Lessons from Rural Chinese Health Insurance: 1950s-2011

Andong Yan
University of California, Riverside
Riverside, CA 92521
ayan013@ucr.edu

April 1, 2020

1 Introduction

During the late 1950s, China established the Cooperative Medical Scheme (CMS) in rural areas as a public health insurance program for rural residents. By the mid-1970s, CMS had covered over 90% of rural villages, named by "communes", and the majority of the rural population in China (World Bank, 1997). However, CMS collapsed due to the economic reform during the 1980s, only 12.8% of villages were still implementing CMS by 1993 (MOH 1994); in 1998, only 9.5% of the rural population was still insured (MOH 1999). Alarmed by the 2003 outbreak of severe acute respiratory syndrome (SARS), realizing how unprepared the health care system is for an emergency despite the huge economy achievement in the 1990s, the State Council announced to rebuild a New Rural Cooperative Medical Scheme (NCMS) in 2003 to insure rural population again and its enrollment rate reached 97% by 2011 (Yip et al, 2012; MOH 2012). (For a brief summary of the evolution of China's health care financing systems, see Table 1.)

From the simple statistics of the insurance coverage rate in Chinese rural areas over the past 70 years, it is obvious to see the dramatic changes in the health insurance policy and the profound impacts. This proposal aims to summarize the stylized facts regarding the health insurance programs implemented in rural China and prepare for a more formalized theoretical analysis on what should be the most considerable factors in the design of the health insurance policy and what could be the driving factors of an efficient(or failed) implementation of such a policy. The topic of this research

Year(s)	Key events
1949	Founding of the People's Republic of China.
1951	Labor Insurance Scheme launched as an employment based health insurance program, targeting urban employers with 100 or more employees.
1952	Government Insurance System launched as a public insurance program for government employees, their dependents, and college students.
Late-1950s	Cooperative Medical Scheme appearing in rural areas as a prepayment health plan organized at the village level, and financed jointly by village collective fund, upper level government subsidies, and premium paid by farmers.
Mid-1970s	Cooperative Medical Scheme implemented in over 90% of villages, covering the vast majority of rural population.
1978	Economic reform initiated in rural areas with the agricultural collectives replaced by a new household-responsibility system.
1980s	Cooperative Medical Scheme collapsed.
1990s	Labor Insurance System crippled by rising health costs and inefficiency of state-owned enterprises.
1998	Urban Employee Basic Medical Insurance launched in urban areas to replace both Labor Insurance Scheme and Government Insurance Scheme.
2003	New Rural Cooperative Medical Scheme implemented nation-wide with heavy government subsidies to rebuild the health insurance system in rural areas.
2007	Urban Resident Basic Medical Insurance launched with heavy government subsidies, targeting the unemployed, children, and the disabled in urban areas.
2011	Universal coverage achieved in China with more than 95% of its population insured.

Table 1: Milestones in the evolution of China's Health Care Financing Systems, 1949–2011.
Source: Yu (2015)

focuses on the rural area of China, while to make a comprehensive analysis on the subject, it is necessary to involve data and comparison of both rural and urban regions, especially given the fact of a clear urban-rural dual structure of China society and the huge disparity between the two parts. To evaluate a health insurance policy, its coverage rate, an insured individual's health expenditure level and the ratio of financial risk relieved by the insurance would be the major factors to track, while in the specific context of rural China, access to health service, quality of the health service by different measurements and even inequality issues are also binding together within policymakers' considerations so that this research will also touch these areas to provide a comprehensive and accurate approach.

The lessons learned from the historical performances of Chinese health insurance programs could be insightful in many perspectives. In the period of 1950s to 1970s, China made a huge improvement in its overall health level by the establishment of a typical communist nation's health care system, including the Cooperative Medical Scheme, mixed with some unique features, represented by the barefoot doctor system. The progress made in this period was achieved with an extremely weak foundation in the nation's health infrastructure, thus it could shed light on other developing countries whose people are still suffering in a bad health condition. However, the collapse of the once-successful CMS in the 1980s and the following sad outcomes appeared to be another demonstration of the many theoretical arguments on the market failure in health insurance markets without a centralized intervention (Arrow 1963; Blomqvist and Horn 1984; Feldstein 1973; Spence 1978; Pauly 1974). While Chinese policymakers at that time could not catch these academic findings to advise their decisions, the negative performances of a laissez-faire health insurance policy(although not exactly the case) in the case of China should raise an alarm to any nation that plans to leave the health insurance market to complete privatization.

The recent comeback of the central government's support for universal health insurance coverage with the implementation of NCMS since 2003 has been through some more complex but meaningful experiences. While the living standards in the megalopolises (such as Shanghai, Beijing and so on) might already reach the same level as cities in those developed countries, the vast rural area will remain less developed for a long time. The health care system that serves these regions of significant and outlandish contrasts naturally faces unimaginable challenges, while China's attempts to overcome such obstacles will undoubtedly inform and benefit other countries, not only those with similar urban-rural duality or severe inequalities issues, but also countries that aim to develop a universal health insurance program or reform an existing health care system. For global

policymakers, the Chinese lessons could provide important references for future reforms in their countries' medical care programs.

Before I further elaborate on my proposal, I want to first thank Prof. Richard J. Arnott for his grant of an extended deadline for this term project. Without the extra time that I was allowed to utilize, I will not be possible to collect and investigate much literature, although I am sure that my literature review is still far from an exhaustive one, that I will refer to in this essay. This research turned out to be an invaluable chance for me to understand the health care system in my home country, especially in the rural area of China; as I have been abroad for the past seven years since graduation of high school and before that, I spent most of my life in the urban areas thus rarely did I observe the facts and changes in the medical system in rural China. Regardless of the future outcome of this research project, it has become an unforgettable experience for me.

The following essay consists of five major sections: Section 2 focuses on the old Cooperative Medical Scheme era (1950s – 1970s); Section 3 investigates the collapse of CMS and the following market-free and "privatization" era (1980s - 2003); Section 4 studies the period after the establishment of the New Rural Cooperative Medical Scheme (2003 – now); Section 5 will summarize the stylized facts learned from the previous sections and provide theory and policy discussions, which conclude the whole essay.

2 Cooperative Medical Scheme (1950s - 1970s)

After the establishment of the People's Republic of China in 1949, the government followed the model of other socialist nations and gradually took over all health-care services and made all health providers state employees (Dong and Philips, 2008). In rural areas, commune, the critical institution in rural life, owned the land, organized its cultivation, distributed its harvest, and provided social services, including health care, which was operated by the Cooperative Medical System (CMS) with a centralized three-tier delivery system (Blumenthal and Hsiao, 2005).

At the first tier, CMS operated a dense network of village health stations, staffed by practitioners who had only basic health care training in hygiene and traditional Chinese medicine — the so-called barefoot doctors. At the second tier, a health center at commune level supervised the health stations and primarily hired medical professionals that were subsidized by the government. Commune level health centers provided a combination of preventive and curative services and were

utilized for most common illnesses. The third tier of the CMS, county hospitals, was for the most seriously ill patients and more sophisticated care was available. They were primarily funded by the government but also collaborated with local systems for resources (equipment, physicians, etc) (Xueshan et al, 1995).

To finance the operation of CMS, there are three sources of funding: 1) premiums collected from rural resident family's annual income with a proportion varied from 0.5 to 2%, depending on the local commune's economic status and the specific benefit plan implemented; 2) the collective welfare fund contributed by a certain portion of each commune's income from collective agricultural production or rural enterprises, according to State guideline; 3) subsidies from higher-level government structures, which was primarily used to compensate health workers and purchase medical equipment (Liu, 2004).

The major difficulty China faced during the 1950s – 1960s era was the weak foundation of the country's economic development level and poor health condition. Before the establishment of the PRC, the country had been suffering in the conflict with Japan during WWII as well as a civil war and the originally weak health care system was widely damaged. By 1960, an average Chinese resident's life expectancy at birth was only 43.725 years old, compared to that of the world average, 52.58, and OECD members average, 67.44, respectively (World Bank). Moreover, an urban bias of medical services was prevalent at that time, as more medical resources were allocated in urban regions and most doctors who received more formal Western medical training worked in city hospitals. In 1964, health-care expenditure for 8.3 million urban citizens covered by the state was more than that for 500 million peasants (Zhang and Unschuld, 2008) .

Observing the status quo, the state health policy emphasis was placed on preventive services, integration of western and Chinese medicine, and the use of mass mobilization campaigns. Major achievements were made in controlling infectious diseases through immunization and other classic public health measures, such as improved sanitation and the control of disease vectors, including mosquitoes for malaria and snails for schistosomiasis (Blumenthal and Hsiao, 2005). As a result, by the end of the 1960s, China's life expectancy at birth already caught up the world average level and the gap with that of developed countries shrank as well (See Figure 1).

To relieve the stress placed on rural areas, in 1965, mobile teams of doctors from urban hospitals were sent to deliver health care and train indigenous paramedics; later in 1968, the program of barefoot doctors was introduced by the journal *Red Flag* as a national policy focused

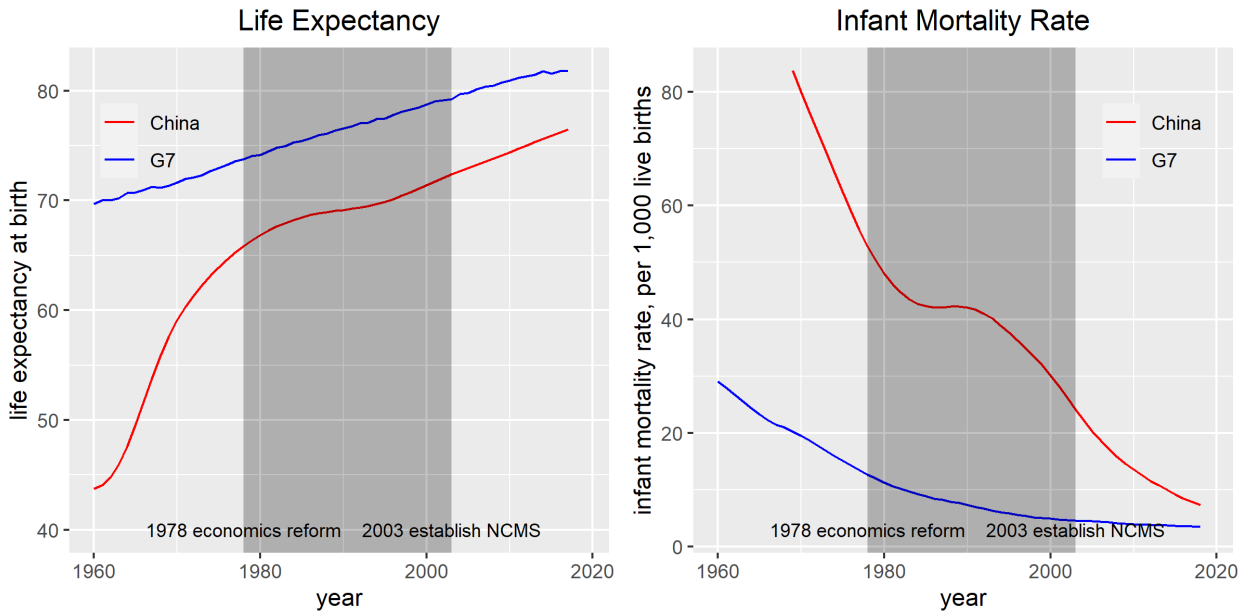

Figure 1: Comparison of infant mortality rate and life expectancy at birth between China and G7 countries, *Source*: World Bank

on quickly training paramedics to meet rural needs (Zhang and Unschuld, 2008). During the *Cultural Revolution* (1966-1976), universities and medical schools were closed for 5 years and their students and faculty members were sent to the countryside, which might indirectly facilitate the training of barefoot doctors (Dong and Philips, 2008). Eventually, the barefoot doctor arrangement managed to solve the distribution of the health-care resources under the urban-rural dual-economic system, effectively reduced health care costs and provided timely treatment to the rural population (Zhang and Unschuld, 2008).

CMS, staffed by a large group of barefoot doctors, as an integrated part of the overall collective system for agricultural production and social services, tackled a set of health issues in rural China including financing rural health insurance system, provision of access to the health service and the disparity between rural and urban. By the mid-1970s, more than 90% of communes were covered by CMS. By the beginning of the 1980s, China finished the epidemiologic transition as the leading causes of illness and death changed from infectious disease to chronic disease, which was seen in Western countries alongside the nation's development level increased (Blumenthal and Hsiao, 2005). During the period of implementation of CMS, China accomplished significant improvement in its health care, as Figure 1 shows two major indicators of primary health condition, life expectancy and infant mortality rate, grew rapidly in China with a speedy convergence rate to those of developed

countries, which was not observed after the collapse of CMS (Figure 1).

From an economic perspective, some interesting research questions arise with the observation of the performances of CMS in rural China. CMS is an implementation of a planned economy in the context of health care provision, while it exhibited extraordinary productive efficiency given the factor inputs that China could allocate at that time, which outperformed countries who followed a market economy with similar endowments during the same period (e.g. India). Of course, production efficiency in the sense of Pareto optimality does not require a competitive market to implement. As far as the allocation of the factor inputs is distributed efficiently, without a competitive market, even a planned economy could reach its production possibility frontier. Meanwhile, the optimality conditions assumed by the welfare theorems might not hold in the case of a poorly developed country at that time: health care production might have an increasing return to production; information asymmetry might hinder the development of a health insurance market; health outcomes could generate strong externality within the dynamics of the factor inputs, e.g. more healthy residents could make more income and thus purchase more nutrition. Thus, there is less chance for a competitive market to achieve production efficiency without a complex allocation mechanism that is not limited to only lump-sum transfer.

However, there could be more takeaways from the example of CMS and barefoot doctors, not limited to whether some efficient general equilibrium could be achieved by the planned economy or market economy, but how should those countries, whose people are still suffering in a bad health condition, design their health policy that could provide programs to practically support low-income individuals to finance their medical expenditure and proactively create more supply of accessible health service to a larger group of population. The success of the CMS demonstrates that many diseases in poor countries could be prevented and solved without significant financial resources or technological transformation. The adequate political focus on support of rural-based and non-commercial forms of preventive healthcare and primary care treatments can change the health landscape of a nation. As a crucial part of CMS, the system of barefoot doctors received much publicity in the West for their supposed effectiveness in meeting the needs of rural populations. The legacy of the barefoot doctors became one of the inspirations for the World Health Organization (WHO) conference held in Alma Ata, Kazakhstan in 1978, where the Alma Ata Declaration (known as the Primary Health Care Initiative) was signed, which called "for urgent action by all governments, all health and development workers, and the world community to protect and promote the health of all the people of the world" (WHO, 1978; WHO, 2008; Lee and Kim, 2018).

3 The collapse of CMS and the privatization of rural health care (1980s - 2003)

Despite the huge success achieved by CMS during the first two decades since its establishment, due to the economic reform in the late 1970s and subsequent political changes in the institution structure, Chinese health care and public system collapsed in the 1980s and CMS was virtually dismantled, with nothing put in its place. The attitude of the Chinese government towards rural health financing can be best described as laissez-faire and the dominant thinking of policymaker was that voluntary community financing schemes would emerge with economic growth (Liu, 2004). Such a sudden mindset switch, from central planning towards a market economy, in rural China health care has many driving factors tangled with each other and its impacts on Chinese health issues were profound. This section will investigate several questions regarding the rural health care situation in China since the economic reform: What were the major reasons for the collapse of CMS and what impacts did it cause? Why and how did privatization happen in the rural health care market? And what lessons could other countries learn from China's experiences?

3.1 The collapse of CMS and its impacts

There were two major reasons responsible for the collapse of CMS: transformation from the commune system to the household production responsibility system, and decentralization reform which transferred fiscal and political responsibility from central government to local governments. First, as the core of the 1978 economic reform, the Chinese government adopted a household responsibility system, which liberalized family as the unit to make all production decisions, while the communes were dismantled to privatize the agricultural economy and replaced by townships as the new regional political institution. As a result of these changes from collective to individual production, and from commune to township, the townships and villages lost the right to appropriate a portion of agricultural output for investment and social services, including the collective welfare fund for financing their CMSs (Xueshan et al, 1995).

Meanwhile, since the adoption of the household responsibility system, rural households were left with all the risks in exchange for keeping the potential profits from their own agricultural productions. Specifically, rural households took the responsibility of paying for health care while the government only involved in the provision of public health and maintaining the minimum

operation of rural health centers. As the result, the central government reduced its proportion in the financial burden of health care, as its share of national health care spending fell from 32 percent to 15 percent, from 1978 to 1999 (Figure 2). With less financial supports from its two major funding sources, collective welfare funds from communes and subsidies from higher-level governments, CMS could only rely on the premium collected from rural resident families directly.

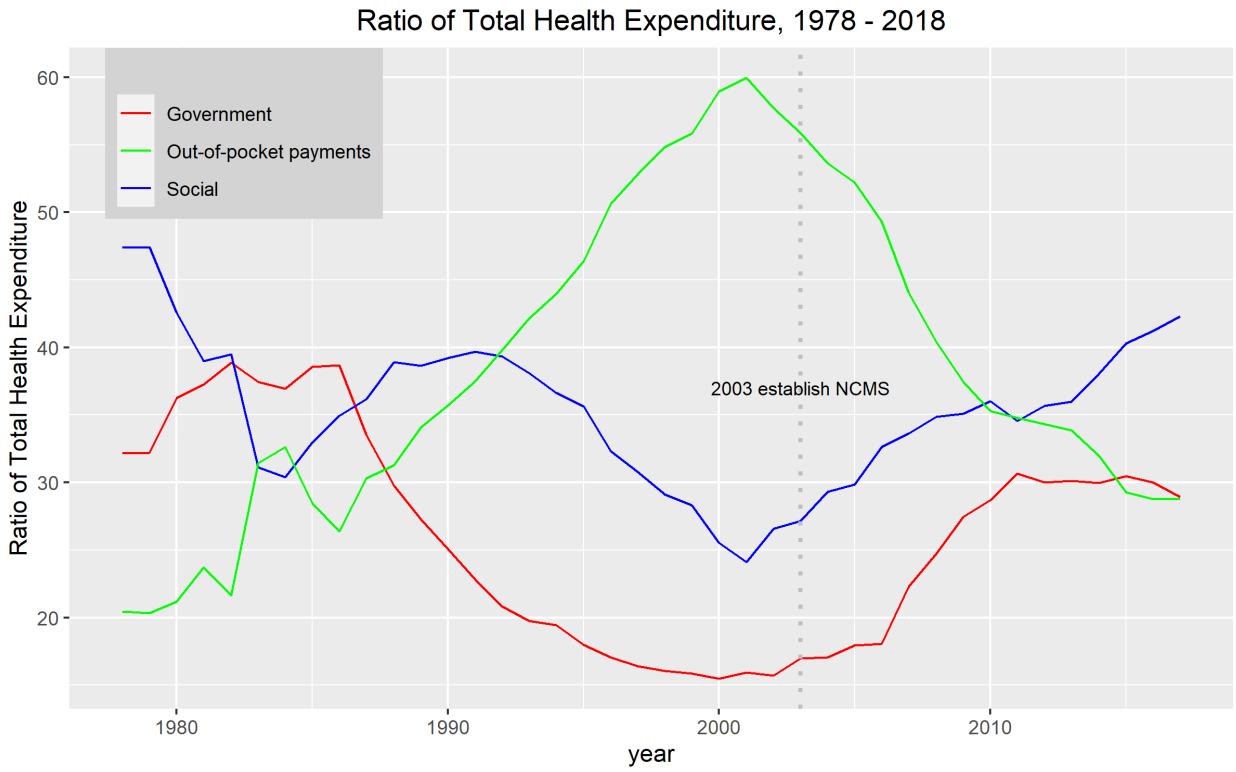

Figure 2: Government, Social and Out-of-pocket Share of Total Health Expenditure, *Source*: China Health Statistics Yearbook 2018

However, as the communes dismantled and rural residents were free to determine their own production decisions, the participation in the CMS became also non-compulsory and largely depended on the ability to pay. Naturally, poor households would decide to quit the scheme as they could not afford to pay the premium, as shown in a 1991 survey that out of all rural villages, only a proportion of 12.8% had at least 50% insurance coverage rate, while that proportion in richer coastal areas was 24.6% (Zhou, 1991). Without the commune system that collectively organized agriculture production, rural China embraced a great liberalization of the labor force as young and educated rural residents migrated to find jobs in the cities or different regions, which left the local governments even harder to organize and collect funds.

With all original financing methods for CMS turned out to be impractical, to maintain the

scheme alive requires necessary transfer payment from local government, which failed to implement, surprisingly, due to the political decentralization. Since the reform in 1978, local governments were assigned more fiscal autonomy as the result of decentralization and also given the responsibility for developing the local economy and funding social infrastructure, especially CMS, through local taxation. The immediate effect of such a new funding channel is that wealthy coastal provinces could provide more financial support to their CMS and other public services, while the disparity between urban and rural health care grew over time (Blumenthal and Hsiao, 2005). While local governments had the discretionary power to decide whether CMS to be continued or disbanded, they found themselves strictly limited by the increasing budgetary obligations and pressures to raise extra-budgetary funds to meet those obligations (Liu, 2004). No matter under the system of fiscal responsibility, introduced in the early 1980s and lasted until 1994, or the tax sharing system, launched in 1994 to strengthen central government's financial position, provincial governments bore the burden of raising fiscal revenues to fulfill their responsibility or to boost economic growth as the economic performance was one of the major evaluation criteria for provincial governors. Since developing public health was never a priority among all the responsibility of local governments, with limited budget constraints and ambiguous political payoff, local governments could not find strong incentives nor sufficient resources for keeping CMS.

The impact of the collapse of CMS is obvious, as, without the CMS, Chinese peasants had no way to pool risks for health care expenses, and 900 million rural, mostly poor residents became, in effect, uninsured overnight (Blumenthal and Hsiao, 2005). Despite the rapidly decreasing CMS coverage rate in the rural area (See Table 2 for village level CMS coverage rate during 1976 - 1990), the medical cost escalated in the 1990s (Table 3, Figure 3), leaving less financial protection and more out-of-pocket expenditure for rural population (Figure 2). Severe disparities in insurance coverage between urban and rural were prevalent, as in 1999, 49 percent of urban Chinese had health insurance, compared to 7 percent of rural residents overall and 3 percent in China's poorest rural Western provinces (Blumenthal and Hsiao, 2005; also see Table 3 for urban-rural comparison in insurance coverage). More wide and profound impacts on the rural health care sector emerged alongside the privatization of the health care market.

3.2 Privatization of Rural Health Care

With a dismantled commune system and collapsing CMS, rural health workers no longer received compensation from the health care system Once the core of CMS, barefoot doctors be-

Year	Villages	Villages with a CMS	Percentage of villages with a CMS	Villages with a VHS	Percentage of villages with a VHS
1976	677834	629708	92.90%	N/A	N/A
1978	685994	562515	82.00%	N/A	N/A
1980	702908	483601	68.80%	N/A	N/A
1982	717665	378927	52.80%	608145	84.74%
1984	715265	54100	7.56%	623662	87.19%
1986	738139	35649	4.83%	647850	87.77%
1988	734095	41940	5.71%	641076	87.33%
1990	749963	45491	6.07%	646529	86.21%

Table 2: Village health stations (VHSs) and CMSs, 1976 - 1990

Source: collected by Xueshan et al.(1997) from Selected Editions of Health Statistics of China, 1976 - 1990, Ministry of Public Health

	1990	1993	1998
Medical costs (yuan)			
Per visit	11	40	79
Per admission	473	1668	2891
Insurance coverage			
Urban		53.7%	42.1%
Rural		12.8%	9.5%

Table 3: Medical costs and rural population insurance coverage in China, 1990, 1993, 1998

Source: collected by Liu (2004) from 2000 National Health Statistics, Ministry of Health; 1993 & 1998 National Health Services Survey, Ministry of Health

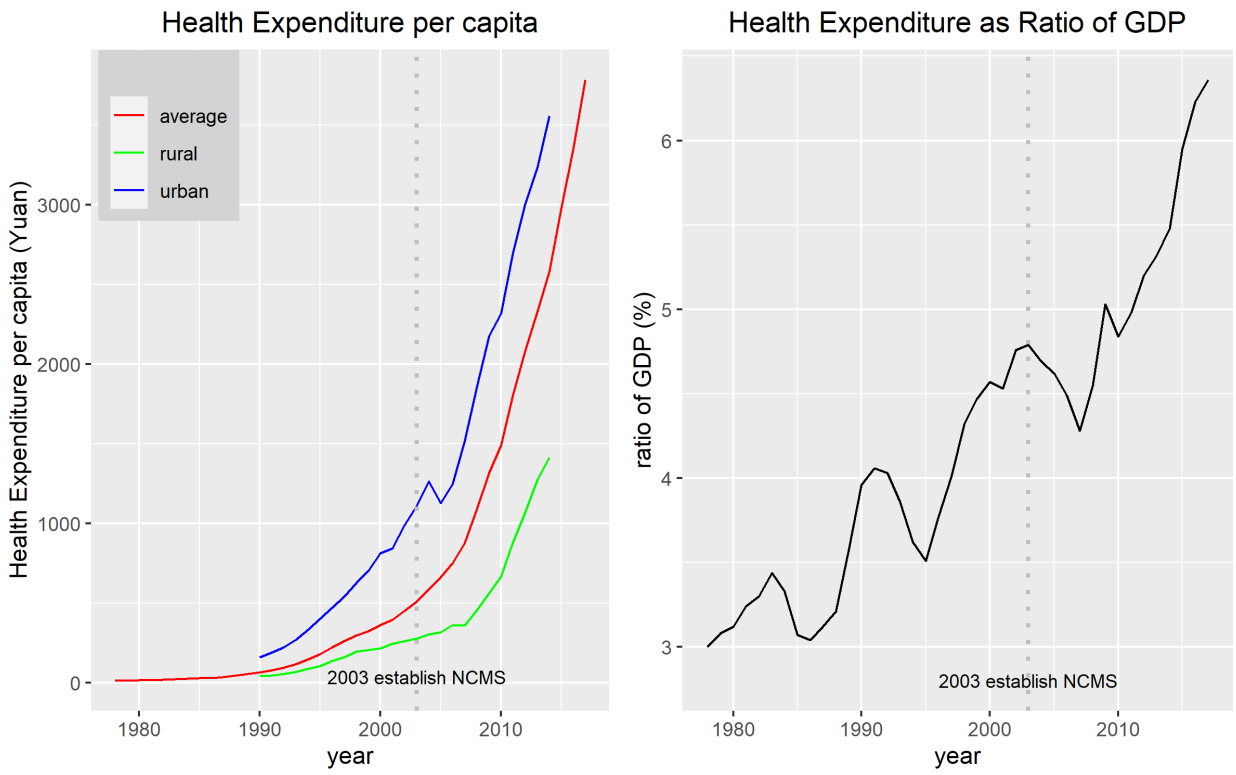

Figure 3: Health Expenditure Per Capita and Share of GDP, *Source*: China Health Statistics Yearbook 2018

came unemployed and forced to become private practitioners. As they need to make a living by themselves, they started charging fees to patients, selling drugs and spending time in non-health activities. Many village health workers dropped out of the health sector because they could not earn enough money, especially in poor areas (Figure 4). Virtually unregulated, rural private health workers abandoned their previous emphasis on public health services, which were no longer funded and for which they were no longer compensated, and switched to providing more lucrative technical services for which they were untrained (Blumenthal and Hsiao, 2005).

Despite the cutting financial support, as only 13% of total wage expenditure of village heath stations was covered by government funding (Feng et al, 2010), the numbers of villages with a health station did not decline with the number of country doctors and rural health workers during the 1980s (Figure 4, Table 2). Nevertheless, there was a marked change in the pattern of ownership and management of village health stations. Back in the 1970s, these facilities were owned by villages and financed largely by CMS, while ever since the economic reform, many health stations were sold to individuals or were let on contract to private practitioners. By 1990, over half of them were run as individual or group private practices (Table 4). Privatization was not limited at the village

level, as governmental financing for the health care system deducted dramatically (according to Feng et al (2010), 26% of county hospitals income was from government funding in 1986, then the ratio decreased to 8.6% in 1992, and 7% in 2004), public hospitals also came to function much like for-profit entities although the ownership still belonged to the township government. In brief, the Chinese government informally sanctioned this privatization of hospitals and village health stations by ignoring it (Blumenthal and Hsiao, 2005).

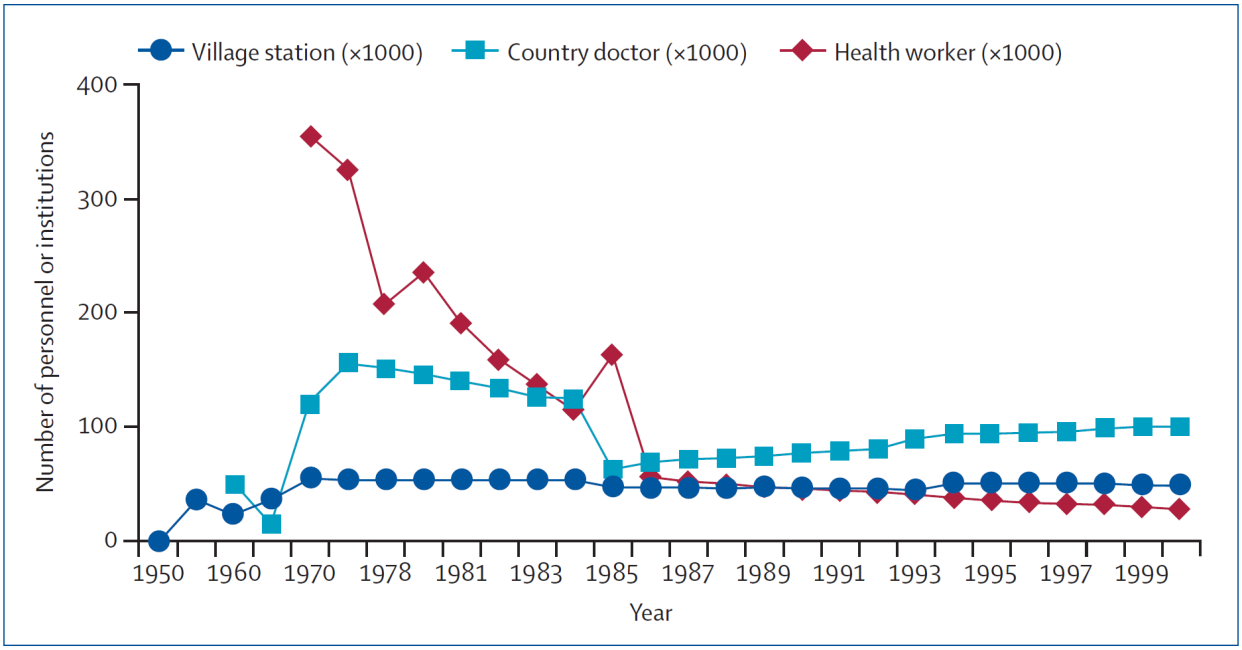

Figure 4: Rural Health personnel and Institutions in China, 1950 - 2000, *Source*: Zhang and Unschuld (2008)

Although experiencing a process of privatization, rural China's health care sector is far from a competitive market due to the uncoordinated policies. Concerning the rising cost of health care and to ensure access to basic care, the central government continued tight controls over the amount that publicly owned hospitals and health centers could charge for routine visits and services such as surgeries, standard diagnostic tests, and routine pharmaceuticals. On the other side, hospitals were permitted to earn profits from new drugs, new tests, and technology, with profit margins no higher than 15 percent. As hospitals started pursing for profits, they performed a salary-based system of compensating hospital doctors that included bonuses linked to the revenue generated by doctors for their hospitals (Blumenthal and Hsiao, 2005). Naturally, such irrational pricing regulation distorted the medical practices which resulted in overuse of drugs and high technology tests (Hsiao, 1995). By the late 1990s, drug spending occupied about half of China's health expenditures, one

Year	Number of VHSs	Village, township or combination (%)	Individual practitioner (%)	Other (%)
1982	608145	Most		
1984	707168	64	32	4
1986	795963	52	44	4
1988	806497	49	46	5
1990	803956	47	48	5

Table 4: Percentage of VHSs under different forms of ownership in rural China, 1982 - 1990
Source: collected by Xueshan et al.(1997) from Selected Editions of Health Statistics of China, 1982 - 1990, Ministry of Public Health

of the highest shares in the world (Yu, 2015). The privatization-induced overspending in health expenditure made affordability a major obstacle for access to health care service in rural China.

Lack of competition in rural health care market exacerbated the situation: privately-run village health centers commonly had bad quality in staff and shortage of equipment so they could hardly compete with county hospitals which owned more human and physical capitals; while generally only one public county hospital was established per county so competition among public hospitals was also negligible in the local health care market. As a result, the referral chain in the original tiered system was not obeyed anymore. Rural residents with serious illnesses frequently bypassed local practitioners and facilities to seek care in the outpatient units of urban hospitals as long as they can afford the fees, leading to underuse of the former, overuse of the latter, and increased fiscal burdens on peasants who seek out more expensive, hospital-based services (Blumenthal and Hsiao, 2005; Xueshan et al, 1995). Altogether, privatization of health facilities, distortionary pricing regulation and lack of competition fueled the rocket-up of the Chinese medical expenditure, while the deteriorating insurance coverage only made the health care affordability even worse for rural Chinese residents.

3.3 Lessons from Privatization in Chinese Health Care System

By 2003, the long-term result of privatization in the rural health care sector became a social issue to be reckoned with. Public discontent with limited access to health care service and increasing out-of-pocket health expenditures (commonly known as kan-bing-nan, kan-bing-gui in Chinese)

became prevalent in low-income groups, especially rural residents. Lack of financial support in the public health service system also undermined the government's ability to deal with epidemic emergence events, as the government's slow response to SARS in 2003 certainly reflected such a trend (Blumenthal and Hsiao, 2005). In response to the public concerns and alarmed by the huge losses incurred by the outbreak of SARS, the Chinese central government determined to retake a proactive role in the provision of public health service, including the implementation of the New Cooperative Medical Scheme (NCMS).

China's experience during this period reflected a major difficulty in health care policy design: the complexity and confoundness of the impacts of a health care program. In fact, rather than simply delegating the responsibility to provincial and local governments, the Chinese central government did consider affordability as a major concern when implementing the change of the health care system. One potential explanation that the central government did not push for a rural health protection system was the concern that collecting household premiums would further increase the already high tax burden for rural residents. As provincial governments could only collect taxes but not design the taxing policy, facing the budgetary pressure to cover the expenditures for economic investment, provincial governments had a tendency to adopted "non-taxation" measures, such as various "cost-sharing" and "fees", to generating "extra-budgetary" revenues. A cooperative health care program could naturally provide several devices for local governments to collect funding while increasing the tax burden, thus central government regulated such programs could only "be collected at the village level when the contributions are totally voluntary and establishing a risk-pool at the village is approved by the villagers" (Liu, 2004). However, such regulation eliminated the motivation for a provincial governor to push or maintain a cooperative health care program, as neither could it provide "extra-budgetary" revenues nor was the decision controlled by the province-level government. Another attempt to help the affordability of health care made by the central government was the pricing regulation. This policy failed to lower the health expenditure, although service fee was controlled under at a low level, as the only remaining incentive for health care providers was to purse profit when the market was privatized, while the unregulated room for drug margin and the lack of competition further pushed up the medical cost.

Privatization of the health care market did not bring a bloom of private health care insurance programs was also an insightful fact for countries that might plan to abandon a publicly financed health insurance scheme. Although some policymakers might hold the impractical hope that voluntary community financing schemes would emerge with economic growth, the natural information

asymmetries embedded in the health insurance program would cause issues of moral hazard and adverse selection, thus a private insurance scheme's efficiency is bounded, e.g. Arrow (1963) claimed the incompleteness of any private insurance programs with information asymmetry; Spence (1978) and Blomqvist (1984) called for a centralized intervention in the insurance markets to induce efficiency. Moreover, the risk-pooling ability of an insurance program highly leans on the size of the pool, while in rural China it was unlikely to raise large funding by collecting payments from rural households. With the bad economics status and the newly implemented household responsibility system, a rural household would most likely invest the marginal budget they had into production to generate more income, rather than contribute to the insurance pool, as the demand for health service was more elastic with uncertainty. As a result, both the insurance participation rate and contribution per participated household were low in rural areas and weakened the risk-pooling ability of the program, thus became less attractive to potential participators.

The dismantle of CMS not only took away the health care protection for rural residents where no private insurance programs could sufficiently function, but also undermined the efficiency and capacity of the health care market through the privatization in rural China. Although CMS was a system that provided health care protection for rural residents, on the other side, it also provided necessary financial supports for rural health care workers. Once CMS collapsed, only part of the health workers stayed in the market, while, as private practitioners, they provided a less accessible service with a lower quality. In other words, the privatization of the health care market indeed resulted in an inferior supply of the medical service in rural China, compared to the outstanding job done by the CMS. Meanwhile, without the three-tier health care delivery system, the market economy did not impose an efficiency in health care production. A patient with a normal illness that could be cured by a village health center might directly go for the county hospital for better treatment but at a higher cost, which incurred a higher opportunity cost than the effective benefit for the marginal health care provision and created inefficiency and social welfare loss.

On the other hand, from the perspective of China's central government, it was hard to tell whether there could be better policy options regarding rural health care protection at that time. Putting economic growth as the top priority of the state, the central government decentralized its political and fiscal resources to motivate local governments to find their own ways to develop the economy. Such strategy definitely worked out as China achieved tremendous economics progress after the economic reform. But the central government's policy space was also restricted by its deducted financial ability, and for rural health care protection, the decision was whether the marginal

monetary transfer could generate more social welfare by investing in the public health insurance program or other economic infrastructures. In fact, from the data of life expectant and mortality rate (Figure 1), the disarray of the Chinese health system, however, did not cause a measurable decline in the health status of the Chinese people. It could be the case that rapidly rising income in China improved nutrition, clean water and education which offset any adverse impacts of poorer medical services to the low-income populations (Hsiao, 1995).

In brief, there are several lessons from China's failed privatization of the health care market. First, identical to the principal-agent problem, it is important for central policymakers to provide a correct incentive for policy practitioners, such as local governments and hospitals, when delegating the responsibility and decentralizing the right of the management. Otherwise, only the policy that favors the practitioners would be truthfully implemented. Second, a health insurance policy could largely determine the access to health care services of the low-income population, which implicitly imposed a significant impact on the health inequality issue. The absence of well-functioning health insurance schemes could accelerate the mechanism that generates social inequality. Third, a public health policy could generate national health outcomes, which would influence economic performance, but vice versa. While China experienced a period with the wrong direction of public health policy, the less investment might provide a saving of opportunity cost for its economic growth that in turn helped the public health status. For less developed countries, it could exist a tradeoff between the economic policy and the public health policy, while the decision and evaluation of the policies need to consider both static impacts of the independent policy and implicit dynamics within the tradeoff of different policies.

4 New Cooperative Medical Scheme (2003 – now)

Facing all the public discontent with limited access to health care and rising health expenditure with less insurance coverage, especially in rural areas, and the degenerate epidemic emergency coping capacity reflected in the SARS outbreak, Chinese central government started to input vast investment in the public health care system and rebuild its health care insurance scheme nationwide. The establishment of the New Rural Cooperative Medical Scheme (NCMS) was one of the signals of the central government's commitment to solving the public care issues. To ensure the quick implementation of NCMS and avoid the mistake of delegating local governments without clear incentives, this time central government required local governments to share premium subsidies

with fixed ratios and also sign "responsibility forms" to carry political responsibilities for expanding coverage (Yu, 2015).

The result of the financial and political promotion of NCMS was significant. From 2008 to 2017, government health expenditure quadrupled, from 359 billion to 1·52 trillion (Yip et al., 2019; Figure 2 also shows the government share of total health expenditure increased since 2003); more than 2700 counties were covered by NCMS in 2009 compared to 333 back in 2004, and the enrollment rate of NCMS rapidly rose to 97% of the rural population in 2011 (China Statistics Year Book 2004 – 2009, 2011); meanwhile, other two health care insurance schemes targeting the urban population, Urban Resident Basic Medical Insurance (URBMI) and Urban Employee Basic Medical Insurance (UEBMI), were also implemented, resulting in a universal health insurance coverage rate of 95% in 2011 (Yu, 2015; Yip et al., 2019).

Nevertheless, policy evaluations over the implementation of NCMS were mixed. Assessments of the NCMS found increases in health-care utilization, but limited results in the reduction of out-of-pocket health expenditure and improvements in financial risk protection (Yip et al., 2019; Lei and Lin, 2009; Wagstaff et al, 2008). To further address the issue, the central government started a second round of reform since 2011. Thus, the following policy assessment of NCMS will be based on its two phases: first phase between 2003 and 2011, when the program placed the focus on insurance expansion and infrastructure development, and the second phase, since 2011 until now, which a health care delivery reform imposed by the central government.

4.1 Expansion of NCMS (2003 - 2011)

NCMS has several characteristics that define the infrastructure it provides: 1) it is a voluntary-based insurance scheme, 2) a participating household makes a lump-sum payment to the insurance pool and receives reimbursement when they pay for medical services, and 3) household's payment consists a very small portion of the total premium, while government subsidy makes up the major share (Table 5). A broad set of literature (Arrow, 1963; Pauly, 1974; Spence and Zeckhauser, 1971 and many else) has shown the possible flaws of such an insurance scheme, which could be categorized into two major issues: moral hazard and adverse selection. Moral hazard is prevalent among insured individuals when the reimbursement scheme distorts the real health care cost and thus induces common overuse of service by individuals who have an elastic demand in health care. To ensure a balanced budget, the insurance scheme must restrict its risk coverage range and

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Government Subsidies	80	120	200	240	280	320	380	420	450	490	520
Individual Contribution	20	30	50	60	70	90	120	150	180	220	250
Total Insurance Premium	100	150	250	300	350	410	500	570	630	710	770
Central Government Subsidies											
East			30	49	44	67	45				
Central			108	142	203	193	277				
West			123	156	193	225	268				

Table 5: Sources of NCMS Premium 2009 - 2019

Source: collected by Yip et al (2019) from Nation Health Committee Website

provide only incomplete insurance. The adverse selection represents the issues that low-income but healthy individuals may not be willing to enroll in the scheme and only individuals with a high tendency to illness would stay in the program. Again, this reduces the risk pooling ability of the scheme and results in a low participation rate, making the scheme less attractive for potential participators. Besides, the lump-sum payment method could generate an unambiguous result for the social inequality, as the low-income group faces a less probability of health expenditure due to their lack of access to health facilities and the financial barrier of the health service, which made the scheme in favor to the wealthy group and become a degressive redistribution to the social welfare. All these issues became concerns for the efficiency of NCMS and the large investment put into it. Fortunately, with the abundant data from the household surveys, a large number of empirical researches were done in the evaluation of NCMS during this period, which brought a better view on how efficient was this expansion of insurance coverage in rural China.

The early implementation NCMS followed a "wide but shallow" strategy, focusing on a quick expansion of coverage while providing either a low reimbursement rate or a low ceiling of reimbursement payment. As a result, NCMS provided very limited help for the reduction of catastrophic health expenditure due to its limited coverage range and also failed to offer sufficient financial protection for the lower-income group from illness-caused poverty (Yip and Hsiao, 2009). Moreover, the total health expenditure increased dramatically since the introduction of NCMS as promised by economic theory, showing no significant decrease in out-of-pocket health expenditure for NCMS participators (Lei and Lin, 2009; Wagstaff et al., 2009). One of the reasons was the privatized health care delivery system motivated by the profit. Health care facilities needed to generate 70-90% of

their revenue from their services while their fee schedule was fee-for-service with government-set criteria. With the 15% mark-up room on drugs and high reimbursement on diagnostic tests, hospitals motivated doctors to overprescribe drugs and perform unnecessary diagnostic items for the patients by linking the bonus salary with the revenue generated from the doctors. The unregulated health care providers majorly offset any financial support that NCMS brought to the rural Chinese residents.

Despite the limited financial protection, NCMS displayed significant health improvement effect. Chen and Zhang (2012) found NCMS brought higher health care service utilization rate which might explain the increasing expenditure, while the extra health care consumption significantly brings improvement in health outcomes. The potential reason was that, as explained in Grossman (1972) model, health care service reflects the demand for a stock of health capital, then a price-sensitive individual would seek for more consumption in health care service in response to the price decrease, while the overall utility level becomes higher after the price change as well as the health capital increases. Another reason for such health effects could be the implementation of NCMS promoted preventive public health care service via routine medical examinations, which provided an early diagnosis of diseases as well as preventive treatments, thus improve the health condition in rural areas (Lei and Lin, 2009).

Further behavior analysis shows the adverse selection issue could be negligible as the individual payment was cheap compared to the substantive subsidy from the government, so that rural residents were rarely unwilling to participate in NCMS. The same research also shows that low-income group did receive a welfare transfer from the wealthy group since a health shock could result in catastrophic results for poor people, but the protection scheme largely covers such risk, thus provides more welfare gain than the loss from their low utilization rate (Feng and Song, 2007). The household registration system in China might also help in the redistribution process within the NCMS, as rural household were registered based on their geographical location that was highly correlated to their income level, thus the government could provide higher subsidies in poorer regions which equated the effective premium that could be utilized by each household. (Table 5 displays different government subsidies in different regions, as East China is traditionally more wealthy than Central and West parts; a geographical visualization (a separate file upon request) also shows the premium level in different provinces were roughly equal with the steady growth rate over years.) In other words, NCMS performed as a transfer payment that subsidized insurance payment in low-income regions and helped with the inequality issues in access to health care services.

4.2 Public Hospital Reform (2011 - now)

Recognizing the discrepancies shown during the expansion of NCMS, the central government started the second round of reform that aimed to address the systematic issues within the public health care delivery system that caused inefficiency and waste of resources. The major policy change was the zero-markup drug policy replacing the 15% mark-up allowance on the drugs. The new policy also regulated the price of diagnostic services, to limit the expenditure on excessive diagnostic tests. To compensate hospitals for their loss in revenue, the government adjusted the fee schedule to reflect more valuation of the labor-intensive service price, while hospitals were also left with the responsibility to increase efficiency to make up the loss and local government should also provide financial support. However, although research shows drug expenditure decreased, total health expenditure did not as hospitals turned to ask patients to pay more visits and service items to increase revenue (Yip et al, 2019).

Another important change in the NCMS scheme was the introduction of catastrophic protection in 2012. While the payment schedule for the NCMS did not change for participants, the catastrophic protection would cover all the health care expenditures once it passed a certain threshold. Theoretically, this new insurance item was contingent only on certain states of the enrolled patient's illness, which would not distort the behavior of insured individuals and thus no marginal efficiency loss incurred. Empirical research (Zhao, 2020) also shows that although stimulating the expansion of health expenditure, the introduction of catastrophic protection did not increase the chance of health expenditure but did improve health outcomes. The effect was significant especially for individuals who initially had an inelastic demand for health care, as the reduced expenditure and the saved budget helped them to seek more health care services.

To fully remodel the public health care delivery system, pilot reforms in the local public hospitals launched in several cities to test alternative payment methods to replace the traditional fee-for-service scheme, with the hope to decrease total medical expenditures and improve service quality. Sanming model, out of eleven reform models, emerged as the most successful one. At the core of the Sanming model is to design the correct incentive for health care providers to provide efficient services while leverage the insurance reimbursement payment to lower down the drug cost. In detail, public hospitals started to receive evaluation depended on 55 indicators of service volume, expenditure control, hospital development and patient satisfaction (Yip et al., 2019). Doctors no longer received the bonus from selling drugs or diagnostic tests, but earned wages based on a

packaged salary schedule based on the new performance evaluation. Hospital directors started to directly manage human resources as old staff could be resigned and new competitors could be hired in order to motivate all staff to improve in their service quality. A new institution, National Healthcare Security Administration, was formed to fully take care of negotiations with medicine dealers and manufacturers, as hospitals lose their control on drug pricing because of zero-markup policy and insurance reimbursement became the major contributor to the sales of drugs. Gathering all the bargaining power from public hospitals and insurance participators, the new institution was entitled to the market power that was close to a monopsony, as the demand side was all formed up to bargain over the cost of medicine. On average, the prices for drugs decreased by more than 30%; some prices fell by over 80% (Yip et al., 2019). Removing the incentive links between profits generation for the hospitals and the compensation to health care providers, skilled physicians could focus on their service quality while the health care expenditure would not be a matter of business. Early evaluation (Fu et al., 2017) shows that Sanming model reduced medical costs significantly without measurably sacrificing clinical quality and production efficiency.

4.3 Overall Evaluation of Health Care Reform

Yip et al. (2019) utilize data from China Family Panel Studies(CFPS) to comprehensively evaluate the outcome of the health care reform from perspectives of financial protection and health care utilization. Evidence shows that both hospital admission rate and rate of doctor visit significantly increased from 2010 to 2016, while two indicators were currently statistically equal among rural and urban areas, showing the rural-urban disparities in access to health care service have disappeared. Although an increase in the utilization of health service might not lead to efficiency improvement, lack of access was one of the issues faced by rural patients, thus the increased utilization should be a good signal for the public health system. Also, catastrophic health expenditure decreased as well as reimbursement rate increased, both with the most significant change occurred in the low-income group based on the quantile analysis. The health care reform efficiently coped with the inequality issues in health care, but still, the misallocation of medical resources existed. (For details, see Appendix A Table)The expansion in coverage and reimbursement increased the demand for high-quality health care services in rural areas, but low-tier public health centers could only provide low-quality serviced due to lack of training and facilities, thus patients keep seeking treatment from top tier hospitals but eventually exacerbate the rationing in the hospitals. NCMS also has various reimbursement rates across levels of healthcare facilities, local level highest, but lower in county or

city hospitals, which keeps rural patients suffered from an even higher out-of-pocket expenditure in urban hospitals.

5 Discussion

Although the topic of this essay should place an emphasis on the "health care insurance in rural China", as the elaboration develops and analysis goes to the deeper level, arguments in this essay are inevitably drawn to relevant topics: urban insurance, health care delivery system, the transition of political regime, economic impact on health, so on and so on. In fact, this out-of-controlled divergence exactly reflects the complexity of a health care insurance policy, as the causal links are between all these factors in a bi-directional way.

As China rapidly grew into a partially developed country with a considerable part of it remained less developed, the reform of the public health care system remains many challenges. First is the unsolved rural-urban disparity in the allocation of medical resources and financial barriers to more sophisticated health care. Restricted by the household registration system, rural households could only enroll in NCMS but not any of the urban insurance schemes that could provide higher reimbursement and protection which requires a higher premium in exchange. With a large group of migrant workers who are registered in their rural hometowns but working in urban cities, they only have access to NCMS which has less reimbursement rate in urban hospitals that limits their access to health care service. The restriction by the registration system denies the chance for rural households who have the ability to pay as well as willingness or necessity to receive larger insurance coverage, incurring sizable inefficiencies and welfare loss. Spence (1978) also points out that public health insurance with the lack of options available to consumers will suffer in efficiency, while the government intervention should aim to subsidize higher-risk groups. In China's case, universal resident insurance that provides identical benefits towards all citizens while subsidizing higher risk low-income groups, combined with different supplemental insurance schemes for different demands of health protection, would bring great improvement to the social welfare and equality in the provision of public health care.

Fortunately, this is the same direction that the Chinese central government is moving to. By 2020, the household registration will be dismantled in most areas in China, while the Healthcare 2030 Plan announced by State Council explicitly claimed the goal of equal access to public health care services via rural infrastructure development and a unified health care insurance scheme for

both rural and urban citizens. The current policy also implicitly leaves the door open to private commercial insurance programs to complement the public insurance scheme, as public health care insurance will only cover basic health expenditure and provide catastrophic protection, but the expenditure for higher quality health care service is not in the plan while private programs could fill in the gap. But it is also necessary to limit the coverage of commercial insurance to prevent over-insurance issues as Fieldstein (1973) proved that without proper constraint on the medical insurance providers, the presence of insurance will push up the medical care cost as consumers will be always overinsured. Concerns also exist in the drug market as the monopsony position of the public health care insurance scheme efficiently negotiated down the market price, with fewer margin rooms, medicine suppliers may choose to downgrade the quality of the medicines or quit the market due to limited profits. Such a market effect also needs further research to better evaluate its influence.

In conclusion, there are numerous lessons from China's experiences in the health care insurance scheme changes over the past 70 years for a public policymaker or researcher. First of all, the financial resources of a public health care system are not always crucial to achieve a good health outcome. The implementation of CMS acquired huge public health progress without a strong economic foundation, and the inefficiency in the NCMS expansion due to the failed health care delivery system, both are remarkable examples that illustrate the uncorrelation between monetary funding and health care production efficiency, while a correct infrastructure and system could improve efficiency without a huge investment. Second, a careful incentive design is necessary for health care providers and insurance schemes to avoid exploitation of reimbursement as well as the overuse of service which are derived from the distortion of the price. Ideally, both patients and physicians should make their health care decision without concerning the monetary transfer incurred by the service. Third, fragmentation of insurance schemes and risk pools could be inefficient and wasteful, but a collective scheme could help reach an equilibrium with more social welfare consideration and higher efficiency.

For the purpose of further economic research, the setting of the theoretical model has been clear at this moment. The question is how to design a health care policy with all the resource and incentive constraints binding. The object of the policy is to provide wide and fair public health care access to the population, potentially highly heterogeneous and segmented, with the welfare considerations in the redistribution of resources and asymmetric risk-bearing ability. Resource constraints are variant dependent on the schemes of the insurance but also the power that the

political constitution owns. In the case of China, a collective production system was implemented at the beginning while market privatization and huge government subsidy could happen 70 years later. The resource constraints for the public policies are totally incomparable over time, and in many respects, the resources were determined endogenously, which turns the problem dynamic and complicated. More importantly, incentive constraints are involved almost in every decision-maker in the economy of health care. Before delegating the implementation of public policy to a lower government, policymaker needs to keep in mind that a lower governor would try everything to accomplish the "object" of the responsibility, while a lack of incentive will result in all means of counterfeit or sloppiness that could be indistinguishable in the short term but generate negative influence in the long run. Also, a centralized monetary transfer mechanism based on a competitive market needs always notice the incentive it imposed on the market participators. A slight distortion or regulation on the opportunity cost faced by the markers would impact their decisions and the general equilibrium effect could be substantive. Although I proposed the model to include these factors, it is highly likely that previous literature has covered similar topics and no innovative ideas exist in this proposal. However, from the comparative economics perspective, a study focused on the policy environment difference between China and other countries could expect more insightful findings from the decision paths of the public policies under different schemes. I will keep reviewing related literature and investigate the topic to enrich the research idea of this project.

References

[1] WHO | China's village doctors take great strides. Library Catalog: www.who.int Publisher: World Health Organization.

[2] G. A. Akerlof. The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics*, 84(3):488–500, Aug. 1970. Publisher: Oxford Academic.

[3] K. J. Arrow. Uncertainty and the Welfare Economics of Medical Care. *The American Economic Review*, 53(5):941–973, 1963. Publisher: American Economic Association.

[4] W. Bank, editor. *Financing health care: issues and options for China*. China 2020 series. World Bank, Washington, D.C, 1997.

[5] A. Blomqvist. Optimal non-linear health insurance. *Journal of Health Economics*, 16(3):303–321, June 1997.

[6] Blomqvist and H. Horn. Public health insurance and optimal income taxation. *Journal of Public Economics*, 24(3):353–371, Aug. 1984.

[7] D. Blumenthal and W. Hsiao. Privatization and Its Discontents — The Evolving Chinese Health Care System. *New England Journal of Medicine*, 353(11):1165–1170, Sept. 2005.

[8] Y. Chen and G. Z. Jin. Does health insurance coverage lead to better health and educational outcomes? Evidence from rural China. *Journal of Health Economics*, 31(1):1–14, Jan. 2012.

[9] L. Cheng and Y. Zhang. The New Rural Cooperative Medical Scheme: Financial Protection or Health Improvement? *Economic Research Journal*, 47(01):120–133, 2012.

[10] J. Das, J. Hammer, and K. Leonard. The Quality of Medical Advice in Low-Income Countries. *Journal of Economic Perspectives*, 22(2):93–114, June 2008.

[11] Z. Dong and M. R. Phillips. Evolution of China's health-care system. *The Lancet*, 372(9651):1715–1716, Nov. 2008.

[12] M. S. Feldstein. The Welfare Loss of Excess Health Insurance. *Journal of Political Economy*, 81(2, Part 1):251–280, Mar. 1973. Publisher: The University of Chicago Press.

[13] J. Feng and Z. Li. Risk Management Options for Health Care in Rural China. *Economic Research Journal*, 44(04):103–115, 2009.

[14] J. Feng, F. Liu, and Q. Chen. Impact of New Cooperative Medical System on Health Care Price. *Economic Research Journal*, 45(11):127–140, 2010.

[15] J. Feng and Z. Song. Health Care System in Rural China :A Quantitative Approach Based on Heterogeneous Individuals. *China Economic Quarterly*, (03):841–858, 2007.

[16] A. Finkelstein and R. McKnight. What did Medicare do? The initial impact of Medicare on mortality and out of pocket medical spending. *Journal of Public Economics*, 92(7):1644–1668, July 2008.

[17] A. Finkelstein, S. Taubman, B. Wright, M. Bernstein, J. Gruber, J. P. Newhouse, H. Allen, K. Baicker, and O. H. S. Group. THE OREGON HEALTH INSURANCE EXPERIMENT: EVIDENCE FROM

THE FIRST YEAR. *The Quarterly Journal of Economics*, 127(3):1057–1106, 2012. Publisher: Oxford University Press.

[18] H. Fu, L. Li, M. Li, C. Yang, and W. Hsiao. An evaluation of systemic reforms of public hospitals: the Sanming model in China. *Health Policy and Planning*, 32(8):1135–1145, Oct. 2017.

[19] A. M. Garber and J. Skinner. Is American Health Care Uniquely Inefficient? *Journal of Economic Perspectives*, 22(4):27–50, Dec. 2008.

[20] M. Grossman. On the Concept of Health Capital and the Demand for Health. *Journal of Political Economy*, 80(2):223–255, 1972. Publisher: University of Chicago Press.

[21] M. J. Hanratty. Canadian National Health Insurance and Infant Health. *The American Economic Review*, 86(1):276–284, 1996. Publisher: American Economic Association.

[22] W. Hsiao. Financing health care : issues and options for China. Technical Report 17091, The World Bank, Sept. 1997. ISBN: 9780821340486.

[23] W. C. Hsiao. The Chinese health care system: lessons for other nations. *Social Science & Medicine (1982)*, 41(8):1047–1055, Oct. 1995.

[24] Y. LEE and H. KIM. The Turning Point of China's Rural Public Health during the Cultural Revolution Period: Barefoot Doctors: A Narrative. *Iranian Journal of Public Health*, 47(Suppl 1):1–8, July 2018.

[25] X. Lei and W. Lin. The New Cooperative Medical Scheme in rural China: does more coverage mean more service and better health? *Health Economics*, 18(S2):S25–S46, 2009. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1002/hec.1501.

[26] Y. Liu. Development of the rural health insurance system in China. *Health Policy and Planning*, 19(3):159–165, May 2004.

[27] Ministry of Health (PRC). Research on national health services – an analysis report of the National Health Services Survey in 1993., 1994.

[28] Ministry of Health (PRC). Reports on the 1998 National Health Services Survey results, 1999.

[29] National Health Commission. China health statistics yearbook 2018, 2018.

[30] M. of Health (PRC). China health statistics yearbook 2011, 2012.

[31] M. V. Pauly. Overinsurance and Public Provision of Insurance: The Roles of Moral Hazard and Adverse Selection. *The Quarterly Journal of Economics*, 88(1):44–62, 1974. Publisher: Oxford University Press.

[32] J. Skinner, E. Fisher, and J. E. Wennberg. The Efficiency of Medicare. Working Paper 8395, National Bureau of Economic Research, July 2001. Series: Working Paper Series.

[33] M. Spence. Product differentiation and performance in insurance markets. *Journal of Public Economics*, 10(3):427–447, Dec. 1978.

[34] M. Spence and R. Zeckhauser. Insurance, Information, and Individual Action. *The American Economic Review*, 61(2):380–387, 1971. Publisher: American Economic Association.

[35] A. Wagstaff and M. Lindelow. Can insurance increase financial risk?: The curious case of health insurance in China. *Journal of Health Economics*, 27(4):990–1005, 2008. Publisher: Elsevier.

[36] J. Watts. China's rural health reforms tackle entrenched inequalities. *The Lancet*, 367(9522):1564–1565, May 2006.

[37] F. Xueshan, T. Shenglan, G. Bloom, M. Segall, and G. Xingyuan. Cooperative medical schemes in contemporary rural China. *Social Science & Medicine*, 41(8):1111–1118, Oct. 1995.

[38] W. Yip, H. Fu, A. T. Chen, T. Zhai, W. Jian, R. Xu, J. Pan, M. Hu, Z. Zhou, Q. Chen, W. Mao, Q. Sun, and W. Chen. 10 years of health-care reform in China: progress and gaps in Universal Health Coverage. *The Lancet*, 394(10204):1192–1204, Sept. 2019.

[39] W. Yip and W. Hsiao. China's health care reform: A tentative assessment. *China Economic Review*, 20(4):613–619, Dec. 2009.

[40] W. C.-M. Yip, W. C. Hsiao, W. Chen, S. Hu, J. Ma, and A. Maynard. Early appraisal of China's huge and complex health-care reforms. *The Lancet*, 379(9818):833–842, Mar. 2012.

[41] H. Yu. Universal health insurance coverage for 1.3 billion people: What accounts for China's success? *Health Policy*, 119(9):1145–1152, Sept. 2015.

[42] D. Zhang and P. U. Unschuld. China's barefoot doctor: past, present, and future. *The Lancet*, 372(9653):1865–1867, Nov. 2008.

[43] W. Zhao. Does New Rural Cooperative Medical Insurance Improve the Health of Rural Residents. *Economic Research Journal*, 46(01):141–154, 2020.

[44] S. Q. Zhou. Seize the right time to extent, cooperative medical insurance schemes. *China Health Economics*, 1991.

6 Appendix A

Source: Yip et al. (2019)

	2010	2012	2014	2016	Difference between 2016 and 2010	p value
Hospital admission rate						
All	7·41%	8·33%	10·66%	13·52%	6·11%	<0·01
Urban	7·34%	8·18%	10·71%	14·94%	7·60%	<0·01
Rural	7·49%	8·47%	10·70%	11·20%	3·71%	<0·01
Group by household Income*						
First quartile (0–25%)	8·61%	8·95%	11·82%	13·94%	5·33%	<0·01
Second quartile (26–50%)	7·21%	8·89%	10·62%	13·07%	5·86%	<0·01
Third quartile (51–75%)	6·89%	7·70%	10·17%	12·84%	5·95%	<0·01
Fourth quartile (76–100%)	6·97%	7·89%	9·92%	14·92%	7·95%	<0·01
Rate of doctor visit in the last 15 days among respondents older than 15 years						
All	16·23%	18·18%	20·13%	22·66%	6·43%	<0·01
Urban	14·63%	15·99%	18·24%	22·57%	7·94%	<0·01
Rural	17·85%	20·72%	23·19%	22·87%	5·02%	<0·01
Group by household income						
First quartile (0–25%)	19·98%	20·52%	23·53%	26·42%	6·44%	<0·01
Second quartile (26–50%)	16·11%	18·92%	21·45%	24·01%	7·90%	<0·01
Third quartile (51–75%)	15·21%	17·08%	18·63%	20·73%	5·52%	<0·01
Fourth quartile (76–100%)	13·55%	16·82%	17·11%	19·70%	6·15%	<0·01
Reimbursement rate of inpatient care among respondents older than 15 years†						
All	29·41%	34·65%	39·65%	41·19%	11·78%	<0·01
Urban	34·87%	39·87%	43·33%	44·25%	9·38%	<0·01
Rural	24·34%	29·69%	34·72%	34·58%	10·24%	<0·01
Group by household Income						
First quartile (0–25%)	23·86%	31·13%	36·38%	38·01%	14·15%	<0·01
Second quartile (26–50%)	24·98%	32·75%	39·61%	35·67%	10·69%	<0·01
Third quartile (51–75%)	32·85%	35·89%	37·05%	41·80%	8·95%	<0·01
Fourth quartile (76–100%)	39·60%	39·86%	48·15%	50·28%	10·68%	<0·01
The proportion of households with catastrophic health expenditure‡						
All	14·35%	14·54%	11·04%	10·65%	–3·70%	<0·01
Urban	12·25%	12·31%	9·24%	8·89%	–3·36%	<0·01
Rural	16·36%	16·88%	13·16%	13·07%	–3·29%	<0·01
Group by household income						
First quartile (0–25%)	22·91%	20·91%	16·74%	16·75%	–6·16%	<0·01
Second quartile (26–50%)	13·72%	14·74%	10·95%	10·98%	–2·74%	<0·01
Third quartile (51–75%)	9·97%	11·88%	8·80%	8·59%	–1·38%	<0·05
Fourth quartile (76–100%)	9·95%	10·23%	7·55%	7·25%	–2·70%	<0·01

The proportion of households with catastrophic health expenditure§						
All	13·58%	11·98%	11·43%	11·06%	−2·52%	<0·01
Urban	11·15%	10·61%	9·25%	8·94%	−2·21%	<0·01
Rural	15·90%	13·42%	13·99%	14·01%	−1·89%	<0·01
Group by household Income						
First quartile (0–25%)	22·17%	16·71%	17·32%	17·49%	−4·68%	<0·01
Second quartile (26–50%)	13·55%	12·29%	12·23%	11·69%	−1·86%	<0·01
Third quartile (51–75%)	9·78%	10·11%	8·73%	8·95%	−0·83%	0·339
Fourth quartile (76–100%)	9·06%	9·16%	7·34%	6·95%	−2·11%	<0·05
The proportion of households with catastrophic health expenditure¶						
All	31·45%	29·27%	27·99%	27·28%	−4·17%	<0·01
Urban	29·09%	27·01%	23·80%	24·89%	−4·20%	<0·01
Rural	33·71%	31·68%	32·99%	30·87%	−2·84%	<0·01
Group by household Income						
First quartile (0–25%)	41·58%	33·81%	36·55%	35·85%	−5·73%	<0·01
Second quartile (26–50%)	32·33%	31·03%	31·18%	29·43%	−2·90%	<0·05
Third quartile (51–75%)	27·04%	27·31%	24·76%	23·91%	−3·13%	<0·05
The richest quartile (76–100%)	25·03%	24·22%	19·01%	21·14%	−3·89%	<0·01

CFPS=China family panel studies.*In 2016, the household income per capita for the first quartile was ¥2216, second quartile was ¥7725, third quartile was ¥15756, and fourth quartile was ¥42909. †CFPS does not ask respondents to recall inpatient expenditure for every admission. Instead, CFPS asks respondents to recall total inpatient expenditures in the last year. ‡The percentage of households in which out-of-pocket payments for health care was 40% or more of households' total consumption expenditure net of food. §The percentage of households in which out-of-pocket payments for health care was 25% or more of households' total consumption expenditure net of food. ¶The percentage of households in which out-of-pocket payments for health care was 10% or more of households' total consumption expenditure net of food.