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**Health Care Pricing and Payment Reforms in China:  
The Implications for Health Service Delivery  
and Cost Containment**

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## ABSTRACT

China's transition into a market economy has exerted some influence on the health sector in terms of a significant growth of facilities, but it has also produced a range of destabilizing social costs. This thesis analyzes the relations between healthcare pricing and payment reforms and the different delivery aspects such as the exemption program for the poor, public health programs for tuberculosis control and the provision of hospital services. A health economics conceptual framework is used for analyzing aspects of the health systems in terms of market failures and the institutional response from governments and regulators.

In study I, the exemption programs for hospitals where the poor are relieved of paying the price or user charges are analyzed. The study is a case study where patient records from nine hospitals were reviewed, together with interviews with key informants and community representatives. The study showed that the discount offered was limited, where only a minority of indigents received discounts and the hospitals lacked incentives for efficiently carrying out the programs.

Study II investigates the effect of the new urban health insurance system on hospital charges. The study uses two tracers, acute appendicitis and normal childbirth, at six hospitals from two cities with different insurance systems. The result showed a lower rate of increase in hospitals charges in the city implementing the urban health insurance reform. Regression analysis showed contracting mechanisms and length of stay to be the main determinants for hospital charges.

Study III analyzes the operation of TB control programs in a decentralized financial system. A case study was conducted in four counties with different economic developments in the Shandong province. Data was collected from a review of documents and interviews with patients and key informants. The study showed weak government support to the TB control program and less developed DOT (directly observed therapy) programs in the poorer counties. TB patients suffered heavy financial burdens. The decentralized financing system had negatively affected the provision of public health programs such as TB control programs.

In study IV, the impact of retail price control of drugs on hospital drug expenditures was examined. The study is a case study at two hospitals. Total drug expenditures were analyzed based on financial records and a tracer, cerebral infarction, was used for an in-depth examination of prices, volume, expenditures and rationality of drug use. Findings showed that after the implementation of the drug pricing policy, total drug expenditures increased as rapidly as before. Drug expenditure per patient for cerebral infarction showed indistinct results, indicating that the regulation was not effective. Utilization rather than price was more determinative for drug expenditures.

Study V investigates the development of revenues, costs and performance in the hospital sector. In a sample of 41 hospitals in two cities, the use of inputs, investments and productivity was estimated. The findings showed that hospitals had expanded their staff and invested in new medical equipment. The corresponding change of outputs in terms of outpatient and inpatient performance showed a slower increasing rate, resulting in a diminishing productivity rate over time.

The market-oriented health care system in China is faced with different 'market failures' problems such as limited access to health services for the poor and the inaccuracy in relying on market mechanisms for services characterized by positive externalities, such as the public health programs. Financial autonomy has given health providers the incentives to maximize revenues. Government interventions to contain costs and improve efficiency show that a sole reliance on the price mechanism is insufficient and must be combined with other tools set by regulators and insurers.

**Key Words:** China, financing, pricing policy, payment, exemption program, tuberculosis, hospital performance and charges, drug pricing, rational use of drugs

## **LIST OF PUBLICATIONS**

- I. Meng Q, Sun Q, and Hearst N. Hospital charge exemptions for the poor in Shandong, China. *Health Policy & Planning* 2002;17(Suppl 1):56-63
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## List of abbreviations

<b>CDC</b>	Center for Disease Control and Prevention
<b>CHSI</b>	Center for Health Statistics and Information, MoH
<b>CMS</b>	Cooperative Medical Scheme
<b>CON</b>	Certificate-of-Needs
<b>CPI</b>	Consumer Price Index
<b>DOT</b>	Directly Observed Therapy
<b>DRG</b>	Diagnosis Related Group
<b>FFS</b>	Fee-For-Service
<b>FGD</b>	Focus Group Discussion
<b>GDP</b>	Gross Domestic Product
<b>GHI</b>	Government Health Insurance
<b>HAST</b>	Health Account Study Team
<b>IHCAR</b>	Division of International Health, Department of Public Health Sciences, Karolinska Institutet, Sweden
<b>LHI</b>	Labor Health Insurance
<b>LMIC</b>	Low- and Middle-Income Countries
<b>LOS</b>	Hospital Length of Stay
<b>MoF</b>	Ministry of Finance
<b>MoH</b>	Ministry of Health
<b>MOLSS</b>	Ministry of Labor and Social Security
<b>NBS</b>	National Bureau of Statistics
<b>NFP</b>	Not-For-Profit
<b>OOP</b>	Out-of-Pocket
<b>PDD</b>	Prescribed Daily Dose
<b>SDRC</b>	State Development and Reform Commission
<b>SFDA</b>	State Food and Drug Administration
<b>TB</b>	Tuberculosis
<b>THC</b>	Township Health Center
<b>USA</b>	United States of America
<b>WB</b>	World Bank
<b>WHO</b>	World Health Organization

## PREFACE

I was trained in public health at Shandong University (previously Shandong Medical University) and Fudan University (previously Shanghai Medical University) and in economics at University of the Philippines. I am now working at Shandong University as a researcher in the area of health economics and policy. Over the past two decades and a half, the Chinese health care system has been substantially changed, in line with overall economic reforms, from a shortage of health resources during the planned economy period to a current rapid expansion of the health sector. I am fortunate to be a researcher working in health economics and policy, since so many research topics are available during the transition of the health care system in China. It is also challenging for a researcher, as new research questions in health policy need advanced knowledge and skills. To better answer the research questions, not only at present but also in the future, I came to Karolinska Institutet for training.

I come from the hometown of Confucius. Confucius says “one can never be too old to learn”. The completion of my PhD studies is a new beginning from where I will continue my studies in practice. I hope that my PhD training will be useful for the improvement of the Chinese health care system.

# **1 INTRODUCTION**

## **1.1 Economic transition and health sector reform**

One of the most substantial social and economic transitions during the last two decades of the twentieth century in a number of countries including China, is the transition from a planned economy to a market system. The health care system has been closely linked to and affected by the changes. A number of aspects of the Chinese health care system are associated with economic reforms including access to health care, health financing reform, decentralization, cost escalation of medical care, and the use of drugs (Hsiao 1995; Gu and Tang 1995; Liu et al. 1999; Liu and Hsiao 1995; Liu et al. 1995; Dong et al. 1999; Fielding et al. 1995). Those aspects are also the key issues in health sector reform in most low- and middle-income countries (LMIC) (Reich 1995; Islam and Tahir 2002; Hammer and Berman 1995; Schieber 1995). However, given the nature of the dynamics in the health sector, the reforms in transitional economies require more in-depth and broader examinations on a number of issues including the impact of the user fee and payment reform on the delivery of public health programs and cost containment.

During the 1980s and 1990s, health sector reform in the world was characterized by efficiency orientation (Whitehead et al. 2001; Gwatkin 2001). Market mechanisms, including user fees, competition, privatization, and a division between purchasers and providers, were recommended (Klein 1993; Shaw and Griffin 1995). Structure adjusted programs in African countries, market-oriented reforms in transitional countries, and cost escalation of medical care in high-income countries, are the causes for the direction of the reforms. However, the health sector differs from a common production market, since the market mechanisms do not lead to a socially optimal allocation of health resources. The problem of market failures raises basic questions of what are the roles of governments (regulators) and markets for resource allocation and distribution in the health sector. In transitional economies like China, the provision of public health programs was fully supported by the government before the economic reforms. A change of this pattern is both a research and a policy issue.

## **1.2 Efforts towards an equitable and efficient health system**

Public health programs have shown higher social and health returns than the allocation of resources in other medical activities by several international organizations including the World Bank (WB) (1993) and the World Health Organization (WHO) (2001). Given the situation of disease burdens and availability of health resources in LMIC, interventions including vector control programs, immunizations, treatment of highly contagious diseases, and maternal and child health care, are strongly recommended, since those activities can generate greater positive externalities (Bitran 1998; WB 1993; WHO 2001). HIV/AIDS, tuberculosis (TB), and malaria have been the top priorities in the world (WHO 2001).

There are several constraints which affect an equitable and efficient provision of public health programs (WHO 2001; Hanson et al. 2003). Financial constraint is one of the most important barriers to scaling up priority public health programs (WHO 2001). Other constraints can come from various dimensions, including weak technical guidance, inadequate regulation, and weak incentives to efficiently use inputs

(Hanson et al. 2003). A research question is how health financing reforms, including fiscal decentralization, aggravate or mitigate the constraints.

Pricing as a means of generating revenues is more important in LMIC where the main part of the health expenditures is due to private user charges (WB 2004). Pricing policy has two functions of improving efficiency and equity (Shaw and Griffin 1995). The pricing tool has been used for cost containment of health care including drugs in the United States of America (USA) and many European countries (Ioannides-Demos 2002; McDonough 1997). The equity implications of pricing policy have been intensively discussed after user fees were introduced in many African countries in the late 1980s (McPack 1993; Mwabu and Mwangi 1986). User fees might improve equity in financing, if the poor could be cross-subsidized by the rich (Shaw and Griffin 1995). However, the user fee system is also likely to prevent the vulnerable population from using essential health care (Mbugua et al. 1995; Wills and Leighton 1995). An exemption program has been implemented to address user fee and access problems in many countries (Huber 1993; Russell 1996; Gilson et al. 1998). In China, the operation of public health providers including public hospitals and centers for disease control and prevention (CDC) has mainly relied on user charges since the economic reforms.

The hospital sector absorbs the majority of health resources and has been one of the main targets for interventions. Among strategies, third-party payers have a crucial role in enhancing hospital efficiency. The effects of payment systems and contracting methods arranged by health insurance schemes to improve efficiency and cost containment have been confirmed by a number of studies, mainly in high-income countries where health insurance schemes have been well developed and cover the majority of the population (Duckett 1995; Bradford et al. 1997; Wiley 1992; Melnick et al. 1992; Propper 1996). In most LMIC such as China, health insurance systems are being developed and there is a need to analyze the role of health insurers in influencing cost containment and the efficiency performance of health providers.

China is no exception as concerns health sector reforms aiming at achieving equity, efficiency, and sustainability. However, for a transitional economy, China has been facing a dilemma. On the one hand, it tries to mobilize more resources for expanding the health sector to address resource shortage and poor quality problems, which would imply a rise in medical costs. On the other hand, it tries to control costs and keep them at as low a level as possible to reduce financial barriers to access. The Chinese government has implemented a series of reforms since the mid 1980s, focusing on mobilization of resources from individuals, decentralization of financial responsibilities, extension of the social health insurance plans, and cost containment of drugs. The impact of those reforms on the realization of the aims of the health care system is crucial for both academic work and policy practice.

### **1.3 Aim and objectives**

The main aim of the thesis is to examine the relations between healthcare pricing and payment reforms and the delivery of public health programs and cost containment of medical care.

The specific objectives are to:

- 1) Explore the relation between the hospital financing reform and the provision of exemption programs (study I);
- 2) Assess the impact of urban health insurance reform on hospital charges (study II);
- 3) Assess the impact of financial decentralization on the provision and financial burden of TB care (study III);
- 4) Explore the relation between drug pricing policy reform and drug expenditures (study IV); and
- 5) Examine the development of revenues, costs and performance in the hospital sector (study V).

## 2 BACKGROUND

### 2.1 Economic and social transitions in China

China had an almost thirty-year period of planned economy after its foundation at the end of the 1940s, under which all resources and productions were planned and equally rationed by the government. Economic growth was very slow and most of the people were equally poor during this time period. In the meantime, however, China made remarkable achievements in improving the health status of the whole population, mainly contributing to effective public interventions in controlling infectious diseases and an affordable health care system.

The economic reform from a planned to a market economy started in the late 1970s. Over the past two decades and a half, China has experienced dramatic changes in both economic and social sectors. In particular, China has achieved great success in sustaining a high gross domestic product (GDP) growth and improved living conditions for all its people. Between 1980 and 1997, GDP per capita was doubled in fixed prices. In 2003, per capita GDP reached 1,000 US Dollars in nominal value. The health status continued to improve. From 1980 to 2002, the life expectancy increased from 67 to 71.6 years, and infant mortality rates decreased from 49 to 30 per thousand live births (WB 2004). Table 2.1 presents the major social and economic indicators in selected years. The monetary values in economic development have been adjusted by consumer price index (CPI) taking 1990 as the base year.

Table 2.1 Major indicators for economic and social development in China

Indicators	1990	1995	2000	2003
<b>Population (Million)</b>	712.2	847.1	1178.6	1404.0
Urban %	26.4	29.0	36.2	40.5
Rural %	73.6	71.0	63.8	59.5
<b>Economic development</b>				
Per capita GDP (yuan)	1634	2831	4153	5410
Per capita income in urban (yuan)	1510	2498	3680	5075
Per capita income in rural (yuan)	686.3	920	1320	1566
<b>Social development</b>				
Illiteracy rate %	15.9	12.0	6.7	n.a
Enrollment rate of schooling children %	97.8	98.5	99.1	98.6
Life expectancy at birth*	68.6	n.a	71.4	n.a
Infant mortality rate	52.3	36.4	32.2	25.5
Maternal mortality ratio	88.9	61.9	53.0	51.3

Data source: National Bureau of Statistics (NBS) 2004; n.a: not available;

\*data from Ministry of Health (MoH) 2004

China had a population of 1.3 billion in 2003, accounting for nearly 20% of the global population (NBS 2004). Since the implementation of the family planning policy in the mid 1970s, fertility rates have declined dramatically. Moreover, urbanization has continuously been increasing over the past years. Yet, while the Chinese social and economic systems are improved overall, disparities in major development indicators between regions and population groups have rapidly increased. It was reported that

the Gini coefficient<sup>1</sup> increased from 0.32 in 1995 to 0.45 in 2002 (Li 2004). The income ratio of urban residents over rural residents increased from 2.2 in 1990 to 2.9 in 2003 (NBS 2004). Within the same region, the income gap between the poor and the rich is large, with about five times higher income for the richest group (top 10% of the population) than the poorest group (bottom 10% of the population) (NBS 2004).

The Chinese social security system has been transformed from institution-based to society-based since the economic reform. Prior to the reform, the Chinese social security system was enterprise- or collective-economy based. In urban areas, the state-owned-enterprises provided their employees and their dependents with relatively comprehensive securities including housing, education, health, and pensions. Government health insurance (GHI) and labor health insurance (LHI) covered most urban residents. In rural areas, collective economy based on communes and villages provided limited social securities to farmers. A cooperative medical scheme (CMS) supported by collective economy was operated in most rural areas during the 1960s and 1970s (Hsiao 1995; Gu and Tang 1995). After the economic reform, the collapse of the rural collective economy and the state-owned enterprise reform required a society-based rather than an institution-based social security system.

## **2.2 The Chinese health care system**

### **2.2.1 History and overview of the system**

The MoH at the national level and the corresponding departments of health at the provincial, prefecture, and county levels, take the leading responsibilities for the organization and administration of the health care system. The Ministry of Finance (MoF) and local departments of finance are crucial in determining the level of the health budgets and resource allocation. At the national level, other ministries closely associated with health include the State Development and Reform Commission (SDRC), the Ministry of Labor and Social Security (MOLSS), and the State Food and Drug Administration (SFDA). Decisions about national investment programs in the health sector and prices of medical care including part of the drugs are usually made by the SDRC. The administrative authority of urban health insurance plan was moved from MoH to MOLSS in 1998. The drug market including assessment of drugs and quality assurance is mainly administered by the SFDA. The MoH and other related ministries are responsible for making national health policies and regulations. Local government departments make policies mainly at the implementation level according to national policies and regulations.

The Chinese system can be characterized as a “two-tier” system, divided into rural and urban health care systems. In urban cities, publicly owned health providers dominate the provision of health care, for example only 2% of the hospitals were privately owned in 2003 (MoH, 2004). In rural areas, a majority of village clinics are operated by private individuals. But at the township and county level, the majority of health entities are operated by the government.

Preventive and curative cares are provided by separated health providers. Township health centers (THC), CDC, and maternal and child health stations at the county level

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<sup>1</sup> The Gini-coefficient, a measurement of income inequality, is a number between 0 and 1, where 0 means perfect equality (everyone has the same income) and 1 means perfect inequality (one person has all income, everyone else has nothing).

and above, are the main providers of preventive care. Curative services are mainly provided by clinics and hospitals. In addition, a number of health institutions responsible for the provision of health care for specific diseases such as TB and malaria are available at the county level and above.

In 2003, the urban health insurance plan (combined GHI and LHI) covered 30.2% of the urban residents and CMS covered 9.5% of the rural population, reported by the Center for Health Statistics and Information (CHSI) of MoH (CHSI, 2003). The urban health insurance plan is for employees working in government and enterprise sectors. It is now being extended to other sections of the population, including self-employed workers and dependents of the employees. New CMS are being piloted and will cover most of the rural population by the end of 2008, according to national planning (MoH, 2005).

The Chinese health care system was decentralized from the mid 1980s, primarily driven by the fiscal system reform in China. To encourage local governments to develop the social and economic sectors within their administrative areas, two parts of taxation of national and local taxes were implemented. For the health sector, the national tax is mainly used for transfer payments, whereas the local tax is mainly used for own use including subsidies to the health sector. Under this arrangement, local governments are responsible for supporting the health providers run by the local governments.

## **2.2.2 Health financing**

### ***Sources of health expenditure***

The GHI and LHI were established for urban residents and CMS was organized for the rural population from the mid 1950s. Today, both urban and rural health insurance plans are in the process of being reformed to achieve universal coverage and efficiency in the use of resources. Government budgets, the social sector<sup>2</sup> and private source<sup>3</sup> constitute the major sources of financing. From the late 1980s, health expenditures increased more rapidly than before, mainly as a result of an increase in expenditures from the private and the social sector. From the mid 1990s, private contribution accounted for a larger proportion in driving the rapid increase in total health expenditures. Figure 2.1 illustrates the trends in total health expenditures in China from 1978 to 2003. The figures of health expenditures are adjusted by CPI.

Compared with the increases in health expenditures from the social sector and private individuals, government expenditures<sup>4</sup> in the health sector grew at a slower rate. In 2003, 56% of the health expenditures came from private sources, 27% from the social sector, and 17% from the government, which means an increase of about 33 percentage points for private sources and an 18 percentage decline for government sources since 1978 (HAST 2004). In the twelve-year period from 1978 to 1990, health expenditures

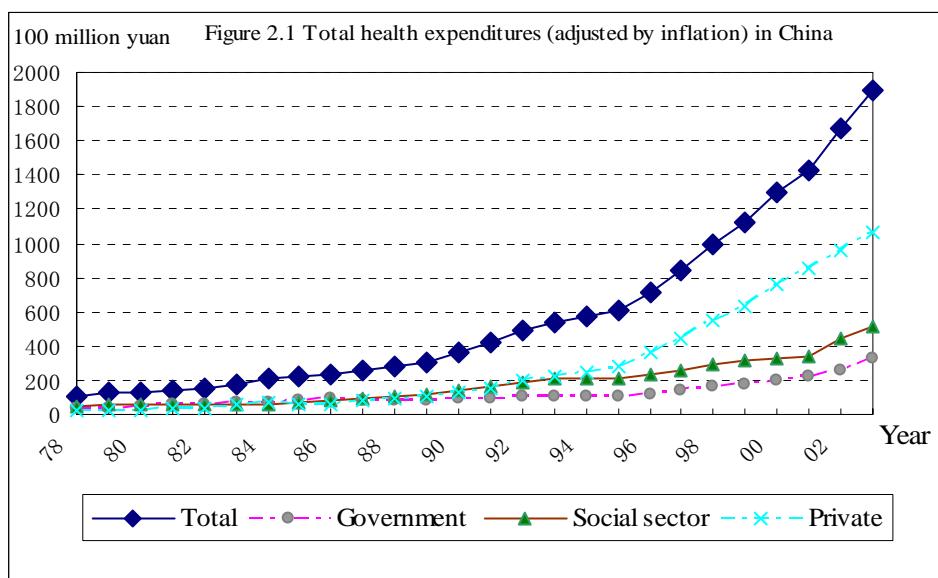
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<sup>2</sup> Social sector refers to organizations including companies, enterprises, schools, etc. Health expenditures from those organizations include contributions to health insurance schemes and other health investments, for example, some entities run health practices with their own resources.

<sup>3</sup> Private source refers to individuals paying medical care through out-of-pocket payment or health insurance premiums. Because of the limited coverage of health insurance schemes, the majority of the private financing is through direct payment from individual users.

<sup>4</sup> Government expenditure mainly includes three components: regular budgets for government health providers and other types of health institutions, specific budgets for purchasing equipment and the construction of buildings for health providers, and subsidies to health insurance.

as share of GDP increased by 1 percent. In the next 12 years from 1990 to 2002, the share of health expenditures in GDP increased by 1.5 percent (HAST 2004).



Source: Health Account Study Team (HAST) 2004

To relate the spending in the Chinese health system to international figures, table 2.2 presents information on health expenditures for selected countries. Public expenditures include expenditures on health from government budgets and social sectors. China's health expenditure per capita was much lower than in several high-income countries, but higher than in countries such as India and Vietnam.

Table 2.2 Information on health expenditures in selected countries in 2001

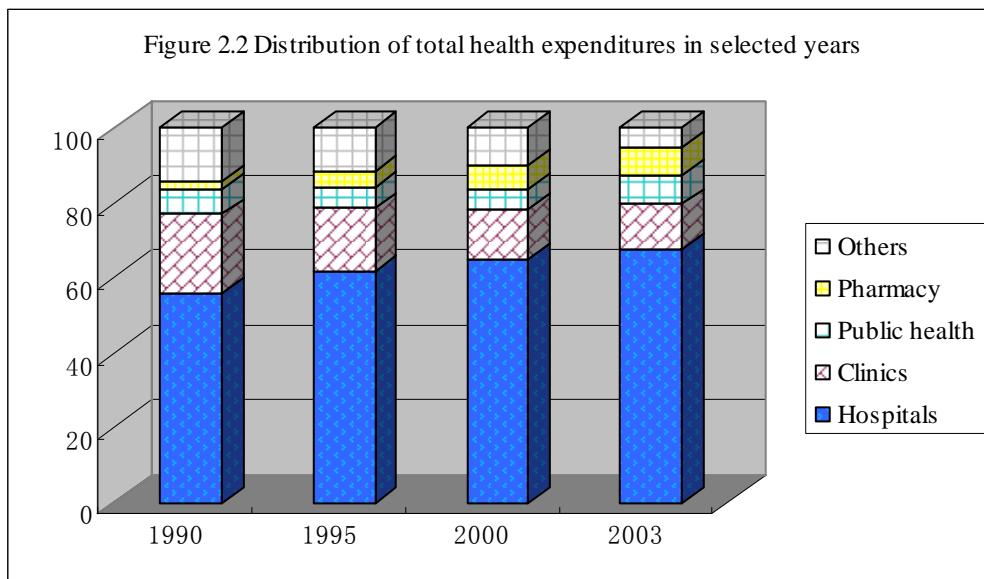
Countries	Health expenditure per capita (US\$)	Health expenditure as % of GDP	Public expenditure as % of total health expenditures
China	49	5.5	37.2
India	24	5.1	17.9
Thailand	69	3.7	57.1
Vietnam	21	5.1	28.5
Brazil	222	7.6	41.6
Russian Federation	115	5.4	68.2
United States	4887	13.9	44.4
Sweden	2150	8.7	85.2
Australia	1741	9.2	67.9
Japan	2627	8.0	77.9

Source: WB 2004

### **Distribution of health expenditures**

In 2003, nearly 68% of the health expenditures were distributed in the hospital sector for inpatient and outpatient care, with a 10% increase as compared to 1990. Together with expenditures on clinics, about 80% of the health expenditures were for curative care. Public health facilities including CDC and maternal and child health stations used

less than 10% of total health expenditures. Spending on pharmacies<sup>5</sup> increased from 2.2% in 1990 to 7.5% in 2003 (figure 2.2).



Source: HAST, 2004

### 2.2.3 Delivery system

Public health services and primary health care Public health service in China is defined as the provision of services delivered for controlling infectious diseases, maternal and child health, promoting environmental and occupational health, and ensuring food safety. The CDCs take the leading role in delivering programs for disease control and environmental and occupation health, in collaboration with other health providers. Maternal and child health stations supply the delivery of ante-natal, post-natal and childbirth care. Those maternal services are also provided by general hospitals. THCs in rural areas and community health centers in urban cities are also crucial providers of public health services. Rural village clinics are asked to provide basic preventive care, including child immunization and health education under the supervision of the THCs.

Village clinics and THCs in rural areas and community health centers in urban cities are the main providers of primary health care. Each village clinic is staffed with at least one doctor and one nurse covering around 1000 inhabitants and mainly provides outpatient services (MoH 2004). THCs provide both outpatient and inpatient care with about 20-50 hospital beds (MoH 2004). An urban community health center usually serves 10,000 inhabitants with outpatient as well as inpatient care (MoH 2004). In both urban and rural areas, no referral mechanism exists for out-of-pocket (OOP) users in the use of health care. For insured individuals who claim reimbursement, the choice is limited to contracted providers.

#### *The hospital sector*

Over the past five decades, the scale of the hospital sector in terms of staff and capital equipment has been rapidly expanded. In the meantime, the structure of hospital incomes substantially changed from public-finance-dominant to user-fee-dominant.

<sup>5</sup> Pharmacies are drug retailers operated outside and independent of hospitals. Within hospitals, departments of pharmacies are also operated, whose expenditures are included in the hospital sector.

Table 2.3 presents basic indicators in selected years for the hospital sector. The decline in the numbers of doctors and nurses was caused by the reclassification of health staff in China starting in 2002.

Between 1978 and 2003, the number of doctors increased from 1.03 million to 1.87 million with a 2.4% annual growth rate. The number of doctors per thousand inhabitants increased from 1.08 in 1978 to 1.48 in 2003. The number of hospital beds per thousand inhabitants increased from 1.93 in 1978 to 2.34 in 2003 (MoH 2004).

**Table 2.3 Changes in scale, health staff and finances for public hospitals**

Indicators	1990	1995	2000	2003
Number of hospitals	62454	67807	66509	62968
Number of hospital doctors (10,000)	176.3	191.8	207.6	186.8
Number of hospital nurses (10,000)	97.5	112.6	126.7	126.6
Number of hospital beds (10,000)	262.4	283.6	294.8	295.5
Value of medical equipment <sup>6</sup> (billion yuan)	7.98	25.10	71.47	126.26
Revenues (billion yuan)	70.22	100.34	229.65	286.6
% of government	11.63	7.49	8.7	6.2
% from professional services	28.61	34.74	40.17	43.9
% from drugs	43.07	49.82	47.12	43.5

Source: Department of Health Planning and Finance of MoH 1990-2003

### ***The pharmaceutical sector***

Production and wholesale distribution in the pharmaceutical sector have expanded rapidly since the early 1980s. According to SFDA (2005), there were 6000 pharmaceutical manufacturers and 12,300 drug wholesalers in China by the end of 2004. The growth rates of those entities declined from 1998 after the application of good manufacturing practices (GMP), an effort to approve operations in this business by the government. The pharmaceutical sector has been an important industry. Between 1999 and 2002, the shares of pharmaceutical product values in total industrial values increased from 2.06% to 2.15%, and the shares of sales revenues increased from 1.97% to 2.08% (NBS 2003). Competition in the pharmaceutical sector is very high. The top 50 pharmaceutical manufacturers shared about 50% of the market in 2004, which is a smaller market concentration than in high-income countries (SFDA 2005). In 2003, pharmaceuticals comprised 40% of the total health expenditures, 85% of which were sold at hospitals and clinics (HAST 2004). Sales through pharmacies account for a small portion of total pharmaceutical sales. The rapid increase in drug expenditures is the one major cause for the escalation of medical costs.

#### **2.2.4 Pricing and regulations**

##### ***Price setting and payment system***

The regulation of prices comprises two systems for health care services. One is the pricing system for medical care excluding drugs (non-pharmaceutical care), the other is

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<sup>6</sup> Value of medical equipment is the current monetary value of the total assets of medical equipment at a given point in time, usually at the end of a year.

the pricing system for drugs. Non-pharmaceutical care includes professional services, nursing, medical technologies, and laboratory tests. Those services are specified in fee schedules. Currently, there are about 4,000 fee items in the schedules used for hospital charges. The prices of the fee items are set by departments of price administration and health at the provincial or municipal level. The central government issues principles for price setting. Drug pricing is administered by SDRC. The central and provincial governments set prices for drugs that are covered by the national drug list of the urban health insurance scheme. Prices for other drugs are determined by market forces.

At present, the majority of the people pay medical care OOP based on a fee-for-service (FFS) payment system. The rates of the 4,000 fee items are the same for all individuals irrespective of insurance coverage. Before 1980, a low-price policy was implemented by the government to make basic medical care affordable (Liu et al. 1996). Since the mid 1980s, fee rates have been adjusted to compensate for the operating costs of health providers, which implies an increase in prices (MoH 1985). The latest government pricing policy for medical care is to increase prices for professional services and decrease prices for high technologies, to provide disincentives for unnecessary provision of high technologies. Between 1980 and 2000, the government controlled the entire cascade of drug prices, from manufacturers' exit prices, to wholesale and retail prices. Manufacturers' exit prices were based on production cost plus a 5% profit margin, to which a 15% margin was added for the wholesale price, and a further 15% margin to create the retail price. Since 2000, the government only sets retail prices for a reduced scope of drugs (SDRC 2000).

### ***Remuneration system for health providers***

The health insurance schemes use alternative payment systems, including FFS, capitation, fixed charges, diagnosis related group (DRG), and case-based. With the reform of the new urban health insurance system since the mid 1990s, the use of FFS in those schemes has decreased. Usually, the mixed payment methods mentioned above are used by insurers according to the types of medical services provided by the contract health providers (Meng 2004). In rural areas, the CMS is trying different payment methods, especially by using DRGs in paying for inpatient care (Mao 2005).

Health providers such as hospitals and CDCs can retain a financial surplus for investments in buildings, new medical equipment, and to improve the living conditions of the staff. Under this incentive arrangement, health care organizations try to increase their surplus mainly through an increase of revenues. One of the major incentive measures is the bonus system which has been in use since the mid 1980s. Besides salary and other benefits, bonus has become a crucial component in the total incomes of individual health workers. The bonus system experienced three different stages of flat bonus (bonus is equal for every one), revenue/volume-based bonus (bonus is determined by revenues generated or quantity provided), and performance-based bonus (a set of indicators including revenue and quality) (Liu and Mills 2005).

### ***Regulatory process***

There are two forms of regulations in the Chinese health sector. One is the legislation including law and regulations issued by legislative bodies, the other is the policy document issued by a single or joint administrative body or by the Chinese Communist Party Committees. Those two kinds of regulations have similar effects in influencing

the health sector. The design of the pricing policy is an example of the policy decision process. Pricing policy is issued by the SDRC as well as by the MoH. This is a negotiation process with parties representing different interest groups. The SDRC represents health care consumers, while the MoH represents health providers. After a general policy has been issued by the central government, the Provincial Department of Price Administration and the Department of Health will negotiate concrete issues about the rates in the official fee schedule. This is a long process that may take two or more years to finalize, before a revised fee schedule comes into use.

## **2.3 Problems and reforms**

### **2.3.1 Problems in equity, efficiency, and cost containment**

Since the early 1980s, the inequities in health and health care have been growing in China (Gao et al. 2002; Liu et al. 1999). First, disparities in health status are evident between regions and population groups. Poor regions and people suffered more and severe health problems. For example, infant mortality rates in high-income provinces such as Beijing and Shanghai were below 9 per 1,000 live births, whereas in poverty provinces such as Qinghai, Guizhou, and Gansu, infant mortality rates ranged from 30-44 per 1,000 live births in 2000 (MoH 2000). Second, access to health care is more constrained for the poor than for the rich in rural areas and for the uninsured in urban cities. In urban cities, 56% of the patients who were advised to receive inpatient care were not hospitalized due to financial constraints, and the corresponding percentage in rural areas was 75% (CHSI 2003). Finally, the financing of health care is most likely regressive, since the rates of official fee schedules are the same for everyone without consideration of ability to pay for the poor. Poorer households spent a higher proportion of their incomes on medical services than did higher-income households (Gong 1999).

### **2.3.2 Health sector reforms**

From the mid 1980s, after the launch of the economic reforms, the Chinese government started to reform the health sector. The reform was initially motivated by health care providers not being adequately financed by public funding and low efficiency in the use of limited health resources. Therefore, the reforms in the 1980s and 1990s were mainly aimed at improving efficiency and revenues for providers. To improve the efficiency of existing health resources, health facilities were offered more financial autonomy and the responsibility for financing was decentralized. In mobilizing resources for health, private practices were allowed and private investment in health was encouraged. Fee rates of health care services were raised to cover costs. In improving the quality of care, an accreditation system was implemented that encouraged hospitals to invest in new medical technologies.

Table 2.4 lists the selected health reforms designed and implemented during the 1980s and 1990s. From an economic perspective, those reforms are crucial in influencing the development of the health sector and the behavior of health providers.

During the 1980s, the reforms and policies were characterized by market-oriented mechanisms for financing and administering health facilities. After a long-period of a regulated low-price policy for medical care services, prices started to play a more important role in revenue generation for health providers. Besides medical care, providers supplying preventive care were also allowed to charge user fees. After those

pricing policy reforms, hospitals and other types of health providers were given more autonomy in the use of the revenues with the assumption that productivity and efficiency would be improved under this kind of incentive arrangement.

Table 2.4 Health policy and regulatory documents in China selected from the 1980s and 1990s

<b>Policies and regulations</b>	<b>Aims</b>	<b>Major contents</b>
State Council, 1985	Reforming financing mechanism for health facilities	<ul style="list-style-type: none"> <li>- Decentralize financial responsibility to local government;</li> <li>- Increase financial autonomy of public hospitals. Hospitals can retain surplus for their own use;</li> <li>- Fee rates of service items, especially new technologies, can be increased;</li> <li>- Preventive care including immunization and MCH can be charged to users.</li> </ul>
State Commission of System Reform, Ministries of Finance, Labor, and Health, 1996	Expanding the pilots in urban health insurance reform	<ul style="list-style-type: none"> <li>- Pilot new urban health insurance with 1) combination of GHI and LHI; 2) single insurer within one municipal city; 3) alternative payment systems; 4) implementation of essential drug list; 5) principles in setting proportions of premiums from employers and employees; 6) principles in setting deductibles and co-insurance.</li> </ul>
Central Committee of the Communist Party and State Council, 1997	Decisions about health sector reform and development	<ul style="list-style-type: none"> <li>- Cost-based pricing method. Prices of basic health services are set based on unit cost;</li> <li>- Adjustment of fee schedules by increasing fee rates for professional services and decreasing fee rates for high technologies;</li> <li>- Implementation of regional health planning to increase the productivity and efficiency of health care provision;</li> <li>- Reestablishment of the community health system to improve access to health care for the community people;</li> <li>- Principles for reforming drug pricing policy.</li> </ul>
State Council, 1998	Decision about establishment of urban health insurance system	<ul style="list-style-type: none"> <li>- Principles for organizing the reform;</li> <li>- Methods in collection of premiums, management of fund, and use of the fund;</li> <li>- Principles for cost containment and quality assurance.</li> </ul>
State Commission of Development and Planning, 2000	Reforming drug pricing policy	<ul style="list-style-type: none"> <li>- Changes in price setting mechanisms with reduced scope of drugs whose prices are controlled by the government;</li> <li>- Introduction of competition mechanism for reducing prices of drugs;</li> <li>- Strengthening monitoring of drugs prices used by health providers.</li> </ul>

## 2.4 Knowledge gaps

A number of studies on health systems and health sector reforms have been carried out in China, which provides helpful evidence for the improvement of health reforms and policy making. With regard to health service delivery, a number of studies and surveys

have demonstrated problems in equity, affordability, and efficiency. The health care financing system including financing of public health programs and health insurance schemes is also presented and, to some extent, evaluated. However, there are a number of knowledge gaps about Chinese health sector reform and its consequences. This thesis tries to fill the knowledge gaps in the following respects.

**Hospital financial policy reform and provision of charity care for the poor.** In theory, public hospitals are supposed to deliver affordable services to the vulnerable population. This means that access for indigents should not be affected by a price barrier under an equitable health care system. In a public hospital sector with user fees, exemption programs have been launched to overcome the access problem. In many LMIC like China, user fees have been implemented and provider autonomy in retaining the surplus has been increased. Much work has been done in analyzing health care utilization and access for the vulnerable population with a focus on the demand side (Bogg 2002; Liu and Mills 2002; Hsiao 1995). However, little is known about provisions of charity services by public hospitals and what determines the provisions for the poor.

**Effect of financial decentralization and user fees on the provision of public health programs.** Decentralization and financing based on user fees are two common phenomena in health sector reforms. Little is known about the impact of the decentralization in the health sector on the performance of public health programs. Tang and Bloom (2000) studied the THCs in a poor rural county to examine the impact of decentralization on finance and management. This thesis complements this study by using TB as a case and covering both rich and poor counties for comparisons. In the international literature, the effects of decentralization on the provision of public health programs have not been intensively studied. This study examines financial expenditures of TB patients under a decentralized user fee system.

**The impact of health insurance arrangements on cost containment and efficiency of hospitals.** Health insurance arrangement includes several aspects of organizing the insurance, the payment system, and the contractual relationship aiming at controlling expenditures and enhancing provider efficiency. The urban health insurance reform is a new agenda and has not been well studied in China. Yip and her colleagues conducted a study in the Hainan Province for examining changes in payment methods and hospital expenditures (Yip and Eggleston 2001; Yip and Eggleston 2004). In the Chinese context, the impact of other tools besides the payment system on health insurance arrangements has not yet been studied and linked to hospital efficiency and costs.

**The effects of price and utilization of drugs on expenditures.** It has been claimed that drug expenditures can only be effectively controlled when both price and utilization are simultaneously regulated (Maynard and Bloor 2003). Studies on how drug costs can be controlled are limited in China. Dong (2000) analyzed the relation between health insurance status and drug expenditures with the conclusion that the insured spent more on drugs than the uninsured. Hu et al (2001) found that a global cap on drug expenditures is effective in controlling drug expenditures in Shanghai where health insurance coverage was relatively higher than in the rest of the country. However, the effect of price and utilization regulation of drugs on the expenditure level is not clear.

### **3 CONCEPTUAL FRAMEWORK**

The conceptual framework of the thesis comprises theories about market failures in the health care sector and subsequent government interventions. The general theme is that the nature of health care leads to certain forms of market failures. In different systems, the institutional responses to these problems will alleviate these effects. The various forms of interventions (or lack of) will have an impact on resource allocation and the distribution of resources as well as the organization of health care provisions. In unregulated markets governed by the price mechanism, certain outcomes are expected in terms of equity and efficiency. However, many of the government interventions do not lead to satisfactory outcomes. There are several ways for providers of circumventing regulations and other unintended effects. The description of the theories is not complete but selective with relevance to the studies in the thesis.

#### **3.1 Market failure in the health sector**

In neoclassical economic theory, demand and supply automatically determine equilibrium prices and quantities of goods or services under a perfect competitive market. With those prices and quantities, both suppliers and consumers gain the optimal benefits and utilities. In the meantime, societal efficiency of resource allocation can be maximized. Interventions from the outside market including government actions would result in inefficient allocations and distributions of resources.

Unfortunately, a perfect competitive market is rarely seen in the real world. It has been widely recognized that in some sectors producing goods and services, the market mechanism does not work partially or completely. This phenomenon is usually defined as the existence of market failure. Market failure refers to a condition or context where optimal resource allocation and distribution cannot be achieved relying on market mechanisms.

Market failure occurs if the preconditions for a completely competitive market are absent. Compared to many business and economic sectors, social sectors including education and health encounter severe market failures, due to the nature of the social sectors where the goods and services required have the characteristics of public goods and externalities. In addition, there are the concerns and objectives in many societies about equal access to these services.

The health sector is a multi-product industry with a complex market system, irrespective of whether private or public goods and services are produced and delivered. The health care market deviates from the traditional market and shows distinctive features that can be summarized as follows (Folland et al. 1993; Evans 1984; Feldstein 1988).

■ *Uncertainty*. Uncertainty means that events of illness, especially catastrophic diseases, are not predictable. People cannot be certain of what diseases will occur and when. Thus, people are not certain of what and how much health care services they will need and how much this will cost in the future. Uncertainty is one of the characteristics that differ from the consumption of other commodities.

■ *Information asymmetry*. Health care service is a knowledge-and-skill-intensive “goods”, requiring much training to be understood and delivered. Health care

providers have an advantaged position over health care consumers in knowing medical prescriptions, costs, quality, and effectiveness. Due to the information asymmetry, users will become what could be called “service and price takers”. Prices and quantities of health care services would not be optimal when suppliers and consumers own different levels of information.

■ *Public goods*. If the consumption of a certain goods by one individual does not reduce someone else's consumption of this goods and none of the consumers is excluded from consuming this good, the nature of the goods is referred to as a public good. Since people cannot be excluded from consuming the goods, they become free riders without contributions to producing such kinds of goods. In the health sector, examples of services of the nature of public goods are research and the establishment of entities delivering public health programs such as food safety and pollution control. Public goods normally require public financing as the provision through a market mechanism will be insufficient.

■ *Externality*. When an individual or a group is affected by the consumption of a certain goods of another individual or group, externalities arise. One classical example of negative externality is the production of pollution by paper manufacturers. In the health sector, one common example showing a positive externality of a certain goods is the child immunization program. Consumption of child vaccine immunization as a private goods can generate positive effects on the whole community by reducing the possibilities of infecting other community members with some infectious disease.

■ *Monopoly*. In the health care market, the existence of monopoly could be of two types, geographic monopoly and technology monopoly. The former could use its location advantage to generate monopolistic revenues or rents by setting higher prices or providing over treatment. The latter could also achieve the same utility by charging users high prices for technologies owned by the monopolistic provider.

■ *Redistribution*. According to Folland and his colleagues, income redistribution could be considered as a public goods dimension to voluntary contribution (Folland et al. 1993). The market mechanism cannot correct income distributional problems.

The existence of the above features in the provision and financing of health care implies market failure in the allocation and distribution of health resources. In particular, the market mechanism cannot address the problems of inequity in health care. According to Wagstaff and Doorslaer (1993), two types of equity, equity in finance and equity in health service utilization, can be observed. Equity in finance requires differential payment levels for the same health care according to ability to pay, while equity in health service utilization requires that health care is provided according to health needs. Obviously, the achievement of equity in health care needs interventions from the outside market.

## **3.2 Government intervention and failure**

### **3.2.1 Government intervention**

The existence of market failure in the health sector provides the basic economic rationale for government intervention (Folland et al.1993). The purpose of the government intervention is to address the problem of inefficiency in the use of resources and inequity in health care caused by market failure. Government interventions can be developed in various forms in different countries, according to their specific social and economic contexts. The government role could take different forms and responsibilities including regulation, financing of health services, provision of health care and income redistribution (Folland et al.1993; WB 1993).

- *Regulation.* The regulation refers to the use of non-market means to address the quantity, price, or quality of the goods brought to market (Folland et al. 1993). In the health care market, the core of regulation focuses on three dimensions: quantity, price, and quality. One of the aims of the health care system is to provide adequate and affordable quality services to people. Starting from this point, the regulatory areas for government intervention in health care are control of costs or expenditures for assuring affordability, and control of quality. Quantity of health care is closely related to issues of either expenditures or quality, since quantity and price determine the level of expenditures on the one hand, and under- or overprovision of medical care affects both expenditures and quality on the other hand.
- *Financing of health services.* To provide services characterized by public goods and positive externality, the government can allocate public funds to support the operation of such health programs. Those health services financially supported by the government can be provided by either public or private health institutions. Common services supported by governments are public health programs. For example, government subsidies of child immunization services can increase the utilization and expand the coverage of immunization by removing financial barriers (zero or low price) for users.
- *Provision of health care.* The government could organize and provide health care services to the general public through public health programs or to vulnerable population groups with basic curative care. Output of health care for targeted programs and population groups can be achieved through direct provision. Government health institutions are usually responsible for the delivery of public health programs and services to lower-income people and other types of vulnerable groups. The provision of health care by the government can, to some extent, address the problems of public goods, externality, and information asymmetry.
- *Redistribution.* An important objective of government interventions in the health sector is to improve access to health care for lower income groups through resource redistribution. Programs for the poor and exemption programs can redistribute income from higher to lower income groups. The direct provision and financing of health care to the poor can also have an income redistribution effect.

In summary, government interventions in the health sector aim at overcoming both efficiency and equity problems, through reallocating health resources, financing

public health programs, and regulating the health care market.

### 3.2.2 Government failure

It is argued whether government intervention could achieve the desired effect (Zerbe and McCurdy 1999; Dolley and Wallis 2001; Barry 2000). The public choice theory demonstrates the elements of government failure. Rent seeking behavior within government agencies is one of the core assumptions resulting in government failure (Dolley and Wallis 2001). In most cases, government intervention aims at reallocating resources and adjusting the interests of different actors. Interest groups with advantaged financial or political positions would lobby the decision makers for achieving their own objectives. Decision makers are likely to be influenced by those interest groups, because the decision makers also want to maximize their own interests, which is consistent with the basic theory of economics. There is also a lack of incentives for governments to efficiently make decisions and interventions about resource allocation.

Efficient resource allocation for public interest would not bring additional utilities for the decision makers. Therefore, the decision makers in the government could use their decision and political powers to satisfy some interest groups, at the expense of the general public, and obtain returns from those interest groups. The groups with a weak voice in influencing decision makers would lose their interests with the existence of a “rent seeking” behavior. Bureaucracies are another source of government failure. The government may lack adequate capacity in implementing interventions or lack motives to efficiently operate the interventions (Barry 2000). There are different interest groups in the health care market, including the hospital sector, the pharmaceutical sector, the medical equipment industry, and health care consumers. Another source of failure is that regulations have unintended effects where the regulatees try to circumvent the interventions. Hence, even if the government agencies are determined to adjust or correct market failures, there is a question of to what extent the intervention has been successful and reached its objectives.

## 3.3 Regulation of prices and payments

Government regulations in the health sector could take various forms in response to the major problems of market failure. Some regulations target the restriction of market entry for health resources including health facilities, physicians, and medical technologies. A license system for physicians is standard in most countries and the Certificate-of-Needs (CON) used in the US is an example of regulating hospital investments (Joskow 1981; Folland et al.1993). Some regulations target processes and outputs of health care, including utilization review for monitoring appropriateness of the services provided, technology assessment for assuring cost-effective provision of medical technologies, and price regulation for the control of medical expenses.

### 3.3.1 Rationales for regulating the user fee

- *Efficiency pricing.* The existence of positive externalities for some type of health care consumption provides a rationale for government subsidies (Folland et al.1993; Feldstein 1988). In the presence of positive externalities, the social demand curve lies to the right of the private demand curve, and the price for achieving a socially optimal quantity of utilization of the services should be set lower than the marginal cost (McPack 1993). The gap between the price for users and the cost is covered by government subsidies. Besides the costs for health care, there are private costs for

gaining access. If the access cost is higher than the price set, health services would be under-utilized and an incentive payment to encourage users to utilize the health care is needed. If the access cost is lower than the price set, over-utilization of the health care would occur. Therefore, there are three determinants of price setting: the level of externality of the health care, the marginal cost of producing the care, and the private access costs. The pricing policy determines how much lower the price should be set in relation to the marginal cost, given the level of externality. Externality is crucial in this price decision (Sepehri and Chernomas 2001; McPack 1993). Pricing can also help reduce excessive or unwanted demand for services, and redirect users to use primary health care through price signaling (Shaw and Griffin 1995).

■ *Equity pricing.* Given a constant health consumption level, along with increases in incomes, the marginal rate of substitution of health for other goods increases. This implies that more other goods are required to substitute for a given loss of health. The individual therefore intends to pay more for health and becomes less sensitive to price change, which means that lower income groups would be more sensitive to price changes (Arhin-Tenkorang 2000). To have an equity pricing policy, the difference in price elasticity between different income groups should be considered. The principle is that fees should be paid according to users' ability to pay. If charges made from rich users can be used to subsidize the poor, this implies an equity pricing (Shaw and Griffin 1995; Yoder 1989; Waddington and Enyimayew 1989).

### **3.3.2 Regulation of quantity and price**

To control medical expenditures, given the quality of care, there are three crucial parameters such as price, quantity, and quality of health care. Health care expenditures ( $E$ ) or costs are the product of price ( $P$ ), quantity ( $Q$ ), and quality ( $q$ ) that can be written as  $E=P*Q(q)$ . For the purpose of efficiency improvement and cost containment, the key issue for regulators is how to regulate prices and the utilization of health care services. The strategy for intervention is twofold. First, the regulator intervenes with regulation of prices or utilization. For price regulation, the assumption is that total health expenditures would be at an optimal level with the regulated prices and given quantities of health care utilized at the regulated price level. Second, regulators target both prices and utilizations of health care for interventions. Obviously, the latter option might be more effective in controlling health expenditures if the regulations were properly implemented, because the two determinants of expenditures are regulated.

Then, it is clear that government interventions are usually directly or indirectly related to the pricing issue in health care. This is understandable, since price is the key element for clearing a market under a perfect competitive market. Market failure implies that the price mechanism does not work well, which calls for price intervention. Direct government provision or financing of health care is initially a price issue as both usually imply a lower-than-cost price for certain categories of services and population groups. Price regulation is a direct means of avoiding price distortion and poor regulations for health care prices would lead to price distortion. Providers' payment is part of price regulation (Folland et al. 1993), which serves the purpose of enhancing efficiency and cost containment through reimbursement arrangements.

### **3.3.3 Reimbursement for health providers**

According to the sources of payers, health providers could be reimbursed by one or more payers at the same time, which means that the total costs of health providers could be shared by government subsidies and/or a health insurance fund and/or direct OOP payments from individual users. Third-party payers, private or public, could use a range of payment methods to reimburse providers. Each payment method gives certain incentives and has its own advantages and disadvantages regarding efficiency and equity, summarized as follows (Kutzin 2001, Bloor and Maynard 1998).

- *FFS (fee-for-service)*. This is a traditional payment method used for paying hospitals by setting a price for each service item provided. The advantages of this method include quality of services, and individual patients might have more freedom to choose service items. But it will also encourage providers to provide over-treatments and it increases difficulties in monitoring and regulating hospital prices from the third-party payers' perspective.
- *Capitation*. Payment according to number of heads or individuals in a contracted health insurance plan or organization is relatively easier to manage. Because the price per head is fixed in a certain time period, global expenditures of insurers and other payers can be well controlled. The disadvantages of this method are that health providers could reduce the intensity of services to save costs and refuse to provide care to patients with a severe medical condition.
- *Fixed charge (per-case payment)*. Paying hospitals with fixed charges per outpatient consultation or per inpatient day or admission could be a way of controlling expenditure per unit of services. However, it could encourage hospitals to reduce inputs in each service unit or induce patients to demand more service units. The DRG-system is one alternative using per case payment where hospitals are reimbursed for each in-patient episode.
- *Global budget*. Its advantage is expenditure control. But the lack of incentives for efficiency and service quality might also be a concern.

### **3.4 Health provider response to health policy and regulation changes**

In response to changes in health policy and regulation, health providers may change their behavior in the distribution and allocation of resources to realize their own objectives. The consequences of health reforms and regulations would therefore be closely related to how health providers react to imposed regulations. Health providers could be described as a special organization with two relatively independent internal organizations of administration and medical staff (Pauly and Redisch 1973). It is recognized that due to the nature of health care production, physicians are more powerful in determining resource allocation than administrators, particularly in the provision and prescription of medical care and drugs (Joskow 1981). For simplicity, health providers in this thesis refer to both individual staff and health entities.

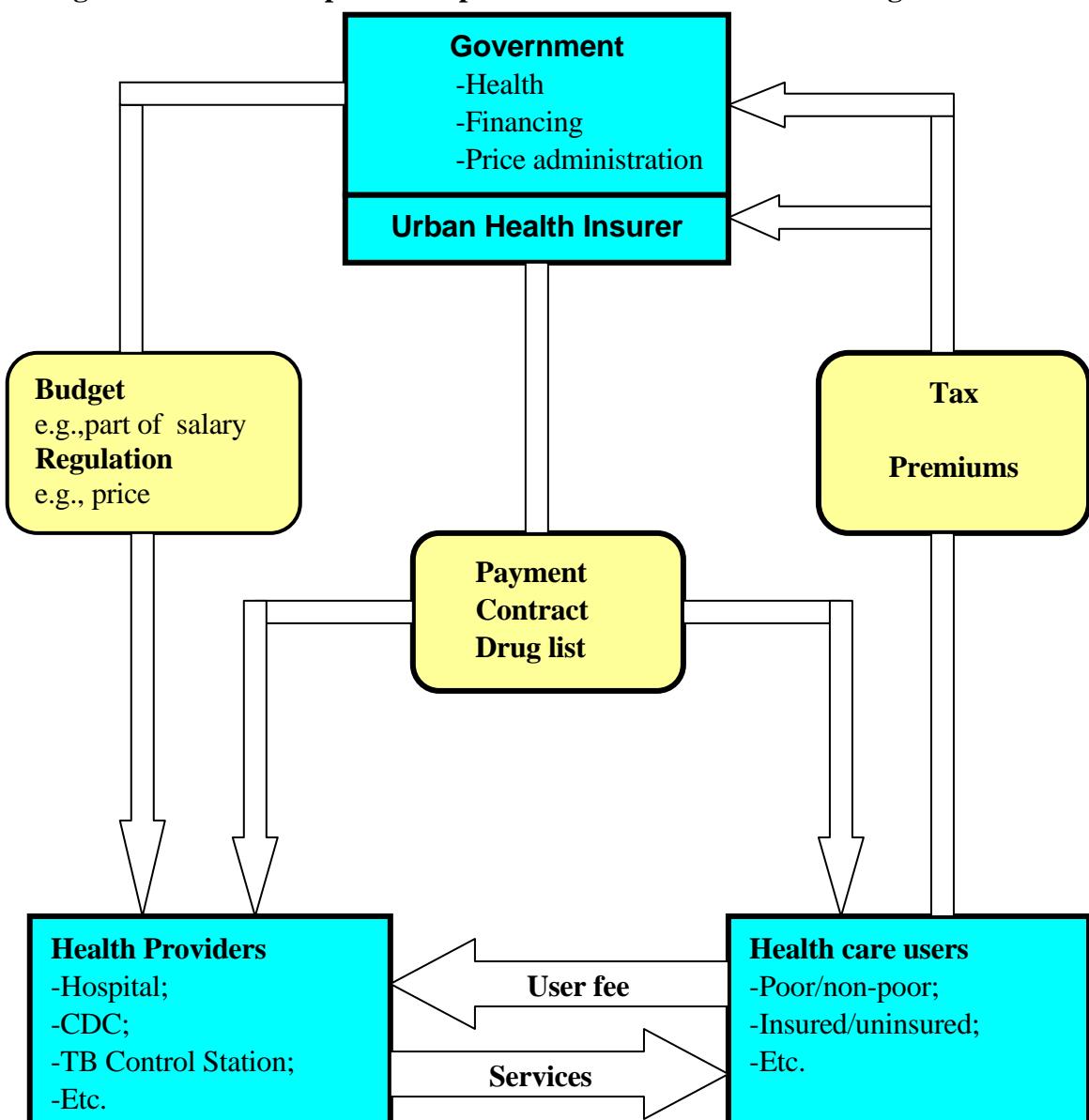
The responses of health providers are largely determined by the objectives that would be maximized by those health providers. In theory, not-for-profit (NFP) health providers, especially those providing public health programs including infectious disease control programs, would maximize the objectives of social outputs. Social outputs include optimal quality and quantity of health care, charity care, and minimum

prices. Even though there exists a debate about the objectives of NFP health providers, where their behavior is regarded as similar to profit maximization (Pauly and Redisch 1973), NFP health providers are more likely to maximize both profit and social outputs (Joskow 1981; Evans 1984; Deneffe and Mason 2002). The achievement of health providers' objectives is subject to constraints. The most often mentioned constraints are the demand curve of health care users and third-party payers, and the financial break-even for providers (Evans 1984; Joskow 1981).

### 3.5 Implications of the theories in the thesis

Starting from the traditional health economics triangular relationship among citizens (patients), third-party payer and providers, we can identify the most important actors in the health care systems. In the Chinese health care system, this model could be applied to identify the major actors as depicted in figure 3.1. Health providers receive subsidies

**Figure 3.1 Relationship between parties involved in health financing in China**



from the government and payments from health insurers and individual users, to provide health services to the users. Society, expressed by the government, health insurers, or individual users, optimally demands health services that are efficient, quality guaranteed and equitably distributed with minimum expenditures. The government and health insurers as the agents for the general public and the insured are the key regulators in realizing the demand mentioned above. The government and health insurers can take various forms of policies and interventions, ranging from administrative orders, financial arrangement, regulation of pricing and payment systems, contractual relationships, and legislations.

This thesis focuses on three points in figure 3.1. The first point is *services* delivered from health providers to users. This is the health service output point concerning the questions of what services are delivered and to whom. The second point is *interactions* between government policies/regulations and health providers focusing on the behavior of health providers in response to regulations and financial incentives. The third point is *interactions* between health insurers and health providers by examining changes in health insurance schemes and health providers' responses to these changes. The appropriateness and effectiveness of interventions from government or health insurers can be reflected in the output of health services delivery.

The health providers included in this thesis must be considered as NFPs , including public hospitals, disease control stations, and THCs. The nature of those health providers has for a long time period been claimed by the government to be charity-oriented rather than profit-oriented. Even though those health providers rely heavily on market revenues for surviving, the objective function cannot be regarded as profit-maximization. However, the internal objective function might be classified as a dual organization similar to the model presented by Pauly and Redisch (1973), with doctors having bonuses and incentives to maximize their income.

The world-wide movement of health sector reform initiated in the early 1980s has been characterized by a “market-oriented” or “efficiency-oriented” direction during the 1980s and 1990s (Klein 2003; Gwatkin 2001). China was not exempted from that movement where market mechanism was the most frequently used words during that time period. Theories of market failure and government intervention provide explanatory tools for examining the consequences of health sector reforms in China. By studying the health financing mechanisms for health providers during the 1980s and 1990s in China, this thesis analyzes the hypotheses that public health providers tend to provide profitable and unnecessary health services for generating revenues, which would result in the under-provision of charity and public health programs and the over-provision of medical care and drugs, if proper interventions were not available. All five studies in this thesis are included to test the following hypotheses: hospital exemption from charges for the poor (study I); the impact of health insurance reform on hospital charges (study II); the provision and financial burden of TB services (study III); the impact of drug pricing policy on drug expenditure control (study IV); and analyzing the performance of hospitals (study V). The implications of health financing reforms for health service delivery are mainly used in studies I and III, where the provisions of exempted services by public hospitals and TB services are examined. The implications of payment reforms for cost containment and efficiency performance of hospitals are

examined in studies II, IV and V. Study IV specifically analyzes the effect of drug pricing policy on drug expenditures.

## 4 METHODOLOGY

### 4.1 Study setting

All studies (I-V) in this thesis were conducted in the Shandong Province. In addition, a municipal city, Nantong from the Jiangsu Province, was included in studies II and V. The Shandong Province<sup>7</sup> is located in the east of China with a 91.8 million population by the end of 2004. This province has the second largest population in the country. Shandong has a relatively strong and rapidly developing economy with a GDP per capita of 16,925 Chinese yuan (US\$2,045) in 2004. There is a big gap in terms of economic development between the eastern and western parts of the province. In 2004, the net income per capita of urban residents was 9,438 yuan, while the net income per capita of rural people was 3,507 yuan. In 2004, the urban health insurance scheme and the rural CMS covered 22.8% of the total urban population and 23.3% of the total rural population, respectively. The hospital beds and the number of doctors per thousand inhabitants were 2.4 and 1.5, respectively, in 2004.

Figure 4.1 Map of China and study sites



### 4.2 Study design

Studies I, III, and IV are case studies. The cases are the public hospitals in studies I and IV and counties organizing TB control programs in study III. Studies II and V have an *ex post facto*<sup>8</sup> comparative study design, with two time periods of before and

<sup>7</sup> Figures in this paragraph about the Shandong Province come from the Public Notification of Shandong Social & Economic Development issued by the Shandong Provincial Bureau of Statistics in February, 2005

<sup>8</sup> When a researcher attempts to determine the cause, or reason, for preexisting differences in groups of individuals, this research is referred to as *ex post facto* (Latin for “after the fact”), since both the effect and the alleged cause have already occurred and must be studied in retrospect.

after the implementation of the urban health insurance reform and two cities with and without the reform. Public hospitals at and above the county level were selected in studies I, II, IV, and V. The first rationale for selecting public hospitals is that those hospitals consumed a large amount of health resources, compared to other types of health facilities. The second reason is that more than 90% of the revenues in those hospitals are from user fees. The third reason is that those hospitals are the dominant providers in the health sector. In study III, the TB control program was selected as an example of public health programs. TB is one of the most serious public health problems in China and the Shandong Province. The prevalence rate of TB has increased in poor counties in Shandong over the past decade.

#### 4.3 Sampling and data methods

In study I, the public hospitals representing the best performance of providing hospital exemption programs located in different economic areas were selected. The samples in studies II and V came from the same source in an EC-sponsored research project<sup>9</sup>. Study V used the total hospital sample in the project (41 hospitals), while study II used six hospitals where a tracer study was conducted. The counties selected in study III represent different economic statuses of the areas in Shandong Province. In study IV, two hospitals, one of them being a model hospital<sup>10</sup> in China, were selected in the province capital.

Table 4.1 Summary of design, sampling, and data methods of the studies

Study	Design	Sample Size	Data methods
I	Case study (Hospital)	- 9 hospitals from Shandong - 45 key persons - 18 community representatives	-Review of hospital records -Interview with key persons -FGD
II	<i>Ex post facto</i> comparative study	- 6 hospitals from two cities - 855 case files of acute appendicitis - 1619 case files of childbirth - 4 key persons - 16 hospital staff	-Review of patient records -FGD -Interview with key persons
III	Case study (County)	- 4 counties - 312 TB patients - 39 key persons	-Interview with TB patients -Interview with key persons -Review of documents
IV	Case study (Hospital)	- 2 public hospital - 213 case files of cerebral infarction cases	-Review of patient records -Review of hospital financial records
V	<i>Ex post facto</i> comparative study	- 41 hospitals from two cities	-Review of hospital financial records -Review of hospital workload records

Data methods include reviews of patients' records (II and IV), hospital financial and workload records (II, IV, and V), documents kept in TB control stations (III);

<sup>9</sup> European Commission: Contract Number ERB3514PL972993.

<sup>10</sup> Model hospitals were selected by the Ministry of Health with the criteria of quality, charging behavior, patients' satisfaction, and working conditions. Its aim is to improve the provision of hospital services by setting up models to be followed by other hospitals.

interviews with policy makers (I, II, III, and IV), health staff (II, III), and TB patients (III); focus group discussion (FGD) with representatives from the community (I) and health staff (II). Table 4.1 presents the summary of sampling and data methods for the five studies in this thesis.

#### **4.3.1 Sampling and data method for study I**

##### *Selection of hospitals*

Nine public hospitals were purposively selected in the Shandong Province. Those hospitals were distributed in four prefectures representing the range of economic development in the province. According to estimates from the officials in the Shandong Department of Health, about 40% of the hospitals had operated discount systems for indigents when the study started, and the nine hospitals represent the best in the province in delivering exemption programs.

##### *Study subjects and data method*

Data came from document reviews including policy documents and hospital financial records, key informant interviews, and FGD.

*Document review* Documents issued from the provincial Department of Health regarding the discount policy were collected and analyzed. Hospital documents were reviewed to determine the service items eligible for discount and the amount of such discount. Hospital financial records stating revenues, expenditures and the provision of services in selected hospitals were reviewed, except in one hospital which was not willing to provide this information. Information on total hospital volume and charges, the number of visits granted discounts and the amount of these discounts was collected where available.

*Key informant interviews* A sample of 43 interviewees was included: hospital managers (9), department heads (17), financial officers (8) and medical directors (9). The interviews averaged about 30 minutes and followed a semi-structured format according to the role of the interviewees. The areas covered included the major motivations for implementing the discount programs, how indigents were identified for discounts and difficulties encountered in this process, and how service items eligible for discount were chosen. The interviews were conducted by the main investigators at the workplace of the employees.

*FGD* Two FGDs were organized in communities serviced by a study hospital. One was in a rural and the other in an urban community. Eight people from six villages within the Xinglong township, near Yanzhou People's Hospital, were selected for the group in the rural community. Ten people were selected from the Botu Spring Community of Jinan city for the urban group. The topics included participants' knowledge about the discount programs, perceptions about the accessibility to these programs and the perceived quality of the discounted services if they, or others they knew, had received them. Each discussion took about two hours, with one moderator and one assistant using a tape recorder.

#### **4.3.2 Sampling and data method for study II**

### **Data source**

In study II, the data was collected from patient medical records for two tracer conditions, reviews of hospital and health insurance documents, interviews with policy makers, and focus group discussions with hospital staff.

Using the background information for the aims of the study and the health insurance reform, a medical expert panel selected acute appendicitis and normal childbirth to be the tracer conditions. Hospital and health insurance documents were reviewed for comparing major variables related to hospital charges between Zibo and Nantong, including financial incentives for hospitals and their staff and the differences in health insurance arrangements. The purpose of the qualitative study was to explore the explanations for changes in hospital charges.

### ***Selection of patient records, interviewees and participants in FGD***

From a total of 33 general hospitals in Nantong, one municipal hospital and two county hospitals were randomly selected using a systematic sampling method. From the total 26 general hospitals in Zibo, one municipal and two county hospitals were randomly selected. The patient medical records for the two conditions were selected for 1995 and 1999. These years were chosen as Nantong implemented the new insurance scheme in mid 1997.

For acute appendicitis, all patient medical records for 1995 and 1999 were collected, and for normal childbirth, all records within the first three months of each year were collected. The cases were classified into three groups: OOP users, GHI-covered, and LHI-covered patients (users). Table 4.2 shows the number of cases of appendicitis and childbirth by user group.

Table 4.2 Number of cases of appendicitis and childbirth by user group

User group	Zibo		Nantong	
	1995	1999	1995	1999
<b>Acute appendicitis</b>				
OOP	124	140	134	243
GHI-patients	26	26	57	19
LHI-patients	32	19	25	10
Total	182	185	216	272
<b>Childbirth</b>				
OOP	309	383	214	290
GHI-users	97	45	80	39
LHI-users	36	21	93	12
Total	442	449	387	341

Two health officials responsible for the hospital and health insurance management from each of the cities and the Director from the Nantong Health Insurance Administrative Center (Zibo had no separate government authority responsible for health insurance) were interviewed. A group of hospital managers, department heads, and professionals in each city (eight in each group) was organized for discussions.

### ***Data methods***

Medical records of the two tracers were reviewed in the hospitals. As a guide for the review, a list of questions was developed. Indicators in the list included basic case characteristics (age, sex, health insurance status, and occupation), health status of discharged patients, and hospital charges on service items. For key informant interviews and FGDs, semi-structured question sheets were prepared which covered questions including the features of the hospitals' cost-containment measures in the two cities, what would be the reform impact of urban health insurance on hospital behavior in providing services, and how the current health insurance schemes facilitated the achievement of the cost containment objective. Question sheets were prepared for collecting general information from related hospital documents. Major variables included financial incentive mechanisms operating in hospitals. Faculty staff and graduate students from Shandong and Fudan universities conducted the interviews and organized the discussions in the working places of the participants.

#### **4.3.3 Sampling and data method for study III**

##### ***Sampling***

Licheng and Zouping were the economically better-off of the four counties, while Ju and Zhanhua were the poorer ones. Data was collected from a review of documents and interviews with key informants and TB patients. The documents reviewed included financial reports and TB working reports kept in County TB control stations. For interviews, 8 key informants from health bureaus and 12 managers and TB experts from county TB control stations were selected. Three TB experts from Shandong Center for TB Control were also selected for interviews to get overall information that was not obtained at the county level. Four to six townships from each of the counties were randomly selected. A total of 16 managers of THCs were interviewed.

In the selected townships, all TB patients who were registered at the TB control stations and had just finished TB treatments were invited for interviews. The total sample consists of 312 TB patients, 92 of whom from Licheng, 74 from Zouping, 81 from Ju, and 65 from Zhanhua. On average, the TB patients interviewed accounted for about 90% of the total registered TB patients in the selected townships.

##### ***Data method***

*Document review.* Data collection sheets were prepared for a review of documents. Variables in the sheets were mainly the indicators for assessing the financial capability of the counties for TB control programs and the performance of TB health care services. The documents were reviewed by the investigators in TB control stations, assisted by managers and accountants at these stations.

*Patient interview* A questionnaire with key questions about characteristics of the TB patients, household incomes, TB services received, and medical expenditures on TB treatment, was used in the interviews. The TB patients were informed of the interview by township health workers in selected townships. The interviews were conducted by faculty staff and graduate students from Shandong University in THCs.

*Key informant interview* A guideline was prepared for the key informant interviews. The interviews with health officials focused on questions including the assessment of TB control programs. The questions for interviewing health staff from the county TB

control stations and THCs focused on the financing of TB services, the working conditions of TB control stations, and the provision of TB care. These topics were developed after the preliminary results from document reviews and patient interviews had become available. The interviews were conducted by the main investigators at the working places of the interviewees.

#### **4.3.4 Sampling and data method for study IV**

##### ***Selections of hospitals and patients' medical records***

Two public hospitals located in the capital of the Shandong Province, a provincial hospital (one of the largest in the province) and a municipal hospital, were purposively selected. The provincial hospital is directly managed by the provincial Department of Health and is one of ten model hospitals in China. The municipal hospital is directly managed by the municipal Department of Health.

A panel of medical experts was organized to select the diagnosis. Cerebral infarction was selected as a tracer condition for drug expenditures. Since the number of patients with the sole diagnosis of cerebral infarction cases was limited, cases with the secondary diagnoses of hypertension or atherosclerotic heart disease were also selected.

The drug retail price control policy was implemented in late 2000. The cases were selected from the beginning of 2002 for the post-reform period and from the end of 2000 and backwards for pre-reform cases. All cases meeting the diagnostic criteria after January 1, 2002, were selected. In the provincial hospital, records of 49 cerebral infarction cases were selected and in the municipal hospital, 55 cases were selected. In the provincial hospital, 49 cases from prior to the implementation of the policy were selected, and in the municipal hospital, 60 such cases. A total of 213 medical records of cerebral infarction patients were reviewed.

##### ***Data method***

The selected hospital patients' records were copied by the investigators and relevant data was recorded. Indicators extracted included patients' age, gender, occupation, insurance status and source, condition when admitted, diagnoses, expenditures by types of drugs (western and Chinese drugs), and the names and quantities of all drugs prescribed. In addition, hospital financial records were reviewed to extract the number of outpatient visits and inpatient days, hospital income and expenditures by items, and numbers of hospital staff and beds.

#### **4.3.5 Sampling and data method for study V**

##### ***Sampling***

All general hospitals at and above the county level in each city were selected into the sample, including all municipal hospitals, all general hospitals at the county (district) level, one enterprise hospital in Nantong and three enterprise hospitals in Zibo.

##### ***Data method***

Data was collected from patient medical and financial records at each hospital. The medical records were compiled to get information about hospitals performance. Documents from both hospitals and insurers were reviewed to get information about

payment systems and incentives for management and staff. The financial records were used to obtain information about the different sources of financing for each hospital and the internal allocation of resources within hospitals.

#### **4.4 Variables and Indicators**

For achieving the proposed objectives in this thesis, dependent variables reflect two dimensions: the delivery of public health care programs including hospital charity care (I) and the delivery of public health (III), and cost containment including control of hospital charges (II), drug expenditures (IV), and changes in performance (V); independent variables include pricing policies (user fee in I and III, drug pricing policy in IV), payment method (II and V), and characteristics of the study subjects. The major variables and indicators are summarized in table 4.3.

Table 4.3 Major variables and indicators in the studies

Study	Dependent variable	Independent variable
I	-Number of services for exemption; -Discount rates; -Values of exemption grants.	-Government finance for exemption; -Government regulation for exemption; -Motivation of hospitals providing discount; -Identification system.
II	- Changes in hospital charges.	-Health insurance arrangements; -LOS; -Expenditures on drugs; -Characteristics of the cases; -Health insurance status of the cases.
III	-Government TB budget; -Matching fund for WB V project; -Case detection rate; -Home visits and DOT*; -Patients' expenditure on TB.	-Capacity of local government; -Source of finance for health providers; -Behavior of providers.
IV	-Drug expenditures.	-Effect of drug price; -Effect of drug utilization; -% of irrational use of drugs; -% of expenditure on drugs whose prices were regulated by the government.
V	-Number of outpatient services and bed-days per doctor; -Unit costs per outpatient service and per bed-day.	-Characteristics of hospitals; -Hospital inputs and outputs; -Health insurance arrangements.

\*DOT: Directly Observed Therapy

#### **4.5 Data analysis**

SPSS version 10.0 was used for processing and analyzing the data in studies I, III and IV. The data in study II was processed and analyzed using the Statistica Version 6.0. The author was the principal investigator for studies I, II, III, and V and co-principal investigator for study IV, participating in data collection, data clearing, and analysis. Logical checks had been conducted before the data was analyzed.

##### **4.5.1 Descriptive analysis (I-V)**

The characteristics of the health financial policy reforms in all studies were described. Means, proportion, and ratio were used to describe services and discounts offered in the exemption programs in study I, the growth rate of and changes in hospital charges in study II, TB services and TB patients' expenditures in study III, and changes in drug expenditures in selected years in study IV.

Students' t-test statistics was used to compare the differences in hospital charges per case and hospital charges by service categories over time and between the two cities in study II. In study II, one-way ANOVA statistics and chi-square test were used to compare the differences in hospital charges among user groups and the gender compositions of the acute appendicitis cases. One-way ANOVA test was used to compare differences in medical expenditures among high, middle, and low-income TB patients. Students' t-test was used in study IV in comparing the characteristics of the cerebral infarction cases and differences in drug expenditures and LOS between 2000 and 2002.

Data from key informant interviews in study I, II, and III and from FGDs in study I and II was analyzed using the content analysis method. The investigators transcribed all written records and classified them according to the themes used.

#### **4.5.2 Statistical analysis (II)**

Multiple regression analysis (stepwise) was used to identify the factors influencing hospital charges, using the data of patients' records in study II. As the arrangement of health insurance in 1999 differed from that in 1995 for Nantong, and childbirth insurance reimbursement was also changed in 1999 for Zibo, the models were run separately for the two cities and each of the years. The dependent variable in the model was the average charge per inpatient. Independent variables included sex, age, insurance status, and LOS of the inpatients.

#### **4.5.3 Effect analysis of drug price and utilization on drug expenditures (IV)**

In study IV, prescribed daily dose (PDD) was employed to measure the utilization of drugs instead of the defined daily dose (DDD) (Capella 1993). PDD is the actual number of daily doses prescribed per capita or patient.

The price and utilization effects were decomposed to examine the effects of changes in price and utilization on changes in drug expenditures. Because drug expenditure is the product of drug price and utilization, the percentage change in drug expenditure between the two periods is determined by changes in utilization, price, or/and both, and the introduction of new drugs. The decomposition of pricing and utilization effects was conducted using the formula developed by William Cleverley (1992).

To identify contributing factors to the development of drug expenditures related to rational use in study IV, the top 15 drugs prescribed by expenditure after the new price control policy were analyzed. The evidence based on safety and efficacy of the drugs was analyzed using treatment guidelines and literature from Medline and two databases from China.

#### **4.6 Ethical clearance**

In all studies, consent forms were used to get approvals from the relevant institutions and participants regarding the collection and the use of the data. Institutions and

interviewees involved in the studies were informed about the purposes and objectives of the studies and were willing to be investigated. Agreements were reached between researchers and study subjects about the use of the data for scientific disseminations.

Studies I, III, and IV were supported by WHO/TDR and the Alliance for Health Policy and Systems Research. Ethical clearances from Shandong University and national endorsement from the Ministry of Health, China, were provided for examinations by the WHO ethical committee for final approval. Studies II and V were part of a larger project supported by the EU Commission. Ethical clearance was conducted for that project through the China Ministry of Health and the European participating institutions. All studies received ethical clearance from the ethics committee at Karolinska Institutet (Dnr 03-106 for studies I and II; Dnr 03-209 for study III; Dnr 02-377 for study IV; and Dnr 03-105 for study V).

## 5 MAIN RESULTS

### 5.1 Study I: Exemption from hospital charge for the poor

The exemption policy is one strategy for improving the access to health care for the poor. This study analyzes the impact of exemption mechanisms in nine hospitals in the Shandong province in China. The study shows that user charges have become the dominant source of revenues for public hospitals and accounts for 70-93% of total hospital revenues in the hospitals studied. The government budget was mainly used to cover part of the salaries of hospital staff. There was no specific budget arrangement from the government for financing hospital exemption programs for the poor. The provincial government issued an official letter asking for free provision or discounted services to the poor, without specific guidelines or compensation for the operation.

None of the nine hospitals studied initiated the discount programs driven by the government request. The costs of operating exemption programs were covered by the hospitals themselves through user charges from other patients. The main motivations for implementing the discount programs for hospitals were to enhance the public image of the hospitals and use the program as a marketing tool for attracting more patients. Table 5.1 shows the categories of service items included in the discount programs and the proportion of discount in nine hospitals.

Table 5.1 categories of service items included in the discount programs

Categories of service items	Proportion of discount (%)	No. of hospitals providing discounts
CT and MRI scans	30-50	8
Bed	10-50	8
Registration	100 (6 hospitals) 10 (1 hospital)	7
Regular examinations and lab tests	20-50	6
Surgical operation	10-50	6
Treatment	50 (3 hospitals) 10 (2 hospitals)	5
Nursing	10 (1 hospital) 100 (1 hospital)	2
Injection	10 (1 hospital) 100 (1 hospital)	2
Drug	10	1

Of the nine hospitals studied, four hospitals provided discount services for both outpatient and inpatient services, four for inpatient services only, and one for outpatient services only. The discount offered ranged between 10-50% for the defined service package included in the exemption programs, except the registration fee which was free for the targets. Only one of the nine hospitals provided a discount for drugs that accounted for a large proportion of medical expenditures. The majority of hospitals offered discounts for registration services and high technologies. The total value of the discounts granted was 1% or less of the total hospital operating budgets. Only a minority of indigents received discounts.

## 5.2 Study II: The urban health insurance

This study is an effort to assess the urban health insurance reform by comparing differences in hospital charges in health systems under different insurance arrangements. Two tracers were used, acute appendicitis and childbirth, for analyzing the differences in two cities, Zibo and Nantong. As concerns treatment of patients in Zibo where health insurance had not been reformed, insurance-covered patients spent more than the uninsured. In 1999, both GHI and LHI patients had 38-48% higher expenditures than OOP patients for treating acute appendicitis, and GHI insured had 38-45% higher expenditures than LHI insured and OOP users for childbirth. No evidence showed significant differences in the severity of the health problems between the user groups.

From 1995 to 1999, expenditures increased by 101% for acute appendicitis and by 94% for childbirth in Zibo. In the same time period, Nantong, the city with the reform, showed a growth rate of expenditure of 41% for acute appendicitis and 34% for childbirth. The changes in hospital charges in the two cities over time are illustrated in figure 5.1.

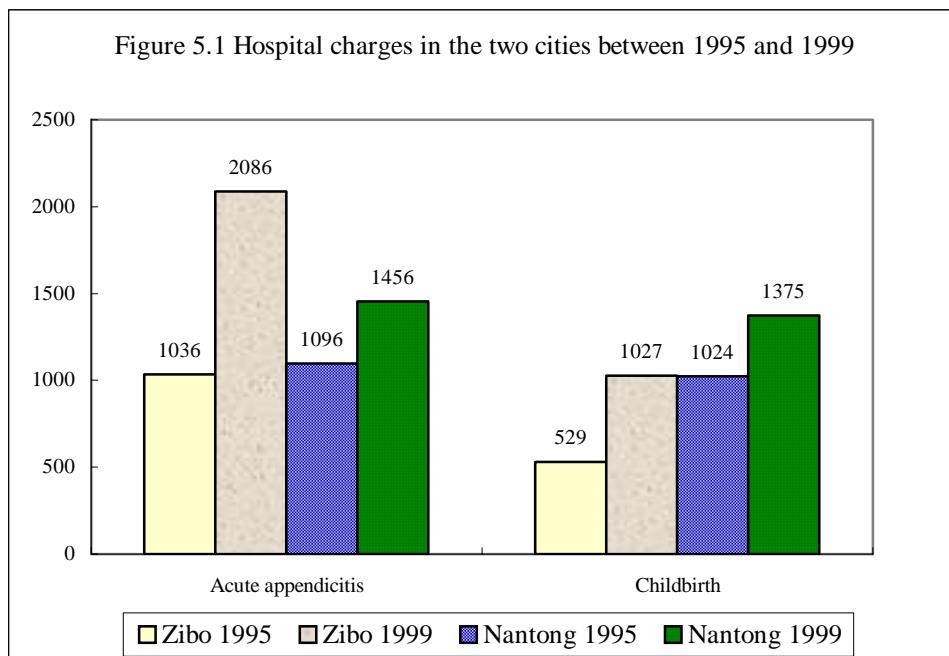


Table 5.2 presents the result of a regression analysis for identifying factors influencing the hospital charge per care. In Zibo (without reform) and Nantong (with a reform from 1997), health insurance status was significantly associated with the hospital charges for acute appendicitis cases in 1995. The insured covered by GHI and LHI spent more on treatment of acute appendicitis than OOP cases. For childbirth, the relation between health insurance status and hospital charges was significant for both cities in 1995 and for Zibo in 1999. In 1999, after the reform in Nantong, health insurance status was no longer the significant factor contributing to hospital charges for both acute appendicitis and childbirth cases. For both types of cases, LOS was the significant factor influencing hospital charges.

Table 5.2 Multiple regression results (Dependent variable: hospital charge per case)

Variable	Zibo 1995		Zibo 1999		Nantong 1995		Nantong 1999	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
<b>Acute appendicitis</b>								
Sex	73.0 (61.1)	1.19	-13.3 (104.8)	-0.13	-47.1 (37.4)	-1.26	-88.2 (44.7)	-1.98*
Age	4.6 (2.1)	2.17*	3.06 (3.3)	0.91	6.4 (1.3)	5.02**	8.6 (1.4)	6.33**
Insurance	79.0 (65.3)	1.21	589.0 (121.9)	4.83**	99.9 (38.5)	2.59**	32.0 (72.5)	0.66
LOS	62.5 (7.0)	8.98**	130.9 (14.3)	9.18**	75.5 (6.3)	12.01**	86.7 (8.8)	9.88**
Constant	203.6 (101.0)	2.01*	697.9 (159.8)	4.37**	257.0 (66.3)	3.88**	563.8 (78.3)	7.20**
N	182		185		216		272	
Adjusted R <sup>2</sup>	0.364		0.441		0.493		0.372	
Prob.>F	0.000		0.000		0.000		0.000	
<b>Childbirth</b>								
Age	0.28 (1.99)	0.142	-5.18 (6.1)	-0.85	2.72 (5.2)	0.52	2.79 (6.9)	0.40
Insurance	215.6 (16.9)	12.74**	164.3 (57.2)	2.87**	113.5 (24.4)	4.65**	13.5 (53.7)	0.25
LOS	50.4 (4.0)	4.04**	50.0 (5.6)	8.89**	4.9 (10.7)	4.6**	124.6 (9.7)	12.82*
Constant	225.9 (61.2)	3.691**	867.7 (175.1)	5.07**	516.6 (139.9)	3.69**	500.3 (199.5)	2.51*
N	442		449		387		341	
Adjusted R <sup>2</sup>	0.448		0.179		0.262		0.330	
Prob.>F	0.000		0.000		0.000		0.000	

Standard errors in parentheses

\*Statistically significant at the 5% level; \*\*Statistically significant at the 1% level

### 5.3 Study III: TB provision and financial burden

This study analyzes the operation of TB control programs in a decentralized financial system in four counties of the Shandong Province. In the poor counties, Ju and Zhanhua, the estimated incidence rate of smear positive TB patients was higher (49 and 75 per 100,000 inhabitants, respectively) than that in rich counties, Licheng and Zouping (27 per 100,000 inhabitants). The allocation of resources did not match the size of TB problem. In 2000, the allocation of the regular government TB budget per capita in rich counties was more than two times higher than that in poor counties. In the poor counties, the matching funds for the World Bank TB project from the county government did not meet the minimum requirement. The allocation per estimated smear positive TB patient in 2000 was more than four times higher in the rich than in the poor counties.

User fee was the main source of financing for operating counties, TB control stations and THCs. In 2000, 40-65% of the salaries for health workers employed by the THCs

were covered by the government budget in both rich and poor counties. In the poor counties, the government budget covered 40-70% of the salaries of health workers in county TB control stations. The rest of the operating costs for both township and county health institutions were covered by user charge.

According to the treatment guidelines from WB and MoH for TB patients' home visits, a TB patient should be visited two times during the standard treatment period by county TB control health workers and two times a month by township health workers. Table 5.3 reports the numbers of visits made by health workers. In the poor counties, Ju and Zhanhua, the proportions of TB patients visited by health workers were lower than in two other wealthy counties. Only about 10% of the TB patients were taking anti-TB drugs under the supervision of village doctors in the four counties.

Table 5.3 Provision of home visits of smear positive TB patients in 2000 (%)

(Denominator: number of TB patients interviewed in each county)

Number of home visits	Licheng n=92	Zouping n=74	Ju n=81	Zhanhua n=65
County TB stations				
None	74.4	47.8	98.3	86.3
1	10.3	20.9	0.0	7.8
2	7.7	13.4	0.0	2.0
>=3	7.6	17.9	1.7	3.9
Township health centers				
None	79.5	80.6	95.0	92.2
1	6.4	4.5	3.3	2.0
2	6.4	10.4	0.0	0.0
>=3	7.7	4.5	1.7	5.9

On average, total annual expenditures per TB patient in the poor counties were not less than in the rich counties. Medical expenditures per TB patient in the poor counties amounted to 119% and 57% of their average annual household incomes, respectively (table 5.4). The distribution of expenditures across TB control stations and non-TB health providers varied among the four counties. In Licheng, a very small proportion of total expenditures (5%) was spent in TB control stations, while in Ju and Zouping, these accounted for more than 45% of total medical expenditures by TB patients.

Table 5.4 Average TB medical expenditure by TB patients in 2000 (Chinese yuan)

Sources of expenditures	Licheng	Zouping	Ju	Zhanhua
Total average expenditure by patients	2661	1693	3070	2241
TB expenditures in percentage of patient's annual household income	75%	27%	119%	57%
In County TB stations	146	760	1919	460
% of total in TB stations	5%	45%	63%	21%
Diagnosis and management	78	335	324	165
Drug	68	425	1595	295
In other health providers	2515	933	1151	1781
% of total in non-TB facilities	95%	55%	37%	79%

## 5.4 Study IV: Drug pricing policy and drug expenditures

This study aims at examining the impact of the retail drug price control on hospital drug expenditures. It is a retrospective pre/post-reform case study based on records from two public hospitals, one provincial and one municipal. The drug retail price control policy was implemented in late 2000. From 1998 to 2000, total revenues increased by 39.7% in the provincial hospital and by 42.0% in the municipal hospital. After the introduction of the regulation from 2000 to 2002, total revenues increased by 46.6% in the provincial and by 69.1% in the municipal hospital. During the two-year period 1998 to 2000, drug revenues increased by 32.5% for the provincial hospital and by 37.9% for the municipal hospital. From 2000 to 2002, drug revenues for the provincial hospital increased by 42.9% and by 49.5% for the municipal hospital. From 2000 to 2002, drug revenues per outpatient visit and per inpatient day increased by 37.9% and 22.2% in the provincial hospital and by 30.7% and 32.3% in the municipal hospital, respectively.

In the provincial hospital, both total utilization (PDD) and utilization per patient and per inpatient day for cerebral infarction fell in the second period (Table 5.5). The PDDs used per inpatient day and per patient decreased by 10-15% in the two periods. The price per PDD decreased slightly. In contrast to the provincial hospital, the utilization of drugs increased by 10% in the municipal hospital in the second period. The utilization of drugs per patient and per inpatient day increased by 9-20% between the two time periods. The price per PDD increased by nearly 25%.

Table 5.5 Drug expenditures and length of stay (LOS) per patient with cerebral infarction

Indicators	2000	2002	Difference	p-value
<i>Provincial hospital</i>				
LOS (days)	20	19	-1	0.589
Total expenditure per patient (RMB)	10327	8873	-1454	0.358
Drug expenditures per patient (RMB)	7932	6673	-1258	0.287
Western (RMB)	6215	5312	-903	0.387
Chinese (RMB)	1716	1361	-355	0.205
<i>Municipal hospital</i>				
LOS (days)	10	11	1	0.355
Total expenditure per patient (RMB)	2193	2878	685	0.014*
Drug expenditures per patient (RMB)	1392	2090	698	0.002**
Western (RMB)	879	1756	877	0.001**
Chinese (RMB)	483	334	-149	0.066

\* Significance at the 0.05 level; \*\*Significance at the 0.01 level

The drug expenditure for cerebral infarction cases decreased by 12.3% before and after the drug price reform in the provincial hospital. The principal reason for the decrease was a decline in drug utilization (7.45% of the contribution). The price changes accounted for 5.26% of the total changes. The total increase in drug expenditures was 36% per inpatient day, 25.04% of which were caused by an increase in drug utilization and 8.8% were due to the price increase. The expenditure level was more sensitive to changes in utilization than to price changes at both hospitals.

In the provincial hospital, 5 of the top 15 drugs for treating cerebral infarction were price regulated by the government. The expenditures for those 5 drugs accounted for

19.5% of the top 15 drug expenditures. In the municipal hospital, 8 of the top 15 drugs were price regulated, and constituted a 46.5% of the expenditure in the top 15 drug expenditures. In a two-year period, the provincial hospital incorporated 5 drugs that were not used in the previous period into the top 15 drugs; the municipal hospital incorporated 6 drugs not previously used into the top 15 drugs. Prices of the newly drugs introduced were two times higher than the average price level among the top 15 drugs for both hospitals studied.

Seven out of the 11 western drugs among the top 15 drugs prescribed in the provincial hospital were weak in evidence, and the expenditures for these accounted for 65% of total drug expenditures among the top 15 drugs. In the municipal hospital, there was no evidence of efficacy and safety for treating cerebral infarction for 3 out of 11 western drugs among the top 15 drugs. Expenditures on those drugs accounted for 41% of total drug expenditures among the top drugs.

## **5.5 Study V: Hospital productivity and cost**

This study aims at examining the development of revenues, costs and performance in the hospital sector. The study is based on a sample of 41 hospitals in two urban areas. The indicators for measuring hospital productivity are outpatient services per doctor, bed-days per doctor, bed occupancy rate, LOS, and bed turn-over rate. Outpatient service has been adjusted for quality, price, and case mix. Bed days have been adjusted for quality and price. All costs and expenditures have been converted into fixed prices using 1999 as a base year.

As shown in table 5.6, the workload per employed doctor has decreased in both cities irrespective of what measure is used. We also observed that the average case-mix of patients increased in both cities. Still, the increased capacity for in-patient care has not been fully used as both average LOS and the bed occupancy rate have decreased.

Table 5.6 Productivity of hospital services in Zibo and Nantong

	1990	1995	1997	1999
<b>Zibo</b>				
Outpatient & emergency visits per doctor	1312	1166	1217	1218
Bed-days per doctor	690	574	525	486
LOS (days)	17.4	15.6	14.2	12.4
Bed turn-over rate (times)	19	19	19	21
Bed occupancy rate (%)	81	73	66	63
<b>Nantong</b>				
Outpatient & emergency visits per doctor	1928	1150	1101	1099
Bed-days per doctor	806	561	532	513
LOS (days)	20.2	17.3	15.9	15.0
Bed turn-over rate (times)	19	16	16	17
Bed occupancy rate (%)	95	71	64	64

Table 5.7 reports the unit costs of inpatient and outpatient care for the hospitals. The costs of both outpatient and inpatient care increased rapidly. Overall, the growth rate of cost per bed-day was larger than the unit cost per outpatient visit in both cities. In one of the cities, Zibo, the unit cost of outpatient and inpatient care increased 2.8 and 3.8 times, respectively, with an annual growth rate of 11.2% and 16.0%, respectively, between 1990 and 1999. The annual growth rates of unit costs for both outpatient and

inpatient care were greater between 1997 and 1999 than between 1990 and 1997. The city of Nantong also experienced a rapid growth of unit costs of outpatient and inpatient care. However, its growth pattern differed from that of Zibo with a reduction in the growth rates of both outpatient and inpatient care between 1997 and 1999, as compared to that before 1997.

Table 5.7 Unit costs of outpatient and inpatient care in Zibo and Nantong (Chinese yuan)

Year	Zibo		Nantong	
	Outpatient care	Inpatient care	Outpatient care	Inpatient care
1990	24.18	67.50	23.19	85.25
1995	40.13	129.69	59.07	205.99
1997	52.18	179.26	75.74	265.53
1999	66.74	257.05	94.50	341.89
1999/1990	2.76	3.81	4.08	4.01
1999/1997	1.28	1.43	1.25	1.29

## **6 DISCUSSION**

The focus of this thesis has been on analyzing the relation between reforms of health care pricing and payments and health care delivery and cost containment. The different cases illustrate how these measures could be used for achieving cost containment objectives, efficiency in the use of resources, and equitable provision of health care, but they also highlight problems and failures experienced. In this section, the main findings will be discussed and related to the conceptual framework used in the study. First, some methodological aspects will be considered.

### **6.1 Methodological considerations**

#### **6.1.1 Study design**

The study design in three of the five studies (I, III, and IV) is a case study and for the other two studies (II and V) an *ex post facto* comparative study was used. One reason for choosing a case study approach is to answer research questions of “how” and “why” (Yin, 2003). For financial policy reforms for public hospitals (I), the TB control programs (III), and the drug pricing policy (IV), there is a complex relationship between influencing factors and the outcome of the reforms. The nature of the case study where the design and implementation of the reforms are outside the researchers’ control should not be experimental. The case studies in this thesis are mainly a type of “critical instance case study”, aiming at answering causes and effects by examining one or more sites (Denscombe 1998). Efforts have been made trying to examine the linkages between financial and pricing policies (financial policy for public hospitals and TB control programs, and the drug pricing policy) and delivery of public health programs (exemption and TB) and cost containment of drugs. However, since it was not clear about the situations with deliveries of exemption and TB control programs, the financial burden of TB patients, and changes in drug expenditures, the studies also have the nature of “illustrative case study”, aiming at describing one or two instances of an event (Denscombe 1998). For examining a complex relationship between dependent and independent variables, the adoption of a case study can use multiple sources of data including data from the survey, key informant interview, FGD, record review, etc. The major weakness is its limitation in generalizing the findings.

The *ex post facto* comparative study design is suitable for analyzing the situations where *pair-wise* matching groups can be found for examining the effects and causes of an event or intervention (Gill and Johnson 1991). However, for health policy and regulation studies, it is not easy to find suitable groups for a comparison, because contextual factors determining outcomes of the policies and regulations exist behind the design and implementation of health policies and regulations. Studies II and V used the *ex post facto* comparative study design, because the differences in health insurance arrangements existed between cities and over time prior to the research. The pilot of urban health insurance reform in the mid 1990s provided a unique opportunity to use *ex post facto* comparative study design, given two natural types of cities with and without the pilot reform. Two main strategies were adopted to meet the requirement of the study design. One is to make the cities studied more comparable in all respects that may affect hospital expenditures and the use of resources, except health insurance arrangements. The other is to conduct comparisons of observations in different time

periods within each city. Therefore, in studies II and V, hospital expenditures and costs were compared between the two cities and between different time periods within each city, taking urban health insurance reform as the categorizing variable.

### **6.1.2 Selection of the tracers**

In studies II and IV, three tracer conditions – acute appendicitis, childbirth, and cerebral infarction – were used to examine relations between changes in health insurance arrangements and pricing policy and changes in hospital charges and drug expenditures. Tracer methods are often used for examining the quality and cost of health care, and consumer-provider relationships in hospitals (Brooks et al. 1997; O'Toole et al 1996; Guller et al 2004; Flores et all 2003; Arredondo 1997; Riewpaiboon 2005). Frequency and treatment protocol of the tracers are the most important criteria for selections of the tracers when the study objectives are to examine the characteristics and treatments of cases, and to examine outcomes of the treatments. This is due to the fact that an adequate number of cases of the selected tracers can be available for the studies and the severity of the health conditions of the cases can be well controlled. Brooks et al (1997) used appendectomy because of its well-defined procedure with little clinical variation for examining hospitals' position in price bargaining with health insurers.

The tracer method based on appendicitis has been used in previous studies for analyzing the relationship between the health insurance status and surgical operations (O'Toole et al 1996) and for examining relationships between health insurance and race and choice of surgical treatment (Guller 2004). Four frequently treated tracers were used (Arredondo 1997) in examining costs and financial consequences of the changing epidemiological profile in Mexico,. Other criteria for selecting tracers may be more crucial, depending on the objectives of the studies. For example, obstetric service was selected in a study in Thailand on trusting the relationship between health providers and users (Riewpaiboon 2005).

The frequency and availability of standard treatment protocol are the main considerations for selecting tracers in study II. A relatively large size of the sample was available together with standardized treatment protocols for the two conditions in hospitals at the two sites. Furthermore, the use of the two conditions made it possible to examine changes in hospital expenditures by access to detailed items over the periods in the two cities. The selection of cerebral infarction in study IV was considered by an intensive and wide range of use of drugs for treatment in the Chinese context, and for the relatively stable composition of the case mix in a short time period. This case was considered as an option for examining changes in prices and utilization of drugs during a period of implementing a new regulation.

### **6.1.3 Validity and reliability**

Several criteria for validity are relevant for the studies in the thesis. One is *construct validity* which refers to a scale correctly measuring the construct studied. The construct can be observable, for example, hospital charge and drug expenditure; or unobservable, for example, the response of health providers to changes in incentives. Observable variables in this thesis mainly come from hospital records with standard definitions, with minor measurement problems. The important unobservable variables include government regulation for the hospital exemption program and hospital responses to

incentives in organizing exemption programs (study I), arrangements of health insurance reform in studies II and V, and financial decentralization in study III. One of the strategies for assuring construct validity is to use multi-modal data types and establish a chain of evidence of unobservable variables (Yin 2003). To adopt this strategy, at least two sources of data, mainly key informant interview, FGD, and records are used in all studies for generating the data.

There are several factors that may affect *internal validity* including sample bias, recall bias, and information bias that could make conclusions from the study population conducive (Gill and Johnson 1991). Studies I and IV may involve sample bias, since the hospitals in the two studies were purposively selected. However, given the purposes of study I, we consider it to be unlikely that it will affect the conclusions, as the hospitals selected represented the best performance in delivering exemption programs. Also for study IV, one of the hospitals was indicating relatively good performance in implementing government regulations. Another level of sample bias is the selection of tracers. Acute appendicitis used in study II does not represent non-surgical treatments in medicine. However, the findings show that the change in expenditure on drugs affecting the overall changes in hospital charges for this case, which implies that drug-intensive diseases may have similar changes in hospital charges with the enforcement of health insurance regulations. The findings from study V using all patient data also confirm some of the results from study II. A recall bias may occur in study III, as interviews with TB patients might not reflect actual income and medical expenditures, thus expecting underreporting. We assume those trends to have been the same for all TB patients studied, which would then not affect the comparison between counties.

*External validity* refers to the generalization problem, i.e. whether the results can be generalized beyond the specific context of the study. Studies I and IV may have generalization problems, due to the purposive sampling strategy for the selection of hospitals and the case study nature of the design of those studies. As previously mentioned, the selected hospitals would most likely represent the best performance in delivering exemption programs and implementing drug pricing policy. Hence, there are reasons to believe that other hospitals have not performed any better. In study III, the use of the random sample of four counties (multi-case study sites) and statistical analysis are the tools for increasing the generalizability of findings (Yin 2003; Maxwell 1996), which is helpful for generalizing the results.

*Reliability* demonstrates the operations of a study that can be repeated with the same results. The major part of the data used in this study came from medical and financial records and documents kept in health facilities. Patient records, as the legal medical documents, are the most reliable source of information on expenditures and prescriptions in hospitals that were used in studies II and IV. Hospital financial and workload documents that are subject to regular report and audit were used in studies I and V. Documents recording health care quality are relatively less reliable and are not used. In data collection, three main strategies were adopted to ensure the data quality. One was to use qualified investigators such as faculty and graduate students from universities. The investigators were well trained in the standard explanations and definitions of the questions investigated. The second strategy was to manage the interviews by a face-to-face method through which understandings of the respondents to the questions could be ensured. The third was to monitor data quality at the field of

data collection. Key investigators were responsible for checking the data once this had been collected, every day during the survey.

## **6.2 Exemption policies and the delivery of public health programs**

The hospital exemption programs for the poor and health care for TB control could both be considered as examples where different types of market failures exist. The increased use of user charges in the Chinese health system has limited and restricted access for the poor. The existence of positive external effects of TB is a traditional argument for government intervention. Health care reforms have led to greater health provider independence and an increased reliance on user fees (III). The findings regarding the exemption programs show that the government policies requiring discounts for the poor have been vague and not enforced (I). The very limited discounts offered are mainly seen as a marketing or image tools for the hospitals. The study shows that if government policies for such programs are not followed by incentives or sanctions, they will most likely fail.

TB is a typical public health problem in China and has been given attention for its prevention and treatment. However, financial responsibility has been decentralized to county and township governments with the reliance on a user fee system, entails variations across geographical areas where poor counties devote less resources to TB control programs (III). The situation as concerns the provision of other public health programs can be reflected by the TB case in China, as found in studies on malaria, schistosomiasis, and leprosy (Liu and Cheng 1998; Meng et al. 1997; Bian et al 2004). Evidence on the effect of decentralization on health care in China is scant. Tang and Bloom (2000) examined the relation between decentralization and delivery of primary health care in rural China and found the existence of a negative impact of decentralization. Similar findings are available in some low and-middle-income countries (Gideon 2001; Lakshminarayanan 2003). Primary health care delivery was found to be negatively affected by decentralization in Chile, since only administrative authority was decentralized without any fiscal decentralization (Gideon 2001). However, in the Philippines where both administrative and financial responsibilities were decentralized, it was found that decentralization had increased inequities, weakened local commitment to priority health issues, and decreased the efficiency of service delivery for reproductive health (Lakshminarayanan 2003). Taking the immunization program as an example, Khaleghian (2004) analyzed the impact of decentralization on coverage in low and-middle-income countries, from which a mixture of findings was generated showing that decentralization had a positive impact on immunization coverage in low-income countries and a negative impact in middle-income countries. Most studies, including this one, show that decentralization without an effective transfer payment mechanism and proper incentives for health providers would negatively affect the delivery of public health programs and primary health care.

A large proportion of patients' household incomes were used for TB treatments in different health facilities (III), which was not expected because of its positive externality nature. This finding differs from studies in most LMIC where the vulnerable population (children and the poor) and essential public health programs including TB and malaria control programs, are targeted for free provisions, in the implementation of a user fee strategy for cost recovery (Mbugua et al. 1995; Mwabu and Mwangi 1986). If access cost (time input, transportation, and accommodation for accompanying

persons) were included, TB patients would bear more costs than what is the case in the findings in this study. Due to the presence of access cost, excess utilization of care by TB patients would not occur even if the user fee were set at zero (McPack 1993; Arhin-Tenkorang 2000; Sepehri and Chernomas 2001). User fees could lead to inefficiency if health providers induced unnecessary care driven by economic incentives (Sepehri and Chernomas 2001).

Many international studies conclude that utilization of health care by the poor was negatively affected by user fees. Studies in African countries show a similar relationship between user fees and health care utilization (Waddington and Enyimayew 1989; Yoder 1989). Whitehead et al (2001) conclude that private financing through user fees lead to the medical poverty trap. Since there was no population survey in study III, it is not clear whether health care utilization of TB suspects was affected by the user fees. However, the National Health Service Survey reported that a large proportion of people did not seek health care when they were ill, due to financial difficulties (CHSI 2003). This implies that high financial expenditures on TB may have prevented some TB suspects from using health care. The low TB detection rate may be related to the existence of the TB user fee, besides the existence of financial disincentives for TB health providers in delivering TB detection services. Hence, given the nature of TB treatment as a disease with positive externalities, the reliance on user fees might have both equity and efficiency consequences.

Findings from studies I and III indicate the relationship between the health financing reform and the protection of the poor as well as the delivery of public health programs during an economic transition period in the 1980s and 1990s. This time period coincides with a global development characterized by market or efficiency orientation, which focused on the themes of competition, user fee, cost recovery, decentralization, and privatization (Sharma 2001; McPack 1996; Gwatkin 2001). The Chinese health policy reforms from the mid 1980s have used and included some of these measures. As an economic non-production sector, the health sector was directed to limit the use of government budgets and extend resources from the market. It could take some time for the health sector itself to realize the effects of this policy and define the government role in financing and delivering different types of health services. Even if the absolute number of government investments in health has continued to increase, its share of total health expenditures declined because of the rapid increase in health resources generated by private sources. While user fees become the main source of financing for public health care providers, government control over those providers became weak. In China, even though the government has always put the provision of public health care at the top of health policy, the policy cannot be effectively implemented if health providers lack incentives to deliver certain types of services needed by the population.

The health providers in studies I and III were all government run with investments mainly financed by the public budgets for the constructions of hospital buildings and the equipment of medical technologies. Before 1980, those public health providers were less concerned about the revenues when delivering services, because government budgets would cover most of their operating costs (Yin 1996). The policy offering hospitals more autonomy in generating and retaining financial resources from user charges may create two incentives for public health providers. On the one hand, public health facilities must try their best to make revenues for covering the operating costs.

On the other hand, the health facilities will try to generate a financial surplus in order to improve the living conditions of their staff and update the technologies. Then, the most likely responses of the providers would be to provide health care with high financial returns, if their behavior is not regulated. The poor operation of the exemption programs found in study I could reflect the assumed response of hospitals, as the exemption program for costs used to attract patients in those programs was minimized. The provision of TB care (III) appeared to show the same symptom that non-profitable services including TB home visits and DOT were not provided as required.

The hospital exemption programs for the poor and health care for TB control intervention were provided under a private-dominated and decentralized financing system in China (I and III). Those findings provide evidence supporting the market failure theory in general, and arguments about the possible effect of the Chinese health care financing reform on health system performance in the work by Hsiao (1995) and Gu (1995), in particular. The findings strongly suggest that protection of the poor and public health programs would not be sufficient without adequate financial support and an effective government regulation.

### **6.3 The role of the insurer in cost containment and efficiency**

The rapid expansion of hospital activities and subsequent cost increases have led to a growing interest in measures aiming at containing costs and improving efficiency. In studies II and V, hospital performance and the use of resources are analyzed considering the payment system and other tools used by third-party payers. Study V shows a rapid expansion of hospitals in terms of their fixed assets and beds, which has pushed the cost escalation for medical care.

Both studies focus on the supply side and how providers receive their revenues from either user fees or reimbursement from third-party payers. Previous studies and theories have concluded the impact of reimbursement methods on the utilization of health care and drug use of the insured, given the existence of moral hazard and price elasticity (Feldstein 1988; Folland et al. 1993). This has been confirmed by a number of studies in different settings (Kim et al. 2005; Solanki and Schauffler 1999; Fairman et al 2003). Co-payments for the insured in the two cities were arranged similarly, which would not result in different impacts on hospital charges from the demand side (II and V).

For cost containment, third-party payers can intervene with a control of either prices or utilization of health care, or both. At the macro level, controls of hospital expansion and introductions of high technologies and new drugs are widely employed in the world to constrain the rapid growth of medical costs. The experience of the US system for regulating the number of hospital beds did not work well, since only a small proportion of the health resources can be regulated by this intervention (Joskow 1981; Getzen 1997).

An examination of the impact of the insurance reform on hospital charges by comparing changes between two cities with different insurance systems showed some promising results about appropriate measures for cost containment and improved efficiency. Given the limited number of observations and the short period that the new system in Nantong has been in place, the findings must be interpreted with some caution. Still, the findings are in line with some international observations stating that a sole reliance on the price-mechanisms is not enough to monitor the behavior of hospital

providers. The combined measures of a single insurer system, selective contracting, fixed reimbursement rates per outpatient visit and per inpatient day, and the use of an essential drug list, are regarded as the key features of an effective hospital charge control, and ultimately a successful measure for containing hospital expenditures.

The payment method of fixed charges used in the city of Nantong with the new reform gives similar incentives for health providers as the per-case payment systems used in many countries. The per-case payment methods are considered as being effective in hospital cost containment, but do also encourage health providers to decrease the provision of health care to the insured, to save costs (Kutzn 2001; Newhouse 1996; Mikkola et al. 2001). Even though quality of care was compared between the two cities and over the time periods, the changes in intensity and procedures of care were not examined in detail, and need further research. Also to be considered is the mixed payment system rather than a single payment method which is used in many countries (Waters and Hussey 2004).

Findings from the multiple regression models in study II suggest the LOS to be the most significant variable influencing hospital charges across all cases. Even though funding policy and health insurance arrangements are related to LOS (Tu et al. 2002; Evers et al. 2002; Leonard et al. 2003), the absence of a straightforward conclusion about the effects of health insurance reform on hospital charges might have several possible explanations. First, a low coverage of urban health insurance schemes weakened the power of the insurer over hospitals. Even though the single insurer became stronger after pooling the funds from individual institutions to one, the insurance coverage (30% of the total urban residents in 2003) determined the limited strength of control power by the insurer. The larger share of the financial source for public hospitals still comes from out-of-pocket patients, who constitute an important source of revenue if the hospitals lose the contracts from the insurers. Second, the cost structure of hospitals is inflexibly dominated by capital and labor costs that are not easily reduced or shifted between alternatives of use. The rapid expansion of hospital scales and the increase in labor costs during the 1980s and 1990s resulted in large fixed costs to be covered. In addition, the internal objectives within public hospitals are important factors to be considered. The autonomy given to the hospital through the decentralization of the financing along with the implementation of bonus systems and other internal incentives creates a situation with a revenue-maximization behavior. Even if the public hospitals do not show any profits or declare dividend to shareholders, there are several interest groups with different 'rent-seeking' behaviors within the organization.

The combination of measures including a single insurer system, payment method, drug list, and contractual relationship shows some positive signs concerning cost containment and efficiency improvement (II and V). Yip and Eggleston (2004) found a positive effect of payment reform on hospital cost containment in their study in the Hainan Province, which had the same reform arrangement as that in Nantong where studies II and V were conducted. Summarizing the relationship between the urban health insurance reform and cost containment, Tang et al. (2004) made the observation that the payment reforms in pilot cities had generally slowed down the growth rates of hospital expenditures. The effect of health insurance plans on the behavior of health providers is largely determined by the strength of the power of the insurers. The

magnitude of the insurance fund is the principal element of the power for health insurers, as found in the US and the Netherlands (Zwanziger and Melnick 1988; Linverdink 2001). One of the characteristics of the Chinese urban health insurance reform from the mid 1990s is to combine all individual-institution-based insurers into a single insurer within one municipal city, which would dramatically increase the amount of funds one insurer can allocate. The single insurer would then exercise a monopsony power that may be the precondition for an effective purchase and payment for services. This point could be supported by evidence that the expected effects of payment reforms implemented by individual institutions during the 1980s did not achieve their objective of cost containment (Cai 2001).

#### **6.4 Regulating drug prices and utilization**

Influencing the pharmaceutical sector is a special case for price regulation and utilization in most countries. Study IV is an effort to examine the impact of a control of retail drug prices on hospital drug expenditures. Keeping in mind that hospitals stand for around 70 % of the total retail sale of prescribed drugs in China, the study shows that for all patients, hospital drug expenditures had similar growth rates before and after the implementation of the drug pricing policy (IV). Several reports and studies support this finding that the control of drug retail price does not work well in controlling the escalation of drug costs in China (MoH 2004; Yao et al. 2005; Zhang et al 2005; Geng 2005). Besides the findings in this study that shifting the utilization of drugs with reduced-prices to drugs with high prices and increasing the utilization of drugs by hospitals for maintaining their drug revenues (IV), other factors influencing the effectiveness of the pricing policy include lack of knowledge about the changes in drug prices by the general public (Zhang et al. 2005); the pharmaceutical manufacturers changed the brand or package with the same ingredients for higher prices (Geng 2005); and in some cases, drugs with reduced prices were not available from drug wholesalers for use in hospitals (Geng 2005). Those findings indicate that pharmaceutical manufacturers and wholesalers would be two other crucial sources for the undesired effect of the pricing policy.

Many other factors could influence drug expenditures for given health conditions. Drug expenditures for cerebral infarction as a case in study IV were not significantly related to the patients' age and health insurance status. However, other studies show that two such factors as patients' age and health status are influential for drug expenditures (Dong 2000). The absence of the age effect could be explained by a selection of individual cases whose average age was nearly and above 60, which differs from the studies in the general population. A number of studies have shown that drug expenditures would be higher for the insured by health insurance than for the uninsured (Dong 2000; Ryan and Birch 1991; Stuart and Grana 1995). Dong (2000) reported that health providers intended to prescribe more expensive and newer drugs to insured patients. This study shows some different findings from previous work. It found no relationship between health insurance status and drug expenditures (for both hospitals in 2000 and for the municipal hospital in 2002), or the reverse relationship (the uninsured spent more on drugs than the insured) in the provincial hospital in 2002. One explanation for this is that the sample size is not sufficient to analyze the insurance effect with skewed numbers of insured (provincial hospital) or uninsured (municipal

hospital). The other explanation is the differences in case mix between the two insurance groups, with more severe conditions for the uninsured.

The lack of an effect of price control on drug expenditures in study IV is supported by experiences in many countries, especially in countries where the reference pricing policy has been implemented (Ioannides-Demos et al. 2002; Lopez-Casasnovas and Puig-Junoy 2000; Maynard and Bloor 2003). Reference pricing means that there is a payment ceiling for each drug group for which the patient can receive subsidies (Ioannides-Demos et al. 2002). It was found that the reference-based pricing schemes have achieved a short-term effect in controlling drug expenditures during the 1990s (Lopez-Casasnovas and Puig-Junoy 2000; Ioannides-Demos et al. 2002). “*Price controls are ubiquitous, but their impact appears to have been slight. Price control must be supplemented with volume control to constrain overall spending*”, concluded by Maynard and Bloor (2003). In other words, as price regulation is focusing on the P (price)-variable, the Q (quantity) remains unregulated. Fixed drug expenditure budgets were used for controlling drug expenditures by controlling both P and Q in Germany and the United Kingdom (Schulenberg 1994; Burstall 1997). In China, the administrative responsibilities for price regulation and utilization regulation are, respectively, located in the State Development and Reform Commission (formally the State Planning and Development Commission) and the Ministry of Health, which could influence the consolidated action in controlling drug spending.

A large proportion of the drug expenditures were on drugs without evidence of safety and efficacy with a higher proportion in the provincial than in the municipal hospital (IV). The prevalence of irrational use of drugs has been reported by a number of studies, especially irrational use of antibiotics (Chalker et al. 2000; Chuc and Tomson 1999; Yang 1993; Zhan et al. 1998; Chen et al. 2003; Xu et al. 2001; Syhakhang 2002). Yang et al (1998) reported that for outpatient treatments of common colds, more than 98% of the patients were given antibiotics by physicians, which is higher than the use of antibiotics in Yemen (45-67%) (Walker G et al 1990), Costa Rica (65%) (Mora Y et al. 2002), and Turkey (16.6%) (Tunger et al. 2000). Xu et al (2001) reported that 30-40% of total drug spending for treating acute appendicitis, in municipal and provincial hospitals, respectively, was wasted due to irrational use of drugs, using a panel of doctors for assessing the appropriateness of drug prescriptions.

Study IV used published guidelines from authoritative organizations and patient records on actual drug prescriptions. This might be more valid in identifying the irrational use of drugs than questionnaire surveys where the data is obtained from stated practice. Drug use and prescription are influenced by a number of factors, including regulation and financing at the policy and system level (Dong 2000; Chalker 2003), incentives and management from the supply side (Goel 1996; Chalker 2003), and a cost sharing mechanism from the demand side (Dong 2000). Given the specific situation in China that the majority of the revenues for hospitals and bonus for individual doctors are from drugs, hospital financing and reimbursement mechanisms are believed to be the most influential factor, while other factors need to be noticed.

## **7 CONCLUSIONS AND IMPLICATIONS**

This thesis and the five studies analyze different aspects of the Chinese health care system related to market failure problems and the institutional response from governments and regulators. In particular, the use of health care pricing and payment systems is analyzed. A health economics and health system framework is used for interpreting the findings which are largely in line with previous studies and theoretical considerations. To address these issues, the different studies consider both market failures in health care and the problems with government interventions.

The widespread use of user charges in the Chinese health system means limited access to hospital services for the poor. To improve access, the government has implemented different exemption policies for the poor. The findings show that public hospitals in the study tended to provide inadequate exemptions for the poor. The absence of government-specific budgets and well-designed regulations for hospital exemption programs was one of the determinants. A policy implication is that exemption policies must be accompanied by incentives and compensations for providers to provide charity care for indigents.

The decentralization of the financing system and the reliance on user charges have also been implemented for public health programs such as TB control. The huge gap in public funding support for TB programs between poorer and wealthier counties, has led to a larger amount of unsatisfied need in delivering TB care in poorer counties. This case illustrates a classical example of ‘market’ failure’, as the TB control programs as a service or good include positive externalities. Hence, the willingness to pay for this service will be less than the social optimum level. The policy implication is that the performance of TB control programs should be comprehensively enhanced, requiring transfer payment systems under a financial decentralization system. The reliance on market financing and user charges is inappropriate for good/services involving positive externalities.

The autonomy given to the hospital sector in combination with a reliance on user charges and fee-for-service has contributed to an expansion of the hospital sector. The internal objectives and the incentive structure have turned the hospitals into what can be regarded as revenue-maximizing organizations. Drug expenditures dominated changes in total hospital revenues. The traditional fee-for-service system as a payment system puts the insurers in a weak position, indicating that reliance solely on the price-mechanisms is insufficient to control cost and efficiency. Yet, recent observations show that reforming the insurers’ system could lead to a decline in hospital charges and an improvement in hospital efficiency. The implementation of a system based on a single insurer, an episode payment system, contracts, and drug lists constitutes the keys in the reform. A problem is the present low rate of health insurance coverage, which raises the issue of using other tools for controlling hospital expansion and the over investment in high technologies.

The regulation of the pharmaceutical sector is another example showing that the control of utilization rather than the price of drugs would be more important in controlling drug expenditures. The control of prices leaves a number of other influencing factors uncontrolled. The study reveals some previous observations about how to circumvent

price-regulations. Hospitals could maintain drug revenues through shifting and increasing drug utilization, partly due to lack of evidence of safety and efficacy. In addition, the prices of newly introduced drugs are difficult to control. The current financing method for hospitals encouraged hospitals to distort the price regulation. Reforming the funding policy for public hospitals by making the hospitals less reliant on user charges from drugs is fundamental.

The decentralization of hospital financing and the incentives it creates, are accompanied by an expansion on the input side which is not followed by a similar development on the output side. The strong incentives to recruit staff and invest in new advanced technologies contribute to the cost escalation. There are also reverse restrictions concerning the reduction in the use of inputs. Hence, if demand does not correspond to supply, hospitals do not have the possibility of reducing staff and cutting the number of beds. This is likely to lead to a decline in productivity and an increase in hospital cost recovery.

To sum up, the type of market failures identified by the cases in this thesis is in line with the observations in many industrialized countries. The market-oriented health care system in China is faced with a ‘market failures’ problem, involving limited access to health services for the poor and the inaccuracy in relying on market mechanisms for services characterized by positive externalities. Government interventions to contain cost and improve efficiency show that the sole reliance on the price mechanism is insufficient and must be combined with other tools set by regulators and insurers.

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