by certain studies (Liu and Mills, 1999). The problem will be further enforced due to the distorted pricing system.

#### **2.4. Distorted pricing policies**

Chinese health services are mainly paid by Fee-for-service (FFS). Prices for health services are set according to China's "yellow book", the guideline established by the State Price Commission. During 1960s and 1970s the government tried to increase access to health care by reducing the prices of medical visits and hospital days to the levels that a poor farmer could afford. The services prices were set far below their marginal costs (World Bank, 1997).

Under the command economy, the budget deficits of hospitals induced by the pricing policy were made up by government budget (Wang, 2009; Liu et al., 2000; Eggleston et al., 2008). However, since the economic reform, due to the increase of health cost and the decrease of public budget, the government could not finance the entire deficits of hospitals anymore. Since 1980s, in order to cross-subsidize expenditure on medical treatments the government allows hospitals to draw a profit of 15 percent from the sale of Western Medicine and 25 percent from the sale of Traditional Chinese Medicine. The prices of high-tech services are also set above the cost to stimulate technical innovation.

The guiding prices, despite double-digit inflation in the 1990s, have rarely been updated in many provinces. The distance between the price and cost of services is striking. Liu et al. (2000), for example, compared fees to average costs for 130 service items in 17 hospitals in Shandong province. They found the fees of non-high-tech services were well below their average costs. The fees for checking blood sugar levels, for example, were 20 percent of the cost. The base charges for a hospital day were 25 percent of the cost. The fees for normal delivery were 30 percent of costs.

In contrast, regulated fees for some new high-technology diagnostics were set well above average cost. The price for CT was 63 percent higher than its cost and that of the remote control x-ray scans was 40 percent higher than the cost. In general, the authors found that the fees for 90 percent of the services were less than their average unit cost. Liu and Meng (1996) compare the estimated costs of 130 most frequently provided services items with their regulated fees in Jinan Province. They found similar results.

The idea of compensating the deficit from the delivery of basic services by the profit from the sale of drugs will induce leverage effect. This can be illustrated by the following reasoning. Suppose that a hospital has two kinds of medical commodities to sell: medical services and drugs. Set the average unit cost of medical services and drugs at 100 Yuan for each. The average regulated fee for medical services is 50 Yuan, or a cost recovery rate of 50 percent. The profit for the sale of drugs is 15 percent. In order to get a total benefit of 10 percent from its operations, the hospital needs to sell 4.7 units of drugs to cross-subsidy the delivery of one unit medical service<sup>15</sup>.

To sum up, due to financing pressure accompanied with this pricing policy, the hospital has two ways to increase revenue: over-prescript the high profit drugs and services; shift the prescription from one service or medicine to another (from regulated to unregulated, from low-margin to high margin) (Wagstaff et al. 2009). The sale of drug becomes the most important income source of hospitals. According to the third National Health Survey, in 2003, drug accounted for 54.7 percent of outpatient and 44.7 percent of inpatient expenditure. The high profits of high-tech services also induce the over use of this kind of services. A study in Xi'an found that CT and MRI were used for only 39.2 percent and 46.8 percent of their full-utilization times (Du and Yan 1996). A study in Shandong indicated that CT was used for 59.4 days on average, a utilization rate of 41.21 percent (Li and Fang, 1997).

The price of medical labor, in contrast, is underestimated. A survey conducted in Guangdong, Sichuang, Shanxi among 720 doctors found that Chinese doctors have low level of satisfaction for their carrier, especially in terms of income. Only 8percent of questioned doctors are satisfied with their income. In addition, the low levels of satisfaction were consistently registered across the board, irrespective of whether the doctors were from urban or rural areas, from the public or private sector, or from a rich or poor province (Lim et al., 2004).

## 2.5. The skewed distribution of health resources

The health expenditure is skewed toward curative care and city hospitals. According to Table II.4, in 1990, the share of the expenditure of public health facilities in the total health expenditure accounted only 6.54. This percentage was further reduced to 5.07 percent in 2000. Among curative health facilities, health spending tilts toward hospitals, especially city hospitals. The hospital sector consumed approximately 63percent of the total health expenditures with a rapid increase of 25 percent per year (without inflation adjustment) in expenditures from the mid-1980s to the mid-1990s (China Ministry of Health, 1995). When looking at the evolution of different kinds of hospitals, the only one which saw its part in total expenditure increased during the 1990s was city

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<sup>15</sup> Set the quantity of sold drug to be Q, the equation of calculation is as following:  $(50 - 100) + (115 - 100) Q = 10\text{percent} \times (100 + 100) \rightarrow Q = 4.7$

hospitals. Its share rose from 32.76 percent to 47.16 percent, or an increase of more than 4 percentage points. Otherwise, the share of pharmaceutical expenditure and administrative cost also rose.

**Table II.4** The structure of the expenditure of health facilities in the 1990s (in percentage)

	1990	1995	2000
Hospital	56.07	61.94	64.9
- <i>City hospital</i>	32.76	41.72	47.16
- <i>County hospital</i>	10.81	8.6	8.74
- <i>Township Health Center</i>	10.62	10.16	7.63
- <i>Others</i>	1.89	1.45	1.37
Clinics	20.93	16.65	13.61
Pharmacy	2.23	4.53	6.37
Public Health Institution	6.54	5.5	5.07
Administrative cost	0.34	0.37	0.55
Others	13.89	11.01	9.51

Data source: China national health Accounts Report 2008

The expenditure of the health facilities which serve mainly rural population, such as county hospital and township health center, decreased over time. The share of the expenditure of county hospital dropped from 10.81 percent to 8.74 percent. And that of township health center dropped from 10.62 percent to 7.63 percent. In China, more than 60 percent of population resides in rural areas which represent a great share of total demands for health services. The degradation of rural health facilities implies a higher obstacle for the rural population to obtain necessary care.

Clinics are the most accessible first level health facilities in China. From 1990 to 2000, the share of clinics expenditure in total expenditure reduced from 20.93 percent to 13.61 percent, or a reduction of more than 6 percentage points. This implies the weakening of first-level health facilities.

Another factor that contributes to the unequal distribution of health resources is the low qualification of medical workers at lower-level health facilities. Under the period of command economy, in order to reduce labor costs, the government intentionally fostered a group of health workers with low qualification. Ever since, the threshold for medical practitioners is low. In 2003, 21.8 percent of health workers had no more than a high school education. Only 1.6 percent of all health workers and 18 percent of workers in hospitals at the county level or above were university graduates. The majority of village health workers have no formal medical education (Eggleston et al., 2008). The low quality of health worker at lower-level health facilities incites the patient to bypass local health facilities for better services at higher level health facilities. It constitutes a main reason of the failure of Chinese health referral system.

Concerning the health expenditure on the consumer-side, of the total health expenditures, 25–30 percent was through the employer-based GIS and LIS, which covered only about 14 percent of the total population (China Health Economics Institute, 1999). Until 1990s, less than 10 percent of rural population was covered by health insurance (World Bank, 1997). This partial coverage of health insurance increases the inequality in the access to medical services.

As the GIS and LIS offer quasi-free access to medical services, it also induced cost inflation. As the insurance increases the capacity to pay of the insured, hospitals intentionally charge more user-fees for insured patients. In 1995, for instance, the average hospitalization fee of discharged patients of pneumonia was 937.5 Yuan for the uninsured and 2400 Yuan for the insured, more than double of the former. That of the cesarean was 1772 Yuan for the uninsured and 2105 Yuan for the insured (Chinese Health Statistic Yearbook 1999). Third, on the consumer side, as GIS offers quasi-free access to health services, it incites over-consumption. Between 1980 and 1984, the annual increase in GIS expenditures was 10.7 percent. 10 percent of patients asked doctors for medicines simply because they wanted sick leave from work. Other anecdotes on the cases of drug wastes are also reported (Liu and Wang, 1991; Ho, 1995). Fourth, GIS mainly reimburses the expenditure on curative personal healthcare which brings relatively few externality gains. As the curative care is much more expensive than preventive care, given the health budget, the increase of expenditure on curative care will disproportionately reduce the resources for preventive care and consequently decline the total efficiency in the use of health resources.

To sum up, health resources tend to flow from preventive care to curative care, from lower-level health facilities to higher level health facilities, and from rural area to urban area. This change is accentuated by the reduction of government efforts on preventive care. Economic theory argues that the preventive care is more efficient in increasing public health, because it is cheaper and with more positive externality than curative care. And the lower level health facilities in general are less expensive than higher level health facilities. In China, all evidences point to the conclusion of an inefficient use of health resources and an unequal access to health service between the rural and urban population in the 1990s.

## **2.6. The weakening of public primary health care system**

Chinese primary health care system was constructed on the basis of production unit. Health stations were implemented at production spot, operated by the members of productive team and financed out of the budget of collectivity. With the economic transition, production units gradually discharged their social responsibilities, including health spending. Without financial support, many health stations were either closed down or overtaken by semi-doctors. Private medical practices developed so quickly that since 1995 the Minister of Health set an independent item in its statistic yearbook to record their volume. In 1998, there are 126068 registered private practitioners, accounting for more than fifty percent of total clinics (Yearbook of Public Health in the People's Republic of China, 1998). Until 2007, 72 percent of clinics are operated by private practitioners (Chinese Health Statistic Yearbook, 2008).

In the period of command economy, the first-level health facilities, including township health centers and village health stations, were an integrated part of public health delivery system, albeit few finance they received from the government. They kept close relationship with upper-level health facilities and the local authorities. They regularly received technical supports from upper-level health facilities and ensured the excursion of the centrally decided health policy to the masses. They were also the gatekeeper of the health system. By filtering the patients for upper level health facilities, they reduced the unnecessary use of expensive health resources (Gerdtham et al., 1999). Furthermore, they played important role in the delivery of preventive care and the surveillance of epidemics at grassroots. As discussed previously, the National Center for Disease Control (CDC) and the Maternal and Child Health Centers (MCH) do not have their agencies in

townships and villages. They were township health centers and village health stations which ensure the epidemiological surveillance and the delivery of preventive cares at township or below administrative levels (cf. Diagram II.3).

The privatization of first-level health facilities imposes great challenges to Chinese health referral system. On the one hand, the delivery system of preventive care is inefficient at grassroots. Private practitioners live on business income. They prefer to deliver more profitable services. As the price of curative care is generally higher than that of preventive one, it incites private practitioners to substitute curative care for preventive one. In order to encourage the delivery of preventive care, the government allows private practitioners to charge user-fees for preventive services. This, on the other hand, discourages the target population to use preventive care and consequently declines the efficiency of the use of medical resources in terms of health outcome. The outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003 gives an incontrovertible proof on the weakness of Chinese disease control system. The reduction of the efficiency of preventive system will increase the health risk and eventually increase the total health expenditure.

On the other hand, the function of private practitioners as gatekeeper is questionable. Private practitioners in rural areas are originated from the semi-doctors in the period of command economy. They normally have no professional training at medical colleges. In the period of command economy, this problem was solved by the close technical exchange between the lower- and upper-level health facilities. High qualified doctors were periodically sent to the lower-level health facilities to give technical assistances and semi-doctors were regularly sent to the upper-level health facilities to receive complementary formation. The technical supports from upper-level health facilities enforced the treatment capacity of first-level health facilities. In addition, the main health problems in this period came from the communicable diseases which could be effectively controlled with preventive measures. This health system could effectively answer the needs of local population. However, in the period of economic transition, the private practitioners are disconnected from public health system. They lost the technical assistance from upper-level health facilities. In addition, their medical knowledge is not updated to answer the needs of epidemiological transition. As a result, the quality of their services is degraded, which pushes the patient-consumer rush into the expensive city hospitals. The national health survey showed that outpatient services provided by first-level health facilities decreased by 41.6 percent in urban cities and 25.7 percent in rural areas between 1986 and 1997 (Gong 1999).

To sum up, the lack of public financial support for the first-level health facilities drives them to look for the solution in the private sector. The privatization of the first-level health facilities considerably weakened the effectiveness of public referral system and disease surveillance system at local level. Both reduce the performance of health system.

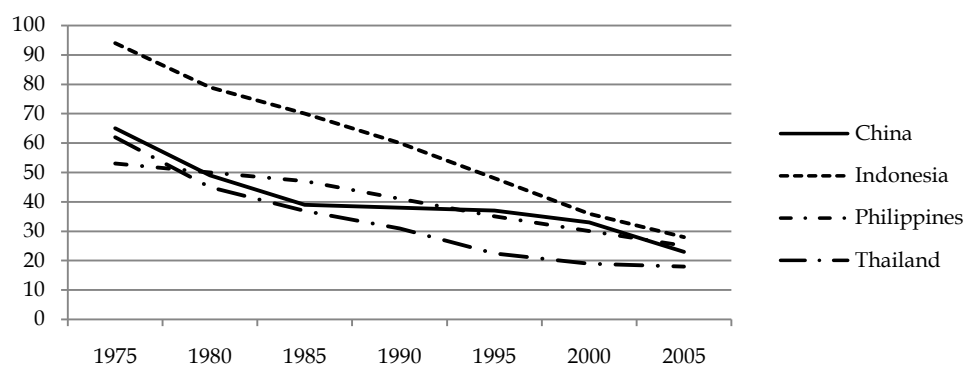
## **2.7. The stagnation of Infant Mortality Rate in the 1990s**

Regardless of the escalation of medical expenditure, the health progress shows proof of weakness. It can be captured by the stagnation of infant mortality rate (IMR) observed since middle of 1980s (Figure II.12). During the ten years between 1985 and 1995, Chinese infant mortality rate (IMR) decreased only two units from 39 to 37 per 1000 living birth; whereas, in other Asian countries with similar economic development levels, the IMR continued to decrease

quickly. It dropped, for instance, from 70 to 48 per 1000 living birth in Indonesia, 47 to 35 in Philippines and 37 to 22.5 in Thailand.

Infant mortality rate has long been viewed as a synoptic indicator of the health and social conditions of a population. The newborn are especially sensible to the poverty and low access to basic health facilities (Filmer and Pritchett, 1997). High infant mortality rate is mainly due to the bad sanitation, high incidence of infectious disease, poor health knowledge due to low education, and high obstacle in the access to basic health services. In China, the income growth reflects a general amelioration of living condition. The education level increases constantly. The illiterate ratio reduced from 22 percent in 1990 to 6.7 percent in 2000 (Chinese health statistic yearbook 2008). Therefore, the relatively low progress of IMR in China since the middle of 1980s reflects above all the decline of accessibility of basic health services. In fact, more and more individuals abandoned medical treatment due to financial hardship. In 1998 National Health Services Survey, for the first time, the investigator ask the question whether the interviewee abandoned seeking medical consultations in case of needs in the two preceding weeks. 50 percent of urban residents and 33 percent of rural residents answered yes. In 2003, these shares rose to 57 percent for the urban residents and 46 percent for the rural residents.

**Figure II.12** Infant mortality rate in selected Asian countries (per 1,000 live births)



Data source: WDI 2007, World Bank

### III. Conclusion and discussion

Chinese health system was constructed on the base of command economy. Medical services were delivered by public sector. Health spending was largely financed by state or community funds. The economic transition fundamentally changed the way Chinese society was organized. The production unit lost its function as the organizer of the network of social protection and became a pure economic entity. The collective production was substituted by personal responsibility. Correspondingly the orientation of agent's behavior was shifted from mass interest to self-interest.

This change caused profound perturbation in public health delivery system. The efficiency of public health system was based on two elements: the central control of resources and the orientation of individual behaviors for mass interests. The former ensured that the allocation of health resources follows central plan and the latter converge the interest of physicians to that of the patient and thus control the agency problem inherent in the medical industry. The economic

reforms reduced the power of central plan and divert the interests of physicians away from that of patients. Due to the lack of public resource, health facilities are required to look for financial resources in the private sector. Meanwhile, the government continues to intervening into their management. As a result, hospitals are responsible for their financial situation; meanwhile have no autonomy on their investment decision.

Reforms in health sector before 2000 was focused on the commercialization of public hospitals. The financial pressure forced health facilities to pursuit economic interests. The distorting pricing policy further imposed inappropriate incentives. Prices of basic medical services were intentionally set below their costs to ensure their accessibility. On the other hand, hospitals were allowed to draw high profits from the sale of drugs and high-tech diagnosis services. As a result, service providers were incited to over-prescript the low cost-effective services to the detriment of the use of high cost-effective services.

The vertical competition is also harmful. It is argued that market competition can spur productivity and efficiency. However, Chinese health facilities do not have equal conditions for competition. Under the command economy, in order to reduce input costs, the government intentionally equipped health facilities in a differentiated way according to their administrative hierarchy. The good function of referral system was based on the cooperation and administration between different-level health facilities.

The commercialization of hospitals broke the cooperative linkage between health facilities and imposed unequal competition on them. As lower-level health facilities are less well equipped than upper-level health facilities, they are less competitive than the latter. Patients equalize the quality of service to their administrative ranks. For those who can afford services, they rush into upper-level health facilities; and for those who cannot afford expensive services, they abandon medical consultation due to the mistrust to lower-level health facilities. Consequently, city hospitals are full of patients who seek for basic medical consultation, while township hospitals struggle for survival due to the lack of patients.

The decline of public resource and the boom of private sector have clearly had a major impact on health financing system, greatly reduced the coverage of public protection and increased financial inequality in access to medical services. In the next chapter, we discuss in more details the evolution of medical charges in the 1990s (the period preceding health insurance reform) from the point of view of households.

## Annex II.1. Definition of health institutions

Medical institutions	Definition
General hospitals	All types and levels of general hospitals
Traditional Chinese Medicine (TCM) hospital	All types and levels of TCM hospitals
Integrated TCM and western medicine hospitals	All types and levels of hospitals integrating TCM and Western medicine
Minority Hospital	All types and levels of minority hospitals
Specialized Hospital	All types and levels of hospitals focusing on specific diseases or types of care, including gynecology and obstetric hospital, children's hospital, ophthalmology hospital, orthopedic hospital, stomatology hospital, infectious disease hospital, mental hospital, tuberculosis hospital, tumor hospital, plastics surgery hospital etc.
Sanatorium	Sanatorium for disabled or demobilized army veterans
Health Center	Urban health center, Township Health Center (THC), and Health Service Center for Community (HSCC).
Outpatient Department and Clinic and First aid stations	Dedicated outpatient clinics in hospitals; clinics set up by different types of units ( <i>Danwei</i> ); private clinics; nursing center
Maternal and Child Health Center	Maternal and child hospitals or centers; all levels of child health protection centers
Specialized Disease Control Institute	Specialized disease centers, including for tuberculosis, occupational health, ophthalmology, stomatology, schistosomiasis, leprosy, mental illness, STD, etc.
<b>Public health institutions</b>	
Center for Disease Control (CDC)	All levels of CDC and other epidemic prevention institutes (not including food inspection institutes and environment inspection institutes)
Other public health institutions	E.g. drug rehabilitation center, leper house, health education station, blood transfusion station.

Source: National Bureau of Statistics of China; State Classification Standard of Industries (MOH, 2002)





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## Chinese Health Spending Burden in the 1990s

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### I. Introduction

The years of 1990s are the period that Chinese economic reforms are in full swing and market mechanism begins to dominate resource distribution. It is also the period that social protection system faces greatest challenge due to the backward of institutional reform. Lots of people lose at the same time the social protections against unemployment, retirement, and health spending risk.

Concerning health system, in the 1990s, only about 30 percent of population is covered by health insurance with 45 percent in urban areas and less than 10 percent in rural areas (World Bank 1997). The share of out-of-pocket payment in total health expenditure climbed from 36 percent in 1990 to 60 percent in 2000 (Chinese Health Statistic Yearbook, 2008).

Meanwhile, health expenditure increases rapidly in this period. The nominal average health spending per person increased from 65.4 Yuan in 1990 to 362 Yuan in 2000 (China National Health Account Report, 2005). Cost inflation factors include the epidemical transition, the inefficiency linking to the failure of referral system, and the over-prescription issued from the for-profit behavior of health providers.

The poverty and poor health induced by financial obstacles in the access to health services draw attention of the government. Since the end of 1990s, a series of reforms is launched to re-establish social health protection system (See Chapter 5). In order to well understand these reforms, it is interesting to at first take a look at how health problems influence people's welfare. In this chapter, we discuss economic and welfare losses suffered by Chinese households due to ill health in the 1990s.

Two types of costs can be induced by a deterioration of health. The first one is the direct or financial cost corresponding to the money spent for medical treatment (it is what we refer to as "medical care spending"); this includes consultation, hospitalization, drugs, and transportation fees (Filmer and Pritchett 1997; Wagstaff 2007). The second one is the indirect or economic cost due to: i) the loss of income caused by a decrease in productivity, either due to a reduction of working hours or a lower efficiency at work; and ii) the opportunity cost of time spent for medical treatment, including transportation and waiting time (Schultz and Tansel, 1997; Audibert 1997; Strauss and Thomas, 1998; Audibert, Mathonnat, Henry, 2003; Wagstaff 2007).

In absence of financial protection, these costs may reduce the household's welfare in two ways. First, given the budget constraint, high medical spending may force households to reduce their consumption of non-medical goods or services, such as foods and education. Second, if poor health persists, the decrease in income may become permanent and consequently hamper household future consumption (Au et al., 2005).

Studies on the consequences of illness episode generally focus on two issues: to what extent medical spending modifies household consumption (Gertler and Gruber 2002, Wagstaff 2007); and what kinds of households are more likely to be confronted to a trade-off between spending on health or on other essential goods. In the literature, this trade-off is referred to as the issue of “catastrophic health spending” (Xu et al., 2003; EQUITAP a., 2005; Limwattananon et al., 2007). The burden of medical spending is often measured by the share of medical spending in household resources.

The distribution of medical spending is unequal across the population. While a large part of the population only spends a small proportion of income on health, a small part of people may suffer catastrophic medical spending (Prescott 1999). In addition, if there is no efficient third-party payment system, this massive health spending burden will not be spread across the population (Limwattananon et al., 2007; Xu et al., 2006). In developing countries, in the event of a serious illness episode, households often have to choose between high quality but high price medical services and low price but low quality services. It leads non-poor households to choose unnecessarily expensive services which increase the risk of catastrophic spending and poor households to abandon medical treatment (EQUITAP a. and b. 2005; Prescott 1999).

Studies on the indirect cost of illness focus on the impact of illness on household productivity (Audibert, 1986; Audibert, 1997; Audibert, Mathonnat and Henry, 2003; Schultz and Tansel, 1997; Gertler and Gruber, 2002; Wagstaff, 2007). Human capital theory considers health as an important determinant of household productivity. Poor health decreases productivity and consequently income. The health impact on income varies according to the nature of work. Health may have an important effect on income in rural areas, because farm work depends on the individual’s physical condition (Liu et al., 2008). It influences also income in urban areas, because the urban formal work is less substitutable within the household (Wagstaff, 2007). There is evidence that in developing countries, households who suffer from economic losses due to health problems tend to rely more on the social network than on the financial system (Fafchamp and Gubert 2007). However the social network, because of a lack of resources, is not always able to address on time the unexpected financial needs. This raises the issue about the need for insurance.

We try to analyze both household’s medical spending burden and the impact of illness episode on household income. The former is examined by using comparative analysis and quintile analysis. The latter is estimated through regression analysis. By doing so, we try to address following questions: how heavy was the individual’s medical spending burden in the years of 1990s? What was its impact on the household future welfare? What implications can be drawn for the design of the new health insurance scheme?

The Chapter is organized as follows. Section 2 presents the data source. Section 3 analyzes the (direct) effect of illness episode by assessing households’ medical spending burden. Section 4 studies the (indirect) effect of illness episode on household income using fixed-effect panel regression. Section 5 concludes.

## **II. Data description**

The data are from the China Health and Nutrition Survey (CHNS), conducted in collaboration with the Chinese Academy of Preventive Medicine (CAPM) and the University of

North Carolina's Population Center (CPC). It is a longitudinal survey that covers eight<sup>16</sup> out of China's 33 province-level divisions. Four counties, stratified by income, were randomly selected in each of the eight provinces. In addition, in each selected province, the provincial capital and a lower income city were included when feasible. Within the 36 counties and urban areas, 190 primary sampling units (villages and urban neighborhoods) were selected randomly. Totally seven round of surveys have been carried out (1989, 1991, 1993, 1997, 2000, 2004, 2006). The objectives of the CHNS were: i) to examine the effects of health, nutrition, and family planning policies and programs implemented by national and local governments; ii) to see how the social and economic transformation of Chinese society affected the health and nutritional status of the population.

### III. Direct medical spending burden in the 1990s

For comparative analysis, 1991 round and 1997 round are used as periods of comparison. The idea is to capture the evolution of population in the years of 1990s. 1993 round is in the middle of the 1990s. In order to simplify the comparison, we dropped 1993 round from statistic analysis and compare only health spending situation at the beginning and the end of 1990s. 2000 round is not used as comparison group because the questions concerning the food expenditure is not consistent with those in the previous surveys. This makes the comparison of capacity to pay between 2000 round and 1991 round impossible.

#### 3.1. Measure of household capacity to pay (CTP)

To limit the recall bias, individuals were asked about their medical expenditures for the most recent illness episode rather than for the total medical expenditure for the entire year. The interviewee was asked the following question: "During the past 4 weeks, have you been sick or injured?" This question is used to create the dummy variable which captures whether or not the individuals and households had encountered illness episode(s) during the period in question. "Medical spending" refers to the total out-of-pocket (OOP) payments made by the household for medical treatment. The medical spending burden is measured by the share of medical spending in household capacity to pay (CTP) (Russell, 2004; Wagstaff and van Doorslaer, 2001; Xu et al., 2003).

Income, expenditure and consumption are three options to measure household resources. In a developing country context, household consumption or expenditure is generally preferred to household income as a measure of household welfare, given the importance of the informal sector and the high variability of incomes over time (O'Donnell et al., 2003, Deaton and Grosh, 2000). However CHNS provides a lot of information on household income, including agricultural income, self-employed income, wage, bonus, and subsidies. In contrast, the information on household expenditure or consumption is rather limited. Thus, data on income is chosen to indicate the household budget constraint.

Following Xu and al. (2003), the household CTP is defined as the effective income remaining after meeting basic substantial needs. Household basic subsistence needs are measured by the

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<sup>16</sup> The eight provinces are: Liaoning, Shandong, Jiangsu, Henan, Hubei, Hunan, Guangxi, Guizhou.

value of essential foods consumption. Households were asked how many essential foods they consumed in the month preceding each survey wave. The list of essential foods includes rice, flour, cook oil, egg, meat, and sugar. Surveys contain also the market price of these foods at community level. We calculate the amount of household monthly food consumption by multiplying the quantity of household monthly consumption on essential foods by the corresponding market prices. The total monthly food consumption is then multiplied by 12 and used as a proxy for the essential foods annual consumption of the household. Given that richer households tend to raise the food consumption level above the substantial needs, we establish a substantial food consumption line equivalent to the average essential food expenditure of household whose food share is in the 45<sup>th</sup> to 55<sup>th</sup> percentile range. The capacity to pay of the  $i^{\text{th}}$  household is then defined as following:

$$CTP_i = INC_i - FC_{45-55i} \quad [\text{II.1}]$$

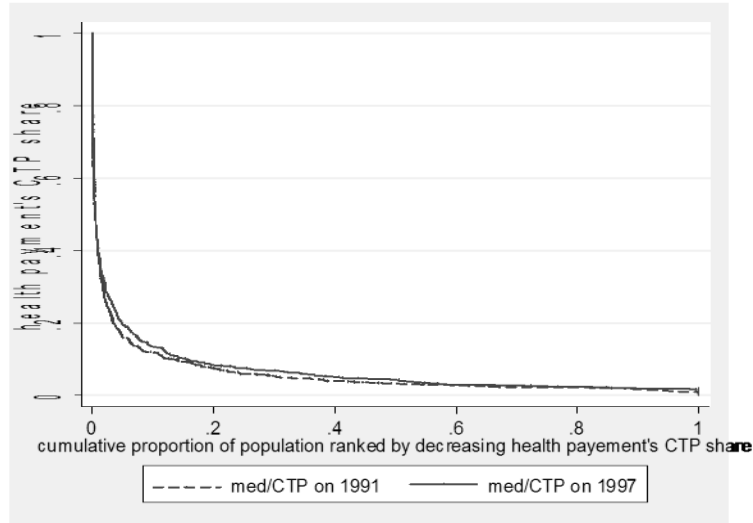
$INC_i$  is the  $i^{\text{th}}$  household annual income.  $FC_{45-55i}$  corresponds to the average food expenditure of households in the 45<sup>th</sup> to 55<sup>th</sup> percentile. If the essential food expenditure of a household is lower than this threshold, we used the observed household food expenditure to define its basic subsistence needs and its capacity to pay (i.e. total expenditure minus food expenditure). All monetary terms are normalized at 1991 constant prices.

### 3.2. Distribution of medical spending burden

The household medical spending burden is measured by the share of direct medical spending in the household capacity to pay.

$$\text{Medical spending burden} = \frac{\text{medical spending}}{CTP} * 100 \text{ percent} \quad [\text{II.2}]$$

Medical spending burden is calculated only for those who reported an illness episode. This is for the purpose of avoiding the abundant zero value due to the low incidence of illness episode. Figure II.13 illustrates the cumulative proportion of sick population suffering a given medical spending burden, from the higher to the lower. Three survey periods are distinguished, but no significant change can be observed over time. The distribution curves of medical spending burden indicate that the medical financing risk is distributed unequally across the sample population: a small part of population is facing a huge medical spending burden while the majority of the population spends only a small share of income on health. According to Figure II.13, less than 5 percent of sick population has spent more than 20 percent of their discretionary income on health, while more than 70 percent of sick population paid less than 10 percent of their discretionary income on health. This distribution of medical spending burden poses a dilemma for the design of the current social insurance scheme: is it better to insure the recurrent risks so that the majority of people can benefit from the insurance, or to insure the big risk so that the insured families get an effective protection? The distribution of health spending burden did not significantly changed between 1991 and 1997.

**Figure II.13** Distribution of health spending' CTP shares in 1991 and 1997

Source: Authors estimations from CHNS data.

### 3.3. Comparison of medical financial burden by income quintiles and its evolution between 1991 and 1997

This section compares the medical spending burden by income groups. The objectives are first to compare the health financing burden of the different social classes and second to examine whether the existing health insurance is protecting people from catastrophic spending and which social-economic class profit most from the system.

Table II.5 provides the definition of the variables used in the statistical comparison. We distinguish two analysis units: household and individual. Normally, the medical expenditure, if paid out-of-pocket, is financed out of household's total income and assets. Medical spending burden is then calculated by household. In contrast, medical insurance is set by person. All household members may not be covered. The protection of medical insurance is therefore examined at individual level. The sample is at first ordered in function of household income. Then it is equally divided into 5 groups with Q1 containing poorest households and Q5 containing richest ones. The statistical characteristics are listed in the Table II.6.

#### 3.3.1. Capacity to pay (CTP)

In the 1990s, China had experienced a rapid economic growth. However the distribution of the fruits of economic prosperity is unequal and pro-rich. According to Table II.6, household capacity to pay, in real term, has increased on average by 40 percent between 1991 and 1997. Different income quintiles, however, enjoy different CTP increases. Higher income groups have also experienced higher growth of CTP. The average CTP of the poorest group, for instance, increased only by 8 percent while that of the richest group increased by 52 percent. As a result, the gap of CTP between the richest group and the poorest groups increased from 14 times in 1991 to 20 times in 1997. Huge income gap implies that poor households have much tighter budget constraint than the rich ones do.

**Table II.5** Definition of the variables

**By household**

Variables	Definition
CTP	Capacity to pay (annual), in Yuan.
haveill	Equals to 1 if the household announced having had at least one illness case during the four weeks preceding the survey; 0 otherwise
Meancost	The average cost of medical treatments per household per episode (Yuan)
Mediacost	The median value of household medical spending per episode (Yuan)
Catas_10	Equals to 1 if the household had received illness shock which induced a medical spending exceeding 10 percent of household CTP; 0 if this medical spending is inferior to 10 percent of CTP
Medcost_cata10	Average level of catastrophic medical spending
Reim_cata_10	Share of insurance reimbursement in the total medical spending when the spending is classified as catastrophic

**By individual**

Variables	Definition
Insur_i	Equals to 1 if the individual claimed having been covered by certain insurance scheme, 0 otherwise.
GIS	Equal to 1 if the <i>insured</i> individual claimed having been covered by government insurance system, 0 otherwise
LIS	Equal to 1 if the <i>insured</i> individual claimed having been covered by labor insurance system, 0 otherwise
CMS	Equal to 1 if the <i>insured</i> individual claimed having been covered by rural cooperative medical system, 0 otherwise
Others	Equal to 1 if the <i>insured</i> individual is covered by the insurance other than those having been mentioned above, 0 otherwise
Premium	The average premium of the insurance
ill_i	Equal to 1 if the individual fell ill during the period in question, 0 otherwise.
reimbursed	Equals to 1 if the individual encountered with an illness episode effectively got reimbursement from the insurance, 0 if the individual in trouble didn't get any reimbursement.
insurpay_ratio	Average share of reimbursement in the total medical spending for the individuals who got the reimbursement
reimbursement	Average level of reimbursement

Note: all values in Yuan are at 1997 constant price.

Table II.6 Health financial burden by income quintiles

	1991						1997					
	Q1	Q2	Q3	Q4	Q5	Q5/Q1	Q1	Q2	Q3	Q4	Q5	Q5/Q1
<b>By household</b>												
CTP	703 (407)	1911 (440)	3103 (464)	4662 (649)	9729 (6007)	14	758 (465)	2185 (580)	3955 (657)	6337 (962)	14836 (9172)	20
Haveill	30%	27%	29%	30%	30%	1.0	16%	18%	18%	18%	19%	1.2
Meancost	144 (508)	216 (1117)	175 (729)	266 (856)	292 (1001)	2.0	156 (493)	300 (826)	242 (676)	312 (806)	322 (785)	2.1
Mediacost	15	12	20	20	20	1.3	16	16	13	36	25	1.6
Catas_10	23%	9%	1%	6%	4%	0.2	20%	13%	8%	7%	4%	0.2
medcost_cata10	429 (864)	987 (2051)	1458 (1960)	1864 (1770)	2600 (2372)	6.1	462 (793)	1148 (1405)	1506 (1232)	2078 (1328)	2122 (1615)	4.6
Reim_cata_10	6% (0.21)	7% (0.20)	46% (0.46)	41% (0.42)	26% (0.40)	4.3	9% (0.22)	24% (0.37)	13% (0.33)	18% (0.34)	35% (0.44)	3.9
<b>By individual</b>												
insur_i	7%	18%	32%	42%	47%	6.6	12%	17%	25%	33%	37%	3.0
- GIS	19%	28%	44%	44%	33%	1.8	14%	24%	32%	32%	36%	2.6
- LIS	14%	24%	29%	35%	33%	2.4	5%	12%	16%	26%	25%	4.7
- CMS	16%	25%	14%	11%	17%	1.1	71%	54%	37%	32%	29%	0.4
- others	52%	24%	13%	10%	8%	0.2	10%	10%	15%	9%	11%	1.1
premium	3.5 (4.7)	4.8 (8.5)	2.2 (5.4)	2.7 (10.0)	3.6 (12.5)	1.0 2.7	5.8 (4.9)	9.1 (9.6)	11.0 (57.7)	17.8 (72.6)	14.6 (58.7)	2.5 11.9
ill_i	11%	10%	11%	11%	9%	0.8	6%	7%	7%	6%	6%	0.9
reimbursed	5%	6%	18%	20%	23%	5.0	6%	12%	12%	13%	25%	4.1
insurpay_ratio	63% (0.24)	67% (0.29)	79% (0.23)	80% (0.22)	72% (0.30)	1.1	63% (0.27)	65% (0.34)	75% (0.22)	77% (0.22)	69% (0.28)	1.1
reimbursement (Yuan)	143 (189)	124 (281)	449 (1354)	275 (677)	348 (1337)	2.4	120 (142)	492 (1194)	273 (853)	335 (642)	305 (772)	2.5

Data source: Author's estimation based on the data CHNS 1991, 1997. In the parenthesis are the standard deviations.



Table II.6 also shows another trend: the development of a middle income class since the beginning of the 1990s. When comparing the CTP between the two consecutive income groups, the most important CTP gaps are found when we move from the first quintile (the poorest) to the second, or from the fourth to the fifth quintile (the richest). In another words, there is sign of a centripetal trend in the distribution of CTP among the middle income classes and a centrifugal stress on the two extreme groups.

### 3.3.2. Illness episode

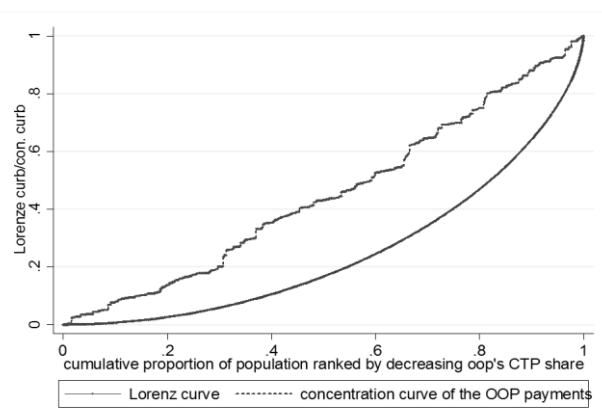
Illness incidence is measured in two dimensions, by household and by individual. About 30 percent of households or 11 percent of individuals in our sample in 1991 have reported an illness episode. In 1997, illness frequency dropped to 18 percent of households and 6 percent of individuals. We have not enough information to explain this sharp decline. However, Table II.6 shows that there is no significant relationship between the declaration rate of illness and income classes. The t-test does not support the hypothesis that the reported illness frequency of individuals in the poorer income groups is different from that in the richer groups.

### 3.3.3. Medical spending

Medical spending is aggregated at household level. The mean value of medical spending (Medcost) is calculated by income quintiles. Due to a more restrictive budget constraint, the poorest quintile has a lower medical consumption level than the others four quintiles. This observation conforms to the funding of other researches (Xu et al., 2006; Hjortsberg, 2003). However, no significant difference in medical spending can be observed among the rest four quintiles.

Big variation of medical spending indicates that the mean value for medical spending may be significantly influenced by outliers in the sample. Therefore, the median value of medical spending (medcost\_m) is also presented in Table II.6. The median spending (in real term) varies from 12 to 20 Yuan in 1991 and 13 to 36 Yuan in 1997. Large differences between the mean and median figures highlight the heavily skewed nature of the distribution of out-of-pocket expenditure. Both the mean and median value show a slight increase of medical spending between 1991 and 1997.

**Figure II.14** Lorenz curve of CTP and concentration curve of OOP payments in 1997



Source: drafted by authors based on CHNS 1997

The unequal distribution of medical spending across the population can be illustrated by the concentration curve and measured by the concentration index (EQUITAP, 2005a). The concentration curve of OOP and the Lorenz curve of CTP in 1997 are presented in the Figure II.14. The distribution of household CTP is more unequal than that of OOP payments in our sample. The concentration index for OOPs in this sample is 0.12<sup>17</sup>, which means that the rich contributes more than the poor to medical spending.

### 3.3.4. Catastrophic medical spending

Following Prescott (1999), the threshold for catastrophic spending is set at 10 percent of CTP (“Catas\_10”). The frequency of catastrophic spending is significantly higher in the lowest income group than in the other four income groups. Among the four higher income groups, in contrast, the catastrophic spending risk is about the same. Between 1991 and 1997, due to the increase of the costs of drugs and laboratory tests, the catastrophic spending risk increased almost for all income quintiles, except for the poorest one (Table II.6).

However, two points worth being noted. First, the dummy “Catas-10” is defined as 10 percent of CTP. It does not provide information on the absolute level of medical consumption. “Medicacost\_10”, in contrast, show the average amount of catastrophic spending by income groups. It can be noticed that catastrophic spending is six times lower in the poorest income quintile than that in the highest one. In other words, a medical spending which is not catastrophic for the better-off could be catastrophic for the poor. This indicates that the poor are more vulnerable to catastrophic medical spending risk and are more likely to be forced to give up a medical treatment. Second, the apparent catastrophic health spending does not provide information on the rate of abandonment of medical treatment. In another word, if the poor abandon more often medical treatment due to higher budget constraint, the registered catastrophic spending would not reflect their real financial obstacles.

In order to check this, we create a dummy “see doctor” equal to 1 if individual searched for medical consultation when he got ill and 0 otherwise<sup>18</sup>. Two tests are then conducted: i) a simple correlation between household income and “see doctor” is used to check the potential relationship between income and medical consultation; ii) consultation rates of different income quintiles are compared to see whether there is a correlation between income and medical consultation across socio-economic groups.

The coefficient of simple correlation of “household income” and “see doctor” is insignificant (0.02), and therefore does not support the hypothesis of a relation between household income and medical consultation. Consultation frequencies by income quintile are listed in Table II.7. The

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<sup>17</sup> Concentration index is restricted to (-1, 1). When it is inferior to 0, it means that the poor contribute more than the rich to medical spending. If it is superior to 0, it means the rich contribute more. If it is equal to zero, it means the rich and the poor have the same contribution to medical spending.

<sup>18</sup> In the questionnaire, the investigator asks the individual if he was ill or injured during the last four weeks. If he answered “yes”, he was then asked what he did to treat this illness. If he answered “saw the local health worker”, or “saw a doctor (clinic, hospital)”, we note “see doctor” as 1. If he answered “didn’t see doctor”, we note “see doctor” as 0.

consultation rate is high among all groups: more than 74 percent of households went to see doctor when they got sick. According to Table II.7 in 1991, the medical consultation frequency were not significantly different between Q1 and Q4 (79.5 percent against 77.8 percent), or between Q2 and Q5 (83 percent against 84 percent). In 1997, no significant difference can be observed across income quintiles. Therefore there is no evidence that the decision of not to seek care, if any, is systematic.

**Table II.7** Frequency of “Seeing doctor when people is ill” by income groups

year	treatment	quintile 1		quintile 2		quintile 3		quintile 4		quintile 5	
		freq	%	freq	%	freq	%	freq	%	freq	%
1991	seedoc = 0	31	20.5	27	16.8	16	10.1	39	22.2	28	15.7
	seedoc = 1	120	79.5	134	83.2	143	89.9	137	77.8	150	84.3
	Total	151	100	161	100	159	100	176	100	178	100
1997	seedoc = 0	19	21.6	21	22.1	22	22	21	21.7	29	25.9
	seedoc = 1	69	78.4	74	77.9	78	78	76	78.4	83	74.1
	Total	88	100	95	100	100	100	97	100	112	100

Source: CHNS 1991 and 1997

### 3.3.5. Insurance

The coverage of insurance was largely pro-rich. In the highest income quintile, the share of people who declared having a health insurance was six times higher than that in the lowest income quintile in 1991. Between 1991 and 1997, the insurance coverage has slightly increased among the poorest income quintile (from 7percent to 12percent), but has decreased for the other four income quintiles. The decline is even more important for the richest income quintile from 47 percent in 1991 to 37 percent in 1997.

Concerning the nature of the insurance, four insurance schemes are distinguished: Government Insurance System (GIS), Labor Insurance System (LIS), Cooperative Medical System (CMS), and others. Other types of schemes include the private commercial insurance, Mother and Child health insurance, planned immunization insurance, etc. Benefits vary considerably across insurance schemes. The most comprehensive insurance schemes are GIS and LIS. CMS, due to its budget constraints, reimburses a relatively small part of health spending. Other insurances offer coverage only for certain predetermined diseases and thus have very narrow coverage. According to Table II.6, people from richer income groups are mostly covered by GIS and LIS, while those from poorer income groups are more often covered by CMS and other insurance schemes. It implies that among the insured population, the wealthier obtain more benefits from their insurance scheme than the poorer.

Between 1991 and 1997, the coverage by GIS and LIS decreased for almost all income quintiles, while that of CMS increased considerably across all income groups, and especially for the lowest income quintile. These changes correspond to the government’s intention to re-establish rural cooperative medical system and replace GIS and LIS by a more integrated and independent urban insurance system (Yip and Hsiao, 2008).

Insurance premium contains big variations, but is low on average. Compared to the CTP of households, a premium of two to five Yuan per year (in 1991) is quite affordable. Even for the

poorest income group (Q1), it represents less than 0.1 percent of CTP. Nevertheless, from 1991 to 1997, the average insurance premium increased by a factor of two (Q1) to six (Q5) according to income groups. The enlargement of standard deviation is even more striking. For the richest income quintile, for instance, the standard deviation increases from 12.5 to 58.7. This important variation reveals the fragmentation of the insurance market during this period.

The increase in the level and the variation of the premium are more important for the richer income groups. This may be linked to the fact that richer income groups are more often covered by public insurance schemes (GIS and LIS) which offer a relatively comprehensive coverage and thus should be more costly. As the government reduced finance to public insurance, the insured should pay higher premium to make up the gap. This change indicates a trend of linking the premium to the real cost of the insurance.

Concerning the insurance reimbursement, less than 25 percent of the patients actually received reimbursement from the insurance for their medical spending. The frequency is even lower for the lower income groups. In 1991, for instance, only 5 percent of the insured in the poorest income quintile received reimbursement from their insurance against 23 percent in the richest income quintile. Nevertheless, for those who received a reimbursement, it represented an important share of total medical spending, between 60 percent and 80 percent. As far as the absolute level of reimbursement is concerned, the poorest income quintile has always the lowest average reimbursement, while in the other quintiles no special trend can be seen. The large standard deviations also indicate that the actual reimbursements vary considerably from one case to another.

The protection of insurance from catastrophic health spending is low and pro-rich. The insurance reimbursement has never exceeded 50 percent of the total spending. In addition, the poorest income quintile is the least reimbursed one, as the reimbursement accounts for less than 10 percent of total spending. Between 1991 and 1997, the level of reimbursement improved for the second quintile but deteriorated for the other three non-poor ones. This suggests that the general level of insurance protection level is lowered. However, more detailed study is required to discern the reasons for this decline. It may stem from the elements outside of insurance system, such as the modification of the demand for medical services, as well as the elements inside of insurance system, such as the drop of public financing.

To sum up, in the 1990s, out-of-pocket payments were the main source of medical spending in China and the distribution of the health spending burden was unequal. While the majority of the population spent a negligible amount of money on medical treatment, a small share of the population faced a severe health spending burden. As the poor have tighter budget constraints, they bear much higher risk of catastrophic health spending than the rich.

The health insurance system turned out to be inefficient. First, it tended to highly reimburse a small part of the population. The coverage was narrow and pro-rich. Consequently, the poor benefited less from the insurance. Second, the insurance market was fragmented: there was a great disparity in the benefits offered by the different insurance schemes. Third, as catastrophic expenditures were poorly covered, it was unlikely that the insurance could offer essential protection to the poor from poverty trap.

## IV. The effect of illness episode on household income earning capacity

In this section, we test the effect of illness episode on household income. We use 1991, 1993, 1997 and 2000 CHNS surveys to construct our panel data. Lagged indicators for illness episode are used to control reverse causality between income and health status. As a result, the 1991 round would be dropped out for the variables other than illness indicators. We get a final balanced panel data with 2645 households and three periods: 1993, 1997, and 2000.

### 3.3. Econometric Model

Inspired by the model of Wagstaff (2007), the equation takes following form:

$$\ln y_{hjt} = \alpha S_{hjt-1} + \sum \beta_k X_{khjt} + u_h + v_{jt} + \varepsilon_{hjt} \quad [\text{II.3}]$$

Where  $y_{hjt}$  is the income per capita of household  $h$  in province  $j$  at period  $t$ ;  $u_h$  are household-level fixed effects capturing both households and individuals characteristics and other heterogeneities fixed in time;  $v_{jt}$  are province-year fixed effects capturing influences and changes affecting households in province  $j$  at time  $t$  (see also Galiani et al., 2008).  $S_{hjt-1}$  represents the illness episode encountered by households in the province  $j$  at time  $t-1$ . To reduce the risk of simultaneity bias, lagged episodes rather than present ones are used.  $\alpha$  gives the marginal effect of illness episodes on household income per capita,  $X_{khjt}$  is a vector of  $k$  household characteristics measured at time  $t$ ,  $\varepsilon$  is the error term.

The heterogeneity of illness effect will then be investigated by using following specification:

$$\ln y_{hjt} = \alpha_1 S_{hjt-1} + \alpha_2 S_{hjt-1} * Z_{hjt-1} + \sum \beta_k X_{khjt} + u_h + v_{jt} + \varepsilon_{hjt} \quad [\text{II.4}]$$

$Z_{hjt-1}$  is the factor which is susceptible to influence the marginal income effect of illness episode. We will use lagged variable to keep  $Z$  in the same period as  $S$ .

### 3.4. Variables

#### 3.4.1. Dependent variable: logarithm of household per capita annual income

Following Lindelow and Wagstaff (2005), household per capita annual income (at 1991 constant prices<sup>19</sup>) is used to control the influence of the change of household size on the individual's income. Between 1991 and 2000, household per capita income increased on average by 8.5 percent per year. During the same timeframe, the standard deviation tripled, implying that the increase in household living standard was accompanied by an exacerbation of income inequalities.

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<sup>19</sup> To facilitate the reading of Table II.8, we show the level of household annual income, rather than its logarithm value.

**Table II.8** Definition and statistical description of the variables

Variable	Definition	1991	1993	1997	2000
Income per capita	Household annual income per capita. at 1991 constant price (Yuan)	869 (973)	1010 (1049)	1225 (1335)	1532 (2733)
ill	Average proportion of ill people in the household, i.e. $\frac{\# \text{ of ill members in house hold}}{\text{house hold size}}$	9.36%	5.89%	5.73%	7.99%
chronic	Average proportions of household members who suffer from chronic illness, i.e. $\frac{\# \text{ of chronic ill members in house hold}}{\text{house hold size}}$	5.51%	3.25%	3.13%	2.63%
Ins_hd	1 if the household head has some insurance. 0 otherwise	28%	23%	24%	21%
Job_type_head	Unemployed	4%	6%	19%	24%
	State	16%	15%	10%	8%
	Collective	16%	16%	10%	8%
	Private company	4%	6%	6%	8%
	Self-employed/farmer	60%	56%	56%	52%
age_head	The age of the household head	46 (14)	47 (13)	50 (13)	51 (13)

Data source: CHNS 1991, 1993, 1997, 2000. In the parentheses are the standard deviations.

### 3.4.2. Explanatory variable of interest: Illness episode

The measure of illness episode has been discussed in various studies (Wallace and Herzog 1995; Gerdtham and al. 1999; van Doorslaer and Jones 2004; Hougaard and Keiding 2005). CHNS asks individuals if they got sick during the 4 weeks preceding the survey. In addition, it records the diagnostics of the individuals who got sick. Based on these two questions, we construct two indicators of illness episode. The first variable (*share\_illness\_1*) is the percentage of household members who experienced an illness episode the 4 weeks preceding the survey. The second variable (*share\_chronic\_1*) is the percentage of household members who suffer from a chronic illness<sup>20</sup>. The indicator of “percentage of sick household members”, rather a simple dummy variable for illness episode, is used to take into account of the cases where more than one family member fall ill in the period in question.

Three sources of the endogeneity are often argued for the health indicator. The first is the double causality between income and health. Health is considered as an important component of human capital and thus contributes to the improvement of the individual’s socioeconomic status (Grossman 1972). In addition, a higher socioeconomic status can also improve the individual’s health status by allowing her or him to invest more in human capital which increases his health stock (Davey-Smith et al., 1994; Ecob and Smith, 1999; Humphries and Van Doorslaer, 2000; Adams et al, 2003). However, even if income may change the individual’s long term health risk, it cannot determine the incidence of a concrete illness episode. It is therefore relevant to consider the incidence of an illness episode as a random element.

<sup>20</sup> The following diagnosis are considered to be chronic illnesses: infectious/parasitic disease; heart disease; tumor; hematological disease; mental/psychiatric disorder; neurological disorder; digestive disease; urinary disease; obstetrical/gynecological disease; old age/mid-life syndrome.

The second source of endogeneity comes from omitted variables. Some factors may influence simultaneously household income and individual's health. If they are not included into the model, it will create an artificial relationship between income and health. We control for this problem by estimating a panel data with fixed effect<sup>21</sup>. Fixed effects controls for the omitted factors that are invariant in the time within households. We add provinces-time dummies to control for provinces-time variant factors common to all households in province *j* at time *t*. Other factors, like household size and household head's age are also included to minimize the effects of time variant characteristics.

The third factor is the illness episode measurement error. The potential measurement error is brought by the creation of chronic illness episode dummy. As this variable is created based on the clinical diagnosis, it means that individuals who had a chronic illness episode but did not see a doctor would be noted as not-chronic by error. If the poor systematically consult less than the non-poor, the effect of chronic illness episode on the income of poor households will be underestimated. The correlation between income level and the frequency of medical consultation has been tested in Section 3.3.4 (Cf. Table II.7), it is proved that there is no systematic correlation between the two variables in our sample.

### 3.4.3. Control variables

Following Lindelow and Wagstaff (2005), household head's characteristics are used to depict the situation of the household in general. The hypothesis is that the head of household is generally the main income earner in the household. The behavior of the household head also influences that of other household members and consequently changes family's illness risks. Household head's characteristics are: age (level and square), insurance (a dummy indicating whether or not the household head is covered by an insurance scheme), and the type of job<sup>22</sup>. The household head's educational level is not included due to its small variation over time. As the model is conducted with household fixed effect, the impact of this element is dropped. More than 20 percent of household heads declared being covered by an insurance scheme. There is nevertheless a general declining trend in the insurance coverage (from 28 percent in 1991 to 21 percent in 2000).

The evolution of the household head's job type reveals the instability of people's working status due to the economic transition. The unemployed household heads increased from 4 percent to 24 percent between 1991 and 2000. Correspondingly, the level of employment decreased considerably for employees of all work units except for those of private companies. The share of employees in public work units, state-owned or collective companies, decreased from 16 percent to 8 percent. The share of self-employed and farmers decreased by 8 percentage points in 9 years but remains predominant compared to other forms of employment.

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<sup>21</sup> The Hausman test rejects the random effect model.

<sup>22</sup> The job dummies indicate separately whether or not the household head works for the following work units: state-owned company (*job\_state*), collective company (*job\_collective*), private company (*job\_private ent.*), and self-employed including farmers (*self\_emp*). The reference group is unemployed.

### 3.4.4. Heterogeneous effect of illness episode on income

Several factors may modify the effect of illness episode on household income. First, the insurance may change illness impact by increasing household financial access to health services. Thanks to insurance, patients may get a treatment that would not be affordable or which they would be reluctant to buy due to the budget constraint if they were uninsured. Punctual medical treatment can reduce the risk that a temporary illness episode transforms into a permanent one. It is therefore expected that the insurance can mitigate the effect of illness episode on household long term income (Long et al., 1998; Pradhan and Prescott, 2002; Mocan et al., 2004).

Second, illness episode may have different influence on work time between urban and rural areas. The extent to which the ill health of one family member influences the total income of the household depends on the adjustments of other household members' labor supply and on the income consequences of such adjustments (Royalty and Abraham, 2006; Wu, 2003). In rural areas, family members often live close to each other. It is then easier to compensate the reduction of work time of the sick by other family members. In urban areas, in contrast, families are often of smaller size. Once they become adults, children leave the parents' house and live elsewhere. It is therefore more difficult to share working time within the family. Another important aspect is the extent to which the work of the sick is substitutable by the other family members. It may be relatively easy, for example, to substitute the work of a self-employed worker or an agricultural worker by other family members, given that these occupations require rather limited skills. In contrast, it is more difficult to replace a sick employee of a formal company by his/her healthy household member, because the job may require special knowledge which other family members do not have.

Third, it is admitted that the same financial shock may have completely different effects on the welfare of the poor and non-poor (Lindelov and Wagstaff, 2005). We then ask the question whether the effects of illness episode on income would be significantly different for the poor and non-poor. If the poor suffer much higher income loss from illness episode and if insurance aims at equalizing health financial burden across the population, then the design of insurance benefits package should take into account of the economic situation of the insured.

In order to test these assumptions, we create following variables to interact with illness indicator. i) Two kinds of insurance indicators will be used separately. The first is a dummy equal to 1 if the household enjoy some insurance scheme and 0 otherwise. The second indicator includes four job dummies<sup>23</sup> which represents main work types in China. As health insurance is closely linked to work types, different work types represent different insurance schemes. This set of indicators allows taking the heterogeneity of insurance schemes into account. These two kinds of insurance indicators will be interacted with illness indicator respectively.

ii) As discussed previously, the urban and rural households may react differently to the loss of household labor force. A rural dummy will therefore interact with illness indicator to detect potential heterogeneity of illness effect under the rural and urban social-economic context.

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<sup>23</sup>Four types of jobs are used in relation to a reference group of unemployed people. They are: employee of state-owned companies, collective companies, private companies, and self-employed (including farmers).



iii) The poor dummy is defined as 1 for those who are in the bottom income quintile (the lowest 20 percent) and 0 otherwise. The “poor” dummy will interact with illness indicators to capture the heterogeneous effect of illness episodes between the poor and non-poor.

iv) Given the sum of insurance reimbursement, the poorer is the household, the higher share this sum will represent in the household income. It is plausible to suppose that the impact of insurance in protecting income would be higher for the poor than for the non-poor. This assumption will be checked by interacting three dummies: poor, insurance and illness episode.

### **3.5. Results**

Panel regressions with fixed effects are conducted on a balanced dataset which contains three periods: 1993, 1997, and 2000. Results are listed in Table II.9. Column 1 shows the homogeneous effect of illness episode on per capita income. Columns 2 to 6 list the results of tests on the heterogeneity of illness episode effects.

According to Table II.9, only the chronic illness has significant long term effect on household income. The coefficient of variable “Chronic” in Column 1 suggests that an increase of 10 percent of family members having suffered chronic disease in the previous survey wave would decrease household per capita income of 2 percent.

Column 2 shows that the incomes of households which enjoy some insurance are generally 5 percent higher than those without insurance. This confirms to the previous finding that insurance is pro-rich. However, the interactive term between insurance and illness dummy is not significant which means that insurance does not provide significant additional protection against income losses issued from illness episodes.

By substituting insurance dummy by the job type dummies, it is found that the effect of illness episode on household income varies according to job types (Column 3). The negative effect of illness episode on household income is most important when household head is unemployed. When household head works for state or private companies, the protection against income loss offered by work unit is positive but not significant. In contrast, when household head works for collective companies or is self-employed, the work unit provides significant and positive protection against income loss caused by illness. Compared to the work offered by SOEs and private enterprises, the work at collective enterprises or for its own account are more substitutable. In the latter cases, the production of sick family member(s) could be compensated by the work of other family members. Compared to self-employed, those who work for the collectivity may also enjoy the solidarity from the collectivity. This internal solidarity offers additional protection for collective companies’ employees and their family in the event of a illness episode. This explains a higher coefficient on the interaction term of collective job dummy and illness indicator than that on the self-employed dummy and illness indicator.

**Table II.9** Effect of illness episode on the household income

Dep: Ln income per capita	1		2		3		4		5		6	
	Illness	Chronic	Illness	Chronic	Illness	Chronic	Illness	Chronic	Illness	Chronic	Illness	Chronic
ill_1[or chronic_1]	-0.142 (0.0995)	-0.205* (0.0910)	-0.117 (0.108)	-0.147* (0.0778)	-0.605** (0.188)	-0.527 (0.343)	-0.276* (0.13)	-0.204 (0.25)	-0.0515 (0.096)	-0.0605 (0.12)	0.0293 (0.088)	0.102 (0.099)
ill_1 [or chronic_1]*insurance_1			-0.0758 (0.130)	-0.183 (0.198)							-0.171 (0.11)	-0.344* (0.18)
ill_1 [or chronic_1]*poor_1									-0.201** (0.081)	-0.299** (0.091)	-0.262* (0.12)	-0.426*** (0.053)
ill_1 [or chronic_1]*rural_1							0.210** (0.081)	-0.00189 (0.30)				
insurance_1*poor_1											0.0333 (0.080)	0.0312 (0.064)
ill_1[or chronic_1]*ins_1*poor_1											-0.0323 (0.69)	-0.142 (0.48)
ill_1 [or chronic_1]*job_state_1					0.291 (0.390)	0.323 (0.357)						
ill_1 [or chronic_1]*job_collective_1					0.999** (0.372)	0.723* (0.300)						
ill_1 [or chronic_1]*job_private ent_1.					0.529 (0.394)	0.288 (0.585)						
ill_1 [or chronic_1]*self_emp_1					0.537** (0.202)	0.336 (0.336)						
ins_hd_1	0.0425* (0.0203)	0.0415* (0.0205)	0.0481** (0.0193)	0.0491* (0.0252)			0.0446* (0.021)	0.0415* (0.021)	0.0775*** (0.020)	0.0766*** (0.020)	0.0838*** (0.022)	0.0856*** (0.022)
Observations	6940	6940	6940	6940	6940	6940	6940	6940	6940	6940	6940	6940
R-squared	0.053	0.053	0.053	0.053	0.056	0.055	0.053	0.053	0.09	0.09	0.09	0.09
Number of hhid	2465	2465	2465	2465	2465	2465	2465	2465	2465	2465	2465	2465

Note: “\_1” means the corresponding variable is lagged one period. Standard errors (in parentheses) are corrected for heteroscedasticity and correlation within province cluster. Fixed effects are at household level and dummies variables are included to control for provinces-year fixed effects. \*\*\* indicates significance at 1 percent; \*\* at 5 percent; and, \* at 10 percent. In the regressions with illness/chronic illness and rural interactive term, the rural dummy is dropped. In the regressions in column 4, the job type dummies are included but not reported. The same for poor dummy in the regressions in column 5 and 6. Others regressors included but not reported are: household head age, household head age squared, and constant.

The illness episode has important negative effect on the income of the poor household, but not on that of the non-poor household (column 5 and 6). When the poor is distinguished from the non-poor, the effect of illness episode (general or chronic) turns out to be insignificant for the non-poor and significant for the poor. For the poor household, an increase of 10 percent of the proportion of household members with general illness episode will reduce the income by 2 percent. If it is chronic episode, the effect is even bigger: the income will be reduced by 3 percent.

When looking at the interaction among the three variables, illness episode, poor, and insurance, it is found that a poor insured household when is encountered with a chronic illness episode will suffer a loss of income more important than if it was a non-poor insured household<sup>24</sup>. In another word, the insurance seems to protect better the non poor's long term income loss due to the illness than the poor's.

#### IV. Discussion and conclusion

This chapter analyzes the financial burden of medical care in China in the 1990's, a crucial period for the design of the actual Chinese health reform. The twofold interest is to deepen the knowledge concerning the short-term and long-term financial effect of illness episode as well as their influences on the household income with different socio-economic contexts. Statistical analysis is used assess the distribution of health financial risk across the population. Quintile analysis is applied to compare health financing burden among different income groups. A fixed-effect panel models is conducted to capture the effect of illness episode on the household income in long term.

It is found that in the 1990s, out-of-pocket payments were the main source of medical spending in China and the distribution of the health spending burden was unequal. In our sample, it is detected that part of the population is indeed suffering severe health spending burdens. In addition, as the poor have higher budget constraints, they bear much higher risk of catastrophic health spending than the rich.

As only a small part of the population is confronted with large medical expenditure, insurance is an interesting option to protect people from catastrophic expenditure risks. However, the Chinese health insurance system in this period turns out to be inefficient. First, it tends to highly reimburse a small part of the population. The coverage is narrow and pro-rich. Consequently, the poor benefit less from the insurance. Second, the insurance market is fragmented: there is a great disparity in the benefits offered by the different insurance schemes. Third, as catastrophic expenditures are poorly covered, the insurance fails to protect people from the poverty trap.

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<sup>24</sup> The effect of a chronic illness shock on the income of an insured poor household is (Table II.9 Model 6)  $-0.344 + (-0.426) = -0.77$ , which means an increase of 10 percent of the proportion of household members with chronic illness shock will reduce the income of the insured poor household by about 8 percent. The effect of a chronic illness shock on the income of an insured non-poor household is  $-0.344$ , which means an increase of 10 percent of the proportion of household members with chronic illness shock will reduce the income of the insured non poor household by about 3 percent.

At the end of the 1990s, the Government put accent on the re-involvement of the poor into the health protection system. However, this extension of coverage was at the expense of the comprehensiveness of the insurance. The insurance benefits were considerably reduced as regard to both the frequency of reimbursement and the share of this reimbursement, if occurred, in the insured's total medical spending. This may be linked to the dramatic increase of health care expenditure during this decade. In fact, as Wagstaff and Lindelow (2008) show for Gansu province, health insurance could be an incentive to push people to increase medical care which are not reimbursed by the current schemes and consequently increase their exposure to catastrophic risks. Insurance, therefore, does not systematically reduce catastrophic health spending risk, if it is not accompanied with the control of medical cost.

As far as the long term impact of illness episode is concerned, it is found that chronic episode has a significant negative impact on household long term income. So if the insurance could incite households to take the necessary prevention and avoid a general illness episode becoming chronic, it would be able to reduce household long term economic losses. In our sample, there is no evidence that insurance protect household against long term income loss due to illness episode. It pledges for the design of insurance schemes to provide incentives to households (i) to be involved in preventive campaign and shift their behavior (as it is actually observed in several counties in Shandong province) and (ii) thanks to a relevant package of benefit, not to delay access to health care in order to limit the risk of illness episode becoming chronic.

The income loss due to illness is larger in urban areas than in rural areas. It is consistent with the observations that rural households are able to better adjust labor supply after health shock shown in the literature for other countries (Audibert and Etard, 2003; Sarris et al., 2006; Sauerborn et al., 1996).

When we decompose the effect of illness in function of job status, we observe that health shock effect is conditional on job position. Therefore, reducing this specific factor of inequity across insurance schemes could be at the agenda of the policy reform but it should be integrated in a comprehensive strategy addressing poverty issues.

Finally, it is found that illness episodes have larger impact on the long-term income of poor household than that of non-poor. In contrast, the insurance protect better the non-poor than the poor. This contradiction revealed the need of providing a more relevant health insurance package for the poor.

Some limits have to be kept in mind when drawing country wide conclusions from our results. Due to data limitation and the Chinese Health and Nutrition Survey design, our conclusions are mainly relevant for our sample. Geographic limits emerge from the survey, only eight provinces are included into the CHNS data with no western provinces and there is no evidence that the sample was representative of the whole population.

Some technical problems still require for more investigation. The potential endogeneity of illness indicator, for example, is partly controlled by using lagged illness indicators. However, due to the lack of candidates for instrumental variables, we cannot verify whether the lagged variables controlled all the endogeneity of illness variable.

The problems lying in Chinese health financing system have drawn more and more government attention. At the end of 1990s, the government accelerated the construction of urban social health insurance system, and meanwhile launched experimentation on new rural cooperative medical system. In the next chapter, we discuss in more details these reforms.

# Health Insurance Reform and its Impact on Services Delivery in the 2000s

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## **I. Introduction**

Chinese health financing system before 2000 had experienced two periods. Between 1949 and 1985, health services were mainly financed out of government budget. The central government was at the same time the purchaser and provider of health services. During the economic transition, the government budget was considerably reduced while the medical cost was largely increased. The shortage of public funding forced the government to call for private sources to feed public hospitals. Between 1985 and 2000, the focus of health reform was put on the marketization of public hospitals. The business income became the main hospital resources. Meanwhile, the economic reform induced the collapse of social security system. At the end of 1990s, more than 60 percent of population is found without any medical insurance coverage (Chinese Health Statistic Yearbook, 2008). The health financing system is predominated by out-of-pocket payment.

The marketization of hospital system considerably reduced the individual's access to medical services. Studies show that, on average, 20 percent of urban population and 23 percent of rural population forego inpatient hospital services recommended by health professionals because they cannot afford them (Center for Health Statistics and Information, 1999). Re-establishing health protection system became an urgent issue in China.

The current debate on health financing reform focus on two options: either financing the supply side by increasing the subsidies to health facilities so that the latter can continue to provide basic health services at low price, or financing the consumer side by constructing a social insurance system and guarantee the affordability of basic services (Yip and Hsiao, 2008; Ramesh and Wu, 2009). The essential difference of the two options is whether to use institutional power or market force to allocate health resources.

If the government directly finances health facilities to offer basic services, the efficiency of services provision depends on the capacity of the government to identify the needs and enforce regulation. China's health system in the years of 1960s and 1970s shows proof on the effectiveness and efficiency of this allocation way when the government has predominant control over national resources and the most urgent health needs of population is appropriately identified. However, the economic reform reduced the government control over the resources. Epidemiological transition also makes the identification of health needs more complicated.

If financing the consumer by social insurance system, the allocation of health resources will be conducted by market force. Health insurance is a demand-side intervention. It provides financial support to the patient-consumer so that the latter has a stronger capacity to pay and

bears smaller financial loss in the event of catastrophic health shock. On the supply-side, compared to government budget, health insurance is expected to enforce the accountability of the providers of health services to the patient-consumer by constructing a direct linkage between them (Wagstaff and Yu, 2006). However, in practice, the efficiency of the resource allocation under insurance system also depends on to what extent the patients can vote by feet for their insurance schemes (Xu et al., 2009).

Since the end of 1990s, political opinions gave favor to the option of using health insurance to finance medical spending. The government launched a series of reforms in an attempt to re-establish a social health insurance system which covers both the urban and rural populations. Three insurance schemes are constructed or in construction ever since: Basic Medical Insurance for Urban Employees (BMIUE), Basic Medical Insurance for Urban Resident (BMIUR), and New Rural Cooperative Medical Scheme (NRCMS). The former two cover mainly urban residents and the last one aims at rural residents.

Heavy engagement of government in the construction of insurance funds is an important characteristic of Chinese health insurance reform. BMIUE addresses the urban employees, a social class which has relatively strong capacity to pay. The insurance funds are mainly based on the contributions of both employees and employers. BMIUR and NRCMS, in contrast, address a large part of poor or inactive population. The government tends to finance two third of total funds (including central and local government subsidies). Chinese government plans to increase government funding for health care by as much as 1 to 1.5 percentage of its GDP (about \$25 to \$38 billion) to realize universal basic healthcare over the next several years (Yip and Hsiao, 2008).

As discussed in part I of this thesis, the insurance increases the capacity to pay of the patient. Hospitals may therefore deliberately increase the services prices for the insured. If it is the case, the insurance will feed cost inflation. How to ensure the funding that the government will inject into health sector be used to increase the consumption of needed medical services rather than to increase the prices of services is an essential current issue.

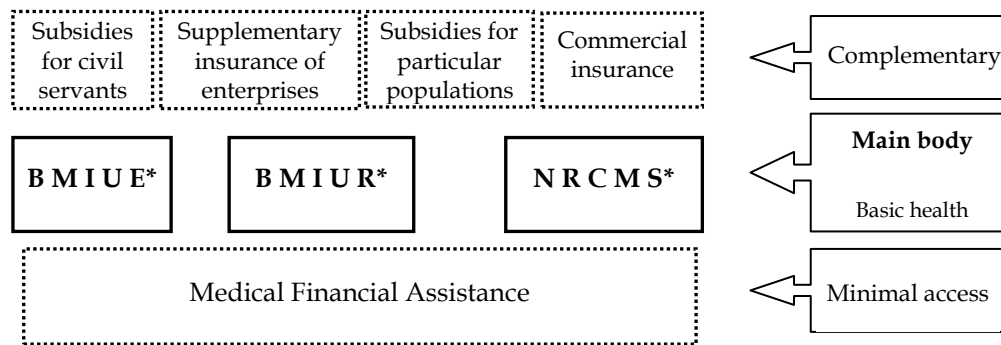
In this chapter, we present the advancement of Chinese insurance reform and provide a case study on the impact of NRCMS on the activities and financial structure of township health centers (THC). Section 2 depicts the insurance reform procedure since the end of 1990s. Section 3 presents the actual structure of Chinese health security system. Section 4 reviews the literature on the role of insurance in Chinese health financing system. Section 5 conducts a case study on the impact of NRCMS reform on health access through effect on THC activities and financial structure in Weifang prefecture. Section 6 gives concluding remarks.

## **II. The insurance reform since 2000**

As discussed previously, since the economic reform, the health financing burden is falling more and more on the shoulder of individuals. The share of out-of pockets (OOPs) increased from 20 percent in 1978 to 60 percent in 2001. In 2000, China was classified at the 188th out of 191 state members in terms of the fairness of health financing system by World Health Organization (World Health Organization, 2000). The coverage of insurance dropped from more than 90 percent in the years before 1970s to less than 40 percent in the end of 1990s.

The decrease of health outcome and the impoverishment induced by medical consumption draws more and more attention of the government. Since the end of 1990s, the government officially launched a series of insurance reforms. After more than ten years of reforms, a multi-level health security system begins to take shape. This system contains three levels of medical financial protection. The first level is the Medical Financial Assistance (MFA). It targets the extremely poor, including the handicap, low income old people, university students in financial hardship. It offers financial assistance to the eligible person so that the latter can have access to basic health services. The second level is basic health insurance system. It is the main body of Chinese health security system. It contains three public social health insurance schemes BMIUE, BMIUR, and NRCMS. The third level is complementary insurance system. It offers high level insurance protection for the populations which are willing to pay for additional protection. (See Diagram II.5)

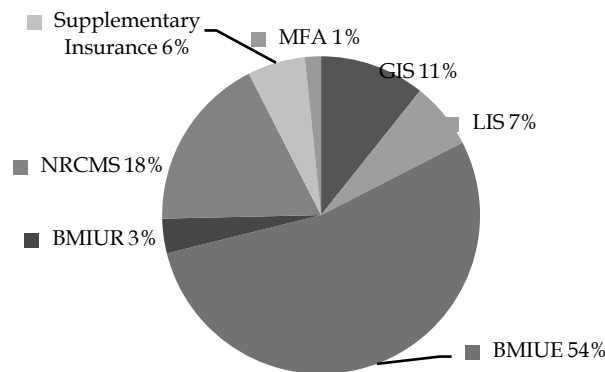
**Diagram II.5** Multi-level Health Security System



\*BMIUE: Basic Medical Insurance for Urban Employees  
 BMIUR: Basic Medical Insurance for Urban Residents  
 NRCMS: New Rural Cooperative Medical System

Sources: drafted by the author based on personal communication with Weifang Health Bureau

**Figure II.15** Structure of health security system in 2008



Data source: China Total Expenditure on Health Report 2009

As illustrated by Figure II.15, the most important part of the system is the three basic health insurance schemes, BMIUR, BMIUE and NRCMS, accounting for 75 percent of the market. The bottom line scheme MFA, regardless of its importance, accounts for only 1 percent. The upper line scheme, mostly commercial private insurance, account for 6 percent. The two insurances schemes issued from the period of command economy, GIS and LIS, remains during the period of



transition, taking in total 18 percent of the market. In the following part of this section, we will at first present in more details the three insurance schemes which composed the main body of health security system. Then we will talk about the development of two other levels health financial protections.

### **2.1. Basic Medical Insurance for Urban Employees (BMIUE)**

BMIUE was officially implemented all over the country since 1998. It covers the employees of all kinds of urban work units. It is a compulsory insurance scheme and based on payroll taxes. The insurance funds are pooled at municipality (or county) level. The contribution is set at 8 percent of employee's wage, of which one quarter is paid by the employee and three quarter by the employer. The collected funds are redistributed to two accounts: an individual's medical saving account (around 30 percent) and a socially pooled mutual fund (70 percent). The mutual funds are managed by the special committee of BMIUE. Meanwhile its operation is under the supervision of the Ministry of Labor and Social Security and the audit of the Ministry of Finance (State Council, 1998).

BMIUE plays an important role in urban employees' healthcare financing and payment. Its penetration ratio rose from 5 percent of urban residents in 1998 to 30 percent (180.2 million people) in 2007 (Table II.10). In 2007, the total premium of all BMIUEs for urban employees was 221.1 billion Yuan, with the pooling funds accounting for 133.1 billion Yuan, while individual accounts contributed the remaining 88.1 billion. The whole reimbursement amounts to 155.1 billion of which 86.1 billion came from the pooling fund and 68.1 billion from individual accounts (Dong, 2009).

Regardless its important scale, BMIUE encountered great resistance during its extension. As shown in Table II.10, the coverage of BMIUE progresses slowly. From 2004 to 2006, it increased only 4 percentage points. The apparent climb of insurance coverage in 2007 is, in part, due to the introduction of urban resident medical insurance.

At least two factors may explain this weak progress. On the employer-side, the compliance rate of enterprises is low, especially in the private enterprise. Wu et al. (2005) investigated 2000 families in Beijing, the capital of the country. They found that about 33 percent of employees are not covered by any health insurance. The compliance rate is higher for the public enterprises than the private ones. A possible explanation is that the insurance scheme imposes unequal financial burden to different kinds of enterprises. As the contribution is based on the individual's wage, the enterprises which pay higher wages to its employees need also pay higher health contribution. As the private enterprises often provide higher salary than public ones and received generally younger employees, they are reluctant to cross subsidy the medical expenditure from the public sector. Hu et al. (1999) investigates the financial burden imposed by health insurance on urban workers. They found that the small enterprises are panelized by participating insurance scheme, because the additional labor cost issued from insurance contribution is more important in proportion of business income for the smaller enterprises. As a result, the smaller enterprises prefer to hire informal workers to avoid the insurance obligation. However the poor are often found in the Small and Middle Enterprises. It implies that the poor are further excluded from the insurance system.

On the employee-side, employees are reluctant to enroll in the insurance due to the low expectation of benefiting it. Since the construction of insurance funds, the sustainability of the funds is set as the priority. Several measures are taken to control the medical reimbursement. First, the deductible needs to be paid from the individual's medical saving account (MSA) before the insured could get any reimbursement from mutual funds. As the individual considers MSA as personal saving, they do not consider it as the benefits of the insurance and thus are reluctant to use it. The utilization rate of MSA was 77 percent in 2007 (Dong, 2009). Second, BMIUE set a restrictive list of the drugs and services which are legitimate to the reimbursement. This limits the medical treatments taken charge by BMIUE. Third, only the consultation at the contracted hospitals and pharmacies can get reimbursed. As hospitals and pharmacies who win the contract are supposed to be those who offer the lowest prices for the insured services and drugs given the quality of services, this measure reduces the cost of BMIUE. However, it also limits the insured's choice on service provider. To sum up, the reimbursement level is low relative to the contribution. The expenditure of BMIUE in 2007 accounted for only 65 percent of its income (Dong, 2009). (See Annex II.2. for an example of reimbursement rules in Wuhan municipality)

**Table II.10** Coverage of the urban basic health insurance 2004-2007

	Covered population (million)		Population (million)		Coverage (in percent)	
	Employee	Residents	Urban Residents*	Non-agr.*	Urban Residents	Non-agr.
2004	124	-	543	391	22.85	31.69
2005	138	-	562	411	24.52	33.51
2006	157	-	577	423	27.26	37.2
2007	180	43	594	431	37.57	51.79

Notes: \* there are two definitions for "urban population": either by residence or by occupation. "Urban residents" represents the population who has a residence in urban areas. "Non-agr." represents the population that is not engaged in agricultural works.

Data source: Chinese Health Statistic Yearbook 2008, online <http://chinadataonline.org>

## 2.2. Basic Medical Insurance for Urban Resident (BMIUR)

BMIUE only cover the working population, but not the non-active population (mainly the dependent household members) or those working in the informal sector (often the immigrants). As a result, only 28 percent of all urban residents were covered by the BMIUR scheme in 2006 (Ramesh and Wu, 2009). In order to address the urban unemployed population, the implementation of BMIUR was carried out since 2007.

BMIUR is a community-based insurance scheme. The participation to the BMIUR is voluntary for all the urban unemployed residents which mainly consist of school-age children and other unemployed urban residents who are not covered by BMIUE. The insurance funds are pooled at municipality (or county) level. The premium is a flat rate, about 20 Yuan per person per year. The local government can modify the premium in function of the local economic development level. The supplementary financial assistance is offered by the central and local government to the extreme poor, the old, and the disabled. It is about 10 Yuan per child and 60 Yuan per adult (State Council, 2007).

In 2007, about 88 cities participated to the pilot programs. In these cities, the insurance increased the access to medical services. According to the estimation of the Committee of the

BMIUR, in the experimental zone the two weeks visit rate increased by 5 percentage points. The rate of abandonment of medical treatment due to financial hardship declined by 10 percentage points (*People's Daily* February 8<sup>th</sup>, 2008).

Insurance premium in practice is higher than planned. The premium for the adults is between 150 Yuan to 300 Yuan, among which, 36 percent are financed out of government budget. The premium for the children is 50 to 100 Yuan, among which 56 percent are out of government budget. For the extremely poor, government subsidizes account for more than 83 percent of total premiums (*People's Daily* February 8<sup>th</sup>, 2008).

BMIUE and BMIUR constitute urban basic medical insurance system. Until 2008, the total fund amounted to 304 billion Yuan, accounting for 21 percent of total health expenditure (China Health Economic Institute, 2009).

### 2.3. New Rural Cooperative Medical Scheme (NRCMS)

NRCMS is a community-based insurance scheme. It is proposed to rural population. The participation is voluntary for all the rural residents who are not covered by other insurance schemes. The initial premium was fixed at a very low level, about 10 Yuan per person. The central and the local government complement the individual premium to obtain a final contribution of 50 Yuan per person. The insurance funds are pooled at county level. The priority of reimbursement is given to inpatient expenditure. The local government decides whether to include outpatient fees.

The local government adjusts the contribution level in accordance with the local economic development level. The most recent data shows that the premium is raised to 120 Yuan per person (20 Yuan from the individual, 50 Yuan from the local government, and 50 Yuan from the central government) in numerous rich rural regions (Ministry of Health, 2006).

**Table II.11** Rural NCMS 2004 - 2007

	Covered pop (million)	Population (million)		Coverage ( percent)	
		Rural Resident	Agr. pop.	Rural Resident	Agr. pop
2004	80	757	879	10.57	9.10
2005	179	745	896	24.01	19.97
2006	410	737	892	55.60	45.98
2007	726	728	878	99.79	82.73

Notes: there are two definitions for "rural population": either by residence or by occupation. "Rural residents" represents the population who has a residence in rural areas. "Agr. pop." represents the population that is engaged in agricultural works.

Data source: Chinese Health Statistic Yearbook 2008

The coverage of the NRCMS was considerably increased in the period of 2006-07. In 2004, NRCMS covered only 9 percent of peasants. By the end of 2007, it reached 83 percent peasants, or 726 million people (Table II.11). By 2007, 85.6 percent of counties in China had implemented NRCMS. The funds of NRCMS reached 42.8 billion Yuan. The overall reimbursements amounted to 34.61 billion Yuan, accounting for 80 percent of insurance income. In 2006, the central and local government appropriation amounted to 15 billion Yuan, accounting for more than 60 percent of total NRCMS funds (You and Kobayashi, 2009).

Regardless of rapid development of NRCMS, the total fund remains small relative to medical expenditure. Until 2008, NRCMS fund amounted to 78 billion Yuan, account for only 5 percent of total health expenditure.

#### **2.4. MFA and private health insurance schemes**

Chinese government use MFA as the main financial tool to protect the extreme poor. It is a government-supported program which aims at increasing access to basic health care of the extreme poor and preventing impoverishment due to illness. China Health Economics Institute (2008) estimated 3 percent of rural population living below national poverty line<sup>25</sup> and another 5.5 percent being low income people. Chinese Economic Daily Newspaper (2003) estimates that there are in total 150 to 210 million poor people in China, including 21.4 million urban poor, 150 million rural poor, and 40 million poor immigrants. Medical spending is an important factor which deteriorates their financial situation. For instance, medical spending raised the number of rural households living below poverty line by 44.3 percent (Liu et al., 2002).

The development of MFA scheme is recent. It is at first applied in several cities, like Beijing, Shanghai, Liaoning, to health urban poor. In rural areas, the most important MFA scheme is brought by China Basic Health Service Project (conventionally referred to as “Health VIII Project”) initiated by the World Bank in 1998 (Wagstaff and Yu, 2006). In 2003, MFA schemes are applied in both urban and rural areas. Detailed conditions of these schemes are adjusted in function of local situations. The total MFA increased from 4.1 billion Yuan to 7.2 billion between 2006 and 2008 (Chinese Health Economic Institutes, 2009).

Private commercial insurance, in contract target the well-off population which desire financial protection for more expensive health spending. The share of private commercial insurance increased quickly in the 1990s. Its coverage for urban population increased from 0.25 percent in 1993 to 3.17 percent in 1998 and that for rural population augmented from 0.33 percent to 1.41 percent (National Health Service Survey of 1993 and 1998). Nevertheless, the role of private insurance remains limited. There are 11 life insurance Companies in China that offer medical insurance products which protect the insured from catastrophic health shock, such as cancer and congestive heart failure. In total, 7.6 percent of the population was covered under a commercial health insurance plan in 2003(Liu, 2002).

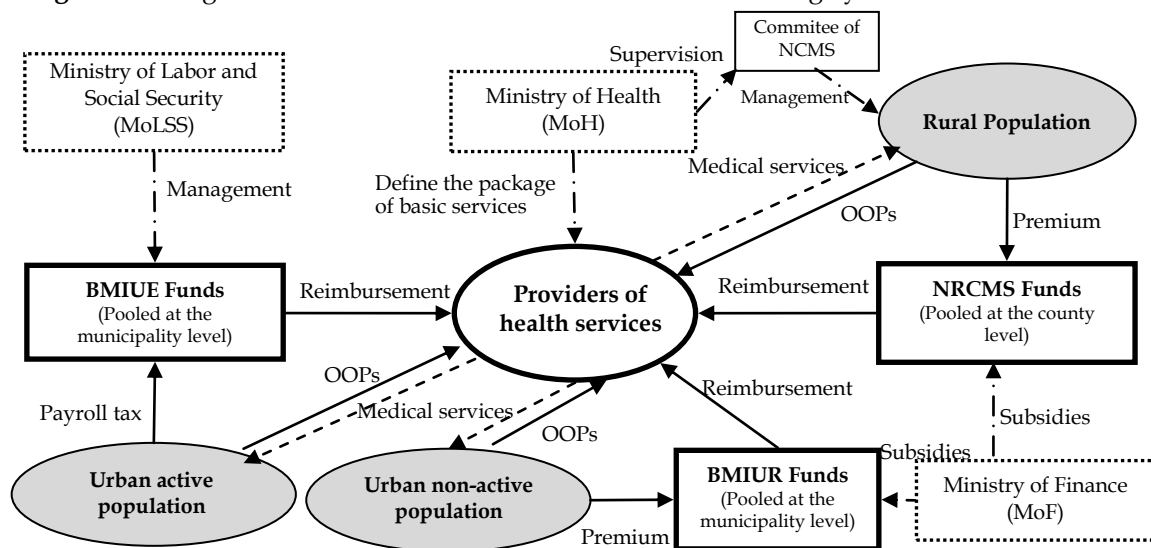
### **III. The comparison of actual health insurance system with the ancient one**

Due to the importance of three basic insurance schemes, their characteristic set the keynote of China’s health security system. Diagram II.6 illustrates the framework of the system. Compared to health security system before 1978 (Diagram II.4), the new system has some substantial changes but also inherited some characteristics from the old one. A summary of comparison is listed in Table II.12.

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<sup>25</sup> 634 Yuan in 2006 (Wang et al., 2006)

**Diagram II.6** Organizational chart of Chinese Basic Health Financing System in 2010



Note:

- The plain arrow indicates the financial flux.
- The dashed arrow indicates the service flux
- The dash-point-dash arrow indicates government's intervention.

Source: compiled by the author

**Table II.12** The comparison between the old and new Chinese health security systems

	Old system			New System		
	GIS	LIS	CMS	BMIUE	BMIUR	NRCMS
Covered population	Government employees	Employees of SOEs and their dependents	Households inside of agricultural commune	Urban Employees	Urban residents without employment	Rural households
Financial contribution	Government budget	In percentage of wages	Flat-rate premium	In percentage of wages	Flat-rate premium	Flat-rate premium
Risk pool level	Ministry	Enterprise	Commune	Municipality or County		
Management responsibility	Government	Enterprise	Commune	Government		
Benefits	Free access to health services		Free access to health services at health station, reimbursement for the hospitalization outside of the commune	Reimbursement for expenditure on basic medical services which is above the deductible and below the reimbursement cap (the deductible, co-insurance rate, and cap are different according to insurance schemes)		
Provider payment	FFS			Mainly by FFS, some prospective payment schemes are under experimentation in several regions		
Role of the gov.	Manager	-	-	Manager	Manager and main financier	

Source: drafted by the author.

### **3.1. Essential changes**

First, the population is now grouped by their residences rather than by their professions. In the old security system, the access to insurance scheme depended on the work unit of the individual. The government employees were automatically covered by GIS. SOEs were required to provide medical services to their employees. The agricultural communities could choose whether to adapt CMS. The decision was, nevertheless, a collective one. Either the whole village participates or no body participates (Wen and Hays, 1976). This insurance system hampered the labor mobility, because changing work means also changing health security coverage. As people in the public sector were better covered than those in the private sector, it impeded labor flowing toward private sector. In order to liberate labor force, the government intentionally kept the new health security system independent of work units.

Second, the risk pool is enlarged. Under the old system, the health spending risk was pooled by work unit. The capacity of each insurance fund to pay for the health spending of its members was directly depended on the economic situation of the work unit. Under the new system, insurance funds are pooled by municipality or county level, with an average population of 20 million. The capacity to pay of insurance funds is considerably increased, because the risk cost will be shared by a big scale of population.

Third, the government put more attention on the needs of the poor. Under the old system, the government budget was mainly used to finance the medical expenditure of the government employees, whereas the poorest population was found among the urban non-active population and the population residing in remote rural areas. In the new system, a great part of government spending is used to finance the urban and rural poor. In the BMIUR and NRCMS funds, the government investment accounts for more than 60 percent, while in the BMIUE funds, the main contribution comes from the payroll-taxes gathered from the employees and employers.

Forth, the benefits are restricted and the patient is asked to share medical costs. Under the old system, the insured often had quasi-free access to medical services. It reduced the awareness of the patient-consumer to medical costs and put all risks of medical consumption on the insurer side. On the other hand, the insurance premium was set in function of the capacity to pay of the insured rather than the insurance expenditure. The gap between the spending and income of each insurance fund threatened their sustainability and finally induced the collapse of the whole system. Under the new system, the government accords great importance to the sustainability of funds. Benefits are calculated in function of the income of the insurance and allowed to vary by regions. Given the relatively low level of contribution, the insurance for the moment offers a quite restrictive range of benefits. The insured normally needs to pay a deductible before receiving any reimbursement from the insurer. There is also a reimbursement cap above which the medical expenditure is on the charge of the patient. In between, a co-payment is required in function of the level of spending, the nature of medical treatment (inpatient or outpatient), and health facility where the medical treatment is provided (See Annex II.2 and II.3 for more details).

### **3.2. Characteristics that have not been fundamentally changed**

Regardless of these important changes, there are also some essential characteristics issued from the old system that the insurance reform has not yet fundamentally changed. First, the

provider payment is still principally based on fees for services (FFS), albeit local experiments on prospective payments. Issued from the old health system and further developed during the economic transition, the Chinese provider payment is based on FFS with a fee schedule that strongly encourages demand shifting to drugs and high-tech diagnosis services on which the margins are higher (Liu and Mills, 1999). Since the insurance reform, numerous local experimentations on prospective provider payment have been carried out in form of the contract between insurance funds and contracted hospitals (Liu et al. 1999; Yip et Eggleston, 2001; Meng, 2002; Bai, 2004; Wu et al, 2004; Wagstaff et al. 2009). However, these experiences remain at local scale. And the local government has discretion on whether or not adapt prospective provider payment.

Concerning medical pricing system, since 2000, Chinese government began to address the modification of the fee schedule. It mainly concerns two changes. First, fees for professional services are raised while those for high-tech care are reduced. Second, government's control on drug prices shifts from the prices for all kinds of drugs to the prices for only selected products (Eggleston et al., 2008). Service suppliers seem encouraged to provide more ordinary medical services. However, to what extent these reforms can change the structure of health service provision stays uncertain, because the sales of drugs and high-tech services still bring much higher profit than the sale of ordinary services (Meng, 2002).

Second, the new health insurance system does not change the government's role as main purchaser of services. The government investment accounts more than 60 percent in BMIUR and NRCMS funds. The government therefore has predominant decision power over the service purchase. All the three public insurance funds are managed by local governments. Although insurance funds are deposited in a separate account, the manager of social insurance is appointed by the local government. The target population can only decide whether or not participate insurance scheme, but has no choice on insurers. This reduces the negotiation power of the insured through voting by feet. As a result, the insurer is more preoccupied by the sustainability of the funds than the attractiveness of the insurance scheme for the insured. All the three insurance schemes have accumulated surplus since their initial year. In 2007, for example, the expenditure of NRCMS was 81 percent of its total funds and that of the two urban basic medical schemes (BMIUE plus BMIUR) accounted for 70 percent of their income. There is no proof that insurance system broke the coalition between the purchaser and provider of health services (Wagstaff, 2007).

Third, the new insurance system, at least for the moment, does not reduce the inequality between urban and rural population in their financial accessibility to medical services. Regardless of great government investment, the contribution of NRCMS remains low relative to BMIUE. In 2007, the average contribution of NRCMS was 60 Yuan against 1229 Yuan for BMIUE. The benefits of insurance directly linked with its income. The great difference in the levels of urban and rural contributions implies that the protections that the urban and rural people can get from their insurance schemes would be substantially different (cf. Annex II.2 and II.3).

## **IV. Literature on the role of insurance in Chinese health system**

### **4.1. On the patient-consumer side**

The need for insurance reform was at first perceived by the deep resentment of people against high health expenditure and low insurance coverage. According to 2003 Household Health Service Survey, 44 percent of urban people and 79 percent of rural people were without any health insurance coverage. Among the 20 percent poorest people, 60 percent of rural people and 46 percent of urban people abandon medical treatment in case of need (China Health Economics Institute, 2008). The first motivation of insurance reform is then to “reduce the monetary cost of accessing medical services, enabling individuals with substantial unmet needs to access otherwise unaffordable care.” (Nyman JA, 1999, page 142) An accompanying motivation is to impede impoverishment, protect household against financial burden of illness, especially large OOP payment resulting from catastrophic illness (Rao et al., 2003).

The coverage of health insurance increases quickly, especially in rural areas. According to the preliminary result of the 4th National Health Service Survey of China in 2008, the NRCMS covered 89.7 percent of rural population; the BMIUE 44.2 percent of urban employees; the BMIUR 12.5 percent of urban unemployed residents; and commercial health insurance accounted for 7.6 percent of the total market share, mainly serving upper class individuals. (Chinese Center for Health Statistics and Information, 2008)

Numerous studies discussed the impact of insurance reform on individual's access to medical service and the reduction of health financing risk. The insurance reform generally increases the use of health services, but does not relieve households from health spending burden, neither in terms of the OOPs nor in terms of the incidence of catastrophic spending (Wagstaff and Lindelow, 2008; Wagstaff et al. 2009; Sun et al., 2008). The NRCMS funds are too limited comparing to insured population to essentially reduce the OOPs and protect the insured for catastrophic spending. The reimbursement accounts for only about 20 percent of total health spending (You and Kobayashi, 2009). Urban insurance offers higher reimbursement. However, it remains insufficient. Liu et al. (2002) found that the urban insurance reform in Zhejiang does not increase the access to expensive and high-tech care of the poor. According to Chinese Health Statistic Yearbook (2009), until 2006, OOP payment still accounts for almost half of total health spending.

Insurance seems reduce the inequality in the access to basic medical services between the poor and non poor. It is found that insurance reform increased more significantly the accessibility of outpatient services for the poor than for the non-poor. As consequence, it narrowed the gap in the use of basic medical services between them. Concerning the consumption of expensive services and advanced diagnosis technology, in contrast, the insurance seems enlarge the gap in the access to service between the poor and non-poor, as the non poor consume even more expensive services than before the reform (Liu et al., 2002; Wagstaff and Yu, 2006).

To sum up, the basis of new health insurance system is built. The coverage of insurance extends quickly, however the depth of protection remains shallow. The insurance increases the access to basic medical services of the poor. Nevertheless, it does not essentially reduce the



catastrophic financial risks due to the high co-payment imposed on the patient side. The argument for demand-side cost sharing was to keep the patient aware of medical cost. However, history data show that the demand side sharing has very little effect to cost containment (Liu and Hsiao, 1995).

## **4.2. On the provider side**

### **4.2.1. Expected impact of insurance**

The insurance scheme can be expected to influence the provision of health services through several aspects. First, it can increase the total demand for medical services. As insurance provide financial assistance to the patient, it enforces the CTP of the latter. If the insurance reimbursement is directly deducted from the patient's direct payment on the spot, it brought a price effect which will be translated into an incremental demand for services. If the insurer does not control the behavior of the service provider, the latter would be able to profit asymmetric information and over-prescript services. If it is the case, the insurance reimbursement will induce medical cost inflation rather than the increase of necessary needs (McGuire, 2000).

Second, insurance can also modify the structure of medical demand by setting preferential reimbursement rules. As the insurance reduces the price of insured medical service, it will encourage the patient-consumer to consume. Based on this idea, the Chinese government intentionally set higher reimbursement rate for medical consultation at lower-level health facilities in an attempt to divert population toward first-level health facilities. A group of basic medical services and medicines are also selected to construct the list of medical goods and services legitimate to reimbursement.

Third, the insurance imposes different incentives to the provider and change the behavior orientation of the latter. If insurance fund is important relative to total health expenditure of the target population, the purchase of insurer could represent an important share of the demand on the medical market. As a result, it would be able to impose different transaction rules to influence health provider's behavior. For example, health service contracting-out system evokes competition among hospitals for contract and consequently spurs productivity and efficiency (Li and Yang, 2006).

Provider payment is another example. International experience proved that by modifying provider payment, the insurer can change the behavior of the service provider. The economic efficiency of provider payment in terms of cost containment can be classified from highest to lowest as follows: budgeting facilities and salaries for personnel; capitation to organized health plans and individual professional providers; negotiated fee schedules and contract rates; unrestricted reimbursement of charges and costs (Liu, 2003). The experience of other Asian countries shows that the government can find appropriate ways to pay supplier (public or private) so that the latter would be encouraged to organize the provision of services in function of needs rather than profitability. This, for example, can be done by substituting FFS with an enveloped payments and case mix formula which alter hospitals' behavior in a desired manner without reducing their autonomy (Ramesh and Wu, 2009).

#### 4.2.2. Certain Chinese realities

Several Chinese realities in the application of insurance schemes are noticed in the literature. First, insurance brings a cost inflation effect because health services providers adjust services prices to the augmented ability to pay. Numerous studies on the impact of insurance found an increase of health expenditure (Wagstaff and Lindelow, 2008; Zhu et al., 2008; Wang, 2005). Wang (2005), for example, found that for the same medicine, the price in NRCMS-appointed hospitals is much higher than that in a pharmacy. Xun (1990) compared drug prescription between the insured and uninsured appendectomy patients. He found that the cost is twice for the insured patient as that for uninsured patient regardless similar outcome. Nevertheless, there is no detailed estimation on the level of extend of cost inflation caused by the implementation of insurance scheme, probably due to the difficulties in distinguishing necessary medical consumption from unnecessary one.

Second, the attempt of modifying the quantity and structure of medical demand through differentiated reimbursement rules could influence consumer's behavior only if the latter has intention to profit insurance benefits. Several elements may impede the insured to enjoy insurance benefits, such as the opportunity cost of the time that the insured need to spend in getting reimbursement, the knowledge about what insurers offer, the biased treatment and poor attitude of health staff towards the insured patients. Sepehri et al. (2009) analyze the determinants for the use of insurance benefits in Vietnam with a national wide household survey data which contains 9,189 household and 46,000 individuals. They found that if the use of insurance correspond to a lower quality of medical service, the individual is more likely to abandon insurance benefits. The richer patient use less often insurance as they prefer to pay out-of-pocket in exchange of more choice on services and providers. The paradox of high OOP payment and huge fund surplus observed in China may also reflect that people are reluctant to use their medical insurance. Doctor persuades the patient to use costly diagnoses or expensive treatments which are not included in the insurance. Direct medical payment is even higher with insurance than without (Wagstaff and Lindelow, 2009). People continue to prefer self-treatment.

Third, health care contracting-out does not necessarily increase the efficiency of service provision. This strategy aims to pick out the most cost-efficient hospitals to provide services. However, contracting-out arrangement also puts designated hospitals in an advantageous competition position, because patients are encouraged to choose these hospitals to get best reimbursement. The efficiency of contracting-out is then depended on whether selected hospitals are indeed the most efficient ones.

The efficiency of selected hospitals may be questioned for several reasons. (1) Competition for contract may be subjected to suppliers' opportunity behaviors, such as price gouging; (2) efficiency measurement is difficult to define, because medical procedures are complicate to judge due to the uncertainty of results; (3) once the contract is set, there is few control on the quality of services delivered in reality. (Vining and Gliberman, 1999) Several studies investigate the effects of health care contracting-out on the overall health system performance in the developing countries. They found that contracting-out increases services consultations in the contracted hospitals but has little effect on the quality of services (Loevinsohn et al., 2009; Liu et al., 2007). If the contracted hospital cannot answer the medical demand of target population, it will evoke the resentment of the insured toward insurance scheme. That explains why in 2008, Weifang health

bureau decide to abandon contraction-out. The insured can choose whatever health facilities inside of the county (personal communication with Weifang Health Bureau).

Forth, the implementation of insurance scheme did give opportunity for the development of prospective payment. In general, transforming FFS to hospital prepayment scheme can reduce the growth rate of overall expenditure and patient co-payment per inpatient admission (Yip and Eggleston, 2001). The implementation of Diagnosis Related Grouping (DRG) seems reduce the length of hospital stays (Zhang, 2007); reduce the expenditure on drugs and high-tech care (Yan et al., 2001); increase patient's trust to healthcare provider (Liu et al., 1999). As far as capitation and global budget are concerned, in 1997 several municipal hospitals in Shanghai tried to use them to replace FFS. They showed proof that both methods decline the growth rate of medical expenditure (Yang and Xuan, 1999; Guo and Ge, 1998). Nevertheless, none of these studies shed light on the evolution of services quality.

Fifth, regardless of numerous proofs on the effectiveness of prospective payment on cost containment, there are still technical and institutional difficulties in adapting prospective payment all over the country. Several factors may explain the difficulties in contracting prospective payment. On the one hand, the control of fraud and abuse in the behavior of service providers is extremely complicated due to the complexity of the elements which intervene into the choice and result of medical treatments (Hyman, 2001; Rai, 2001). The problem is not specific to developing countries. In US, health care fraud and abuse reportedly account for 10 percent of total spending on health care, or about 120 billion dollars per year (Hyman, 2001). On the other hand, even if we can set concrete criteria and regulation for the reimbursement, the effectiveness of these regulatory measures also depends on the number of services and medicines that are included in the list of reimbursement. If the insurance regulates only a small part of hospital activities, the physician could shift the prescription from regulated services or medicines to unregulated ones (Wagstaff et al. 2009). However, given the income of insurance schemes, especially those of BMIUR and NRCMS, the insurance covers only a limited list of medical services and medicines. It is found that the insurance induces higher medical expenditure because it encouraged physicians to prescribe more non reimbursed services and medicines (Wagstaff and Lindelow, 2008).

Lastly, the regulation power of insurance schemes remains weak. In China, the enforcement of regulation is challenged by the coalition between public health facilities and public insurance agents. When hospitals fail to attain the performance objectives, the MOH is reluctant to sanction them because they are the MOH's political base (Yip and Hsiao, 2008). As result, the compliance rate seems low in health sector. Liu et al. (2000), for instance, found that regulated prices are rarely respected. According to their study, although the prices of most of health services are set below their marginal costs, 85 percent of the surgical operation services actually charged more than their costs and the total cost-recovery rate of medical services was 124 percent. Wang et al. (2006) found that although NCMS set household as enrollment unit, one third of households were only partially enrolled. And the enrollees were most often those who were in higher needs of medical services. The compulsory nature of BMIUE is also challenged due to weak regulation. The local social insurance bureaus do not have "the legal authority to force participation, because China does not yet have a social insurance law". (Liu, Y., 2002, page 143) In order to enforce regulation, an independent agency should be found which has no interest to protect health

provider. However, most supervision agencies are government institutes and primarily concerned with their own interests and thus those of the provider (Yip and Hsiao, 2008).

## **V. Empirical study on impacts of NRCMS on activities and the financial structure of township health centers in Weifang prefecture<sup>26</sup>**

### **5.1. The motivation**

In this section we put our point of view on the supplier side. Through a case-study, we try to estimate the impact of NRCMS reform on township health center (THC) activities and the financial structure in Weifang prefecture. Several reasons make this subject interesting.

First, among the three insurance reforms, NRCMS covers largest population and receives most important government subsidies. Until 2008, NRCMS covers 815 million rural people. The participation rate reached 91.5 percent (Chinese Health Economic Institutes, 2008). Government subsidies allocated for NRCMS amounted 32 billion Yuan until 2007, accounting for 68 percent of total NRCMS funds (Chinese Health Economic Institutes, 2008 and 2009). An evaluation on the impact of NRCMS offers important information on the performance of the government investment and the availability of medical resources to a large part of population.

Second, NRCMS offers important experiences for the implementation of BMIUR. The target populations of the two schemes have some similar characteristics. 1) They are both difficult to identify. NRCMS is mainly proposed to the rural population who are engaged in agricultural work. They are often considered as working in the informal sector, because they are generally self-employed and run family business (Henley and Arabsheibani, 2009). As a result, it is difficult to impose a compulsory social insurance scheme based on payroll-taxes, because it is difficult and costly for the government to trace their income. BMIUR targets urban unemployed. Compulsory social insurance scheme could not work out for the same reason. The two insurance schemes are therefore defined as community-based insurances with voluntary participation. 2) Both populations contain a great number of people who are economically disadvantaged. In another word, both populations have a low capacity to pay and would not be able to afford a high insurance premium. On the other hand, they are also often exposed to high health risks due to difficult living circumstance, the lack of medical knowledge and the absence of necessary sanitation conditions. The great challenge in constructing health insurance is how to make up the gap between the small premium and great medical needs. The government played a major role. Two third of NRCMS funds comes from government budget. MBIUR is following the same pattern.

Third, the study subject is township health centers (TH for short) which play an important role in rural health referral system. As presented in Chapter 3, THs are the linkage between health stations and county hospitals. On the one hand, they supervise the quality of services delivered at village health stations; offer technique backup to the latter; and provide general surgery care. On

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<sup>26</sup> This study is conducted in collaboration with Aurore Pelissier under the framework of BQR project directed by Jacky Mathonnat and Martine Audibert and financed by the French Embassy in China and the University of Auvergne.

the other hand, they play the role of gate keeper who filters needed patients to upper-level hospitals. In addition, they are also in charge of the organization and delivery of preventive care to the rural population. They are therefore the main provider of primary care in rural areas (Hillier and Shen, 1996).

Since the economic reform, THs fall in great financial hardship. Due to the shortage of public financing, THs, as other health facilities, are encouraged to make up the budget deficit by participating market competition (Xu et al., 1996). However township health centers are less well equipped than county hospitals in terms of the quality of medical staff as well as the technical level of equipment. As consequence, as long as services are affordable, patients prefer to consult at county or above level hospitals for better quality of services, even if they are more expensive (Dib et al., 2010).

The failure of THs directly threatens health referral system. NRCMS reform is considered as an opportunity to diver patients toward first-level health facilities (Central Committee of the Communist Party and the State Council, 2002). The government set preferential reimbursement for the medical consultation at THs in order to attract patients. However, as we discussed previously, the effectiveness of this policy depends also on whether insured population make consumption decision in function of insurance benefits. Studying whether the implementation of insurance effect THs' activities can help us to discern how the insured appreciate the insurance scheme and through which channel this influences health provision.

Lastly, the study permits to analyze the effectiveness of a third-payment system which does not permit for the separation of the purchase from the provision of services. Studies on the efficiency gain from health service purchasing arrangement argue that it is important to separate the purchase from the provision of services (Preker and Langenbrunner, 2005). A third-party payment system is expected to facilitate this separation (Dixon et al., 2004). However, Chinese government is largely engaged in the implementation and operation of NRCMS. The government, rather than an independent third-payer, is the main purchaser of services. In this context, the study on the influence of NRCMS permits to verify whether purchaser-supplier split is a necessary condition for the good function of the system.

## **5.2. Literature on the impact of insurance scheme**

The effect of NRCMS on increasing medical access and reducing financial risks of the patient-consumers has been intensely discussed in political and academic domains (Sun et al, 2008; Wang et al., 2006; You and Kodayashi, 2009). Numerous studies also address the impact of NRCMS on rural health service delivery system (Bloom et al., 1995; Yang and Li, 2006; Wagstaff and Yu, 2006; Wagstaff et al., 2009). Nevertheless, these researches are generally based on statistical descriptions and theoretical reflections. Relatively few studies evaluate the impact of NRCMS project on health facilities' activities based on econometric model.

The main contributions in the domain of impact evaluation of rural insurance program can be found in the works of Wagstaff and Yu (2006) and Wagstaff et al. (2009). Wagstaff and Yu (2006) use differences-in-differences (DID) model with propensity score matching to analyze the impact of World Bank China Basic Health Service Project (conventionally referred to as "Health VIII Project") on the accessibility and supply of medical services in Gansu province. However,

Health VIII project contains several components of which health insurance reform is only a small part. The authors warn that “any impacts found in the analysis”... “are unlikely therefore to be attributable to this first component (rural insurance reform) of the project” (Wagstaff and Yu, 2006, page 5). Wagstaff et al. (2009) use similar technique to analyze the impact of NRCMS on releasing health financial burden of rural households and on improving the outcomes of health facilities in 10 NRCMS counties and 5 non-NRCMS counties in 12 provinces. This study provides empirical proofs on the impacts of insurance reform on the delivery of health service in rural areas.

However, our study may offer interesting complementary information on the impact evaluation of NRCMS project relative to that of Wagstaff et al. (2009). We, first, focus on one specific prefecture rather than a large range of regions. According to the political design, the insurance is pooled at county level and managed by local government. The county government has great discretions on the details of insurance practices. The discrepancy of insurance schemes can be a potential source of heterogeneity in project impact (Mao, 2006). Comparing our results with those from a more general study, like that of Wagstaff et al. (2009), can bring more detailed information by taking into account of the heterogeneity of insurance packages across regions.

Second, we use a panel data to exploit the quasi-experimental character of our sample. In a cross-section dataset, the matching method is often used to identify counterfactual groups. However it is not always easy to find appropriate matches. Wagstaff et al. (2009) reports that when they do the propensity score matching only 20 percent of potential control county facilities were used as controls, because the others were found to be too different from treated groups. In our sample, insurance program is phased in over time in Weifang. This permits to temporarily construct counterfactual groups by comparing the treated counties with the untreated ones at a given time. Our estimation with panel data and staggered entry can therefore be an interesting alternative.

In order to conduct our analysis, a unique and original dataset was collected in the Weifang prefecture of the Shandong province in China. It contains rich information on a group of randomly chosen township health centers in the province. The data covers a period of 9 years (2000-2008). Econometric analysis exploits the schedule of NRCMS implementation, beginning in 2003 and completed in 2006 (in our sample). Identification tests will be performed to valid the econometric model, including tests for parallel trend assumption (PTA) and selection bias. Then, the heterogeneity of impact is investigated.

### **5.3. Background of NRCMS reform in Weifang prefecture**

Weifang is a city-prefecture of Shandong province locating in the northeast of China. It is composed of 16 county-level administrative divisions. To simplify the appellation, they are jointly referred to as “county” in the following presentation. These counties have jurisdiction over 148 townships (or districts) and 9285 villages. The total population is 8.5 million, in which 6.22 million are rural population, accounting for 73 percent of total. In terms of health infrastructures, there are 6384 health facilities, including 61 county-or-above-level hospitals and 194 township health centers (Weifang Statistic Yearbook, 2008).

The reform proceeds in rural areas in a gradual way since 2003. At the initial stage, the Weifang government chose at first pilot counties which then chose pilot townships to apply the reform. There were no explicit criteria on the choice of pilot counties. New counties and townships were involved into the reform gradually over the time. Until 2006, all the municipalities and counties in Weifang are eligible to the insurance reform. Universal coverage of rural population was obtained by 2009 (Weifang Health Bureau, 2010).

Rural households in the eligible townships are free to choose whether to enroll. Nevertheless, the participation rate increases quickly. In our sample, the average participation rate during the experimental period, from 2003 to 2005, was 37 percent; while during the extending period, since 2006, it is more than 95 percent.

Insurance funds are collected once per year. Until 2006, the contributions are hand out in May or June. However, in 2006, the period of fund collection shifted to November to conform to fiscal year. Once individual's contributions are collected, the subsidies of local and central governments are allocated in accordance with the number of participates.

Health service providers are mainly paid by FFS, albeit experiments on prospective payments in some townships. The reimbursement rules contain thresholds for deductible, the ratio of co-payment, and the cap of reimbursement. Inpatient fees are better reimbursed than outpatient ones. In general, medical treatments at township health centers are better reimbursed (in terms of their share in total health spending) than those at county or higher-level hospitals. In 2009, the share of reimbursement in total health expenditure in Weifang was around 35 percent, of which 30 percent was used for outpatient fees and 70 percent for inpatient (Weifang Health Bureau, 2010).

Several measures are taken to encourage insurance participation. In order to facilitate reimbursement, a computer system is implemented in health facilities to calculate the insurance benefits on the spot. The patient needs only to pay medical fees deducting reimbursement. In order to attract people in relatively good health, an annual comprehensive physical exam is also organized for the insured that did not enjoyed the insurance reimbursement during the covered year.

One source of heterogeneous impact is the income level of townships. The reimbursement rules are set in function of the categories and prices of medical services. It represents a larger share of household income in poor townships than that in non-poor townships. It is therefore expected that insurance program have larger impact for THs in poor townships.

It is also interesting to know how the impact of reform changes over time. It takes time for both patient-consumers and THs to adapt to the insurance scheme. On the patient side, during the first year of implementation, the insurance may encourage medical consultation because people want to try the new program. In the following years, the patient consumer's behavior will be modified in function of his experience in the previous year. If the patient appreciates the experience, he will continue to profit insurance. Otherwise, he will be discouraged and abandon the program. It also may be the case that, with the help of insurance, people has more access to medical services and their health status ameliorates in the following year. As consequence, there will be lower demand for medical services in the following year.

On the provider side, the insurance covers only the medical goods and services in a pre-determined list. The demands for these goods and services will increase. If these goods and services are profitable, it will help THs to ameliorate their financial situation. Otherwise, THs will have to prescript even more expensive goods and services to cross-subsidize the business lose due to the sale of insured low-profit goods and services. These sources of heterogeneity will be investigated.

## 5.4. Methodology

### 5.4.1. Data

Data come from a survey conducted in collaboration with the CERDI of Auvergne University, the Weifang Health Bureau, and the Medical University of Weifang. It is a longitudinal survey, covering the period from 2000 to 2008. 24 THs are randomly selected among 6 counties of the Weifang prefecture. According to Table II.13, the NRCMS is gradually implemented among the sample counties between 2003 and 2006. Townships do not necessarily enter into program at the same date as the county which they belong to. This conforms to the reform design: counties choose pilot townships before extend the reform to the whole region. The participation rate in each township may increase over time, but generally reaches more than 90 percent since 2007.

**Table II.13** - Phasing-in of the rural health insurance reform in the selected townships

County	Township	2000	2001	2002	2003	2004	2005	2006	2007	2008
Anqui (2003)	Jin Zhongzi								X	X
	Guan Gong Zhen							X	X	X
	Jingshi							X	X	X
	Lin Wu							X	X	X
	Wu Shan Zhen							X	X	X
	Xin An							X	X	X
	Zhe Shan Zhen							X	X	X
Changyi (2004)	Liu Tan								X	X
	Xia Dian Zhen							X	X	X
Gaomi (2005)	Cai Gou Zhen							X	X	X
	Da Mou Jia Zhen						X	X	X	X
	Jing Gou Zhen						X	X	X	X
	Kan Jia Zhen						X	X	X	X
Qinzhou (2003)	Dong Xia Zhen				X	X	X	X	X	X
	Gao Liu Zhen							X	X	X
	He Guan Zhen							X	X	X
	Shao Zhuang Zhen						X	X	X	X
	Tan Fang Zhen						X	X	X	X
	Wang Fen Zhen						X	X	X	X
Shouguang (2004)	Dao Tian Zhen					X	X	X	X	X
	Hou Zhen					X	X	X	X	X
	Tian Liu Zhen							X	X	X
Zhucheng (2004)	Bai Chi He						X	X	X	X
	Ma Zhuang Zhen							X	X	X

Note: the entry date of county into the reform is in the parentheses. Compartments colored in chestnut when a township is covered by NRCMS. When, there are 90 percent or more of NRCMS participants in the township population, a cross is added.

Source: Authors' database.



### 5.4.2. Econometric model

In order to estimate the NRCMS impact, the generalization of the double-difference method is used. This quasi-experimental approach allows exploiting the panel dataset and the gradual implementation of the health insurance reform over time. THs not yet covered by the reform are used as a comparison group for THs covered by the NRCMS. Typically, the within estimator is used. The basic model to be estimated is the following:

$$\ln(Y_{it}) = \delta P_{it} + u_i + v_t + \varepsilon_{it} \quad [\text{II.5}]$$

where:

- $Y_{it}$  are the activities and financing variables for township hospital  $i$  at time  $t$ . As there is only one township hospital per township in our sample, we use " $i$ " to represent either township hospital or township.
- $P_{it}$  is a dummy variable which equals to one if in year  $t$  the township  $i$  was covered by the NRCMS and 0 otherwise. The coefficient of  $P_{it}$ ,  $\delta$ , is the estimator of interest. It displays the estimated average effect of the NRCMS implementation on hospital outcomes.
- $u_i$  is township hospitals fixed-effects. It controls for time-invariant individual characteristics.
- $v_t$  is year fixed-effects. It captures township hospitals common characteristics varying over years.
- $\varepsilon_{it}$  is the error term, assumed to be *independent and identical distributed random variables (iid)*.

Positive serial correlation is detected in our data<sup>27</sup>. The model II.5 is estimated via first-differences rather than fixed-effect estimator because the former offers more efficient estimators in the presence of serial correlation (Wooldridge, 2002; Aker, 2008). The estimated model is the following:

$$\Delta \ln(Y_{it}) = \delta \Delta P_{it} + \Delta v_t + \Delta \varepsilon_{it} \quad [\text{II.6}]$$

Data for  $t=2000$  are dropped and the panel contains now 8 years (2001-2008). Standard errors are corrected for heteroscedasticity (Huber, 1967; White, 1980, 1982) and clustered at township level.

## 5.5. Empirical analysis

### 5.5.1. Measurement

Five outcome variables are selected. Medical activities are measured by the number of outpatient visits, the number of discharged patients (reflecting the volume of inpatients), the

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<sup>27</sup> The Wooldridge test (2001), the Baltagi-Wu LBI statistic and the Bhargava et al. (1982) Durbin-Watson statistic were performed. All conclude that error terms are positively serially correlated. Results of tests are available upon request.

**Table II.14a** Descriptive statistics I

SD	Total sample (2000 - 2008)					YEAR 2000					YEAR 2003					YEAR 2008				
	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max
Township characteristics'																				
# of households <sup>28</sup>	216	1.36	0.68	0.59	3.98	24	1.09	0.54	0.59	3.33	24	1.26	0.61	0.63	3.34	24	1.79	0.83	0.70	3.98
Share of rural (percent)	216	92.80	4.38	78.62	98.65	24	93.46	3.98	82.00	98.65	24	93.56	4.17	83.00	98.65	24	92.57	4.46	79.62	98.04
Farmer net income per # of health stations (unit)	211	0.43	0.09	0.31	0.64	22	0.35	0.03	0.31	0.40	24	0.39	0.04	0.36	0.49	24	0.57	0.05	0.50	0.64
	216	31	18	8	97	24	25	16	8	71	24	30	17	8	71	24	37	20	8	75
Township hospitals characteristics'																				
# of beds (unit)	213	39	19	16	150	24	33	12	16	62	24	34	12	16	70	24	59	34	20	150
# of professionals	213	52	31	16	201	24	47	25	18	143	24	49	30	17	159	24	67	42	21	201
- # of seniors	205	1	1	0	7	24	1	1	0	4	24	1	2	0	6	24	1	1	0	4
- # of intermediate	213	8	8	0	42	24	6	7	0	37	24	7	7	0	39	24	13	10	0	37
- # of juniors	213	41	24	13	171	24	38	19	15	102	24	40	22	14	114	24	52	34	18	171
# of outpatient visits	213	30398	24767	4934	138911	24	26135	21176	5432	98208	24	25350	21183	5508	78172	24	48244	32582	7082	138911
# of discharged	213	1249	901	40.9	4596	24	921	656	41	3369	24	864	730	50	3422	24	2184	1078	738	4467
# of vaccination	213	9162	9470	103	73378	24	6909	4914	156	18507	24	7363	5330	103	20958	24	14861	18529	108	73378
ALOS ( days)	216	5	1.42	2.14	15.2	24	5.29	2.43	3	15.2	24	5.21	1.52	2.14	9.96	24	5.11	0.92	3.2	7
Bed occupancy	216	0.47	0.24	0.03	1.40	24	0.44	0.25	0.03	1.25	24	0.38	0.24	0.05	0.91	24	0.61	0.19	0.26	0.94

<sup>28</sup> Unit: 10000 households.

<sup>29</sup> All monetary variables are in 10000 Yuan and normalized to 2000 constant prices.

**Table II.14b** Descriptive statistics II

Variables <sup>30</sup>	Total sample					YEAR 2000					YEAR 2003					YEAR 2008				
	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max	Obs	Mean	SD.	Min	Max
<u>Total subsidies</u>	216	15.39	20.07	0	149.01	24	14.95	14.86	0	64.9	24	14.13	14.48	0	48.92	24	32.91	42.15	1.54	149.01
County subsidies	216	10.25	17.32	0	149.01	24	9.10	9.69	0	34.7	24	9.56	12.00	0	43.05	24	24.34	42.00	0	149.01
Government subsidies	216	2.47	11.75	0	91.97	24	1.70	8.35	0	40.9	24	2.04	9.99	0	48.92	24	5.27	19.75	0	91.97
<u>Business income</u>	216	190.85	177.58	17.63	1120.58	24	133.81	100.12	34.52	488.73	24	128.08	98.83	33.04	376.82	24	370.73	275.65	42.88	1120.58
Medical treatment income	216	74.47	80.93	5.42	496.43	24	50.63	47.42	12.6	208.79	24	47.93	46.84	5.42	180.39	24	135.30	122.25	17.37	496.43
Drug income	216	116.38	101.44	11.84	624.15	24	83.19	57.00	21.92	279.94	24	80.15	55.73	27.62	223.96	24	235.43	160.61	25.51	624.15
<u>Total expenditures</u>	216	290.92	251.65	41.96	1635.84	24	191.00	112.74	86.97	599.35	24	216.12	143.13	69.65	636.77	24	569.56	396.79	143.93	1635.84
Current expenditures	215	261.15	215.80	41.17	1402.39	24	178.80	111.73	45.48	575.42	24	203.36	132.82	68.97	597.75	24	468.03	321.55	114.67	1402.39
Staff expenditures	215	106.18	85.63	18.72	566.51	24	67.23	35.84	28.83	180.61	24	86.62	54.65	31.75	241.88	24	181.01	126.16	27.22	566.51
Drug expenditures	216	73.85	65.32	0	467.56	24	65.96	49.81	0	236.22	24	50.24	38.21	11.31	187.39	24	143.42	102.74	32.50	467.56
<u>Total NRCMS reimbursement (10000 Yuan)</u>	107	94.85	105.29	4.59	619.78	4	0	0	0	0	6	44.44	29.36	7.11	90.40	24	169.08	161.30	32.29	619.78
share in inpatient (percent)	107	23	6	5	32	4	0	0	0	0	6	20	0	20	20	24	27	5	19	32
share in outpatient (percent)	107	47	10	14	69	4	0	0	0	0	6	40	0	40	40	24	57	6	51	69

<sup>30</sup> All monetary variables are in 10000 Yuan and normalized to 2000 constant prices.

average length of hospital stay (ALOS) and the bed occupancy ratio. Changes in financial structure are captured by the share of the income from the sale of drugs in total business income. All variables are transformed on logarithm.

### 5.5.2. Descriptive Statistics

Table II.14a and II.14b present descriptive statistics of the main analysis variables. Three years are chosen to capture the statistical characteristic of the sample: 2000, 2003 and 2008 which represent respectively before, during, and after reform. On average, a township contained 13,603 households with 93 percent of rural population. The farmer's net income per capita amounted 4332 Yuan<sup>31</sup>. Between 2000 and 2008, the number of households and the average net income per capita increased, but the percentage of rural population remained quite stable. The growth rate of income was higher in 2003-08's period than in 2000-03's period, 22 against 5 percent per year.

Concerning health service supply, two kinds of first-level health facilities were available in rural areas: village health stations and township health center. The number of village health stations per township varied from 8 to 97 with an average of 31. One or two new village health stations appeared each year.

There is only one health center per township. The volume of services is measure by the number of TH beds and that of health staff. There were on average 39 beds and 52 health workers per TH. The most important increase in the volume of TH was observed since the implementation of insurance program. Between 2003 and 2008, the average number of beds per TH increased of 25 units, against 1 unit between 2000 and 2003; the average number of health staff per TH increased of 18 in 2003-08 period against 2 in 2000-03 period. Nevertheless, the qualification structure of health staff remained similar. Junior professionals were the most important component, accounting for more than 80 percent of total.

In terms of the volume of hospital activities, three kinds of activities need to be distinguished: outpatient, inpatient and preventive services. They are represented by the number of outpatient visits, the number of discharged patients, and the number of vaccinations respectively. Outpatient services turned out to be the main activities of THs. The number of outpatient visits accounted for 74 percent of all three activities. Township hospitals activities increased significantly since the reform. All the three indicators had doubled between 2003 and 2008, whereas they stayed quite stable during the three years preceding the reform.

Two indicators are employed to measure the use of hospital resources: the bed occupancy rate and ALOS. The use rate of hospital resources seems augmented. The bed occupancy rate was almost doubled between 2003 and 2008 (from 38 percent to 61 percent), while it was slightly declined (from 42 percent to 38 percent) in the pre-reform period (2000-2003). ALOS, in contrast, was stabled at 5 days over 2000-08 period. The maximum ALOS, nevertheless, reduced from 15 days to 7 days between 2000 and 2008.

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<sup>31</sup> All monetary terms are in 2000 constant prices.

The implementation of insurance program seems have important positive influence on the income of THs. The average business income of THs had been tripled between 2003 and 2008, whereas it was slightly declined during the pre-reform period. The sale of drugs was the most important income source, representing 60 percent of total business income. During the reform period, both the service income and drug income increased by three times. The share of the income from the sale of drug in total business income, in contrast, remained stable.

High profit of the sale of drugs can be perceived by comparing the drug income with its expenditure. The average profit of drugs was 58 percent. Its escalation over years was striking. In 2000, the profit from the sale of drug was 26 percent. It was augmented to 60 percent in 2003 and 64 percent in 2008. The most important increase, nevertheless, was observed before the implementation of insurance reform.

To conclude with insurance scheme, the average reimbursement increased in accordance with the number of townships evolved into the NRCMS program. Between 2003 and 2008, both the number of legitimate townships and the amount of reimbursement are increased by four times. The share of reimbursement in medical expenditure is higher for inpatient than for outpatient care. In 2003, insurance reimbursement accounted for 20 percent of outpatient spending and 40 percent of inpatient spending. In 2008, the reimbursement was augmented, accounting for 27 percent and 57 percent of outpatient and inpatient spending respectively.

To sum up, there are signs that THs are significantly influenced by the insurance reform. Both the capacity of treatment and the quantity of activities of THs are augmented after the launch of insurance reform. TH's business income is also raised. However, there is no proof that insurance reform influences the way TH is organized and operated. Neither the structure of medical staff nor that of business income is significantly different ex- and post- reform.

### 5.5.3. Identification

In order to obtain an unbiased and consistent estimator of the program impact based on equation [II.6], several assumptions need to be verified: i) the parallel trend assumption (PTA), ii) the exogeneity of the order in which the reform was implemented, iii) the absence of migration.

- **The PTA**

PTA states that the intrinsic evolution of the outcomes of township hospitals in the absence of reform should be independent of NRCMS implementation. One way to test the existence of PTA is to compare the pre-intervention trends of hospital outcomes between the regions which enter into the program at different time (Aker, 2008; Wagstaff and Moreno-Serra, 2009; Barham, 2010). The hypothesis is that the pre-intervention trends of township hospital outcomes would be the same in the post-intervention period if the program were not introduced. This will be the case if, other things equal; the pre-intervention trends are not significantly different among the regions with different entry dates to the NRCMS. Inspired by Barham (2010), the test of PTA is conducted with the following specification:

$$Y_{it} = \gamma_0 + \sum_{t=2001}^{t=2002} \gamma_t dyear_t + \sum_{t=2001}^{t=2002} \sum_{k=2004}^{k=2006} \theta_{tk} dyear_t \times NRCMS_k + u_{kt} \quad [II.7]$$

- $t=2001-2002$  (pre-intervention period, 2000 is drop because it is the reference period).
- $k=2004-2006$  (period after the first intervention in 2003).
- $NRCMS_k$  equals to one if the township hospital enters in the reform during year  $k$ , 0 otherwise.
- $dyear_t$  are year dummies which capture the period specific effect of 2002 and 2001.
- $\theta_{tk}$  represents, at year  $t$ , the additional period effect hold by the regions which enter into NRCMS program in year  $k$ . If  $\theta_{tk}$  are not significantly different from zero, PTA is confirmed, i.e. pre-intervention trends can be considered as similar between township hospitals that applied the reform at various years.

Results are summarized in Table II.15. For all the five outcome indicators, the test supported the assumption that pre-intervention trends of outcomes were similar across groups which entered into the reform at different time.

**Table II.15** Test of PTA

Pre-intervention years	Ln (outpatient)	Ln (discharged patient)	Ln (ALOS)	Ln(Bed occupancy rate)	Ln(Share of drug income)
<b>Township hospitals which implemented NRCMS in 2003</b>					
2001	0.0445 (0.0595)	0.0951 (0.0658)	0.00567 (0.152)	0.00961 (0.0274)	-3.594 (3.385)
2002	-0.0310 (0.0593)	0.0743 (0.414)	-0.00677 (0.158)	0.0510 (0.140)	-0.501 (4.114)
<b>Township hospitals which implemented NRCMS in 2004</b>					
2001	0.0668 (0.120)	0.0555 (0.145)	-0.0674 (0.166)	0.0474 (0.0618)	6.965 (4.130)
2002	0.194 (0.132)	-0.170 (0.469)	0.0221 (0.169)	-0.0540 (0.155)	2.429 (4.979)
<b>Township hospitals which implemented NRCMS in 2005</b>					
2001	-0.0945 (0.0859)	-0.0512 (0.116)	-0.0396 (0.153)	0.0449 (0.0388)	4.635 (5.025)
2002	-0.0783 (0.118)	-0.101 (0.424)	-0.0566 (0.162)	0.00544 (0.143)	-0.808 (4.786)
<b>Township hospitals which implemented NRCMS in 2006</b>					
2001	-0.0205 (0.119)	-0.0683 (0.197)	0.105 (0.172)	-0.0893 (0.0546)	4.345 (3.453)
2002	-0.0278 (0.141)	-0.278 (0.473)	0.0549 (0.187)	-0.148 (0.158)	3.646 (4.586)

Note: Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at township level. \*\*\* indicates significance at 1 percent; \*\* at 5 percent; and, \* at 10 percent. Test is performed on a sample from 2000 to 2003, i.e the pre-reform period. The model is estimated by OLS with county fixed-effects because TH fixed-effects lead to a huge loss of degree of freedom.

- **The exogeneity of the entry order**

The model requires that the assignment of the program is exogenous across space and over time. NRCMS is a national policy which is expected to be adapted in all rural areas in China. Therefore the potential endogeneity comes rather from the date they enter into the reform than their eligibility.

There are two sources of selection bias: the omitted variables and the reverse causality. Regarding to the problem of omitted variables, the FD model (or FE model) controls for the time-invariant characteristics of THs and therefore eliminate time-invariant selection bias (Ravallion, 2001). However, it is possible that elements which vary across time and township hospitals have effects on both the outcomes of THs and the implementation of NRCMS in townships. If these variables are not controlled, they will cause artificial correlation between outcome variables and insurance implementation dummy. The income of rural household, for example, is a variable that vary across townships and years. It influences TH's activities, or financial structure, because it decides the effective demand of households for health care services. On the other hand, it may also be correlated with the interest variable,  $P_{it}$ , because economic development level of a township directly influences their needs for insurance reform and their capacity to apply the reform. As consequence, it is an important parameter for the choice of Weifang Health Bureau (personal communication with Weifang Health Bureau). This problem of artificial relation caused by omitted variables can be solved by adding control variables into the regression (Aker, 2008; Imbens, 2004). The model II.6 is then augmented:

$$\Delta \ln(Y_{it}) = \delta \Delta P_{it} + \beta \Delta X_{it} + \Delta v_t + \Delta \varepsilon_{it} \quad [II.8]$$

Mean tests are performed on the pre-reform period to identify control variable vector. It is done by comparing the means of a list of township and township hospital characteristics between townships hospitals chosen for the first year of implementation of the health insurance reform (i.e. in 2003) and townships that entered into the insurance program later on (Aker, 2008). The differences in means between the sub-sample groups that entered in 2004, 2005 and 2006 and the sub-sample that entered in 2003 are calculated respectively. Then, they are divided by standard deviation of the 2003 group. Covariates with score higher than 0.25 (in absolute value) are considered to be significantly different, and thus will be entered into the model (Imbens and Wooldridge, 2007; Aker, 2008). According to Table II.16, seven covariates are retained: the surface, the number of households, the number of village health stations, the rural net income per capita in the township, the number of total staff, the number of operational beds in the TH, and the total subsidies received by the TH.

Reverse causality refers to the situation where the activities or financial situation of township health centers are a determinant of the order in which townships would enter into the NRCMS program. At the initial stage of the reform, the authority may prefer to choose the regions where the impact of reform is expected to be more significant. As a consequence, regions where the hospitals have more activities have more chance to be chosen in first. It may also be the case that the variation in hospital outcome influences the chance that the township should be chosen. If, for instant, a TH has encountered rapid decline of activities in the preceding years of the reform, the township would be more motivated to participate in the program in hoping that the latter would

**Table II.16** Comparison of means between phasing-groups in pre-reform period (2000-2003)

	Year reform 2003			Year reform 2004			Mean 2003 - Mean 2004	Diff/s d(2003 )	Year reform 2005			Mean 2003 - Mean 2004	Diff/sd (2003)	Year reform 2006			Mean 2003 - Mean 2004	Diff/s d(2003)
	Obs.	Mean	SD.	Obs.	Mean	SD.			Obs.	Mean	SD.			Obs.	Mean	SD.		
<b>Township characteristics</b>																		
Surface	18	110.45	57.779	15	95.57	28.27	14.88	0.26	15	95.31	10.44	15.14	0.26	24	95.24	42.05	15.21	0.26
# of households	18	1.07	0.244	15	1.31	0.33	-0.24	-0.96	15	1.05	0.21	0.02	0.09	24	1.25	0.82	-0.18	-0.73
# of health stations	18	27.72	3.165	15	34.67	19.02	-6.94	-2.19	15	26.73	17.44	0.99	0.31	24	22.79	15.42	4.93	1.56
Share of rural population	18	93.27	2.786	15	93.83	2.64	-0.56	-0.20	15	93.76	4.77	-0.49	-0.17	24	93.24	4.89	0.03	0.01
Rural net income per capita	18	0.31	0.051	15	0.37	0.05	-0.07	-1.33	15	0.32	0.01	-0.02	-0.35	24	0.35	0.06	-0.05	-0.89
<b>Township hospital characteristics</b>																		
# of beds	18	29.33	2.505	15	32.07	12.09	-2.73	-0.09	15	35.00	11.34	-5.67	-2.26	24	35.96	15.41	-6.63	-2.64
# of staff	18	28.50	9.282	15	43.20	14.31	-14.70	-0.52	15	44.67	22.42	-16.17	-1.74	24	44.63	48.97	-16.13	-1.74
Subsidy	18	5.82	3.657	15	30.45	22.09	-24.63	-4.23	15	14.37	2.91	-8.55	-2.34	24	13.90	11.43	-8.08	-2.21



bring more patients. In these cases, the date of introduction of the reform is not independent from the outcome of THs.

Two strategies of test are adopted to verify the existence of reverse causality. The first is aimed at testing whether TH's outcomes influence the date that the corresponding township enters into the program. The test proposed by Gruber and Hanratty (1995) and also applied in the study of Wagstaff and Moreno-Serra (2009). A dummy variable reflecting the implementation of the reform in the next year is introduced into the model to capture potential reverse causality. The specification is as following:

$$Y_{it} = \alpha + \delta P_{it} + \delta' P_{it+1} + \beta X_{it} + u_i + v_{jt} + \varepsilon_{it} \quad [\text{II.9}]$$

There is no problem of reverse causality when coefficient on  $P_{it+1}$ , noted  $\delta'$  is not statistically significant. In our sample, coefficient on the added variable (participation in the next year) is not significant in any regressions<sup>32</sup>.

The second strategy is to test whether the NRCMS implementation decision is correlated with the variation of outcome variables during the preceding years of reform. The test is performed on a pre-reform period sample defined as three years preceding the implementation of the NRCMS for each township<sup>33</sup>. The following specification is used to test the assumption (Gruber and Hanratty, 1995; De Janvry et al., 2009):

$$Y_{it} = w_j + v_t + \sum_{l=1}^{l=2} \kappa_l \text{year}_{-l,it} + u_{it} \quad [\text{II.10}]$$

- $\text{year}_{-l,it}$  takes the value 1 if at year  $t$ , the reform will be implemented in  $l$  years for township  $i$  in county  $j$ , and 0 otherwise.  $l = 1, 2$  or  $3$ . ( $\text{year}_{-3,it}$  is drop because it is the reference period).
- County and year fixed effects are included, noted as  $w_j$  and  $v_t$  respectively<sup>34</sup>.
- $\kappa_l$  are the coefficients of interest. If  $\kappa_l$  are statistically significant, it suggests that the entrance dates of township hospitals are subject to the evolution of outcomes during the three years before the implementation of the NRCMS.

The results are presented in Table II.17. None of the coefficients are significant, which implies that the date of NRCMS placement is not driven by evolution of outcome trends during the three years before the implementation of the reform.

<sup>32</sup> P\_value on test variable is not list listed, results are available upon request.

<sup>33</sup> As the dataset begins in 2000 and the reform begins in 2003, for townships that first implemented NRCMS in 2003, the information on the period before the implementation of reform is available for maximum three years. In order to keep the same quantity of information for all the townships whatever their entry dates of reform, we choose the three years before the implementation to construct pre-reform dataset.

<sup>34</sup> County fixed effects rather than township ones are included into the model due to the small sample size of the sample.

**Table II.17** Test of the exogeneity of the entrance date into the NRCMS

	Ln (outpatient)	Ln (discharged patient)	Ln (ALOS)	Ln(Bed occupancy rate)	Ln(Share of drug income)
year1_before	0.0280 (0.378)	0.132 (0.530)	-0.0382 (0.182)	0.0315 (0.0819)	-0.365 (3.596)
year2_before	0.0784 (0.189)	0.108 (0.293)	-0.0101 (0.0959)	0.0155 (0.0511)	-1.674 (1.910)

Note: Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at township level. \*\*\* indicates significance at 1 percent; \*\* at 5 percent; and, \* at 10 percent. The five specifications are estimated on a sample consisted of the three years preceding the entrance date into the reform of each township. The model is estimated by OLS with county and year fixed-effects because TH fixed-effects lead to a huge loss of degree-of-freedom.

#### 5.5.4. Migration

Another element which could potentially biased the result concerns the problem of selective migration (Galiani et al., 2008). The change of outcome may be due to the modification of the characteristic of the target population following the implementation of the program, rather than the effect of reform itself. As different townships enter into the program at different time, at a given period, the residents of the townships which are not yet covered by insurance may want to look for medical consultation in townships that have been covered to benefit the system. It will bias results if the characteristic of the immigrants are significantly different from the local population. If, for instance, they are sicker than local people and therefore have greater needs for medical services, the increase of medical activities in the insured township hospital would not be the result of the reform per se but rather due to the change of target population.

This assumption does not hold for our sample, because the beneficiary status depends on the resident place of the population. People in the townships which are not covered by NRCMS would not be able to benefit from the insurance even if they seek medical consultation at covered hospitals. Another possibility is that people move into the covered region. However, in China, the residence status is generally linked with the birth place. It is costly to change the living place, if possible.

### 5.6. Results

#### 5.6.1. NRCMS impact

Table II.18 lists the results. Column 1 presents the results of model 2 (without control variables). In others columns, a vector of selected control variables representing the characteristics of townships and THs are included. In order to take into account the scale of reform, in columns 4 and 5, the dummy for participation is replaced by the proportion of people covered by NRCMS in the legible townships (NRCMS coverage) and the reimbursement rate for outpatient and inpatient spending at TH level respectively (OP or IP reimbursement rate). Both are alternative indicators of reform reflecting the intensity and the depth of the insurance coverage. In columns 1, 2, 4 and 5, standard errors are corrected for heteroskedasticity and clustered at township level. In order to check the consistency of the standard errors, column 3 shows results with bootstrap standard errors (reps=1000).

**Table II.18** NRCMS impact

	(1)	(2)	(3)	(4)	(5)
Ln(outpatient)					
Participation	0.151 (0.0899)	0.149 (0.0925)	0.149* (0.0782)		
NRCMS coverage				0.00201* (0.00116)	
OP reimbursement rate					0.00739 (0.00479)
Observations	192	192	192	192	192
R-squared	0.192	0.232	0.232	0.239	0.233
X(it)	N	Y	Y	Y	Y
Ln(inpatient)					
Participation	0.478** (0.172)	0.456** (0.170)	0.456*** (0.159)		
NRCMS coverage				0.00523** (0.00208)	
IP reimbursement rate					0.0107** (0.00400)
Observations	192	192	192	192	192
R-squared	0.191	0.221	0.221	0.215	0.213
X(it)	N	Y	Y	Y	Y
Ln(bed occupancy rate)					
Participation	0.244** (0.0899)	0.224** (0.0988)	0.224** (0.104)		
NRCMS coverage				0.00211* (0.00110)	
IP reimbursement rate					0.00545** (0.00232)
Observations	192	192	192	192	192
R-squared	0.171	0.199	0.199	0.190	0.198
X(it)	N	Y	Y	Y	Y
Ln(ALOS)					
Participation	-0.0697 (0.0455)	-0.0826* (0.0441)	-0.0826** (0.0417)		
NRCMS coverage				-0.00101* (0.000494)	
IP reimbursement rate					-0.00211* (0.00120)
Observations	192	192	192	192	192
R-squared	0.067	0.137	0.137	0.138	0.138
X(it)	N	Y	Y	Y	Y
Ln(share of drug income)					
Participation	0.0165 (0.0248)	0.0176 (0.0250)	0.0176 (0.0242)		
NRCMS coverage				0.000256 (0.000314)	
Observations	192	192	192	192	192
R-squared	0.109	0.144	0.144	0.146	
X(it)	N	Y	Y	Y	

Note: Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at township level. \*\*\* indicates significance at 1 percent; \*\* at 5 percent; and, \* at 10 percent. The model is estimated by OLS with year fixed-effects. X(it) represents the control variable vector. The control variables include surface, rural net income per capita in the township, the number of households, the number of village health stations in the township, the number of total staff and operational beds in the TH, and the total subsidies received by the TH.

The results suggest that the NRCMS has significant impacts on TH's activities, especially on inpatient services. In the townships where the NRCMS is implemented, the number of discharged patients of THs is 58 percent<sup>35</sup> higher than that of the THs which are outside of the NRCMS zone (Column 2). The positive impact of NRCMS on TH's outpatient visits was captured by bootstrapping the residues (Column 3) and confirmed with alternative reform indicator "NRCMS coverage" (Column 4). Compared to THs in non-NRCMS zones, the number of outpatient visits of the THs in NRCMS zone is 16 percent higher.

The scale of reform decides the magnitude of its impact on TH's activities. If the population enrolling to the NRCMS raised 10 percentage points, the outpatient visits of THs would raise 2 percent and the number of discharged patient would raise 5 percent. The reimbursement ratio, in contrast, shows only significant influence on the volume of inpatient services. It is estimated that, with an increase of 10 percentage points of reimbursement ratio, the number of discharged patients would raise 11 percent. The insignificant impact of reimbursement ratio on outpatient visits may be due to its low level in absolute terms. Statistic analysis shows that in 2008 the reimbursement ratio for outpatient fees ranged from 19 to 32 percent with an average of 27, whereas the reimbursement ratio for inpatient fees was the double (Table II.14b). It indicates that if the government wants to essentially reduce the financial obstacle of people to medical services, it needs to propose an insurance scheme which offers substantial protection.

The adaption of insurance ameliorates the use of medical resources. The occupancy rate of beds increased of 25 percent, while the ALOS declined 8.6 percent. In China, the staff and subsidies are fixed in function of the number of beds. Hospitals are therefore encouraged to keep more beds than necessary. It is found that Chinese ALOS is about three times that of the U.S and its occupancy rate of beds is well below OECD countries. (Hsiao, 1995; Wagstaff et al., 2009) Given this context, the NRCMS shows rather a positive effect on the use of medical resources. Nevertheless, this result should be interpreted with precautions, because we have no information on the evaluation of the quality of medical services.

The alternative reform indicators suggest that the impacts of insurance reform on the use of medical services are also enforced with the scale of reform. If the NRCMS coverage increases of 10 percentage points, the bed occupancy rate would increase of 2 percent and the ALOS would reduce 1 percent. If the reimbursement rate increases of 10 percentage points, the bed occupancy rate would increase 5 percent and the ALOS would reduce 2 percent.

No significant impact of reform on the financial structure of THs is capture. Neither the coefficient of participant dummy nor that of the indicator of NRCMS coverage turns out to be significant. As the reimbursement rules are set in function of the category of services rather than in function of the contents of medical treatment (medical services or drugs), we have no information on the reimbursement ratio of drug spending.

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<sup>35</sup> Participation is a dummy variable so the elasticity is calculated by the following formula:  $[e^{(\text{coefficient})}-1]*100$ .

### 5.6.2. Heterogeneity of the impact

The previous analysis supposed that the impact of NRCMS was homogenous. This section investigates the potential heterogeneous impacts of reform across space and over time. Results are presented in Table II.19.

The incentive brought by the new insurance system is different for the population with different socio-economic characteristics. It can be expected that the price effect of insurance is less important for people in rich townships than those in poor townships. In order to check these differentiated impacts across space, a dummy variable "poor" is interact with  $P_{it}$ . "Poor" is equal to 1 if the township belongs to the 20 percent of the poorest townships in our sample, and 0 otherwise.

The reform shows higher impacts on the inpatient activities of THs in poor townships than on those in non-poor ones. Compared to the THs in NRCMS zone, the adaption of insurance will increase the number of discharged patient of 118 percent in poor townships against 48 percent in non-poor townships. For the bed occupancy ratio, the result suggests that the reform essentially influence the bed occupancy ratio in poor townships rather than in non-poor townships. The adoption of insurance increased the bed occupancy rate of 38 percent in THs of poor townships. In contrast, impact is not significantly different for the ALOS of township hospitals in poor and non-poor zone.

There are two levels of THs: general and central ones. Theoretically, their missions and responsibilities are complementary. Central THs are better equipped to treat hospitalized patients than general hospitals. The former also brings technical support to the latter. In practice, the relationship of the two kinds of health centers is rather competitive (personal communication with Weifang Health Bureau). By interacting the participation variable with a dummy reflecting the hospital level (1 for central THs, and 0 for general THs), we tend to check whether the treatment capacity of health centers will influence their ability to profit the opportunity brought by insurance reform. The result of our estimation shows no proof of heterogeneity of the impacts of insurance between general and central hospitals.

The effect of the new policy can evolve over the time. The experience with the insurance scheme can influence the reaction of both the covered population and the THs and consequently change the impact of the NRCMS. Inspired by Gruber and Hanratty (1995) and Galiani, et al. (2008), the heterogeneous impact of reform over time is checked in two ways. First, cumulative effects of the reform are captured by two dummies: "1 year after the reform" and "2 years or more after the reform"<sup>36</sup>. Second, a discrete variable reflects the number of years that the township is covered by the insurance system. The 0 value is attributed to the townships which have not yet been covered by insurance or entered into the program for less than one year. It assumes that there is a linear trend in the impact of the NRCMS.

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<sup>36</sup> "1 year after the reform" equals to 1 if the township has been in the program since one year, 0 otherwise; "2 years or more after the reform" equals to 1 if reform as implemented in the township since two years or more, 0 otherwise. The reference group is therefore the townships which have not yet been covered by insurance or entered into the program for less than one year.

Results suggest that the NRCMS reform may have influence on THs' activities in long term. Significant impacts of insurance are captured on four of the five outcome variables for the THs which have been in the NRCMS zone for two years or more. However, the marginal impact of insurance reform is negative, which means that the impact of reform is decreasing over time. Compared to the townships which have not yet enter or have just entered the NRCMS zone, the number of outpatient visits as well as that of discharged patients are lowered in the townships which have been in the NRCMS for two years or more. Additional information is needed to identify the reasons of these decreases. It may be due to the amelioration of general health status of the target population and therefore a decline of the demands for medical services. It may also because the price effect brought by the implementation of insurance disappears over time since people adapt their estimation on the value of medical services to the presence of insurance. The decrease of demands for inpatient services will induce the decrease of bed occupancy rate. This is confirmed by the regression results.

The reform displayed positive impact on the share of the sale of drugs in business income two years after the implementation. For the THs in the townships which have implemented reform for two year or more, the share of their sale of drugs in total business income is on average 8 percent higher than THs in the townships which have not yet entered or just entered (less than one year) into the program. As the insurance enforces the capacity to pay of the patient, the service provider may increase the sale of profitable goods and services correspondingly. Xun (1990), for example, compared the drug cost for insured and uninsured appendectomy patient. He found that the cost is twice for the insured patient as that for uninsured patient regardless similar outcome.

**Table II.19** Heterogeneous impact of the NRCMS

	Ln(outpatient)	Ln(inpatient)	Ln(ALOS)	Ln(bed occupancy rate)	Ln(share drug income)
Participation	0.150 (0.0971)	0.395** (0.170)	-0.0807* (0.0446)	0.156 (0.0970)	0.0161 (0.0244)
P*Poor (1=poor, 0=non poor)	-0.00721 (0.142)	0.297* (0.172)	-0.00932 (0.0582)	0.328*** (0.106)	0.00751 (0.0397)
Participation	0.209 (0.123)	0.386** (0.164)	-0.0951* (0.0522)	0.296** (0.132)	-0.00370 (0.0302)
P*hospital level (1=central, 0=general)	-0.160 (0.142)	0.187 (0.381)	0.0332 (0.0783)	-0.191 (0.162)	0.0566 (0.0400)
1 year after NRCMS	-0.0357 (0.0615)	-0.145** (0.0566)	-0.00627 (0.0454)	-0.0216 (0.0729)	0.0320 (0.0313)
2 years or more after NRCMS	-0.170* (0.0968)	-0.529*** (0.103)	0.0504 (0.0711)	-0.309** (0.111)	0.0783** (0.0358)
# of years after NRCMS	-0.129** (0.0527)	-0.287*** (0.0969)	0.0289 (0.0520)	-0.215*** (0.0659)	-0.00290 (0.0213)

Note: Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at township level. \*\*\* indicates significance at 1 percent; \*\* at 5 percent; and, \* at 10 percent. The model is estimated by OLS with year fixed-effects. Only the variables of interest are listed in the table. Other variables are identical with those in Table II.17. They are introduced into the regression but not listed in this table.

## **5.7. Concluding remarks**

We estimated the impact of the introduction of NRCMS on the activities of 24 randomly selected township hospitals in Weifang prefecture. The data covers nine years from 2000 to 2008. The impact of NRCMS on township hospitals outcomes was estimated with first difference method, the results are validated with a series of tests for the model assumptions.

Estimations confirm that insurance reform has positive impacts on township hospitals' activities. Both the numbers of outpatient visits and discharged patients are increased with the adaption of NRCMS. The impact of insurance reform on the volume of inpatient services is much more significant and important than its impact on the outpatient visits. This is an expected result providing that the design of the reform had put accent on the coverage of hospitalization fees. These results indicate that the insurance considerably increased individual's access to expensive medical treatments which are often found in hospitalization.

The reform seems also have positive impact on the use of medical services. The bed occupancy ratio was increased while the ALOS was reduced. As Chinese health sector is over-supplied in terms of hospital beds and medical staff, this funding indicates a more efficient use of health resources. These results are consistent with those presented in the literature about the impact of the health insurance introduction (Wagstaff and Moreno-Serra, 2009; Wagstaff et al. 2009). Nevertheless, we cannot draw conclusion on the efficiency of services because we have no information on the evolution of the quality of health services.

Estimations show that the impact can be heterogeneous across space and time, especially for hospitalization. Regarding to spatial heterogeneity, poor regions seem benefit more from the insurance reform than non poor regions do. On the other hand, as our sample come from one prefecture, same rules are applied to decide the government subsidies and insurance reimbursement. It means, given government subsidies, the THs in poor regions enjoyed a higher increase of activities volume than the non-poor regions. This result suggests that in order to increase the efficiency of public spending on health, it is essential to benefit poor regions.

The influence of the NRCMS also changed over time. There are signs that the impact of insurance reform on TH's activities reduces over time. This warns policy makers to investigate the reasons of this decline. If it is due to a general amelioration of health status of the population, it will confirm the value of insurance reform. If it is due to the modification of agent behaviors, it is then important to understand how the behaviors have been changed in order to ensure insurance reform obtain its objectives.

A major concern is that service providers use insurance to feed the cost-inflation of medical services rather than increase the provision of basic services. In our sample, the share of the sale of drugs in total TH's business income is increase two year after the implementation of insurance. This finding suggests that without any complementary reforms on the provider payment and pricing system, the simple fact that insurance pays a part of medical spending for patients will not change the orientation of health facilities behaviors. Service provider would consider the insurance as a financial source to make up their financial deficits and consequently push up medical spending. Wagstaff and Lindelow (2009) also found that the presence of insurance

increase the OOP payment and the risk of catastrophic spending because they incite service providers to over-prescript.

Several precautions need to be taken. First, obviously the demands for medical service from township health centers have been increased thanks to the reform. But we don't know to what extent it implies a net increase of demand or if a share of this demand is coming from a transfer of demand from the upper level health facilities (i.e. county hospital or above), because NCMS offers preferential reimbursement rules to the consultation at THs relative to that at county hospitals. Second, this study contains a relatively small sample. Only 24 hospitals are involved. Although this shortcoming is partly "compensated" by randomized process of selection of the hospitals and by the nine years of the survey period, it would be desirable to check the results with a larger sample. As all the hospitals are coming from Weifang prefecture, the results cannot be directly generalized for other regions in China, especially in poor provinces as Ningxia or Qinghai for example. Third, longer period is necessary to further analysis the long-term impact of the reform.

## **VI. Conclusion and Discussion**

Since the end of 1990s, Chinese government pay more and more attention to the financial problems induced by the marketization of health service. The re-establishment of health security system became an urgent issue in the government agenda.

The design of health security system in the period of post-economic reform is, at large extent, based on the experiences from the system before the economic reforms. Fundamental efforts are made to correct the blunders of former system. The insurance pools, for example, are enlarged to municipality or county level to enforce the capacity of the insurance to cope with financial risks. The linkage between the work unit and insurance scheme is cut to ensure the labor mobility. The entitlement is attached to the contribution to guarantee the sustainability of insurance funds.

However, there are also several characteristics that the new insurance system has kept. The first is the fragmentation of market. Due to the essential difference in the capacity to pay between urban and rural population, as well as between the urban employees and non-employed, three kinds of insurance schemes are proposed to urban employees, urban unemployed and rural residents separately. The contributions of these three schemes are substantially different, albeit great government subsidies for the poor. As consequence, they offer quite different insurance coverage. The access to medical services between different populations remains unequal.

Second, there is no essential split between services purchaser and supplier. The government financed two third of NRCMS and BMIUR funds. It is therefore the biggest stakeholder. The central government decides the guideline on the design of insurance scheme and the local government adapts the central plan to local configuration. As 90 percent of hospitals also belong to the government, it is difficult for the insurer to bring reform on the provider side because the Ministry of Health will be reluctant to sanction hospitals in case of abuse and fraud as the latter is its political base.



Until now, the insurance reform is concentrated on how to choose relevant benefits which maximize protection to the patient-consumer providing the relatively low contributions, especially those for NRCMS and BMIUR schemes. The primary objectives of insurance reform are to help the patient-consumer to have access to basic medical services and to avoid impoverishment due to catastrophic health spending. However, these objectives would not be able to obtain without taking into account the problems of health provider system.

The main problems on the provider side include the financial pressure faced by the public health facilities; the FFS payment with distorted pricing system; the weak regulation on the behaviors of hospitals. Due to the financial pressure, public health facilities orient their behaviors by economic interests. FFS payment incites the provider to over-prescript and the pricing system drive the over-prescription toward the consumption of low cost-effective services such as high-tech diagnosis and expensive drugs. Weak regulation reduces the cost of fraud and abuse and enforces the agency problem on the medical market. Insurance reform, until now, does not address these problems.

The government injected and continues to injecting huge funds into health sector to construct new health security system. However, a major concern is how to ensure that the funds brought by insurance would not be used to feed cost-inflation of medical services. Numerous studies have found that hospitals charge a higher user fee for insured patients than uninsured patients. The experience of China as well as that of other countries shows that the stress of cost containment should be put on the provider side. This could be done either through market mechanism by imposing different methods of provider payments to modify economic incentives for the service provider, or by directly imposing administrative regulation.

Although both national and international experiences show the effectiveness of prospective provider payment in augmenting the efficiency of services provision and cost-containment, no such reform has been applied at national scale. Both technical and institutional difficulties contribute to this hesitation. As a result, in China, for the moment, the cost containment relies more on regulation than incentives. A restrict list of insured drugs and services are set to limit the reimbursement responsibility of the insurance. This indeed controlled the cost of insurance, but not that of the patient-consumer. Study shows that the presence of insurance increases, rather than decreases, the risks of catastrophic spending.

Under this circumstance, analyzing the influences of the insurance reform on the flux of medical services can give indication on the distance between political objectives and practical results as well as the effectiveness of administrative regulation.

Since 2003, the emphasis of health insurance reform was put on the NRCMS. The objective that the government set for rural health insurance scheme is not only increases the financial accessibility of basic medical services in rural areas, but also increase the efficiency of rural referral system by divert patients toward first-level health facilities. By comparing the medical activities between township health centers with or without insurance scheme, we can measure simultaneously the effectiveness of insurance reform in realizing the two objectives.

Twenty four township health centers in Weifang prefecture of Shandong province are chosen to study the impact of NRCMS scheme on the activities of township health centers. The results

confirm the expectation that the insurance scheme, to some extent, increases the use of medical services at first-level health facilities. It is reflected by the increase in the quantity of outpatient and inpatient services as well as the rise of use rate of medical resources. However, there is sign that in long-term, the effect of insurance reform on the quantity of service would be absorbed by the increase of the sale of drugs, if no reforms in the domains of provider payment and service pricing follow up.

**Annex II.2** Premiums and Reimbursement of Urban Basic Medical Insurance in Wuhan (Wuhan Labor Security Committee, 2004).

Collection of funds

The contribution: 10 percent of wages, in which 8 percent are paid by the employer and 2 percent paid by the employee. Employee's average monthly wage of last year is used to calculate the contribution. If this wage is lower than 60 percent of prefecture's average wage of last year, the latter is used to calculate contribution. If, on the other hand, the employee's wage is higher than 300 percent of prefecture's average wage of last year, the latter is used to calculate contribution.

People who get retired before the reform need not to pay the contribution. Their former employer, nevertheless, need to pay a contribution for each of them, which is calculated on the base of 50 percent of the average wage of the prefecture in the preceding year.

Collected funds are divided into two parts: Medical Saving Account (MSA) and Social Coordinating Fund. The former is a personnel account which is at the disposal of the individual. According to the age of the insured, 1.1 percent to 1.7 percent of the contribution is put into this part. It is mainly used to pay for small outpatient fees (the deductible, for example). The latter is a mutual fund which is pooled at prefecture level to share the risk. It is used to pay for hospitalization fees and important outpatient spending (the expenditure for chronic disease, for example).

Reimbursement

The reimbursement takes two things into consideration: the importance of medical spending and the level of hospital where the patient receives the treatment. General criteria can be found in the following table.

Health facilities	Deductible	Co-insurance		Ceiling
First-level	400	Actual employee	(Hospitalization fees -deductible)*88 %	last year's average wage of the city *4
		Retiree	(Hospitalization fees -deductible)*90 %	
Second-level	600	Actual employee	(Hospitalization fees -deductible)*85 %	
		Retiree	(Hospitalization fees -deductible)*88 %	
Third-level	800	Actual employee	(Hospitalization fees -deductible)*82 %	
		Retiree	(Hospitalization fees -deductible)*85.6 %	

### Annex II.3 Insurance packages proposed by NRCMS (Statistical Center of the Ministry of Health, 2006)

In the design of insurance package, two essential questions need to be answered: to reimburse what, and how much? The first question brings the debate on the choice of services to be included in the insurance package. Whether should the insurance reimburse the frequent but relatively cheaper health services associated especially with outpatient visits or rare but expensive services often issued from hospitalization? The second question concerns the threshold for deductible and cap, as well as the co-insurance for the health spending in between.

In 2005, the Ministry of Health carried out a survey among 189 NRCMS pilot counties to estimate the performance of NCMS. There are four categories of insurance packages: only reimburse the hospitalization fees; reimburse hospitalization and important outpatient fees, reimburse both the hospitalization and outpatient fees with mutual funds; reimburse the hospitalization with mutual funds but outpatient fees with household's MSA. The distribution of choices among east, middle, and west<sup>37</sup> regions is listed in the following table.

	Only hospitalization		Hospitalization + big outpatient		Hospitalization + outpatient (by mutual funds)		Hospitalization (Mutual funds) + outpatient (MSA)	
	County	%	County	%	County	%	County	%
Total	16	8.5	16	8.5	46	24.3	111	58.7
East	11	16.2	16	23.5	26	38.2	15	22.1
Middle	2	2.9			8	11.6	59	85.5
West	3	5.8			12	23.1	37	71.2

In most regions, both the hospitalization and outpatient visit are involved in the insurance package. Higher developed regions rely more on the mutual funds than lower developed regions. All regions put essential efforts on the reimbursement of important spending.

Concerning the deductible, it is most often applied in middle regions and for the consultation at higher level health facilities. The threshold for deductible increases from the consultation at lower to higher health facilities.

Health facilities	Total		East		Middle		West	
	% of Counties setting deductible	Median deductible (Yuan)	% of Counties setting deductible	Median deductible (Yuan)	% of Counties setting deductible	Median deductible (Yuan)	% of Counties setting deductible	Median deductible (Yuan)
Village-level	69.3	200	55.9	500	82.6	100	69.2	135
County-level	76.2	400	61.8	501	87.0	400	80.8	300
Above county	78.8	500	61.8	800	92.8	700	82.7	400

Co-insurance rate is low. In most of the townships, it is fixed between 30 to 50 percent. Richer regions have relatively higher reimbursement ratio. Consultations at lower-level health facilities receive higher reimbursement ratio.

<sup>37</sup> It is rather an economic concept than geographic notion. The economic development level rises from west to east.

Co-insurance ratio by Health facilities	Total		East		Middle		West	
	County	%	County	%	County	%	County	%
Township								
<30 %	8	4.2	5	7.4	2	2.9	1	1.9
30~50 %	106	56.1	38	55.9	42	60.9	26	50
>50 %	56	29.6	19	27.9	20	29	17	32.7
County								
<30 %	20	10.6	15	22.1	2	2.9	3	5.8
30~50 %	120	63.5	34	50	53	76.8	33	63.5
>50 %	30	15.9	14	20.6	9	13	7	13.5
Above county								
<30 %	55	29.1	26	38.2	11	15.9	18	34.6
30~50 %	102	54	29	42.6	50	72.5	23	44.2
>50 %	18	9.5	9	13.2	4	5.8	5	9.6

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## General Conclusions

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The purpose of this thesis is not to give definite answers to the question of the benefits that social health insurance could bring to a country, but rather to shed light on the complexity of health financing system and put forward multiple factors that can influence the good function of a social health insurance system. It offers a global look at different options of health financing. It emphasizes the necessity to construct health system on the basis of each country's economic conditions. It highlights the importance of taking institutional quality and government commitment into the consideration when designing health financing system. It also offers a relatively comprehensive documentation on the evolution of Chinese health financing system.

Medical consumption contains great uncertainties. We identified two major sources: the uncertainty of the incidence of illness episode and the uncertainty of the effectiveness and efficiency of medical treatment. Health per se has no price, but medical spending sometimes may become very expensive for an individual. It is therefore necessary to get financially prepared for unexpected high health spending. Insurance is a frequently used tool for financial risk management. However, medical consumption risks may be too expensive to insurer due to moral hazard, reverse selection, or/and no randomness of health spending.

The origin of the problems of market allocation for health resources includes the asymmetric information between the health services provider and the patient-consumer as well as between the insurer and the insured; the conflict between public-interest and self-interest; and the question of social justice lying behind the access to health services. When market is failed, the government is expected to do better. However, the quality of government intervention depends on the quality of governance, which varies from country to country. Hence, there is no conclusion on the efficiency of government intervention versus market allocation.

Nevertheless, there is consensus that replacing direct payment by third-party payment can involve more social partners into the share of medical consumption risks and thus reduce the cost of risk dealing of each. In function of who play the role of third-party payer, there are four main options for third-party payment: private health insurance, community-based health insurance, social health insurance, and state-funded health financing system. The choice and the good function of each system depend, at large extent, on the social-economic conditions of a country.

We then conducted a statistical analysis on the health spending and health financing system over the world. Our key findings are: 1) the distribution of health resource is quite unequal over the world. The high-income countries consume considerably more health resources than low- and middle-income countries. 2) This unequal distribution of resource is not in proportion of population density. The low- and middle income countries contain more than 80 percent of world population but consume less than 30 percent of world health resources. The lack of resources is one of the most important obstacles in the realization of universal coverage of health financing in the developing world. 3) The low- and middle-income countries also hold institutional and governmental shortcomings which reduce the efficiency of public health purchasing. This is one of the reasons which motivate many middle-income countries to replace state-funded system with social health insurance. 4) Nevertheless, using SHI to realize universal coverage is not

without difficulties. It requires a more accountable use of health resources. The demanding missions include increasing the compliance of contributors regardless of the existence of a relative big informal sector; maximizing insurance beneficiaries in spite of limited insurance budget; and allowing for the fragmentation of insurance market at initial stage while retaining the possibility for future unification of insurance pools.

Countries in transition offer an ongoing example to study the advantages of social health insurance relative to state-funded system in the low- and middle-income countries. It can be noticed that the adaption of SHI requires for certain economic conditions. It is why most of the CITs which adapted SHI reform are middle-income countries while most of the low-income CITs keep their state-funded system. Due to the limit of institutional capacity, community-based health insurance remains a useful intermediate system which can facilitate the transition to SHI system. One of the objectives of SHI reform is to encourage efficient service purchasing by imposing innovative supplier payment rules. In many CITs countries which have carried out or are carrying SHI reform, we do observe more reforms on supplier payment than that in the countries which keep their ancient state-funded health financing system. However, the effectiveness of financial protection offered by SHI remains very low due to restrictive budget constraint.

In the second part of the thesis, our discussion focused on a particular country in transition: China. China has gained remarkable economic performance since its economic reform. However, in term of health outcome and health financial protection, there is a rather regressive trend.

In the period of command economy, China had constructed a public health system which was in charge of both the delivery and the purchase of health services. This system had gained important health progress in a relatively short time after the establishment of the People's Republic of China. Several elements contributed to the success of this regime. 1) The most important health threats came from communicable diseases which was due to the poverty and poor sanitation conditions. These diseases can be considerably reduced with effective public health policies. 2) Based on the understanding for most urgent health needs of Chinese people, the government had organized a group of shortly trained health workers, called "bare foot doctor", who worked side by side with citizens and villagers. They supervised the emergence of epidemic at work unit, offered first treatment for ailments and transferred more serious patients to upper-level health facilities. This strategy considerably reduced the cost of primary healthcare. 3) Under intensive moral education which was accompanied by a relatively equal income distribution, health professions were mainly motivated by the interest of the mass. This explained why even with low salary, health workers were devoted to their work. 4) As far as health financing is concerned, medical care were paid by the welfare fund of each work unit. The principal of self-sufficiency enforced each fund to control treatment cost. As health services were also organized by work unit, the latter could organize service provision in function of global cost of medical treatment. As consequence, preventive care was accorded great importance.

Economic reform fundamentally changed the way in which the country organizes its production and income distribution. With the growth of private sector, more and more resources flow from public sector to the private sector. The shrink of public budget impose great challenges to the development of health sector. The direct result was the increase of private payment for health services.

We studied in more detail the distribution of health spending burden in the 1990s. It is found that in the 1990s, out-of-pocket payments were the main source of medical spending in China and the distribution of the health spending burden was unequal. In our sample, it was detected that part of the population is indeed suffering severe health spending burdens. In addition, as the poor have higher budget constraints, they bear much higher risk of catastrophic health spending than the rich.

Chinese health insurance system in this period turns out to be inefficient. First, it tends to highly reimburse only a small part of the population. The coverage is narrow and pro-rich. Consequently, the poor benefit less from the insurance than the rich. Second, the insurance market is fragmented: there is a great disparity in the benefits offered by the different insurance schemes. Third, as catastrophic expenditures are poorly covered, the insurance fails to protect people from the poverty trap.

As far as the long term impact of illness episode is concerned, it is found that chronic episode has a significant negative impact on household long term income. In our sample, there is no evidence that insurance system in the 1990s protected household against long term income loss due to illness episode.

Since the end of 1990s, Chinese government has adapted a series reforms to re-establish social health insurance system. It is one component of a more comprehensive reform in health sector. The new insurance system contains three main parts: Basic Medical Insurance for Urban Employees (BMIUE), Basic Medical Insurance for Urban Residents (BMIUR), and New Rural Cooperative Medical System (NRCMS). The government aims to use these three systems to gradually replace the former health financing system which relied principally on the government budget and the welfare fund of each work unit. In this way, the government hopes the new health financing system can make the money following the patient rather than the supplier. Nevertheless, the new health financing system has not yet fundamentally changed the way that the health service provider gets paid. In another word, the fee-for-service payment remains the main form of supplier payment.

In order to make the insurance scheme accessible to all, especially for the poor, the government injected large sum of money to subsidize BIMUR and NRCMS. This, on the other hand, reduced the financial independency of these insurance pools relative to government budget. We asked question to what extent the new insurance system can modify the performance of hospitals. We addressed this question by conducting an impact analysis based on an original dataset collected in Weifang prefecture of China.

Our major conclusions are that insurance reform has positive impacts on the volume of township hospitals activities. This impact seems larger for inpatient services than for outpatient visits, which proved that insurance reimbursement rules can change the medical demand of the insured. As a consequence of the augmentation of demand, there is also proof that insurance increases the use of medical services. The bed occupancy ratio was increased while the ALOS was reduced. Nevertheless the insurance does not show impact on the financial structure of hospitals. These observations show that the insurance for the moment has more direct effects on the medical demand of the patient-consumer than on the for-profit behavior of service provider.



We also detected heterogeneous impact of insurance reform across region and over time. Poor regions seem benefit more from insurance scheme than rich ones. This may due to relatively small insurance budget comparing to total health spending in rich regions. The effect of the reform fades away with time, which suggests that, without accompanied institutional reform, a reform of pure financial arrangement would not fundamentally solve the problems of health system.

Combining the analyses in Part I and Part II, we conclude that SHI is just one of health financing options. Its application requires for specific socio-economic conditions. Economic development remains the most important determinant of better health. However, the enforcement of institutional capacity makes it possible to gain better health outcome than economic conditions would allow for. SHI is at the same time the tool for and the result of the amelioration of institutional capacity.

Health financing system addresses the questions such as the accessibility of medical services and the fairness of the distribution of health spending burden. It may also influence the efficiency of medical spending by imposing different incentives on both the supplier and the consumer sides. The essential question is whether medical consumption risk is equally distributed among the services provider, the patient-consumer and the purchaser. One of the arguments for SHI is that, compared to government budget, it allows for the split-up of the service provider and the purchaser. However, in reality, this is not necessarily the case, especially when SHI calls for government financing to make up budget deficit. Without financial independence, it would be difficult for SHI to impose reforms on provider payment which often touch the interest groups that have decision power in the government.

China's reform of health insurance system is initiated and organized by the government. It reached a large part of Chinese people in a relatively short time (about 10 years). The main change issued from this reform is that SHI replaced government subsidizes and became the main form of public spending for medical consumption. Nevertheless, the government continues to be the biggest stakeholder of the insurance funds. One relating observation is that there is little change on the way that services providers get paid. As consequence there is no proof that hospitals' financial structure has significantly changed. It is argued that supplier-induced consumption is a more important factor of medical cost escalation than consumer-induced consumption (Eichler and Levine, 2009). In order to ameliorate the efficiency of health financing system, it is important to adapt political tools to align service provider's interests with that of the service purchaser and service consumer.

We conclude that social health insurance (SHI) permits a sharing of health financial responsibilities between the service provider, the patient-consumer, and the service purchaser. It not only involves both public and private agents into the collection of funds for health financing system, but also makes each party more accountable due to the risks they bear from the result of medical consumption. Meanwhile it is necessary to note that SHI is just one option among others to organize health financing system. The implementation of SHI requires a certain level of social-economic development. SHI does not systematically bring better performance on health financing if it is not accompanied by the reforms on provider payment or on service delivery system. Government commitment and institutional capacity are also key factors for the good function of the system.

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## **PART I**

### ***Chapter 1***

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