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The Security Effect and Operating Mechanism of the "Zhanjiang Model" of the Serious Illnesses Medical Insurance System

Luo Liming

Doctor of Management

Supervisor:
PhD Luis Martins, Assistant Professor,
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I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

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Abstract

In China, the current critical illness insurance program varies significantly from region to region and is characterized by “fragmentation”. At present, the “Zhanjiang model” is one of the main representative models of critical illness insurance program. The “Zhanjiang model” is a reform and innovation made by the Zhanjiang Municipal Government in establishing a critical illness insurance program, in which commercial insurance has been introduced into the social security system for the first time in China. Through reinsurance, it has increased the reimbursement amount of insured patients with critical illnesses and improved the level of cooperation between the government and enterprises and the coverage scope of the insured persons. Still, there are problems that need to be further summarized and studied, including: how effective is the system in providing security for the insured people since its implementation? Can it effectively reduce the incidence of catastrophic medical expenditures for the insured families? Does the system fully demonstrate the characteristics of fairness and efficiency? And what are the major problems in the operating mechanism? Therefore, this research takes the “Zhanjiang model” as the case to study the role of critical illness insurance program in reducing both the incidence of catastrophic medical expenditures and the level of medical expenditures in the families in Zhanjiang, by applying the theories of health economics, welfare economics, public goods and social security and adopting the method of field research. At the same time, based on the principles of fairness and efficiency, this research adopts marginal utility and Gini coefficient to develop a model to describe the fairness and efficiency of the use of critical illness insurance funds. And by means of qualitative comparative research and literature induction research, this thesis studied and analyzed the operating mechanism of the “Zhanjiang model” from the aspect of the policy and proposed suggestions for optimization.

The study found that: (1) After the implementation of the “Zhanjiang model”, according to data analysis in 2015, the incidence of catastrophic medical expenditures in Zhanjiang urban and rural households decreased from 5.34% to 3.14% under the 40% definition standard, and the proportion of per capita medical and health expenditures in Zhanjiang dropped from 37% to 11% during 2013-2018. However, critical illness medical insurance has exerted no obvious effect on reducing the incidence of family catastrophic medical expenditures, which should be further optimized. (2) Under the same budget constraints, the disease-free scheme of the critical illness insurance program could be more fair and effective.

(3) The supporting policies for the “Zhanjiang model” of critical illness insurance program should be further improved; the level of coordination and fund utilization efficiency should be promoted; and a dynamic adjustment mechanism for diversified financing should be established. Each region should implement critical illness insurance policies according to its local conditions.

Keywords: Critical illness medical insurance; System; The Zhanjiang model; Catastrophic medical expenditure; Fairness; Efficiency

JEL: H41; H51

Resumo

Na China, os sistemas de seguros de saúde para cobrir custos provenientes de doenças graves, apresentam enormes diferenças de região para região, assumindo características fragmentadas. Atualmente, o modelo "Zhanjiang" constitui um dos principais modelos representativos deste tipo de seguros . O modelo "Zhanjiang" resulta de uma reforma inovadora destes sistemas, concebido pelas autoridades governamentais locais tendo sido o pioneiro em introduzir os seguros comerciais no sistema de seguro social da China. Através do resseguro proveniente desta cooperação entre o público e o privado, foi aumentado o reembolso das despesas dos segurados com doenças críticas e incrementado o nível de cooperação entre o governo e empresas, ampliando a cobertura dos segurados. Mesmo assim, existem problemas que merecem maior sistematização e pesquisa, incluindo: quão eficaz é o seguro após a implementação do sistema? Pode reduzir-se efetivamente a probabilidade de despesas médicas catastróficas das famílias seguradas? O sistema reflete totalmente justiça e eficiência? E quais são os principais problemas com os mecanismos de operacionalização? Assim, a presente tese toma o modelo do "Zhanjiang" como caso de estudo para investigar o papel do sistema de seguro de saúde na redução da probabilidade de despesas médicas catastróficas das famílias seguradas, assim como o nível de despesas médicas das famílias em Zhanjiang. Recorre-se às teorias da economia da saúde, economia do bem-estar, bens públicos e segurança social como suporte ao desenvolvimento da pesquisa de terreno. Em simultâneo, com base no princípio de justiça e eficiência, esta pesquisa adota a utilidade marginal e o coeficiente de Gini para estabelecer um modelo visando descrever a justiça e a eficiência no uso dos fundos do seguro de saúde para doenças graves. Através do estudo comparativo de natureza qualitativa, a presente tese analisa o mecanismo operacional do modelo de Zhanjiang, desde o nível da sua conceção enquanto política social, propondo sugestões de otimização.

O estudo constatou que: (1) Após a implementação do modelo de Zhanjiang, de acordo com a análise de dados em 2015, a ocorrência de despesas médicas catastróficas de residentes urbanos e rurais em Zhanjiang caiu de 5,34% para 3,14%, abaixo do objetivo definido de 40%. De 2013 a 2018, a proporção de despesas médicas e de saúde per capita na cidade de Zhanjiang desceu de 37% para 11%. No entanto, ainda que estas reduções sejam importantes não debelaream ainda a ocorrência de despesas médicas catastróficas famíliares, o que deve ser no futuro otimizado. (2) Face às mesmas restrições orçamentais, o esquema

do seguro de saúde sem restrição do tipo de doenças, deve ser mais justo e efetivo. (3) Devem ser melhoradas as políticas de apoio ao modelo Zhanjiang de seguros de saúde para doenças graves; o nível de coordenação e a eficiência de utilização dos fundos do seguro de saúde devem ser igualmente incrementados; o mecanismo de ajustamento dinâmico para o financiamento deve ser implementado. Cada região deve assim aplicar programas de seguros de saúde para doenças graves, de acordo com as condições locais.

Palavras-chave: Seguro saúde para doenças graves; Sistema; Modelo "Zhanjiang"; Despesas médicas catastróficas; Justiça; Eficiência
JEL: H41; H51

摘　要

在中国，目前各地区大病医保制度差异明显，呈现“碎片化”特征。现阶段，大病医保“湛江模式”是主要代表模式之一。“湛江模式”是湛江市政府在建立大病医保制度中的一项改革创新，在中国首次将商业保险引入社会保障体系，通过再保险的方式，提高了参保大病患者的报销额度，提升了政企合作水平和参保人员保障范围。该制度实施后，它的保障效果如何？能有效的降低参保人员家庭灾难性医疗支出的发生概率吗？充分体现了公平与效率吗？运行机制还存在哪些主要的问题？这迫切需要进一步总结和研究。因此，本文以“湛江模式”为例，运用健康经济学、福利经济学、公共产品与社会保障等理论。通过实地调研法，考察大病医保制度“湛江模式”在降低湛江家庭灾难性医疗支出的发生概率以及医疗支出水平方面的作用。同时基于公平与效率原则，应用边际效用、基尼系数建立相关模型，描述大病医保资金使用的公平及效率。并通过定性对比研究和文献归纳研究的方法对“湛江模式”运行机制从政策层面进行研究分析，提出优化建议。

研究发现：（1）“湛江模式”推行后，据 2015 年数据分析，在 40%的界定标准下，湛江城乡居民家庭灾难性医疗支出的发生率由 5.34%降到 3.14%，2013-2018 年期间，湛江市人均医疗卫生支出比重由 37%降到 11%，效果明显。但大病医疗保险这单一因素在降低家庭灾难性医疗支出发生概率方面的作用不明显，应进一步优化。（2）在相同的资金预算约束下，大病医保制度无病种限制方案能够得到更好的公平性和更大的总效用。（3）应进一步完善大病医保“湛江模式”配套政策，提高统筹层次与基金利用效率，构建多元化筹资动态调整机制，各地区应因地制宜实施大病医保政策。

关键词：大病医保；制度；湛江模式；灾难性医疗支出；公平；效率

JEL: H41; H51

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Chapter 1: Introduction

1.1 Research background

The pursuit for health is the common wish of mankind, and keeping people away from diseases is an important manifestation of protecting people’s rights to survival and development. However, with the development of the market economy, traditional family and social structures have gradually disintegrated. The weakness of family power and the dispersion of social power have weakened the ability of urban and rural residents and families to take risks, and especially the high cost of treatment threatens the survival of individuals and the development of families. In 2003, researchers from World Health Organization (WHO) (Xu et al., 2003) conducted a sample survey of households in 59 countries around the world to explore the variable relationship between household income and catastrophic medical expenditure. Regressive analysis of the data obtained shows that the medical expenditure paid by residents or households / (total household income-household essential food and other living expenditure) is greater than 40%, and this is called catastrophic medical payment. It is found in the survey that the proportion of households with “catastrophic medical expenditure” in various countries is very different, among which the highest proportion appears in some Latin American countries and sometransitional economies. The availability of medical services, medical affordability, and medical insurance are the key conditions that determine whether “catastrophic medical expenditures” occur and a problem with any of them may lead to “catastrophic medical expenditures” for families. Once residents or families have “catastrophic medical expenditures”, people will have to save money to reduce their investment in children’s education. Research shows that more than 150 million people in about 44 million households worldwide have “catastrophic medical expenditure”, plunging more than 100 million people in 25 million households into poverty. It is worth noting that when medical expenditure exceed the level of “catastrophic medical expenditure”, many people can no longer afford outpatient, medical and examination services, nor can they afford transportation and accommodation during treatment and have to abandon medical treatment. Therefore, diseases further damage their health, weaken their ability of wealth-production and self-development, worsen the situation

of poverty, and even throw people into the dilemma of long-term poverty and intergenerational transmission of poverty (Xu et al., 2005). Therefore, for any country or region, it is particularly important to set up a health coordination system that keeps pace with the times to avoid families falling into illness-caused poverty or returning to poverty due to illnesses. This also tests the governance capabilityof a country or region’s ruling party.

Generally speaking, the main factors that contribute to “catastrophic medical expenditure” for families include: (1) out-of-pocket expenditure (OOP) medical services, (2) weak household affordability, and (3) lack of prepayment mechanism for disease prevention. That is to say, the cost-effective treatment of medical payment and medical services, the ability of patient’s family to pay, the corresponding medical insurance and pre-payment mechanism determine whether a family would fall into illness-caused povertyor return to poverty due to illness. Therefore, in order to alleviate the problem of illness-caused poverty or reduce serious illnesses catastrophic health expenditure, most countries and regions are currently establishing pre-payment mechanisms by taxing residents or collecting insurance premiums. When out-of-pocket medical expenditure beyond some families’s ability to pay, especially those with elderly, infirm, physically-disabled and chronically ill members, their demand for medical services is stronger but their ability to pay is weaker, the pre-payment mechanism can reduce their medical costs, relieve their worries about the high cost of medical services and increase the utilization rate of medical services. Therefore, the more compensation the prepayment mechanism has for medical expenses paid by families, especially the poor families, the more effective it is to avoid “catastrophic medical expenditure” for families, which is conducive to improving the health status of these families and promoting social equity and justice. According to the study of Xu et al. (2005), very few residents or families face “catastrophic medical expenditure” when their out-of-pocket expenses do not exceed 15% of the total medical costs. In practice, the scope of medical security, compensation projects and compensation amount of the prepayment mechanism is also limited due to factors such as the level of national economy, social development and political, cultural and customary factors. Initially, only a small number of residents or families were covered by the prepayment mechanism, while many residents and families still incurred medical costs that were not adequately compensated or not compensated by the pre-payment mechanism. Experience in developed countries has also shown that even in economically developed regions, high income levels do not automatically eliminate “catastrophic medical expenditure”, whose occurrence is closely related to the price, quality

and accessibility of medical services. In the long run, to build an efficient, convenient, sound and affordable medical service system, it is necessary to develop various forms of pre-payment mechanisms and other forms of joint pre-payment mechanism in terms of national public health and social medical insurance, etc., so as to greatly reduce the proportion of out-of-pocket expenses of households in China as well as the incidence of catastrophic medical expenditure.

In 2012, *The Lancet* noted that in 2011, the proportion of households in China with “catastrophic medical expenditure” is 12.9%, the proportion in the central and western china (13.3%) was higher than that in the east China(11.9%), and the proportion of rural households (13.9%) was higher than that of urban households (10.9%) (Meng et al., 2012). The study shows that Chinese households are at serious risk of disease, and that differences in urban and rural and geographical development have a significant impact on “catastrophic medical expenditure” and that the adoption of policies and measures to reduce “catastrophic medical expenditure” is challenging. As a result of China’s long-standing household registration system, the family planning policy and the long-term implementation of economic policies in which rural area supports the development of towns and agriculture supports industries, a series of problems appear such as the isolated economic and social development of urban and rural areas, the accelerated aging population and the imbalance of regional development. The establishment of pre-payment mechanisms in China with such a large population, vast territory and complex socioeconomic status to provide health care for residents and families and reduce the incidence of “catastrophic medical expenditure” is a long-term and arduous undertaking.

However, the serious threat of diseases faced by most of the peoplebecomes the shackles of implementation of economic reform, and even to some extent affects political stability. Since the 1990s, the construction and reform of a new pre-payment mechanism, taking social medical insurance as the main form, has been gradually carried out in China. In 1997, targeted at protecting formal employees, the Chinese government established the basic medical insurance system for urban employees in which employers and employees pay in proportions so as to meet people’s basic medical needs. Various subsidy systems have also been established to reduce catastrophic medical expenditures. This mechanism effectively reduces the level of disease risk, and urban workers get medical security as a result. However, there are some deficiencies in this medical security model .For example, only a small number of full-time employees are protected, benefiting a small number of people. However, this

medical security model can provide a reference for each region to further improve local medical care services and reduce the incidence of catastrophic medical expenditure.

The new-type cooperative medical system (hereinafter referred to as NCMS) and the medical insurance system for urban and rural residents has covered most of the urban and rural population, and obviously alleviated the burden on urban and rural residents and on rural medical system in China. However, under the influence of low level of financing, large population, low level of management skill and other reasons, coupled with the the new rural cooperative medical insurance and basic medical insurance, some families and residents in China have received little economic compensation and weak risk protection, so the issue of illness-caused poverty and returning to poverty due to illness is still unsolved. How to reduce the disease risk loss of urban and rural residents and families, reduce the incidence of “catastrophic medical expenditure”, and establish a new pre-payment mechanism to make up for the lack of basic medical insurance in urban and rural areas is urgent. In the future, China’s medical security system will undergo major changes, and it will be more comprehensive and will reach a new high level. The new compound medical security model is officially introduced, changing from “wide coverage and basic protection” to “wide coverage, basic protection andmulti-level”. By the end of 2017, a total of 920 million urban and rural residents have enjoyed the medical security and the reimbursement rate increased by 10-15 percentage points, more than 17 million people benefiting from this. China has made great achievement in solving the family’s catastrophic medical expenditure since the implementation of the medical security system for serious illnesses. However, there are still many problems that need to be optimized and solved, for example: Can system differences significantly reduce the incidence of catastrophic medical expenditure of local insured families? How can we better ensure equity and efficiency? What other aspects need to be optimized in terms of operation mechanism and policy-making? In recent years, these issues have been the focus of academia and government policy makers.

This research will take Zhanjiang Model’s practice of medical insurance for serious illnesses as an example, apply theories such as welfare economics, health economics, public products to study this model’s security effect and operating mechanism, and analysis and conclusion will be made.

1.2 The objective and meaning of research

1.2.1 The objective of research

China has established basic medical insurance for urban workers, and the new rural cooperative medical insurance and basic medical insurance for urban residents. At present, the first two have been merged into the basic medical insurance system for urban and rural residents (Shang & Lv, 2017), and on this basis derived the medical insurance system for serious illnesses as a supplement to the basic medical insurance. After nearly 20 years of development, medical insurance gradually moves towards today's unified management by National Healthcare Security Administration. The payment threshold, reimbursement ratio, drugs covered by medical insurance of various basic medical security systems are gradually unified from the differences of various regions and different security systems. However, due to the uneven economic development of various regions, there are still great differences in outpatient services, inpatient payment threshold, reimbursement ratio, the range of durgs covered by medical insurance. Moreover, outpatient, in-patient payment threshold, reimbursement ratio, the range of drugs covered by medical insurance for rural and urban residents and urban workers are still different, but the gap is gradually narrowed. The medical insurance system for serious illnesses and the medical assistance system in some areas supplement the basic medical insurance, which prevent some families from falling into illness-caused poverty or returning to poverty due to illness. However, some scholars believe that, according to the current situation of our country and the experience and lessons of some developed countries' health insurance policies, to continuously implement the policy of "Healthy China" and achieve sustainable development, it is necessary to make clear the boundaries of basic medical insurance, serious illnesses co-ordination and other projects. We can't blindly raise the reimbursement rate, over-weaken the payment liability, blindly expand the scope of reimbursement, and oppose the proposal to include sports expenditure, health and wellness expenditure and other items into the scope of basic medical reimbursement. Deepen the reform of medical payments through a clear sharing mechanism with clear rights and responsibilities in accordance with the law, return to the insurance attributes of basic medical care and medical care for serious illnesseses, and avoid the waste of health insurance funds and the collapse of health insurance funds, thus contributing to the implementation of "Healthy China" policy (Shang & Lv, 2017).

At present, the medical insurance system for serious illnesses adopts the pre-payment

mechanism. China’s pre-payment mechanism is established by way of urban-rural segregation, which is composed of the pre-payment mechanism for the urban registered residents and the pre-payment mechanism for the rural registered residents. There are significant differences in the financing model, the scope of compensation and the level of compensation, and its essence isa dual social medical insurance system. With the implementation of China’s reform and opening-up policy in the 1980s, NCMS tends to collapse with the breakdown of rural collective economic system (due to funding mechanism failure). With the further development of China’s security system for residents, the difference of medical security system caused by the difference of identity is gradually eliminated, and regional differences appear instead. At present, “Zhanjiang Model”, “Taicang Model” and other models with regional characteristics have implemented in China. At present, there are obvious differences in the level of economic development, population structure, basic medical insurance system, regional medical and health conditions, disease risk types and conditions in various regions. Therefore, in order to better promote the development of medical insurance for serious illnesseses, and to better respond to several key issues that need to be solved after the implementation of the serious illnesses medical security system: (1) the fundamental purpose of serious illnesses medical insuranceserious illnesses is to tackle the problem of “illness-induced poverty and returningto poverty due to illness”. Therefore, under different systems, can the implementation of different systems significantly reduce reduce the out-of-pocket expenses of urban and rural residents? Can there be a significant reduction in the incidence of catastrophic medical expenditure for insured families? (2) The formulation and optimization of medical insurance policy for serious illnesses involves the design of multiple standards such as payment threshold and reimbursement ratio, and the design of these standards needs to be based on certain principles. From an economic point of view, are these standards designed based on principles of “equity” and “efficiency”? How can the medical security system for serious illnesses better reflect equity and efficiency? (3) What other aspects need to be optimized in terms of operation mechanism and policy-making? These problems need to be verified by evidence-based research.

Therefore, this research takes Zhanjiang City, China as an example, using the theories of health economics, welfare economics, public goods and social security. Through field research, this thesis examine the role of Zhanjiang’s medical insurance system in reducing the probability of catastrophic medical expenditure and the level of expenditure of

households in Zhanjiang. The model is based on the principle of equity and efficiency, and the Gini coefficient is used to describe the equity of medical insurance funds for serious illnesses, and the use efficiency of funds in the medical insurance system for serious illnesses is described by marginal utility. Through qualitative comparative study and literature induction, this thesis analyzes the operation mechanism of serious illness medical insurance system from the perspective of policy, and put forward optimization recommendations.

1.2.2 The meaning of research

Zhanjiang City began to explore the medical security system model in 2009. The urban-rural integration of the medical security model and practical experience of serious illness medical security have important reference significance for other regions of China to promote the system of serious illness medical security and eliminate the dual structure of urban and rural areas, and can effectively promote the the introduction of *Guidance Opinions* as a programmatic policy. (Zeng, 2014). According to *the Zhanjiang City Statistical Yearbook*, in 2012, Zhanjiang's per capita GDP was 26,734 yuan with the urban population/total population (38.30%) and the total health expenditure/GDP (5.20%).While in 2012, the average Chinese GDP was 38,354 yuan with the urban population/total population (52.6%) and the total health expenditure/GDP (5.36%). In 2012, the Engel coefficients for urban and rural households in Zhanjiang were 41.80% and 51.2% respectively, and that of rural households was 10% higher than that of urban households (*Zhanjiang Statistical Yearbook*, 2009-2012). The above data show that the gap between the rich and the poor in Zhanjiang is large, which seriously affects the reform of the integrated medical security system for urban and rural residents (Yin & Chen, 2012).

Zhanjiang serious illnesses medical insurance system is implemented on the basis of the integration of NCMS and urban residents' medical insurance system, so that rural and urban residents are insured against serious illness, breaking the registered residence and regional barriers of the insured participants in the past. The operation characteristics of "Zhanjiang Model" include "government purchase, amplified guarantee, secondary compensation" and so on. The main contents include the following aspects: 1) Take full coverage of urban and rural areas. Since 2009, Zhanjiang municipal government has merged NCMS and urban residents' medical insurance system to establish a unified medical insurance system. 2) The operation of funds is divided, which means that in the case of individual payment and government expenditure unchanged, a part of the general fund will

be taken out to buy large medical insurance. 3) Promote integrated management, so that the basic can be supplemented and reduce operating costs.4. Implement the whole process monitoring of “information + capital”. Social security departments, health insurance designated hospitals, insurance companies should cooperate to improve the management level and establish a unified risk prevention mechanism. It adopts the “Trinity model” of “Total Amount Control, Monthly Prepayment and Year-end settlement” (Zeng, 2014). This thesis takes Zhanjiang as an example to examine the effect of the medical security model and its operating mechanism.

The significance of this research is mainly reflected in the following aspects: Firstly, based on the current background and practical experience of China’s serious illness medical security policy, this research will conduct a comparative analysis of the serious illness medical security models, their operating mechanism and their scopes of application in major representative regions of China. This can provide the basis for other regions to choose the appropriate medical security model for serious illnesses; Secondly, using the survey data of the serious illness medical insurance in Zhanjiang City, the effect of serious illness medical insurance system in reducing catastrophic health expenditure of insured families is tested. In addition, the modeling and analysis of the design of serious illness medical security system from the perspective of efficiency and equity can provide a basis for its optimization and improvement at the present stage. This study can also provide useful experience for the country to further summarize, optimize and promote serious illness medical security system.

1.3 Theoretical basis of research

1.3.1 Thoery of health economics

Health economics is widely used in many fields, among which the assertion of “healthy human capital”, principal agent relationship used in system innovationand the adverse risk of information asymmetry are of great value to this thesis. In the middle of the 20th century, some economists put forward the idea that “health is a kind of human capital”. In 1962, Dr. S.J. Mushkin incorporated “Health and Education” in his article *Health as An investment.* Dr. Grossman first introduced the theory, which belonged to the concept of human capital, and built a health needs model that combined human capital and health in 1972 . This theoretical basis can be used in the field of production market, calculating production related problems, and directly used as utility variables. The individual’s health is depreciated with

age, and capital needs to be invested to protect against health problems when the depreciation rate rises significantly, so the need for health means that the individual’s health investment is to reduce the depreciation rate of healthy capital, extend the length of health or life. Grossman initially believed that health should not be calculated according to depreciation rates, and that health is a decentralized variable with random, discrete characteristics. Depreciation rate is an endogenous variable that conforms to the characteristics of random variables, so everyone’s need for medical services and health needs would increase. Selden and Chang introduced some relationships based on the model, making assumptions about the material and physical health of individuals, and thus introducing an uncertain feature. Dardanoni and other scholars point out that there is a positive correlation between health status, the degree of personal interest in health, and the uncertainty of personal property. When the government provides health care to the people, individual’s health capital will be reduced accordingly. But if the price of social insurance is high, commercial insurance will flood into the market, so a lot of health capital will be put into the commercial insurance market.

Health as a human capital theory has been widely applied in modern society, residents’ health can guarantee the social productivity. As the government plays a leading role in providing major disease protection for urban and rural residents, the government shouldincrease the financial investment in medical services, stimulate residents’ desire for health, and ensure residents’ reasonable medical consumption. In addition, on the basis of implementing the basic medical security policy for urban and rural residents, the government should constantly improve the security work of major diseases, so as to improve the demand and utilization rate of medical services. Aeverse selection, asymmetric information between doctors and patients and moral hazard proposed by Arrow are very important in health economics. Therefore, many economists believe that Arrow’s research direction is the risk index of health insurance and the core of health economics. Huang and Gan (2010) conducted in-depth study on the medical security situation of the urban elderly in China. The results showed that when the elderly participated in the medical insurance, the family self-paid expenses were significantly reduced, and the death risk was 19% lower than that of the uninsured elderly, but the total medical expenses were on the high side. Cheng and Zhang (2012) in 2005, conducted a follow-up survey on the implementation effect of NCMS and found that: the personal health level and the frequency of medical treatment increased after people participating in NCMS. This makes full use of the medical service resources in rural

areas and encourages the improvement of medical service level. Serious illness insurance system for residents began to be implemented nationwide in 2012, which is an innovative model that is underwritten by commercial insurance institutions and led by the government. This new model essentially shows the principal-agent relationship in health economics, which can improve the protection of residents' major diseases from the aspects of technology, risk management and specialty. It can really alleviate the financial risk of residents and avoid "illness-caused poverty and returning to poverty due to illness"

1.3.2 The theory of welfare economics

Welfare economics is essentially a normative distribution economy. In 1920, *Welfare Economics* written by Pigou from the UK marked the birth of welfare economics, which was later called as old welfare economics. Pigou divides welfare into economic welfare and social welfare. Economic welfare is only a part of social welfare but it has a decisive influence on social welfare and reflects the social situation to some extent. Since the beginning of the last century, scholars like N. Kaldor, A. Bergson, Hicks, A. Lerner and Samuelson replaced the cardinalutility theory with indifference curve analysis and ordinal utility theory, and established a new welfare economics by revising Pigou's old welfare economics. According to the new welfare economics, any redistribution will make at least one person's situation better, which is the Pareto optimality of efficient allocation. Therefore, Pareto optimization means that at least one perso's situation becomes better under other conditions unchanged (Li, 2011).

Compared with the old welfare economics, the new welfare economics has both progress and regression. First of all, the new welfare economics opposes the government's comprehensive control of distribution and production and supports that the market mechanism of free competition can maximize social welfare and realize the optimal allocation of resources, which is an affirmation of the role of the market mechanism. However, according to the new welfare economics, the value judgment involved in the old welfare economics should be excluded from the study of economics. The views of "social welfare function theory" and "Kaldor-Hicks rule" also imply the problem of distribution. On the one hand, it holds that the allocation of rationality is determined by public opinion, or the ruling class such as the government or Congress. But what is the definition of "rationality"? It's not clear whether "rationality" benefits the rich or the poor. On the other hand, they believe that the government can compensate for the poverty caused by social

change through social security transfer policies, and that the government has no responsibility to address poverty caused by individuals' own causes (Li, 2011).

Huang (2015) briefly analyzed the theoretical support of health insurance reform from the perspective of welfare economics, and pointed out that the health care system within the social framework has an impact on every individual, and that measure of the effectiveness of health insurance should be based on individuals or groups in this society. Speeding up the overallplanning of urban and rural medical security system, providing stronger medical security to vulnerable groups, and improving the equity of medical security are conducive to improving the overall level of economic welfare of society. Li (2018) pointed out that under the principle of social equity, the reform of urban and rural residents' medical insurance must adhere to the principle of universalization and equalization, which aims to coordinate the economic and social development of urban and rural areas and narrow the differences in the treatment of urban and rural medical insurance. To avoid fragmentation of the medical insurance system, only the unified system can be adopted. As a core part of social welfare, the medical insurance system should not only pursue equity, but also prevent the aggravation of social class solidification. In addition, basic medical insurance is a typical public goods or quasi-public goods, and the government has the responsibility to conduct policy balance. Therefore, equity and efficiency are two aspects that the health insurance system should take into account in the distribution of welfare, which means low-income people pay less tax, while high-income people pay more taxes; and the accumulated taxes paid by high-income earners go to low-income people as a whole. This is conducive to narrowing the gap between the rich and the poor.

1.3.3 Theory of public product

In 1739, the phenomenon of "hitchhike" was discussed in *A Treatise on Human Nature* (by David Hume, a philosopher). Government's responsibilities are also analyzed in *The Wealth of Nations* (by Adam Smith). It is generally believed that Samuelson (neo-classical synthesis) began to study public goods in modern economics and defined them in the *Pure Theory of Public Expenditure*. Public goods are provided by public institutions or governments, and everyone has the right to use public items. When a quantity of goods is produced, the appreciation, wear and tear and consumption of such items will have no impact on the privateand have nothing to do with individuals financially. Therefore, public goods have significant features: non-exclusive and non-competitive. The two features are

significantly different from those of public goods, and this is also the reason for the phenomenon of "hitchhike". According to the western economic theory, the market is not omnipotent, and it will also fail. Therefore, when the market fails, the government should take economic and legal policies and means to assist the market, so as to achieve Pareto optimal use of public goods. It is generally believed that as the manager and enforcer of the system, it is the responsibility of the government to provide public goods. However, the research significance of economics is how to determine the quantity and price of public goods provided in order to meet the demand and social requirements to the greatest extent. Based on the optimal supply theory of western public goods, this thesis analyzes the supply-demand curve of public goods, and found that the intersection of supply and demand curve of any product is the equilibrium of the market's output and price. Because only in this way can the marginal cost and marginal income be equal and the maximum allocation of resources be achieved. Tax revenue is the main source of government revenue, mainly used to provide public goods. At the same time, tax revenue is also used to meet the needs of the whole society. The reasonable allocation of the cost of public goods (i.e., the tax level) is the core problem to be solved by the effective supply mechanism of public goods. Bowen argues that the effective supply of public goods needs to meet the following conditions: every private individual in society can assume the corresponding obligation, that is, the average cost of marginal benefits obtained by individuals using public goods. This involves economic assumptions and human desires. However, this is still an ideal situation.

The theory of public goods was introduced into China by Zhang (1991), and this theory has caused widespread controversy in the academic circles at the beginning. However, western countries benefit from this theory, so it is necessary for China to adopt it. The major illness insurancefor urban and rural residents is a public product provided by the government, which is public welfare and irreplaceable. Therefore, it is a guaranteed right to be enjoyed by every resident and is clearly separated from private products. The government's reference is based on the theory of public goods, and in the construction of multi-level medical security system, basic medical security is the foundation stone. "Hitchhike" is a market defect, resulting ina situation that "in the face of public tragedy, only the government can make up for the shortage of the market" (Li, 2012). Gu (2012) believes that we should always adhere to the guidance of the government, take the *Social Insurance Law* as a precondition; and when negotiating with commercial organizations, we should regard serious illness medical insurance as a quasi public product and bring it into the scope of medical insurance

compensation.

1.3.4 Thoery of social security

The social security theory that emerged in western countries plays an important guiding role in the process of social security system. Among them, welfare economists first studied the theory of social security, and the earliest representative figure. Father of Welfare Economics, Pigou advocated that every citizen should be provided with unemployment insurance and endowment insurance, and the state should establish a welfare system.This is the rudiment of social security theory. Social security includes the medical security system. According to the theory of welfare economics, an individual can be satisfied because a certain desire is metand that is the utility of desire. With the increase of a country’s total national income, social welfare will increase accordingly, and the level of social security will be significantly improved. Accordingly, when a person has more capital, from the point of view of satisfying himself and using it for consumption to obtain certain utility, consumption is only a slight reduction in personal capital.On the contrary, if a person has less capital, he will only use the existing capital to meet his most urgent needs. Therefore, this is the best explanation that the middle and high-income groups are the demanders of commercial medical security, while the low-income groups can only enjoy basic medical security. At present, the weak point in China’s medical security is the serious disease insurance forurban and rural residents. The top priority of the government’s social security work is to speed up the construction of residents’ serious disease insurance and basic medical security, offset the shortcoming of the system, establish a comprehensive index system. These are the guarantee of realizing the residents’ social security and a well-off society in an all-round way.

1.4 Research content and methods

1.4.1 Content of the research

This thesis will take the serious illness medical security system in “Zhanjiang Model” as an example and examine its operating mechanism and protection effect. Specifically, this research includes the following chapters:

The first chapter is the introduction. This thesis introduces the background, significance and purpose of the research, and analyzes the theoretical basis, content and method, innovation and framework of the main research. The second chapter is literature review. The

first part of this chapter defines the relevant concepts in this study, and gives a review and analysis of domestic and foreign literature. The second part describes the health care system condition in China, elaborates on China’s medical insurance for urban workers, basic medical insurance for urban residents, NCMS, the background and reasons of its establishment, the course of development, the effect of reform and problems involved. The study analyzes the relationship between medical insurance for serious diseases and basic medical insurance, clarifies the environment of medical insurance in China, and analyzes the social equity of residents’ medical insurance from three levels: starting point, process and result. The third part analyzes the insurance system and implementation of serious illness medical insurancefor urban and rural residents in Zhanjiang City. Specifically, this part analyzes the impact of the socioeconomicdevelopment onurban and rural residents in Zhanjiang City and the basic situation of medical security from the four aspects of the socioeconomicdevelopment of Zhanjiang City, population distribution and structure, the basic situation of the basic medical care of residents. It also analyzes the medical insurance model of Zhanjiang City by comparing it with the traditional basic medical insurance, and discusses the advantages of the medical insurance for serious illness in Zhanjiang City. The existing problems of serious illness insurance for urban and rural residents in Zhanjiang City are examined in terms of the source of funds and the effect of protection.

The third chapter is one of the core parts of this study. This chapter compares the financing policy of serious illness medical insurance for urban and rural residentsfrom the aspects of financing criteria, sources of funds and overall levels. It also compares and analyzes the insurance policies of serious illness insurance for urban and rural residents from the scope of protection, protection object, payment threshold and capping standard, the level of protection and other aspects. It also makes a comparative analysis on the security management model of serious illness medical insurance from the aspects of separation operationfinancing model, urban and rural co-ordination and fund balance and other aspects. On this basis, taking Zhanjiang City’s medical insurance for serious illness as an example, this chapter compares the differences amongoperation mechanism of Taicang Model, Xiamen Model and Hangzhou Model.

Chapter four is one of the core chapters of this theis. This chapter first carries out macro analysis of the impact of medical insurance on medical and health expenditure based on the official date from 2013 to 2018. Then, based on the field survey data of serious illness medical insurance in Zhanjiang City in 2015 and the relevant policies, the occurrence

probability, gap and concentration index of catastrophic health expenditure of urban and rural residents after participating in serious illness medical insurance will be calculated. This part also takes the uninsured families as the control group to investigate the changes of catastrophic health expenditure under the system of serious illness medical compensation and basic medical compensation, and to evaluate the effect of serious illness medical insurance on catastrophic health expenditure.

Chapter five is also one of the core chapters of this research. Based on the perspective of equity and efficiency, this chapter constructs a theoretical model to evaluate the effect of medical insurance for urban and rural residents in Zhanjiang City. Specifically, equity and economic efficiency of different medical insurance plans for serious illness will be compared and analyzed, so as to provide a theoretical basis for the optimal design of serious illness medical insurance policy.

The last chapter is the summary of this research, including policy recommendations and conclusions of this research.

1.4.2 Research methods

This thesis makes a theoretical review of medical insurance, health economics, welfare economics and other disciplines. On this basis, taking “Zhanjiang Model” as an example, this thesis makes a comparative analysis of the major medical security models in several major areas, and analyzes their security effect and operation mechanism. Then, this thesis further empirically tests the effect of Zhanjiang’s medical security policy on the catastrophic medical expenditure of local insured residents. Finally, from the perspective of equity and efficiency, theoretical modeling is used to analyze the optimization of the policy mechanism of medical security for serious illness. The specific research methods adopted mainly include:

(1) Qualitative research method. The thesis collects and organizes the basic policies of medical insurance in the main areas of China, including the object and scope of protection, the amount of capital contribution, the payment threshold, the capping line, the reimbursement ratio, the scope of protection and other items. On this basis, this study analyzes the operation mechanism and policy of medical security for serious illness in these areas and compares them with “Zhanjiang Model”.

(2) Literature research method. This thesis systematically collects and collates the relevant theoretical and empirical research literature of medical insurance for serious illness at home and abroad, and systematically review the changes of medical insurance policy for

serious illness in many regions of China. In particular, this thesis analyzes the medical insurance model of serious illness at home and abroad and summarizes the experience, evaluates the effect of medical insurance for serious illness from three aspects: commercial insurance medical security system, medical insurance effect of serious illness, effect of medical insurance for serious illness and the effect of medical insurance for families catastrophic medical expenditure. This thesis also evaluates the existing problems of medical security system for serious illness in specific areas of China, and how the government should promote the medical security policyfor serious illness and its optimization.

(3) Field research method. In this thesis, a random sample survey of the insured persons participating in medical insurance is designed for the survey of medical insurance and medical expenditure of urban and rural residents in Zhanjiang City. The contents of the survey mainly includes the participation of all members of the respondent’s family in medical insurance of Zhanjiang City, the total expenditure of hospitalization, outpatient and medical services, the total reimbursement of medical insurance, the total income and expenditure details of the family members during the period.(4) Concentration index. Using the concentration index of household catastrophic medical expenditure to reflect household catastrophic expenditure, this thesis uses Wagstaff and Doorslaer’s calculation method. Specifically, the index values range from -1 to 1, with an average of 0. When the value is negative, it indicates that the family’s catastrophic medical expenditure is more in poor families, and the relative value of the gap within poor families is larger. When the value is positive, it indicates that the family’s catastrophic medical expenditure is more in the rich family, and the relative value of the gap within rich families is larger. In addition, this thesiswill use the survey data of Zhanjiang City medical insurance for serious illnesses in 2015 to measure the probability and gap of the family’s catastrophic medical expenditure after the implementation of medical insurance for serious illness, and take the families not involved in the medical insurance for serious illness as a control group to examine the changes of family’s catastrophic medical expenditure under the two systems, namely the basic medical compensation system and the medical compensation for serious illness, and then assess the effect of the medical insurance system for serious illness on the family’s catastrophic medical expenditure.

(5) Theoretical modeling methods. At present, the medical insurance system for serious illness shows different characteristics in various parts of our country. The differences in financing standards and reimbursement standards will lead to different equity and efficiency

of medical insurance for serious illness. In the sixth chapter, this thesis will construct a theoretical model to evaluate the effect of urban and rural residents’ medical insurance for serious illness from the perspective of equity and efficiency, and use the Gini coefficient to measure the equity of compensation for the insured. Gini coefficient reflects whether the compensation is fair or not. The smaller the Gini coefficient is, the fairer it is. The larger the Gini coefficient is, the more obvious the problem is.At the same time, the economic efficiency of different health-care scenario is measured by marginal utility, which means to measure its efficiency from the distribution and reimbursement efficiency within the system.

1.5 Highlights of innovation

The possible innovations in this research are reflected in the following aspects:

(1) By comparing and analyzing several major medical insurance models for serious illness in China, including financing policies, security policies, and security management models, the thesis provides a feasible basis for how to choosea medical insurance model for serious illness for a specific region. This is a useful complement to the available literature.

(2) Based on DID method and micro-research data, the probability, gap and concentration index of the catastrophic medical expenditure of urban and rural households in Zhanjiang City are calculatedfor the first time. Taking the families not paticipating in the medical insurance for serious illness as the control group, this thesis investigates the changes in the family’s catastrophic medical expenditure under the two systems, namely the basic medical insurance compensation system and the medical insurance compensation system for serious illness, and the effect of catastrophic medical expenditure of families under the serious illness medical security system is also evaluated.

(3) From the perspective of equity and efficiency, a theoretical model is constructed to evaluate the efficiency of medical insurance for urban and rural residents in Zhanjiang City, and a comparative analysis of the equity and economic efficiency of different medical insurance scenarios for serious illness provides a theoretical basis for the optimal design of medical security policies for serious illness. The construction of this theoretical model can provide a framework for related research.

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Chapter 2: Literature Review

2.1 Definition of concepts

2.1.1 Serious illness and risk of serious illness

Serious illness has different definitions in different research fields and scholars' eyes. The definition of serious illness is generally based on catastrophic health expenditure as the standard, and it can be interpreted from three aspects (Zhang, Zhou, & Liang, 2013): First, serious diseases in clinical diagnosis and treatment. *Medical Subject Heading* (MSH) compiled by the National Library of Medicine of the United States is generally deemed as the authoritative reference, which defines the serious disease as Catastrophic Illness. (Wang, 2010): Its specific meaning is a long-term or acute disease, which is usually considered to be accompanied by a severe disability, or a life-threatening disease, and can onlybe thoroughly treated with high costs; Second, the definition of specific threshold. Third, the standard of a certain proportion. International standards: the individual's self payment in cash / family consumption is more than 40%, or the single or annual medical expenditure is more than 4 times of the local average level, which is called serious illness [1-2]. The definition of serious illness in China also has the following different interpretations (2015): First, the medical expenditure exceed the ceiling set by the co-ordination fund. Second, according to disease types, major diseases refer to diseases with high cost and great harm, such as gastric cancer, lung cancer, leukemia. Total 25 common serious illness are identified. Third, the serious illness defined in the serious illness insurance for urban and rural residents. It is a kind of disease that individuals still have to bear high but compliant medical expenses after the compensation from NCMS and the basic medical insurance system for urban residents.

Because the occurrence of serious illness will inevitably lead to high medical costs, we can not judge the impact of serious illness only from the degree of injury to human health. The risk of serious illness in *the Code* starts from the inherent characteristics of the disease, which will affect a family's the normal life, that is, catastrophic medical expenditure disease risk; on the contrary, if the normal life of the family is not affected by various methods, then this kind of serious illness risk is not regarded as catastrophic medical expenditure. Therefore,

in the context of economics, the risk of serious illness mentioned in this study can be defined as: within a certain level of socioeconomic development, the final loss caused by various diseases exceeds the family’s ability to pay, resulting in uncertainty.

2.1.2 Catastrophic medical expenditure.

Compared with the concept of “serious illness medical insurance” at home, there is no complete corresponding concept internationally. “Catastrophic medical expenditure” is a relatively similar concept, which is defined economic risk caused by high medical expenditure exceeding a family’s affordability. Serious illness security mechanism is established to reduce or avoid the probability of catastrophic medical expenditure. Most of the international standards measure catastrophic medical expenditure with family as a unit; during a specific period, the proportion of compulsory medical and health expenditure to total household expenditureexceeds a certain threshold(except necessities such as food). Xu’s (2007) judgment criteria for the total cost of health care is recognized by the academic community, that is, in addition to the medical expenses, consultation expenses, hospitalization expenses and other expenses directly related to medical services covered by medical insurance, the indirect medical and health expenses that need to be paid in order to restore health, such as board and lodging expenses, transportation expenses, nutrition expenses are also included. The total expenditure on household health has three calculation criteria: First, proposed by Wagstaff et al. (2008) and Pradhan et al. (2002), the total family income or annual per capita income should be taken as the standard. Second, proposed by Cavagnero et al. (2006) and Habicht et al. (2006), the annual affordability of families should be taken as the standard. Third, proposed by Limwattananon et al. (2007), Ekman, Björn (2007), the annual total expenditure of families other than food can be taken as the standard, which is also accepted by more scholars. At present, WHO proposes that catastrophic health care expenditure means that after deducting the basic living expenses (food expenditure), family compulsory medical and health expenditure accounts for more than 40% of all expenditures. This standard is recognized by scholars at home and abroad (Ran, Meng, & Xiong, 2013). Generally, people may think that families with catastrophic expenditures are equal to low-income families, but they are different concepts. Families with catastrophic expenditure refer to those whose health expenditure is higher than 40% of disposable income, but their household income may not be low. They may be middle-income families or even high-income families. However, low-income families are divided according to family

income, so it is essentially different from the former, because it does not involve medical and health expenditure. Low-income families do not necessarily have catastrophic household expenditure, but if catastrophic household expenditure occurs in low-income households, the impact will be devastating because the needs of special groups of people for health services are much higher than that of the general population. But health financing does not give them special care, and they lack the ability to reduce health risk (Ying et al., 2004). For serious illness insurance, this thesis compares the medical expenditure of the insured with the economic affordability of urban and rural residents.

2.1.3 Medical insurance for serious illness

In 2012, *the Guidance on the Development of Serious Illness Insurance for Urban and Rural Residents* introduced the market mechanism into medical security systems such as NCMS, establishing a serious illness insurance system, reducing the burden of serious illnesses to the masses. The prescribed reimbursement ratio is not less than 50%, which is to reduce the problem of illness-caused poverty or returing to poverty due to illness. Therefore, from the perspective of protection function, the important embodiment of China’s establishment of multi-level medical security system is the serious illness medical security model, which is a compound security model formed by basic medical insurance and serious illness insurance. Among them, there is a shortage of funds for serious illness insurance. It is now being established by means of a unified purchase of supplementary health insurance from commercial insurance companies on behalf of residents by the government social insurance department to make up for the shortcomings. The coverage of serious illness insurance is the extension of basic medical insurance. From the perspective of welfare, the serious illnessmedical security model is combined with “inclusive” welfare and “preferential” welfare. The insurance for serious illnesses is a medical welfaresystem with “second” compensation.

2.2 The present research status at home and abroad

At present, the research on the medical insurance model of serious illness, one of the medical insurance models, can be divided into the research on the current situation of medical insurance system and operation of serious illness at home and abroad, on the influencing factors of policy implementation effect, on the study of the catastrophic medical expenditure influenced by medical insurance for serious illness. The details can be

summarized as follows:

2.2.1 Institutional analysis of the medical insurance model for serious illness

2.2.1.1 Analysis of the medical insurance system for serious illness abroad

Scholars at home and abroad have studied the foreign medical insurance model of serious illness, and found through literature review that, according to the research object, the analysis of the medical insurance system for serious illness can be divided into two main categories: one is the analysis of a single serious illness medical insurance model, the other is the analysis of several serious illnessmedical insurance models.

(1) Foreign research on single serious illness medical insurance model

Manahan (1998) pointed out that private hospitals are encouraged to compete with national hospitals in order to improve the overall medical level of the country. Chen (2014) pointed out that France is a welfare country with high securitywith more than 60% reimbursement for medical expenditure. Chen (2014) also pointed out that Netherlands has introduced competition mechanisms in the field of health care, and has improved services and reduced costs through competition, giving the public the option to choose insurance companies. The role of the Dutch government has changed from a direct market participant to a regulator through health care reform to ensure a fair and effective competition mechanism.Yu (2014) pointed out that a special “high medical expenditure” system in Japan, which generally refers to the medical expenditure required for cases undergoing surgery, and the medical expenses in Japan include the fees of emergency room and observation room. Only single and double wards are charged, while wards for more than four patients are free. Among them, the high medical expenses refer to the amount that the monthly medical expenses reach at least 80,000 yen, which exceeds the insurance payment amount.

(2) Foreign research on several serious illnessmedical insurance models

Sun et al. (2013) introduced three basic models of medical insurancefor serious illness in developed countries, including the following models:

(a) Commercial insurance-led model. Commercial health insurance institutions provide the health insurance and the serious illness insurance to the majority of members of society, and the government provides medical care and assistance programs for only a small number of vulnerable groups (such as children, unemployed people with disabilities, and the elderly). The representative country that adopts this kind of model is the United States. Because the

U.S. health insurance system is more perfect, even if there is no insurance system specifically for serious illness, it is also possible to set personal capping line, carry out medical assistance through commercial health insurance, and provide medical security system for vulnerable groups by the government. At present, some commercial insurance companies in the United States, influenced by South Africa and the United Kingdom, have also begun to introduce serious illness insurance, aiming toprovide financial assistance to patients who are unable to work properly due to serious illness.

(b) National medical insurance led model. Most of the public medical institutions are directly established by the government to provide free medical services based on the needs of patients rather than the ability to pay. For some vulnerable groups, the government also implements the policy of reducing and exempting prescription fees. The UK is the representative country of this model. The national health-care system began in the late 1840s with the origin of the Keynesian after World War II. This model is mainly financed by taxes, and people can enjoy almost free medical services. No matter whether the disease is serious or not, people need not worry about the economic burden caused by high medical expenses when they go to the prescribed medical institutions.

(c) Social medical insurance led model. This model is managed by the state through legislation. When the medical cost is higher than a certain amount, the individual will only bear the part of the cost higher than a certain amount, and the rest will be borne by the government. The representative countries adopting this model are Japan and SouthKorea.Based on the independence of the serious illness securitymechanism and its relationship with the basic medical insurance system, Wang (2014) divided the security mechanism inthe world into three models: 1) the integrated disease security model: Instead of establishing a system of insurance for serious illness specifically for a particular group, a comprehensive policywithin the framework of the national health-care system is adopted to provide financial compensation for patients faced with high medical expenses due tosevere illnesses. 2) Special-type serious illness security model: it is an independent mandatory institutional arrangement. In the framework of basic medical insurance system, serious illness insurance fund should be established separately, but it still has the attribute of basic medical insurance. 3)Supplementary model of serious illness security: The supplementary medical insurance system is independent of the basic medical insurance, which provides people with the economic security against serious disease risk.Wang (2014) believes that although the serious illness security models vary in different countries, they share some

common rules: the serious illness security mechanism is established by the government; the government actively formulates and refines various policies and measures, and promotes relevant legislation. The government strengthens the support for serious illness insurance by means of tax relief and financial fund subsidies; the government builds its own medical security system based on the national conditions, and makes those models adapt to the national socioeconomic development level; the government adopts comprehensive measures to reduce the economic burden on patients, such as reducing the out-of-pocket expenses, increasing the proportion of reimbursement and implementing tax incentives and subsidized premiums. Gao (2013) summarized the foreign models of serious illness medical insurance into the following three models: 1) Commercial insurance-led model, typical example: the United States. 2) Social security-led model, typical example: Germany. 3) Public medical service for all, typical example: the United Kingdom. Luo (2016) divided the medical security model of serious illness in developed countries into two kinds: one is the disease security system, the other is the cost security system. The content of the latter is different, that is, patients’ out-of- pocket expenses are set with a certain amount. The United States and Australia will compensate the part exceeding the amount in a certain proportion; while Germany and South Korea will make full compensation for the excess. Zhang (2015) studied the serious illness medical insurance systems in Australia, Japan and Germany. She classifies the serious illness insurance models into the self-payment capping model and the excess compensation model. Japan and Australia are the representative countries that adopt the excess compensation model, that is, they compensate the medical expenses exceeding the predetermined amount according to a certain proportion; Germany is the representative country that adopts the self-payment capping model, and the medical insurance fund compensates all expenses exceeding the predetermined amount. Zhao (2017) pointed out that the health insurance system varies greatly from country to country, and some of the serious illnesses health insurance system is basically managed by the government, typical examples being Senberg, Norway, Sweden and the United Kingdom. There is also a serious illness medical insurance system led by the government and jointly managed by commercial insurance institutions, typical examples being France, Canada, Germany and other countries. According to the difference of government participation, three representative countries, namely, the United Kingdom, Germany and the United States areselected for analysis. Britain’s health insurance system for the serious illnesses is led by the government, with tax as financial support. The advantage of this model is that everyone is equal and there is no need to worry about poverty caused by illness. But the government’s financial pressure is

too heavy, leading to medical personnel and equipment shortage, long waiting time for medical treatment, so the health insurance system is often complained by residents; Germany’s social medical security system is mainly regulated by law, supplemented by private medical insurance. Therefore, all German people have health insurance, and the social medical security system is mainly led by the government and the market. The government is the main body of the medical insurance system, and the compulsory law has become its solid backing. Patients suffering from major diseases and whose normal work is affected can enjoy sick leave subsidy. The nature of serious illness medical insurance in the United States is a kind of commodity. According to the rules and principles of the market, medical insurance fees are charged to the American people and corresponding commodities are provided, namely medical insurance services. In the US, commercial health insurance is the main body of American medical insurance, and the government only plays a role in regulating the market..

China’s medical insurance participation rate is more than 95%, and the actual compensation ratio is only about 50%, which is a low level. Serious illness insurance is a “short board” in China. Therefore, the government has issued some guiding opinions for serious illness insurance (Xu, 2013). At present, there are many domestic researches on the operation mechanism, policies and specific rules of medical insurance in various regions, which can be roughly divided into four aspects: the research on the overall situation of serious illness medical insurance, the research on medical insurance in a single region, the research on multiple serious illness medical insurances in multiple regions, and the research on the relationship between serious illness medical insurance and other medical insurance.

(1) General research on the system and current situation of serious illness medical insurance

The main point of Chen et al. (2004) is that serious illness medical insurance is a supplementary insurance on top of medical insurance system. Zhou et al. (2016) believe that non-disease restriction scheme can bring more reimbursement rights, which is better than disease restriction scheme.

Song et al. (2014) dynamically predicted the sustainability of medical insurance for urban residents in 31 provinces (cities, autonomous regions) in China. Cheng (2016) summarized the ideas of improving the medical assistance policy for serious illness: on the premise of clarifying the concept of serious illness, scientifically define the objects that need assistance by strictly standardizing the family economic and property accounting system,

and establish an effective financing and growth mechanism of the medical assistance fund for serious illness, so as to improve the implementation effect of the policy. Xie et al. (2018) believe that the implementation of major disease security for rural residents can effectively prevent illness-caused poverty, which requires laying a good foundation, improving the quality of treatment, optimizing the treatment process, strengthening inspection and supervision methods, paying attention to training and publicity, and continuously improving the level of major disease treatment and management. The implementation of major diseases policy is obviously conducive to reducing the economic burden of rural residents with major diseases. With the deepening of China’s medical reform, the scope of reimbursement has been extended, and the proportion of reimbursement of basic medical expenses in the same period has increased. The serious illness medical insurance system has achieved certain results. But at the same time, there are also many problems in the pilot process. Domestic scholars mainly study the problem of serious illness medical insurance from five aspects.

a) Research is carried out from the perspective of regional differences. Jiang (2017) found that although China’s serious illness insurance benefits the people obviously, but some issues related to equity cannot be ignored. The problems include insufficient security for the middle and low-income groups, especially for the poor, and the sustainability of financing. Fang (2016) believes that due to the differences, the policy models of serious illness insurance in different regions have made remarkable achievements, but at the same time, some problems need to be paid attention to. For example, if they are too biased in the scope of benefits and the intensity of compensation, it will lead to serious fund deficit or excessive balance. Moreover, under the same system, looking for the factors that lead to the different effects of system implementation is the fundamental to solve the reform dilemma. Firstly, the interests of all parties should be fully considered, and the best balance should be found between equity and efficiency, which is the key to advance the reform of serious illness insurance. Secondly, the advantages and disadvantages of serious illness insurance models undertaken by commercial insurance or social security are reflected, which shows that compared with the undertaker, the policy model should be highlighted.

b) From the perspective of the medical insurance fund. Deng and Lu (2015) think that the financing channel of serious illness insurance is single, the level of overall planning and sustainability is low, so the financing mechanism is worrying. Wu et al. (2015) think that the reimbursement ratio within the policy scope is quite different from the actual reimbursement ratio.

c) Research on the operation of medical insurance for urban and rural residents with serious illnesses. Rao and Wang (2019) think that the representative problems currently facing include: insufficient publicity leads to the low level of residents' cognition of the system; the low level of fund co-ordination affects the effect of medical security; the cumbersome reimbursement procedures and the low efficiency of the system. Wu et al. (2019) affirmed the effectiveness of the serious illness insurance system for urban and rural residents, but also put forward some problems: the system convergence is not tight, the cost growth is too fast, and the performance is not high.

d) Research on NCMS. Kang (2019) pointed out that with the implementation of targeted poverty alleviation, it is necessary to improve the serious illness medical insurance of NCMS and the main problems include: 1) The operability of solving illness-caused poverty is not strong, and the current policies are inadequate; the propaganda work of health poverty alleviation policy is not in place, which reduces the satisfaction of the masses; 2)The growth of medical expenditure is too fast, but the development of medical and health services is not relatively slow; 3) The medical insurance system is fragmented, but the insurance is difficult to provide the insured with enough medical security; 4) There are some defects in policy design including the limitation of policy scope and the lack of policy effectiveness.

e) Analysis of the operation of serious illness medical insurance by commercial institutions. Wu (2014) analyzed the loss caused by serious illness insurance of insurance companies, and believe that in order to maintain the smooth operation of this system, it is a must to innovate the financing mechanism. At the same time, he also put forward the method to solve this problem, that is to reform the financing model of serious illness insurance and adopt dynamic adjustment to the financing form. For a commercial insurance institution, profit is its fundamental purpose. If there is a loss, it will certainly affect the enthusiasm of its operation, resulting in a system breakdown. In order to avoid the continuous loss of the company, strengthening the financing is the key. The current source of financing is not to increase the burden of the masses, and the balance of NCMS fund will be used. However, the fund balance is limited, so the current situation is not optimistic.

Ma et al. (2016) proposed that there are the following problems in the pilot operation of China’s serious illness medical insurance system: the system is moving towards the trend of fragmentation; the lack of regulatory guarantee; commercial insurance is profit oriented, leading to the escalation of safety risks.

In view of the problems existing in the operation of the medical insurance system for

serious illnesses, scholars put forward their own opinions. For regional and individual differences, Yuan et al. (2015) found that the design of the payment threshold, the capping line and the reimbursement ratio of serious illness insurance can not be completely copied. It is necessary to choose suitable local compensation schemes according to the level of local economic development, medical consumption level, population structure and disease risk situation, and adjust them flexibly based on the effect and fund payment ability, ensuring that the local people are satisfied. Hao et al. (2017) proposed that the policy of insurance for serious illnesses should be tilted towards the people with high medical expenses, so as to reflect the equity of medical security. As for issues as medical insurance fund and fund-raising method, Wu et al. (2013) believe that it is necessary to strengthen the effectiveness of medical insurance fund and establish a serious illness insurance fund on top of the basic medical insurance balance. Deng and Lu (2015) pointed out that the positioning of serious illnesses insurance should be clarified, and the “fund pool” should be expanded through various measures. Yang et al. (2014) proposed that the effective strategy to solve the existing problems of serious illness insurance is to improve the level of fund coordination, promote the implementation in the whole province, reasonably determine the coverage and financing standards of serious illness insurance, and work with the insurance industry for common development. Dai and Bai (2019) suggested that basic medical insurance and serious illness medical insurance should be merged to improve the level of overall planning and maintain the positioning of major illness overall planning. Wang (2019) suggested that the social assistance system should be closely linked to establish a multi-level medical insurance system: “basic medical insurance + serious illness medical insurance + supplementary medical insurance”. Some scholars also put forward corresponding suggestions for the existing problems of the medical insurance system for serious illness of urban and rural residents. Cheng (2018) found that the security effect of serious illness insurance is very limited.

Leng (2016) put forward the following suggestions: First of all, as for the funding standard, an analysis on a series of factors should be conducted, such as the year-end serious illness insurance compensation personnel, and establish a hierarchical diagnosis and treatment system for serious illness insurance according to the level of local economic and social development.

Zhan and Zheng (2018) pointed out that the current serious illness insurance and NCMS implement the financing method based on the head quota, which has its own shortcomings.

In their opinion, as for the order of medical insurance expense compensation for serious illness, it is suggested to use the integrated nodel of “NCMS + serious illness insurance + civil affairs (charity) assistance”. This model not only takes into account the role of the NCMS in taking the lead in “basic insurance”, but also makes effective use of the supplementary role of serious illness insurance. At the same time, it can reflect the effect of backing security and medical assistance. In addition, in view of the overall operation of the serious illness medical insurance system, some scholars put forward more extensive suggestions. Jiang (2017) suggested that: 1) the definition of “serious illness” should adopt WHO’s definition of “catastrophic health expenditure”; 2) strengthen the medical protection for low-income groups; 3) reduce medical expenses. Chen (2013) pointed out some problems of serious illness insurance, including unclear product attribute positioning, insufficient medical risk management and control, and obvious shortage of professional talents. Therefore, Chen proposed to establish risk linkage mechanism and talent training mechanism to solve these problems.

Feng (2015) pointed out that the sustainable operation of social medical insurance is a difficult problem facing all countries. The development of new technologies and the emergence of new drugs provide more necessary choices for the treatment of serious diseases, and also promote the continuous increase of medical costs. Technological progress has become the most important driving force for the increase of medical expenses. In the case of limited resources, the use of economic means, the establishment of different levels of consumption are worth studying.

Hu (2017) proposed four suggestions for the serious illnesses of health insurance: First, we should respect the operation law of the medical insurance system, consider the sustainability of the system, carefully use the balance of the medical insurance fund, do not regard the livelihood project as a performance project, and prevent “reverse subsidy” and “cost transfer” (Zhao & Hu, 2015); second, we should gradually establish and improve the negotiation mechanism for improving the medical insurance, so as to establish the boundaries of rights and responsibilities and risks of all parties; thirdly, we should be alert to the “populism” in the social security region to avoid this “populism commitment” changing citizens’ welfare expectations (Hu, 2015) and increasing the government's financial burden; fourthly, the medical insurance system can not be the only guarantee, we should leave space for social welfare and medical assistance projects, and promote the basic medical insurance system to return to its “rationality” and the “basic security” system standard.

Feng et al. (2014) suggested that: 1) we should formulate different levels of payment standards; 2) we should reasonably define “serious illness” and adjust the “three major catalogues” of basic medical insurance; 3) we should strengthen the supervision and management of medical behavior and carry out economic evaluation on it; 4) hospitals should cooperate with medical insurance agencies to reduce the burden of individual medical expenses on the basis of “expenditure based on revenue with a small balance”.

(2) Research on the medical insurance system for serious illnesses in a single region

In addition to the research on the general medical insurance system and its current situation of operation, domestic scholars also clarify the medical insurance system for serious illnesses in individual regions, summarize and analyze its implementation in each region. This is not only the verification of the overall research, but also a supplement of special cases.

Tao (2016) studied the new policy of medical insurance for serious illnesses in Hangzhou, analyzed the implementation and difficulties of the new policy from four aspects of government, commercial insurance institutions, medical institutions and insured persons, and pointed out that the new policy of serious illness medical insurance is a sign of the progress of China's medical reform, which can improve the medical security system.

Lu (2015) found that Hunan has effectively alleviated the problem of “expensive medical service”.

Niu and Tang (2016) made the following conclusions through a questionnaire survey in a certain area of Nanjing: 1) People who are not in good health are more likely to participate in NCMS. 2) The families with high education level and high medical expenditure in the previous year tend to participate in NCMS. 3)To a certain extent, the proportion of reimbursement affects people’s participation enthusiasm. How to attract hesitant people to participate is of great significance for the sustainable development of NCMS. At the same time, they also put forward some suggestions: first, we should increase the publicity of NCMS to enhance people’s awareness of it; second, we should solve the unfair problems in the implementation process; finally, they also stress the need to simplify the reimbursement process and increase the convenience of medical reimbursement. At the same time, they believe that a reasonable reimbursement ratio should be determined as “serious illness medical insurance” plays an important role in preventing farmers from becoming poor or returning to poverty due to illness.

Wei and He (2017) found that the actual effect of Xi'an medical insurance policy is not ideal.

Wang (2003) found that the method of risk sharing in Suzhou rural serious illness medical insurance is that when the serious illness risk occurs, the insured's risk loss will enjoy a certain degree of compensation, and the result is the transfer of serious illness risk and the sharing of loss.

Zeng et al. (2016) studied the effect of serious illness insurance and the causes of fund losses based on the number of serious illness of urban and rural insured persons in Suining City, basic medical insurance reimbursement, serious illness insurance compensation, medical expenses and the staffing of commercial insurance institutions, and provided scientific basis for determining the payment threshold, improving the measures of commercial insurance institutions to handle serious illness insurance, taking responsibility for risk control of serious illness insurance.

Xu (2014, 2015) thinks that Qingdao's serious illnesses relief system can achieve the goal of "making people enjoy affordable medical services".

Liu (2016) studied the security degree of serious illness insurance in various cities of Hebei Province, and put forward some existing problems: 1) The payment threshold is relatively high, and it is also quite different in different regions due to various economic levels. Liu believes that although the payment threshold of serious illness insurance in Hebei Province meets the requirements of *The Opinions*, it is still slightly higher than the national average. Compared with most countries in the world, he thinks that the payment threshold needs to be reduced by 50%; 2) The overall reimbursement proportion is relatively reasonable, but the reimbursement process is not clear, and the specific reimbursement process of each region is not consistent; 3) For urban employees in Baoding City, different standards are set according to different drug classifications of cities and counties, but in Cangzhou City, the reimbursement proportion is determined according to whether they retire or not. The conditions and proportion of reimbursement in different regions are inconsistent, which is not conducive to the overall planning; 4) According to the medical insurance regulations for serious illness of urban and rural residents, the payment expenses minus the basic medical insurance, minus the non-compliance medical expenses, and then minus the payment threshold, and the rest are reimbursed according to the proportion. But for the general public, they do not clearly know which are the compliant medical expenses and which are the drugs in the catalogue. Therefore, it is easy to have some misunderstanding

and even some disputes in the process of medical expense reimbursement, which is not conducive to the healthy development of “serious illness medical insurance”. His suggestions are: 1) Refine the payment threshold, set different payment thresholds respectively for high-income families and low-income families; 2) Optimize the reimbursement process; 3) Cancel the capping line.

Xu (2012) believes the implementation of treatment in designated hospitals, payment according to disease type, hierarchical medical treatment and improvement of medical security level should be integrated, so that farmers participating in NCMS can enjoy more compensation, the efficiency of the NCMS fund will be improved, and medical institutions will also be developed.

(3) Research on the medical insurance system for serious illnesses in multiple regions

It is difficult to summarize the feasible empirical model by analyzing the medical insurance system for serious illnesses in a certain region without making a comparative analysis, and the conclusions and experiences obtained are not universal. Therefore, in order to better compare the homogeneity and heterogeneity of the medical insurance for serious illnesses in various regions of China, a large number of studies have been carried out on models of serious illness medical insurance in various regions of China.

Li and Hu (2015) proposed measures such as commercial undertaking and introduction of competition to build a major disease protection mechanism.

Wang (2014) compared the traditional basic medical insurance model with the “Zhanjiang Model”, and proposed to build an urban-rural integrated health insurance model of “one-time insurance + two-time reinsurance + third-party collaborative management”. Zhanjiang has ensured the smooth convergence of the system and improved the medical security level of urban and rural residents at a lower cost. At the same time, she pointed out some shortcomings of Zhanjiang model: 1) Legitimacy: there are no clear provisions in the current law to confirm its legitimacy; 2) Sustainable development: a commercial insurance enterprise is for the purpose of profit, once the enterprise has a loss or bankruptcy, it is difficult to operate this model; 3) Where does the profit come from? All this has yet to be tested in time.

Qiu and Huang (2014) analyzed the operation mechanism of serious illness insurance in Taicang, Hangzhou and Xiamen cities, and concluded that: 1) In the economically developed areas, the capping line of serious illness medical insurance should be cancelled

and the out-of-pocket limit should be tried out; 2) The business entities should be diversified to facilitate the sustainable development of medical insurance.

Zhang (2019) pointed out that with the formulation of serious illness medical insurance policy, the abuse of medical insurance funds is becoming increasingly serious when the medical demand is increasing.

Han et al. (2016) used quantitative data collection method, literature reading and policy consulting to collect the data and information on the serious illness insurance system and compensation for serious illness in Qinzhou City and Liuzhou city from 2013 to 2014 to test the policy effect. Through research, they found that from 2013 to 2014, the utilization rate of serious illness insurance fund for urban residents in Liuzhou city was 118.83% and 174.42% respectively, the fund balance rate was -18.83% and -74.42% respectively, and the actual reimbursement rate was 61.07% and 61.08% respectively; the utilization rate of fund in Qinzhou City was 92.83% and 76.33% respectively, the fund balance rate was 7.17% and 23.67% respectively, and the actual compensation rate was 53.29% and 54.81% respectively.

Lin and Na (2014) made a comparative study on the operation mechanism of serious illness insurance in Dalian, Chengdu and Taicang. Under the guidance of *Opinions*, the three cities entrust commercial insurance institutions to manage serious illness insurance, but there are differences in their financing ratio, compensation method and payment ratio. The way of independent operation and accounting of commercial insurance institutions helps to reduce administrative costs, while the control mechanism of "benefit sharing and risk sharing" is more conducive to risk control. At the same time, the study also pointed out that the profit seeking nature of commercial insurance companies should be noted and and the current way to undertake serious illness medical insurance is to share the insurance database with medical insurance agencies. In order to guard against commercial insurance companies using it as a profit-making tool, the government needs to participate in coordination, play a role of protecting public goods, and maintain the information security and account security of the insured. The specific method can learn from the operation experience of Taicang City, that is, to combine the evaluation with the reinsurance fund reserved at the beginning of the year. To assess the risk of insurance company's bankruptcy and other indicators, such as compensation rate, profit rate, catastrophic medical expenditure resolution rate, compensation equity. Insurance carriers need to implement the principle of break even with small profit, and regularly publicize the operation data of serious illness insurance fund to the public, so as to establish an open and transparent competition mechanism.

(4) Correlation analysis between serious illness medical insurance and other medical insurance models

In order to better implement and popularize the serious illness medical insurance system, China combines it with other medical insurance systems. Domestic research on the relationship between serious illness medical insurance and other medical insurance models can be divided into three aspects: the overall system research, the joint model research and the specific regional joint measures research.

1. Overall research

Shi (2015) pointed out that the new policy of serious illness medical insurance should be led by the government and assisted by commercial insurance institutions. In China, a set of clear supervision, admittance, evaluation and supervision system of commercial medical insurance handling social medical insurance has not been established.

Zhang et al. (2016) through policy documents, practice cases and literature, came to the following conclusions: 1) it is necessary to allocate high-quality and efficient medical resources through the government; 2) Improve the security system of major diseases; 3) Design the implementation path; 4) Enhance the ability to resist the risk of major diseases through the government, insurance institutions, individuals and medical mutual assistance.

Meng (2015) pointed out that serious illness insurance is a social reinsurance model, which introduces the third-party management. The serious illness insurance is dominated by the government, the competition mechanism is introduced, and the high-quality commercial insurance institutions are appointed to handle it. He analyzed the reasons for the slow development of the model in the past two years: 1) The pilot areas have doubts about commercial insurance institutions, and many of them adopt a wait-and-see attitude; 2) The market competition is not sufficient, and not enough qualified commercial insurance institutions are introduced into the market competition; 3) The insurance institutions can not supervise themselves, and can not effectively control the medical costs. To solve these problems, he put forward some suggestions: 1) To clarify the legality of commercial insurance institutions participating in serious illness insurance from the legal level; 2) To refine the relevant procedures and systems; 3) The local government should work closely with insurance institutions; 4) Insurance institutions should have a professional team with excellent skills.

Fu (2011) believes that the government and commercial institutions can transcend the

boundary between the supply of public goods and private goods, find an effective way of “internalization” of “externality”, and find the “intersection” of government management and market regulation. Gao (2013) believes that the introduction of commercial insurance in serious illness medical insurance will bring advantages while lead to limitations. However, as long as we give full play to the professional advantages of insurance companies under strict and feasible standards, limitations can be avoided and the advantages can be brought into full play.

Qin (2014) pointed out that the fundamental reason for promoting the enthusiasm of residents in charge control of commercial insurance is the operation logic of the two. Hao pointed out that serious illness medical insurance is a key to implement the new *Opinions of the State Council on the reform and development of the insurance industry.*

Cai and Wu (2015) proposed through system comparison that the important content of the construction of serious illness medical security system is the integration of commercial major illness insurance and urban and rural residents' serious illness insurance.

Ding, Xu, and Bo (2013) pointed out that the government bidding method can be adopted for serious illness supplementary medical insurance for urban workers and urban and rural residents, and the insurance contract can be entrusted to commercial insurance institutions, and the insured can purchase it voluntarily. The government is no longer involved in the daily operation and management, but responsible for the collection and supervision of the basic medical insurance fund, so as to realize government regulation separating from management on basic medical insurance.

Ma, Sun, and Wang (2016) put forward the bottom line model and the best model scheme in the research.

Research on the joint model

Li and Luo (2018), on the basis of reviewing the reform course of serious medical insurance in China, analyzed the existing problems, such as the risk of capital management, the imperfect supervision mechanism, different roles of commercial insurance institutions and government departments, and the different purposes of cooperation in the existing integration models of commercial insurance and serious medical insurance, namely insurance joint model, contract service model and commercial loan contract model. To solve these problems, they put forward some suggestions, such as broadening the sources of funds, strictly controlling the entry threshold of commercial insurance institutions, increasing the

intensity of fund management, establishing and improving the supervision and guarantee mechanism, so as to promote the integration and development of serious illness medical insurance and commercial insurance in China.

Yao (2008) analyzed that since 2003, commercial insurance institutions have actively explored the effective model of participating in NCMS. Specifically, there are the following three basic models: (a) Fund management model: insurance companies are entrusted by the government to provide services and charge appropriate management fees. The government bears the risk of the NCMS fund, and the rest of the fund will be automatically transferred to the next year. (b) Insurance contract model: the insurance company will sign an insurance contract with the government to provide medical insurance services to the insured according to the agreement. The overdraft risk of NCMS will be borne by insurance companies. (c) Mixed model: this model is between the above two models, and the possible overdraft risk of fund is shared by the government and insurance companies. Among them, the fund management model is the mainstream, on the basis of which the typical “Jiangyin ModeL” and “Xinxiang Model” are established. In this model, commercial insurance companies are only partially involved, which means they only participate in the fund management of the NCMS, but they are not the main body of responsibility. The future trend is that insurance companies will change from partial participation to “process participation”. Yao put forward that hierarchical management model should be adopted to realize “process participation”, which divides NCMS fund into two levels: supplementary insurance level and basic insurance level. The government should negotiate with insurance companies to determine the compensation standard and premium standard of the basic insurance level, and provide medical subsidy for the insured. At the same time, according to the two levels of financing proportion, the government and insurance companies should share the risk of fund losses, and the remaining part of the fund will be automatically transferred to the next year. For NCMS fund model at the level of supplementary insurance, it is operated according to the commercial insurance model, and the insurance company is responsible for its own profits and losses and bears the operational risk. Insurance companies should change their position in NCMS and participate in its financing, management and distribution in order to improve the security level and alleviate the contradiction between serious disease security and normal disease security (Yao, 2008).

Ma, Sun, and Wang (2016) pointed out: 1) It is in violation of China’s social insurance law that the serious illness medical insurance fund withdraws the operating funds of

commercial insurance. Whether it is the “Contract model”, “Commercial loan model” or the “Insurance joint model”, among the cities that realize the “public-private cooperation” between commercial insurance institutions and social security fund management departments, there are some choices for commercial insurance companies to withdraw the management and operation fees of medical insurance fund in different degrees and in a legal capacity, or to purchase commercial insurance services through government finance. 2) The main financing body of serious illness medical insurance is the residents who participate in the basic medical insurance for urban and rural residents. The government only formulates preferential incentives and other supporting policies to encourage urban and rural residents to participate voluntarily. What the government undertakes is a kind of implicit financing responsibility.

Joint measures in specific regions

Gao (2013) analyzed the separation of management and operation of “Luoyang Model”, the innovation of which is that commercial insurance institutions are responsible for their own profits and losses, and the government regulator is responsible for medical insurance funds.

Xu (2014) pointed out that Taicang Medical Insurance Center cooperated with commercial insurance institutions to create a working platform of settlement system, early warning system and social security service platform in accordance with the model featured by “led by government, joint work, convenient service and professional operation”.

Jiang (2012) pointed out that the introduction of basic medical insurance in Zhanjiang City and the participation of commercial insurance institutions in the management have effectively enhanced the service management level of the government, saved the government's administrative costs, improved the medical security level of the insured, and expanded the effect of the medical insurance fund. Through the management of basic medical insurance and the supplement medical insurance, commercial insurance institutions have strengthened the supervision of hospitals and of of the insured’s medical behavior, effectively standardized the medical service behavior, and improved the utilization efficiency of medical insurance funds.

Li (2014) pointed out that Zhanjiang’s basic medical system for urban and rural residents broke thousehold registration limits, and adopted the form of basic medical insurance plus large amount of supplementary medical insurance, that is, a medical insurance model of “one system and two levels”, in which commercial insurance institutions are also

introduced. “Zhanjiang model” is very suitable to be popularized in economically underdeveloped areas. According to the above analysis, we can summarize the experience of serious illness medical insurance at home and abroad as follows: 1) Insurance companies reduce medical expenses and improve efficiency by selecting medical service providers, negotiating pricing and supervising medical behavior. The most common practice is to combine health insurance with health services and disease management. Insurance companies can adopt the methods of disease prevention, medical supervision and review of medical expenses to reduce the potential medical expenses, improve the level of medical services and reduce unreasonable medical behavior. These are experiences that insurance companies in China can learn from. 2) We should reasonably design the payment threshold, payment limit, reimbursement ratio and other indicators. On the basis of ensuring the sustainable development of the medical insurance fund, the payment limit of serious illness insurance should be increased and the ladder reimbursement proportion should be set up so that the patients with higher medical expenses can get more reimbursement amount and their financial burden can be relieved as much as possible. 3) Insurance companies can adopt and optimize the two insurance models as “Entrusted management model” and “Insurance contract model” based on the local situation. Under the supervision of the government, insurance companies can also combine the two models to provide management services for basic medical insurance for urban and rural residents while undertaking serious illness insurance. Insurance companies should reasonably develop additional products with additional premium paid by the insured, expand the scope of medical insurance, improve the security level and provide more choices for the insured in need.

2.2.2 Effect evaluation of medical security for serious illness

Most scholars at home and abroad analyzed the influencing factors of the effect of medical insurance or serious illness insurance through case studies, and focused on the impact of serious illness medical insurance system on catastrophic medical expenditure based on the definition method of catastrophic medical expenditure. Therefore, the existing literature in this field mainly includes the following branches:

(1) Analysis on the influencing factors of the effect of serious illness medical security

Lee et al. (2009) measured the variables of social economics and demographic sociology by investigating the satisfaction degree of Korean health insurance. It was found that registered residence types, subjective health status, insured type and benefit cost ratio

will significantly affect the satisfaction degree of insured people to their medical insurance.

Liu (2014) collected 1103 samples of national health insurance policies in Taiwan Province of China through telephone interviews, and classified them according to age, gender, residential area and other factors to make a comparative analysis of satisfaction and importance. Garba et al. (2018) compared the satisfaction of NHIS (National Health Insurance Scheme) participants and the uninsured in Aminu Cano Teaching Hospital, and found that patients participating in medical insurance were very satisfied with waiting time, hospitalization time and medical expenses. Therefore, they concluded that improving NHIS coverage can significantly improve patients' satisfaction with medical services and the accessibility of medical services.

Li (2014) pointed out that the actual security level of medical insurance for residents is still relatively low on the whole, so he proposed to control the medical expenses outside the “Three Categories” to improve the actual security level.

Li (2017) took Beijing citizens as the survey objects and found that most of the insured did not know much about the content of the serious illness insurance system. The main factors causing this problem include education level, policy recognition, health level, handling ability, reimbursement ratio and payment threshold.

Xu (2018) studied the implementation and satisfaction of serious illness insurance in Yangzhou City and Taicang City under different levels of overall planning, and found that there were significant differences. Therefore, she pointed out that we should integrate the serious illness insurance funds for urban and rural residents and workers, improve the overall planning level according to local conditions, and gradually improve the reimbursement standards such as the payment threshold, compensation ratio and capping line, so as to improve the satisfaction and operation efficiency of serious illness insurance.

Zhu, Yu, and Song (2013) predicted that the long-term balance pressure of medical insurance fund mainly comes from payment scale and financing model.

Zhu, Song, and Wang (2013) hold the view that the actual number of beneficiaries of the serious illness insuranc system is the main reason for its effect.

Zhou et al. (2011) studied the level of major disease security for urban workers, and determined the measurement indicators including personal factors, self-paid medical expenses/family income, institutional factors and social factors. They pointed out that if we want to improve the medical security level for urban workers, the priority is to develop the

economy, so as to improve the income of urban workers and the subsidies for the poor; basic medical insurance plays an important role in providing major disease risk protection for workers. The more the medical insurance can pay, the less the burden of patients at their own expense.

Yu et al. (2018) pointed out that almost all serious illness insurances for urban and rural residents haven’t not established a standard information application platform at the national level. The information data shared between insurance companies and government departments in different regions has a large gap. Therefore, the obtained statistical data is relatively rough, and there are communication barriers between them, which affects the precise pricing of serious illness insurance and the sustainable development of integrated management.

Zhu and Song (2014) pointed out that the main body of serious illness insurance is rural residents, and the higher payment threshold will greatly weaken its actual security effect, so more accurate payment threshold is a very important factor.

Ding (2017) evaluated the security effect of major disease medical insurance for rural residents in China from four aspects: medical care, compensation, coverage and financing burden ratio. He found that the higher the level of financing in a region, the stronger the fund's ability to pay and resist risks; the higher the reimbursement proportion of serious illness insurance in a region, the higher the amount of compensation per capita. Therefore, the level of financing is the root cause of security level of serious illness insurance, and the secondary indicator is the fund utilization rate of serious illness insurance in that year. The utilization rate of serious illness insurance fund in a region is the basic element to the study of its security level in the region. In addition, the utilization rate of the fund, the proportion of compliance fees, the level of financing, and the actual hospitalization subsidy for the seriously ill are positively correlated, that is, the higher the first three, the higher the actual hospitalization subsidy. However, there is a negative correlation between per capita net income, benefit coverage, medical expenses and the actual hospitalization subsidy for the seriously ill, that is, the higher the first three, the lower the actual hospitalization subsidy.

(2) Serious illness insurance and catastrophic medical expenditure

① Status of foreign research

Ke et al. (2003) proposed the standard and definition of catastrophic medical expenditure, and demonstrated the correlation between the incidence of catastrophic medical

expenditure and the overall economic and social development level of the country. They pointed out that the main causes of catastrophic medical expenditure are inaccessibility of medical services, lack of non-prepaid medical services and low household income; and the proportion of total medical expenditure is an important factor affecting the incidence of catastrophic medical expenditure. Improving the income level will not spontaneously solve problem of catastrophic medical expenditure. Most of the low and middle-income countries' medical services or medical security systems can not meet their actual needs, and their financial risk sharing mechanism and medical and health system are not perfect.

Ekman B (2004) compared the situation before and after the implementation of the community medical security system in some underdeveloped countries and the situation of patients, especially the patients with serious diseases paying for medical expenses, and found that the medical insurance system has played a significant role in preventing catastrophic medical expenses. Caroline (2011) studied the operation effect of the community medical security system in Ghana, and found that the system had a very significant effect on the potential catastrophic medical expenditure of the insured, and its impact on “poverty alleviation” was very obvious. Ramses H. et al. (2008) pointed out that the incidence of catastrophic medical expenditure is negatively correlated with the coverage of medical insurance, and the expansion of the latter can lead to the reduction of the former.

Mohammad and Hajizadeh (2011) found that low family income, length of hospital stay and hospitalization in private hospitals were the main reasons for increasing the possibility of catastrophic medical expenditure. Rama and Pal (2012) used a new method to measure catastrophic medical cash expenditure, and pointed out that the reduction of non-health expenditure will lead to the family unable to maintain the consumption of necessities, so the medical cash expenditure will be catastrophic. Using the new method, they also found that the impact of catastrophic expenditure would decrease as income increased.

Grogger et al. (2015) studied the relationship between national health insurance and catastrophic medical expenditure in Mexico, and found that Mexico’s new national health insurance system reduced catastrophic medical expenditure in urban areas, while reducing catastrophic medical cash expenditure in rural areas. However, this mitigation effect is mainly based on different types of medical resources that the beneficiaries can enjoy, which means that it can only significantly reduce the catastrophic medical expenditure of the beneficiaries in rural areas with high access to medical services.

Dorjdagva et al. (2016) calculated the incidence of catastrophic medical expenditure in

Mongolia. They found that the incidence of catastrophic medical expenditure was 5.5% and 1.1% when the total affordability threshold was respectively set at 10% and 40%. The study found that the number of inpatient and outpatient services of rich families was significantly higher than that of poor families; at the same time, the number of inpatients in urban families was more than that in rural families. This shows that medical expenditure is more likely to become the burden of low-income groups.

Choi (2015) conducted a follow-up analysis of 7006 families in the 2008 Korean Health Survey, and found that although the Korean government has expanded the coverage of serious illness insurance, there were still 3.5% families with catastrophic medical expenses, especially those with diabetes, cerebrovascular diseases and other chronic diseases.

Nakamura et al. (2013) studied Japanese patients with grade 3 hypertension, and found that the proportion of catastrophic expenditure caused by hospitalization expenses of patients with grade 3 hypertension who had not received intervention treatment was significantly higher than that of patients with intervention treatment. Therefore, the risk of catastrophic expenditure can be significantly reduced by early intervention, raising disease prevention awareness and improving primary medical network.

Kronenberg and Barros (2014) used logistic regression model to analyze the results of Family Health Budget Survey of Portugal in 2000 and 2005, and found that countries with developed NHS system will also have the dilemma of excessive personal out-of-pocket expenses, and vulnerable groups will be more likely to become poor due to catastrophic medical expenditure.

Hallman (1972) proposed that it is necessary to reduce the individual out-of-pocket expenses, do not set the maximum payment limit, and increase the coverage of medical insurance to solve the problem of catastrophic medical expenditure. Havighurst et al. (1976) thought that diversified strategies should be used to solve the problem of catastrophic medical expenditure. Lee et al. (2016) compared the catastrophic medical expenditure of families without disabilities and families with disabilities in South Korea, and proposed that increasing financial support and reducing or exempting the out-of-pocket expenses can help patients with poor economic conditions and chronic diseases and their families avoid poverty crisis.

② Status of domestic research

Duan et al. (2015) pointed out that the purpose of raising the payment threshold of

serious illness insurance is to alleviate the catastrophic medical expenditure of patients with serious illness and reduce “illness-caused poverty and returning to poverty due to illness”. Therefore, the key objects of serious illness insurance should be patients prone to catastrophic medical expenditure.

Zhu and Song (2012) pointed out that the actual number of beneficiaries and the actual security level of the policy are two important indicators to assess the impact of catastrophic medical insurance on the risk dispersion. However, the catastrophic medical expenditure standard in China is too high, which may lead to the limited number of beneficiaries and make it difficult to give full play to its role of risk dispersion.

The definition method of catastrophic medical expenditure elaborated by Tao et al. (2004) has been widely cited by domestic scholars. Since then, many studies have found that the role of NCMS in reducing catastrophic medical expenditure is not very obvious.

Chang et al. (2005) found that the NCMS in Huairou District of Beijing from 1998 to 2003 can reduce the incidence of catastrophic medical expenditure by 20% - 30%.

Gong et al. (2009) pointed out that NCMS has little effect on the catastrophic medical expenditure of hospitalization expenses in Ningxia and Shandong.

Wang et al. (2010) studied the difference before and after the intervention of the mutual health care project, and found that the mutual health care project can reduce catastrophic medical expenditure, but its effect is reduced due to the improvement of its defined standard.

Wang et al. (2012) pointed out that NCMS compensation in Anhui Province has little change for catastrophic medical expenditure.

Gao et al. (2017) defined the percentage of households with catastrophic medical expenditure / all sample households as the incidence of catastrophic medical expenditure, reflecting the breadth of catastrophic medical expenditure reduction by serious illness insurance. The compensation effect of NCMS serious illness insurance is not obvious, and the mechanism of serious illness insurance to alleviate catastrophic medical expenditure needs to be improved. Moreover, some scholars have conducted a detailed study on the impact of NCMS on catastrophic medical expenditure in a certain area of China.

Yan et al. (2013) found that NCMS has a certain effect on family catastrophic medical expenditure, but the effect is limited.

Pan et al. (2013) analyzed the flow and cost of medical treatment for children aged 0-14 in a county of Guangxi, and conducted a study on the occurrence of major diseases in

children according to the multiple standard of annual (or single) medical cost exceeding the local average cost. The results showed that the actual subsidy ratio of 0-14 years old children with major diseases from NCMS is very low, which makes their families vulnerable to catastrophic medical expendure. The proportion of the average out-of-pocket expenses of sick children to their family disposable income and the medical treatment outside the county are the important reasons for the low compensation ratio. Some families with sick children may give up treatment because they can not enjoy the policy of advance medical expenses.

Xu (2012) analyzed the basic situation, preliminary results and main problems of NCMS in Anhui Province, and pointed out that the policy has achieved initial results in improving the reimbursement ratio of hospitalization expenses, controlling the growth rate of hospitalization expenses, and promoting hierarchical diagnosis and treatment, but there are still problems such as decomposition of charges in medical institutions.

Xu et al. (2016) suggested that "graded compensation" should be implemented for serious illness medical insurance, and special subsidy standards should be set for special groups in need.

In addition to the research on the NCMS, there is also extensive research on the medical treatment for urban residents.

Zhou et al. (2013) studied the role of medical insurance in serious illness through the survey data from the State Council, and found that the role of medical insurance is obvious, but the role for specific groups of people is limited. Therefore, different standards should be formulated.

③The impact of the health insurance system on catastrophic medical expenditure

Wang et al. (2014) suggested the establishment of a diversified insurance system.

Peng et al. (2017) pointed out that the establishment of serious illness insurance system should be promoted to reduce the incidence of catastrophic medical expenditure. According to China's standards, catastrophic medical expenditure can be reduced by 20% with serious illness insurance compensation, which is stronger than the security provided by the NCMS.

Yan et al. (2012) pointed out that the effects of various medical insurance systems on reducing the incidence of catastrophic medical expenditure are different.

Wu et al. (2012) pointed out that the incidence of catastrophic medical expenditure for families participating in the NCMS was as high as 14.8%.

Ma, Yu, and Zhang (2015) studied the effect of serious illness insurance on reducing

the incidence of catastrophic medical expenditure of insured patients. Based on the first standard [1] (catastrophic medical expenditure = family self paid medical expenses / total household income greater than or equal to 40%), it is found that catastrophic medical expenditure rate is reduced by 11.53% by serious illness insurance. Based on the second standard [2] (catastrophic medical expenditure = the amount of medical expenses paid by individuals is greater than or equal to the local annual per capita disposable income), it is found that serious illness insurance reduces the incidence of catastrophic medical expenditure by 5.36%.

In addition, the factors affecting the occurrence rate of catastrophic expenditure have been studied.

Yin et al. (2014) studied the contribution rate of health financing (the proportion of total household health care expenditure in household disposable income) and catastrophic medical expenditure of households, and explored the main reasons for catastrophic medical expenditure of rural households. It is found that annual family income and hospitalization expenses are important factors of catastrophic medical expenditure of rural families.

2.2.3 Literature review

The above research provides a good research basis for us to understand the operation mechanism, the regional model and the operating efficiency of serious illness medical insurance, and we can get the following enlightenment:

(1) Reducing the incidence of catastrophic medical expenditure is not only the fundamental purpose of serious illness medical security, but also the reflection of its effectiveness. As for catastrophic medical expenditure standard, family income level and expenditure structure, family disposable income and the proportion of medical expenses in family disposable income should all be considered. (2) As for the security effect of serious illness, the medical burden of vulnerable groups needs to be paid special attention. Improving the equity of medical insurance is another goal of serious illness medical insurance. Only by greatly improving the level of medical security for vulnerable groups to avoid them falling into a state of persistent poverty, can we achieve this goal. (3) The main factors of the effect of medical insurance for serious illness include: first, institutional factors: design of medical insurance system (payment threshold, individual self payment ratio, the capping line, hospital level, content of the three catalogues), service factors of medical insurance insitutions, medical and health service efficiency; second, economic factors:

family income, expenditure level and structure; third, demographic factors: the number of family members, proportion of maintenance, the number of minor children; fourth, the disease spectrum factor:chronic diseases and serious diseases.

Although the above literature has laid a good foundation for this study, there are still many problems to be solved: first, although the existing research has analyzed the major illness medical insurance models in various regions, how to choose an appropriate model has not been analyzed; second, for Zhanjiang City, the existing literature has not empirically tested the impact of major illness medical insurance on the development of the city; finally, although some policy recommendations were put forward, there is no corresponding theoretical evidence on how to optimize the serious illness medical insurance policy.

2.3 Overview of China’s medical security system

So far, China has launched three social insurance systems for different groups, including basic medical insurance for urban workers, new rural cooperative medical insurance and basic medical insurance for urban residents, as well as urban and rural medical assistance system for the poor and commercial health insurance system as a supplement.

2.3.1 Reform and development of basic medical insurance for urban workers

1978-1992 reform of state-funded public medical care and labor insurance medical care systems: these two systems constructed China's urban medical insurance system from 1950s to 1990s, reflecting the distinctive characteristics of welfare medical care under the planned economic system (Table 2-1).

The labor insurance medical system is managed and operated by a single enterprise. The funds are raised by the enterprise itself. The level of medical security enjoyed by workers is relatively high. According to *The Labor Insurance Regulations of The People's Republic of China*, medical treatment can be divided into four levels: first, excellent medical treatment; second, medical treatment for work-related injury; third, ordinary medical treatment; fourth, medical treatment for employees' relatives. Half of the medical expenses of employees' relatives are borne by the enterprise, and the rest three kinds of medical expenses are borne by the enterprise. Under the public medical system, the out-patient expenses, medicine expenses and hospitalization expenses of the staff of state organs can be reimbursed under items of medical expenses; the inpatient's meal expenses and

transportation expenses are borne by the patient, and they can be reimbursed within the scope of administrative expenses if the patient can't afford them (Xu, 2004). That is to say, almost all expenses incurred by an individual who enjoys medical security due to illness can be reimbursed. Since the reform and opening up in 1978, the planned economic system was gradually disintegrated. Since then, the background of China’s social security system has changed greatly. In this change, the basic medical insurance for urban workers gradually lost its foundation. At the same time, due to the welfare nature of the medical insurance system under the planned economy system, the medical expenses of employees are all covered by the state, state-owned enterprises and institutions. Lack of effective constraints on both sides resulted in serious waste of expenditure. In 1978, the total expenditure of medical expenses for employees was 2.7 billion yuan, which increased to 55.8 billion yuan in 1994, resulting in financial difficulties at all levels, and the burden of state-owned enterprises and institutions is becoming increasingly heavy (Peng, 2014).

Table 2-1 Basic information on state-funded public medical care and labor insurance medical care

Category	Coverage	Free items	Items to be paid	Regulatory agency	Source of funds
State-funded public medical care	Working / retired personnel in state agencies and public institutions; college students; demobilized soldiers; persons with disabilities of second-class or above	Medical treatment, medicine, examination, hospitalization, surgery, childbirth; cost of meals for the injured on business, the cost of travel to other places, the cost of meals for the special contributors prosthetic cost...	Registration fees, visit fees, hospitalization meal expenses and others	Government health	Appropriation from state treasury

labor insurance	Enterprise employees and immediate family members, retirees	Same as above	Registration fees, medical expenses of family members, hospitalization fee of family members, transportation cost	Enterprise administration	Welfare fund for enterprise employees

Source: Zeng (2011)

Since the 1980s, a series of explorations and practices have been carried out in various regions of China to seek solutions. However, at this stage, the exploration of reform is basically carried out in a local scope, lacking macro guidelines and supporting measures, failing to fundamentally solve the problems of public medical care and labor insurance medical care, and the effective management of medical institutions and the restriction mechanism of drug production and circulation are still not established. In short, the deep-seated medical reform has not yet been realized, and hospitals, individuals and enterprises can not reach a consensus in this field. Therefore, in the process of exploration and practice, with the clarity of reform ideas, all localities realize that partial adjustments of public medical care and labor insurance medical care systems are unable to meet the requirements of the market economic system, and must fundamentally carry out reform and establish a new medical security system.

The reform of basic medical insurance for urban workers from 1992 to 1998: the reform of social security system including medical care, pension and unemployment was put forward as a supporting measure for the reform of state-owned enterprises and the implementation of market economy. From 1992 to 1998, the pilot project of medical insurance reform with the focus of "the combination of social overall planning and individual account" in China was divided into the following periods:

(1) The reform began. In 1992, the prelude to the fundamental reform of China's basic medical insurance system for urban workers was *the Provisional Regulations of Shenzhen social insurance* issued by Shenzhen municipal government, which required the implementation of a unified medical social insurance system in the whole city.

(2) Pilot project was carried out. In 1994, on the basis of summing up various regional experience and drawing lessons from international experience, the State Council formulated

the *Opinions on the Pilot Reform of the Medical Security System for Urban Workers* and pilot projects of medical insurance system in Jiujiang City and Zhenjiang City were carried out, featuring the combination of social overall planning and personal accounts.

(3) The scope of the pilot project was expanded. In 1996, *the Opinions on Expanding the Pilot Reform of Medical Security System for Urban Workers* was issued, which clearly pointed out that it should be carried out in 38 cities nationwide, and the pilot scope should be expanded on the previous basis. At the same time, Hainan, Shenzhen, Qingdao and other cities have reformed the payment method according to the actual situation and the "combination of social overall planning and individual account". So far, in the process of the pilot reform of the medical insurance system, there are three models of "combination of social overall planning and personal account": 1) "Three section channel model" represented by that in Zhenjiang City and Jiujiang City; 2) The "Sector model" represented by that in Hainan and Shenzhen; 3) The "Three fund model" represented by that in Qingdao and Yantai. In addition, at this stage, there was a trend of institutional innovation in Beijing, Shanghai, Chengdu and other cities, that is, the mode of "overall planning of major diseases and diversion of minor diseases". The core content of the pilot project is to build a social medical insurance system and abolish welfare public medical care and labor insurance medical care. The specific measures refer to the reform of pension system at that time. The state, employers and individuals reach an agreement to implement the system model of combining social overall planning with individual accounts. Practice shows that the pilot reform in Zhenjiang and Jiujiang is in line with the national conditions at that time.

The results of the pilot reform are summarized as follows: First, a reasonable mechanism for raising medical insurance funds has been formed; second, a mechanism for restricting medical expenses has been initially established; third, the management system of designated medical institutions and the settlement system of medical expenses have been implemented. The establishment of the three mechanisms has effectively solved the inherent drawbacks of public medical care and labor insurance medical care, guaranteed the stable source of medical funds, curbed the unreasonable growth of medical expenses, and successfully promoted the internal management of medical institutions and the improvement of medical service quality. At the same time, the pilot reform also had an important impact on the establishment of the basic medical insurance system for urban residents and the new rural cooperative medical insurance system, which laid a solid foundation for the basic medical insurance system for urban workers(Wu, 2014). However, since this period did not

move towards a comprehensive reform of the medical insurance system, issues of medical security and pension security are still the main obstacles to deepen the reform of state-owned enterprises.

The 1998-2003 comprehensive reform of medical insurance for urban workers: On the one hand, through several years of pilot projects and expanded pilot experiments, we have explored the system model and specific path of China's medical insurance system reform, and formed a consensus on some basic policies, ideas and principles of medical insurance system reform in practice. On the other hand, deepening reform of state-owned enterprises also requires comprehensive reform of employee medical insurance. At this time, the reform ideas and the actual situation are mature, and the voice of transforming the valid experience into a national policy and promoting it in the whole country is growing.

In this context, the basic medical insurance system for urban workers in China began to enter a comprehensive reform stage in 1998. This conforms to the situation of social and economic development, ensures the process of state-owned enterprise reform, and effectively solves the problem of great changes in employment distribution pattern in the reform of state-owned enterprise. On the premise of ensuring the basic medical needs of the masses, it promotes the free allocation of labor resources under the market economy and maintains the basic stability in the period of social transformation. (Chen, 2014).

The development and integration of the medical insurance system for urban workers after 2003: with the advancement of the reform of the market economic system, some social issues are exposed at the same time. In 2009, *Opinions on Deepening the Reform of Medical and Health System* clearly pointed out that under the premise of the combination of government leading and market mechanism, we should further expand the coverage of basic medical insurance for urban workers, integrate and promote the convergence of new rural cooperative medical insurance, employee medical insurance and resident medical insurance, and standardize the management methods and financing measures of employee medical insurance fund. As for fund management, we should follow the three principles of "expenditure based on revenue with a small balance", and make rational use of the accumulated balance and annual balance of the fund. Where there is excessive balance, measures such as raising the level of security should be taken to achieve a reasonable level. A risk adjustment fund system for the basic medical insurance fund should be established, and the balance of the fund should be publicized to the masses on a regular basis. In 2011, the basic medical insurance for urban workers almost achieved city (prefecture) level

coordination.

2.3.2 Reform achievements and effects

The reform and development of the basic medical insurance for urban workers, giving employees universal and fair medical treatment, is of great significance to the formation of a fair employment environment and the promotion of free flow of labor resources in the market. At the same time, with the purpose of protecting the basic medical rights and interests of urban workers, the reform of the basic medical insurance for urban workers solves the problems faced by migrant workers and reformed state-owned enterprise workers through improving the system and security policies, and rationalizes the relationship between the economic development and people's medical security needs.

2.4 Reform and development of the new rural cooperative medical system

Since the founding of new China, urban-rural dual structure system has been implemented. For a long time, the medical security system of rural population relied on community financing and residents’ cooperative funding. In this way, not only the level of security is low, but also it has been extremely unstable. It was not until 2003 when the new rural cooperative medical system was established and the government’s investment increased year by year that a stable medical security system was gradually formed.

2.4.1 Urban-rural dual structure

Urban rural dual economic structure refers to the coexistence of urban economy and rural economy. From the end of 1956 to the end of 1957, the State Council issued the work instructions of *Preventing and Stopping the Blind Outflow of Rural Population* four times; *Regulations of the People’s Republic of China on Household Registration* issued in 1958 strictly restricted the inflow of rural population into cities. The division of registered residence management policy represents the formation of the dual economic structure in urban and rural areas. A series of management systems centered on registered residence system divided urban and rural areas. The vast majority of rural residents are excluded from the process of industrialization and are treated differently economically and socially from urban residents. The urban-rural dual structure has the following negative effects: first, the urban-rural dual economic structure is contrary to the goal of building a harmonious society

in China. Urban-rural isolation artificially damages the interests of rural residents, leading to poverty in rural areas. To a certain extent, it protects the interests of urban residents, which is contrary to the embodiment of social equity. Secondly, the urban-rural dual economic structure is obviously not conducive to the sustainable development of China's economy. At that time, under the background of urban-rural isolation, the income of rural residents in China was relatively low, and it was difficult to form a strong consumption to support China’s industrial development. At the same time, because of the backward configuration facilities in rural areas, farmers’ actual demand for industrial products is limited. The insufficient income of rural residents seriously leads to the insufficient domestic demand of China's economy, which affects the sustainable development of the national economy. In addition, urban- rural division leads to obstacles in the circulation of labor resources, increasing the labor cost of urban enterprises, and has a negative impact on the long-term economic development. Moreover, the urban-rural dual economic structure is not conducive to social stability. The wide gap between the rich and the poor in urban and rural areas will cause the psychological imbalance of farmers, bring hidden danger to social stability, which is not conducive to national stability and the harmonious and healthy development of society.

2.4.2 Traditional rural cooperative medical system

The traditional rural cooperative medical system is the medical and health security system in the period of planned economy. It is a collective public welfare health security system established under the leadership of the government, relying on farmers’s own ability and through the mechanism of joint fund-raising, risk sharing and mutual assistance. This system has several characteristics: farmers' willingness, risk sharing, joint fund-raising, mutual assistance and cooperation. In essence, it is a collective mutual medical security system, which is run by local people and subsidized by the state. It is mainly manifested as follows: on the one hand, its promotion and development is greatly interfered by the government; on the other hand, its fund comes from the public welfare fund of the collective economy and farmers’ individual payment; salaries of village doctors and health workers are subsidized by their production team or recorded by their production team, and then paid by the collective; the operation of commune’s health center mainly depends on capital form the rural community; the operation of production team’s health center is maintained by the common reserve fund of the team; the housing, equipment and Chinese herbal medicine base in cooperative medical station are invested by production teams; the working capital is also

allocated by production teams.

2.4.3 Establishment of new type rural cooperative medical system

China’s rural population is large, and the government's financial resources are insufficient. It is difficult to establish a medical security system with wide coverage in rural areas in the short term, so the limited funds can only be used in the most urgent places. For the majority of farmers, the biggest threat is major diseases, which is a risk they can not afford. Therefore, the rual cooperative medical system can meet the needs of farmers. In October 2002, the CPC Central Committee issued *the Decision on Further Strengthening Rural Work*, which pointed out that the new rural cooperative medical system should be gradually established; in the same year, the issuance of *the Opinions on the Establishment of the New Rural Cooperative Medical System* marked its formal operatio. Based on the pilot experience from 2003 to 2005, the pilot work of the new rural cooperative medical system was gradually strengthened in 2006; in 2007, it was promoted nationwide with a coverage rate of 80%; by 2010, this system basically covered all rural areas.

The main characteristics of the new rural cooperative medical system are as follows: in terms of financing, the main financing responsibility of the new system is borne by the government, while the old system is mainly borne by the village collective and farmers; in terms of security, the new system mainly focuses on “overall planning of serious diseases”, with a goal to reduce the farmers' burden of paying for serious diseases, which is obviously different from the old system focusing on “minor diseases”; in terms of overall planning, the new system mainly focuses on “overall planning of serious diseases”. On the other hand, the new system takes the county as a unit for overall planning, while the old system only takes the village or township as a unit for overall planning

2.4.5 Existing problems

First of all, the popularization rate of serious illness insurance policy is not high enough. Guo (2018) found in the survey of residents' familiarity with serious illness medical insurance that 63.64% of the people who participated in the serious illness medical insurance did not know the specific policy when reimbursement. Thus, the popularity of the policy is very low. Guo also found that there are great differences and even misunderstandings among ordinary insured people. Many people have not realized that the policy is beneficial to them, so its participation rate has not been improved rapidly. Only by vigorously carrying out

publicity activities and letting the masses truly feel the benefits of the policy, can the masses make active response. As long as the insurance rate increases, there will be sufficient sources of fund raising. In addition, there are still some problems in the operation of the current new rural cooperative medical system: First, it is difficult to raise funds. Local finance is restricted by the level of economic development, and farmers’ individual affordability is low; second, the degree of compensation is low and the procedure is cumbersome; third, the fund supervision is not effective, and there are loopholes in the fund being used; fourth, the government's propaganda is not in place, and farmers' cognition of the new rural cooperative medical system is biased, which affects their enthusiasm about this policy; fifth, farmers are faced with the problem of “adverse selection” before joining the insurance, while they are faced with the problem of “moral hazard” after joining the insurance; sixth, the service level of rural health institutions is low, the designated medical institutions induce medical demand and the diagnosis and treatment is not standardized; seventh, the external factors such as the low income of farmers, the chaotic drug market, the limited role of rural medical assistance system are not conducive to its sustainable development.

At present, urban and rural medical assistance system, basic medical insurance system for urban workers, basic medical insurance system for urban residents and new rural cooperative medical system constitute the basic medical security system in China. Because the urban-ruraldual structure is obviously unfair and inefficient, it does not meet the fundamental needs of China's political, economic and social development. It is urgent to reform it and build a more fair and reasonable basic medical security system between urban and rural areas, which is featured by “overall planning and urban and rural integration”.

2.5 Establishment of basic medical insurance system for urban residents

2.5.1 Background of establishment

Firstly, the huge demand on urban residents' medical insurance directly stimulates the construction of the basic medical insurance system for urban residents. With the steady improvement of people's quality of life, the demand of urban residents for public services is increasing, and the demand for medical security is becoming more and more urgent. At the same time, with the further deepening of China's economic system reform, great changes have taken place in the ownership structure, employment structure and mode of production. Trends of diversified employment situation, aging population and urbanization are becoming

more and more obvious. The basic medical insurance system for urban workers is only for urban workers while new-form employees and their family members are not included in the coverage. There is no institutional arrangement for these people's medical insurance, which leads to the construction of the medical insurance system for urban residents.

Secondly, the basic medical insurance system for urban residents should be established as soon as possible. The new medical insurance system for urban workers in 1998 and the new rural cooperative medical insurance system in 2003 have been established one after another. The basic medical needs of rural residents and urban workers have been secured by the system while urban residents are not all covered by medical security system. The uneven coverage will lead to unfairness, which is bound to become a social instability factor that can not be ignored. To a large extent, this urges the government to issue relevant regulations on medical insurance for urban residents in time.

2.5.2 Development and content

In 2007, the relevant guidance issued by the government proposed that the pilot city rate of basic medical security for urban residents should reach more than 80% in 2009, and comprehensive coverage should be achieved in 2010, gradually forming the medical security system characterized by overall planning for serious diseases. The system should cover urban residents who are not covered by employee medical insurance, including students and children. Local economic development level and basic medical consumption demand determine the financing level and payment standard. The source of urban residents' medical insurance fund is family payment, the government can give appropriate subsidies, and introduce incentive policies for individual payment and company subsidy.

2.5.3 Meaning of establishment

The objects of medical insurance for urban residents are mainly the urban minors who have not been insured and the unemployed residents. It is a major measure taken by the Party Central Committee and the State Council to further improve the people's medical security and continuously improve the medical security system after the implementation of the basic medical insurance system for urban workers and the new rural cooperative medical system. This system is of great significance to the process of China's insurance system reform, and completes the institutional arrangement for China's social insurance system to achieve full coverage.

2.5.4 Principles of basic medical insurance for urban and rural residents

The Opinions issued in 2016 proposed to integrate the new rural cooperative medical insurance system and the basic medical insurance system for urban residents. In order to ensure the integration of urban and rural medical insurance, six unified principles have been clarified: 1) the principle of unified coverage: covering all people who should be insured and flexible employees and farmers should participate in the basic medical insurance according to law. 2) Unified financing principle: adhere to multi-channel financing, different regions can adopt differentiated financing, stabilize the financing mechanism, and make a good connection between the mechanisms. 3) The principle of unified security treatment: this is to ensure the equity of basic medical treatment. 4) Principle of unified medical insurance catalogue: medical treatment should follow the principles such as “clinical necessity” and “fund affordability”. 5) The principle of inified management of designated hospitals: unify the management methods of medical insurance, and implement the same management system in non-public medical institutions. 6) Unified fund management principle: adhere to the principle of “expenditure based on revenue with slight balance”.

2.6 Positioning of serious illness medical insurance

China's serious illness medical insurance is purchased from commercial insurance institutions by the government using insurance funds, and the government is jointly responsible with the insurance institutions.The system form of serious illness medical insurance makes it different from commercial insurance and basic medical insurance for urban and rural residents, but there are some connections between them. China’s basic medical insurance system and serious illness medical insurance system are not inclusive to each other, but complementary to each other. Serious illness medical insurance can increase the proportion of reimbursement through “second reimbursement”, so as to alleviate the heavy financial burden caused by serious illness. It is also a supplement to the security level of basic medical insurance; while basic medical insurance complements the weakness that serious illness medical insurance can not provide basic security. China's serious illness medical insurance is undertaken by commercial insurance institutions, but it is different from commercial insurance, because it does not follow the wishes of the insured and is mandatory to some extent, so serious illness medical insurance has its special independence. Serious illness medical insurance expands the scope of basic medical insurance and commercial

insurance. It has the attributes and basic characteristics of social insurance. Therefore, it should belong to the social insurance system from the perspective of positioning and it is an important part of China's medical security system.

2.6.1 Basic principles

There are five basic principles of serious illness medical insurance in China: First, the principle of government leading: the operation mechanism of serious illness medical insurance is controlled by the government and assisted by commercial insurance institutions. If we regard serious illness medical insurance as a big ship, the government is at the helm, while the commercial insurance institutions are paddlers. They have clear division of labor and strong professionalism, which can improve the service efficiency. Second, people-oriented principle. The fundamental purpose of the design of serious illness medical insurance system in China is to safeguard the people's right to life and health, and to solve the problem that the people can not bear the economic burden and continue to live a normal life due to serious illness. Third, the principle of shared responsibility. China's development has changed from high speed to medium speed to the new normal. In this context, we should adhere to the principle of shared responsibility. The serious illness medical insurance system is based on meeting the needs of the masses, combining with the masses' ability to pay, and cooperating with the economic development. In the past, the government alone bears the risk of fund management, but now the government and commercial insurance institutions share the responsibility. This can significantly improve the efficiency of fund utilization, making the system develop sustainably. Fourth, the principle of adjusting measures to local conditions. China has a vast territory, the development of various regions is unbalanced, and the differences in various aspects of development are relatively large, which were taken into account when the serious illness medical insurance system was designed. Each region can formulate specific rules suitable for its own characteristics within the scope of the system according to the local actual situation, such as the setting of the payment threshold. Fifth, the principle of keeping capital and creating small profits. “Keeping the capital, creating small profits and achieving balance of revenue and expenditure” is a clear provision for medical insurance institutions of serious illness medical insurance system in China, which is also the internal condition for the smooth development of this system. “Balance of revenue and expenditure” means to set up appropriate premium price and security level according to the people's ability to pay, and use the fund balance to solve the problem of high medical

expenditure of serious diseases to the greatest extent. On the one hand, it is conducive to enhance the internal power of commercial institutions undertaking serious illness medical insurance; on the other hand, it is to optimize the operation effect of serious illness medical insurance by taking advantage of market competition. If medical insurance institutions want to improve the profit, they need to reduce the cost by improving the operation efficiency.

2.6.2 Funding mechanism and coverage of medical insurance

The fund of serious illness medical insurance in China comes from the fund allocation of basic medical insurance, so there is no need to raise additional funds for the insured, and the fund-raising standard is adapted to local conditions. The formulation of premium price in each region should be related to the local economic development, the level of medical expenses, the proportion of reimbursement, and the income of the masses. In 2012, China's six ministries and commissions jointly issued *the Opinions*, which proposed that the balance of basic medical insurance funds in various regions is allowed to be allocated to the serious illness medical insurance fund; if the fund balance is small or there is no balance, it can be supplemented by improving the financing standard of urban and rural residents' medical insurance. Research shows that in order to calculate the incidence of serious diseases in various regions of China, the Medical Reform Office has conducted a sample survey on 100 million people. The results show that the premium price shoule be about 45 yuan. At that time, the financing standard was relatively scientific. As the financing level of basic medical insurance improves, the fund balance is also increasing, which ensures the sustainability of serious illness medical insurance.

The purpose of serious illness medical insurance system in China is to reduce the burden of high medical expenses due to serious illness and to cover the part of expenses that cannot be reimbursed by basic medical insurance. In practice, there is little difference between the two systems. The serious illness medical insurance is like an extension of the basic medical insurance. The reimbursement ratio, self-expense ratio, the capping line and other aspects have been improved. Expenses beyond the scope of basic medical insurance can not be reimbursed by serious illness medical insurance. For example, drugs that cannot be reimbursed by basic medical insurance cannot be reimbursed by serious illness medical insurance. Fortunately, China's medical insurance for urban and rural residents has basically achieved full coverage, covering urban and rural residents, but excluding urban workers. Serious illness medical insurance can cover the part of expenses that the individual still needs

to bear after the reimbursement of medical insurance for urban and rural residents, but the “second reimbursement” must be carried out under the reimbursement provisions of serious illness medical insurance. Under normal circumstances, the more medical expenses that meet the requirements, the higher the proportion of reimbursement will be. There is no capping line, and the final reimbursement proportion will not be less than 50%. “High medical expenses” here means that the expenses exceed the disposable income of urban residents and the per capita net income of farmers in the previous year as shown in the statistics of the region. As for the payment threshold, the proportion of out-of-pocket payment and the capping line should be determined according to local actual conditions. Expenses should be in line with the reimbursement regulations, which refers to the reasonable medical expenses that can be reimbursed. However, there are also some expenses that cannot be reimbursed by serious illness medical insurance, and the specific situation varies from region to region. With the development of economy, the level of financing is also improving, and the scope of security will gradually expand.

2.6.3 Existing problems

(1) The penetration rate of the serious illness insurance policy is not high enough.

Guo (2018) conducted a survey on people’s familiarity with serious illness medical insurance policy and found that 63.64% of the insured people of the serious illness medical insurance did not know the specific policy at the time of reimbursement. Thus, the penetration rate of this policy is very low. Afer interview and investigation, Guo found that the common participants had different understanding of the serious illness medical insurance, and even misunderstood it. Many people have not realized the benefits of this policy, so the rate of participating insurance has not been improved rapidly. Only by vigorously carrying out publicity activities and making the masses truly know the benefits, can the masses actively respond to it. As long as the rate of participating insurance increases, there will be sufficient sources for insurance fund.

(2) The fund stock of serious illness insurance is insufficient and wasted seriously.

At present, each region is based on the local economic situation rather than the medical needs of the masses to set the corresponding insurance financing standards, capping line and payment threshold, so there are a series of problems, such as high payment threshold and low capping line. This is determined by the economic level of our country. To meet the needs of rural medical insurance funds for serious illness, the central government and local

governments are facing great challenges. In recent years, with the deepening of medical reform, the profit seeking phenomenon of medical institutions is becoming more and more obvious. Some hospitals even set tasks for medical staff in order to improve their economic interests, and give them bonuses and commissions according to the drugs sold. As a result, doctors continue to recommend inappropriate drugs to patients, forming a vicious circle, causing serious waste of medical insurance funds and medical resources. This is common in recent years, and some patients even reported this problem to government regulators, but the problem has not been well solved. This reflects that the government management is not perfect, which is also a problem to be solved urgently for serious illness medical insurance. For seriously ill patients, medical costs are very high, but they can not fully supervise the behavior of medical staff. Driven by the interests, medical expenses are increasing, resulting in the waste of medical insurance funds. When there is a deficit in the medical insurance fund, the financing level will also increase, but ultimately the insured will have to pay. Under the current medical insurance mechanism, it is difficult to supervise the medical institutions, resulting in the waste of medical insurance funds. Moreover, serious illness medical insurance funds are scarce, mainly from the allocation of basic medical insurance fund, which leads to the coverage and level of security can not be improved. Sufficient funds are the material basis to ensure the smooth development of a policy. It is difficult for any policy to go long without financial support. Song and Zhu (2014) dynamically predicted the sustainable development of the medical insurance system for urban residents in 31 provinces (cities, autonomous regions) of China. The results showed that in some area, the medical insurance fund even had a negative income of 1.363 billion yuan.

In recent years, from the perspective of the management mechanism of serious illness insurance, the lack of risk sharing mechanism and the low level of overall planning are two prominent problems. The fragmentation of China's social insurance system can be described as a long-term problem, which is very difficult to overcome. Therefore, it is necessary to realize the overall planning at the municipal level as soon as possible, improve the overall planning level of basic medical insurance, and implement it in parallel with the medical insurance for urban and rural residents and the medical insurance for urban workers. Zhang et al. (2019) pointed out that the expansion of serious illness insurance coverage will cause the imbalance between revenue and expenditure.

2.7 Medical insurance for residents from the perspective of social equity

Starting point equity, process equity and result equity constitute social equity. 1) Starting point equity: the initial conditions for social members to participate in various social activities and self-shaping process are equal; 2) process equity: in the development process of social members, there should be no social or human factors hindering the access and realization of social members' opportunities; 3) result equity: the results of social members' participation in social activities should be equal, that is, fair distribution, which is the core of social equity.

2.7.1 Starting point equity

From the perspective of starting point equity of social members, medical insurance emphasizes that every social member should enjoy equal basic medical security rights regardless of the differences in their status, identity and income. Fair starting point means the establishment of medical security system covering all members of society. The establishment of basic medical insurance system for urban residents means that the qualification of urban residents to participate in social medical insurance has a system basis, and their right to participate in social medical insurance is guaranteed.

China's medical insurance system is diversified, which makes different groups get different medical treatment. Although there are historical reasons, from the perspective of starting point equity, this difference is unreasonable. Swedish International Development Cooperation Agency (SIDA) and WHO have pointed out the significance of equalization of universal health care: health services are provided to meet the needs of social members and should not be affected by other factors (Hu, 2009). This reflects the pursuit of starting point equity. However, China's medical insurance reform is from the bottom to the top. The medical insurance system for the groups with relatively low social status was established earlier, while the basic medical insurance system for urban residents has been missing for a long time, which is obviously contrary to the principle of starting point equity. It is easy to find this point when we review the course of medical insurance reform. It can be seen from Appendix 3 Table 2-1 that China has initially formed a medical insurance system that can cover all citizens, so that the system equity of medical insurance in China can be initially reflected.

In addition, the reform of the basic medical insurance system for urban residents is

deepening, and the security gap between urban residents and urban workers can be gradually reduced by improving the financial reimbursement level for urban residents, increasing the proportion of hospitalization expenses reimbursement, and establishing outpatient coordination. We should standardize the security level of different medical insurance systems, give different groups of people relatively equal medical security rights, and try our best to meet the medical needs of different groups. This shows that China’s medical insurance has made a new step towards the starting point equity.

2.7.2 Process equity

From the perspective of maintaining the process equity of social members' participation in medical insurance, medical insurance for urban residents should effectively protect the rights of residents to enjoy social insurance. As long as the urban residents are in line with the corresponding provisions, they should be compulsorily included in the scope of the medical insurance system. Therefore, the medical insurance should be fully covered. In reality, everyone should get equal opportunities for survival and development provided by medical insurance, regardless of geographical, economic and professional differences. Equal opportunity represents the first core of health insurance for all: full coverage (Zhu, 2006). The maintenance of process equity is the prerequisite for social security system to realize result equity, and it is also the key link of socialequity. It can be said without hesitation that although process equity does not necessarily lead to result equity, but if there is no process equity, result equity can never be achieved.It can be seen from Table 2-2 that the number of participants of urban basic medical insurance increased from 473.432 million in 2011 to 1344.520 million in 2018, an increase of 2.84 times; the number of participants of medical insurance for urban residents also increased from 221.161 million in 2011 to 873.587 million in 2017, an increase of 3.95 times. This shows that under the effect of policy, the coverage of residents’ medical insurance is gradually expanding, which is a process of realizing process equity.

Table 2-2 Participation of urban medical insurance

Year	Number of participants of basic medical insurance (ten thousand)	growth rate(%)	Number of participants of medical insurance for urban residents (ten thousand)	growth rate(%)
2011	47343.2	/	22116.1	/
2012	53641.3	13.30	27155.7	22.79
2013	57072.6	6.40	29629.4	9.11
2014	59746.9	4.69	31450.9	6.15
2015	66581.6	11.44	37688.5	19.83
2016	74391.6	11.73	44860.0	19.03
2017	117681.4	58.19	87358.7	94.74
2018	134452	14.25	89741.0	2.7

Source: National Bureau of Statistics

2.7.3 Result equity

To maintain the result equity of social members’ participation in medical insurance, urban residents should enjoy basic equal treatment in terms of actual medical funds and medical assistance. Specifically, the basic medical insurance system maintains the balance of payments of the medical insurance fund by adjusting the way and level of financing and guarantee, so as to continuously and effectively meet urban residents’ basic needs for medical insurance, ultimately ensuring that they can enjoy the result equity of basic medical security. On the one hand, the basic medical insurance system for urban residents transfers social wealth from high-income people (regions) to low-income people (regions) through financial assistance, narrowing the unequity of the medical security. On the other hand, under the guidance of the principle of meeting social members’ needs for health care, differing medical security levels according to groups, regions and stages can not only safeguard medical insurance benefits of all parties, but also use the medical insurance fund efficiently. The result equity means the second core of universal health insurance: the same benefit criterion (Zhu, 2006), which means urban residents who are covered by the health insurance enjoy the equity of financing and guarantee.

The sources of raising medical insurance fund include individual contributions and government financial subsidies. The difference in fund-raising level reflects two points: one

is the economic development level, and the other is the basic medical consumption demand. From the perspective of the government finance, the current financial subsidy to urban residents by basic medical insurance reflects that the government transfers part of the social wealth to relatively vulnerable urban residents through redistribution, which guarantees their basic medical needs and narrows the difference in medical security level. As the basic medical insurance system for urban residents in China is still in the early stage, the regional economic development level has an obviously stronger influence on the fund-raising level than residents' basic medical consumption demand. Locally, the influence of economic development level is mainly reflected in rich areas, so the policy support to the poor areas under the influence of political factors reflects the result equity to a certain extent.

The guarantee model and guarantee level of basic medical insurance for urban residents are directly reflected by indicators including the scope of reimbursement for residents' medical treatment, the proportion of reimbursement and actual reimbursement items, and indirectly influence the expenditure of residents' medical services, ultimately the consumption structure. Therefore, as a part of social security system, the different guarantee level and model of residents' medical insurance will bring different effects of income redistribution. In addition, similar to the fund-raising problem in the spatial dimension, residents' medical insurance also involves problems like the medical security treatment differences in different regions or urban and rural areas, which means regional differences in the guarantee model and level affect the result equity of residents' health insurance.

2.8 Summary

The basic medical security of our country is constituted by the new rural cooperative medical insurance, the basic medical insurance for urban workers, ect. China's basic medical insurance coverage is wide with the purpose of meeting the nation's basic medical security needs. China's medical security system contains "three horizontals" and "three verticals", which intersect and influence each other (Figure 2-1 and 2-2). The "three horizontals" are divided according to the social and economic structure and demand. At the bottom is the subsidy for the needy to participate in basic medical insurance, and the main level includes commercial health insurance and other supplementary insurance, mainly to meet the higher level of medical service needs in addition to the basic medical insurance. In 2007, China for the first time clearly put forward the "three horizontals and three verticals" overall framework of the medical security system, and pointed out the new "three verticals" concept,

which includes the basic medical insurance system for urban workers, the NCMS and the basic medical insurance system for urban residents.

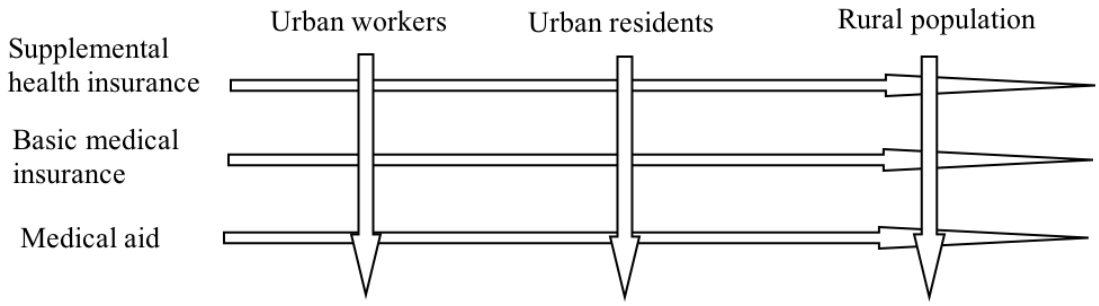

Figure 2-1 China's "three horizontals" and "three verticals" medical security system

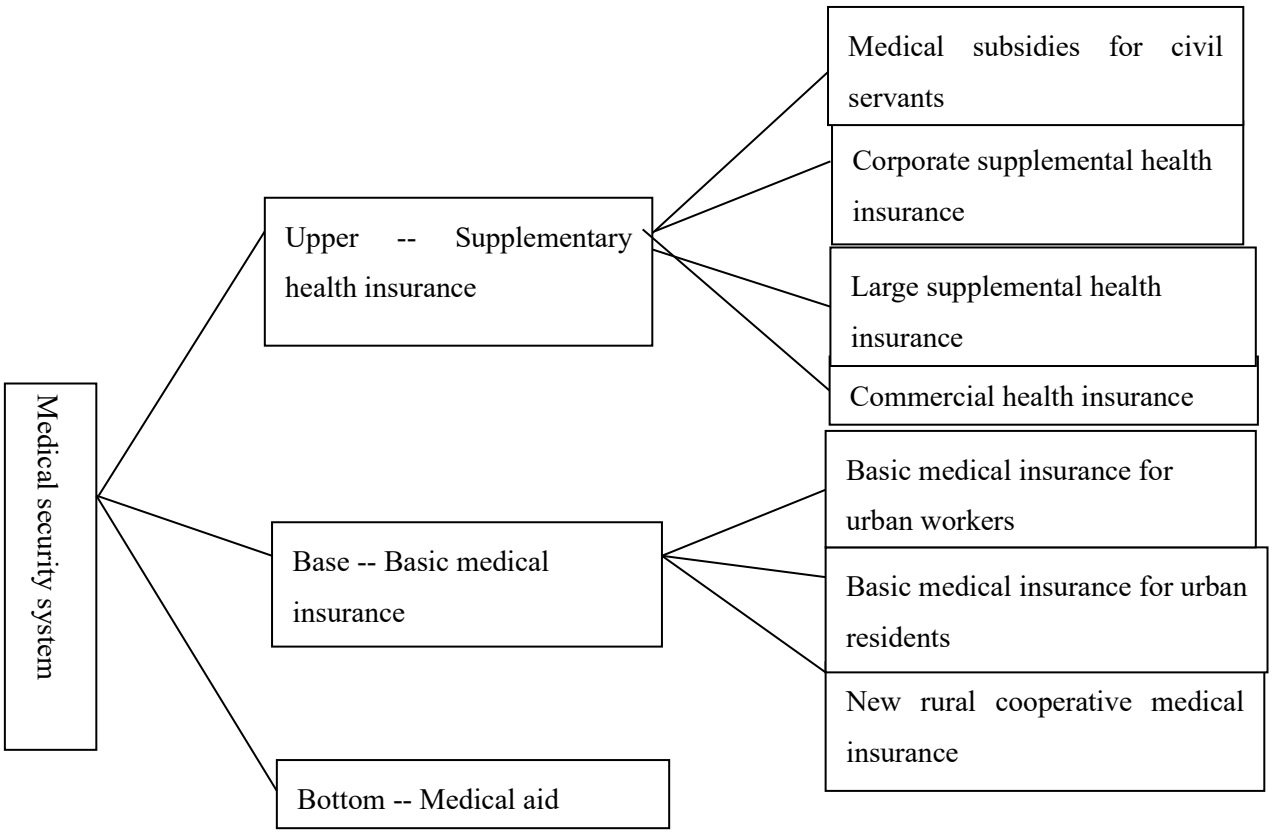

Figure 2-2 China's medical security system

2.9 An analysis of the serious illness insurance system for urban and rural residents and its current implementation in Zhanjiang

2.9.1 Basic situation of economic, social and medical security for urban and rural residents in Zhanjiang

(1) Social and economic development of Zhanjiang

Zhanjiang, formerly known as Guangzhou Bay, also called as Port City, is the prefecture-level city of Guangdong Province. As a prefecture-level city with the second largest population, it has nearly 8 million citizens. Located at the southernmost tip of the mainland, it has the jurisdiction over 3 county-level cities, 5 districts and 2 counties. It is the economic center of western Guangdong and Beibu Gulf economic circle, one of the shortest port cities in mainland China to Oceania, Europe and other regions, and the first 14 coastal open cities in China in 1984. In recent years, Zhanjiang has been listed as the central city of “one nuclear two poles” and positioned as the provincial sub-central city. In 2018, Zhanjiang’s GDP reached 300.839 billion yuan, rising by 6.0% year on year. The output value of the primary industry was 53.361 billion yuan, accounting for 17.73% of GDP, the output value of the secondary industry was 108.661 billion yuan, accounting for 36.12%, and the output value of the tertiary industry was 138.816 billion yuan, accounting for 46.14%. In 2018, Zhanjiang’s investment in fixed assets was 185.164 billion yuan, rising by 12.80% year on year, and the retail sales of social consumer goods amounted to 169.730 billion yuan, an increase of 10.30% over the previous year. According to the population data related to medical insurance, the permanent resident population of Zhanjiang at the end of 2018 was 7.332 million, increasing by 0.37% over the previous year, the registered population was 8.4802 million, increasing 1.08% over the previous year, and the number of social employees at the end of the year was 3.4376 million, basically the same as the previous year (See Table 2-3).

Table 2-3 The main indicators of national economic and social development of Zhanjiang from 2012 to 2018

ITEM	Unit	2012	2013	2014	2015	2016	2017	Y 2018
Permanent population at the end of the year	10K	710.92	716.71	721.24	724.14	727.3	730.50	733.2
Total registered population at the end of the year	10K	785.17	804.23	819.00	822.96	834.81	838.94	848.02
Social workers at the end of the year	10K	331.64	336.37	340.75	340.85	343.75	344.51	343.76
Number of employees	10K	43.37	48.96	48.86	48.37	48.46	47.08	47.93
GDP (current price)	100 million yuan	1860.22	2060.01	2258.99	2380.02	2584.78	2806.88	3008.39
The primary industry	100 million yuan	384.97	421.44	429.38/	452.56	507.28	491.17	533.61
The secondary industry	100 million yuan	723.10	814.33	894.15	907.84	984.74	1058.97	1086.61
The tertiary Industry	100 million yuan	752.15	824.24	935.46	1019.62	1092.77	1256.74	1388.16
Investment in fixed assets	100 million yuan	572.28	795.58	1020.76	1313.69	1531.60	1641.53	1851.64
The total retail sales of social consumer goods	100 million yuan	861.33	1010.70	1162.10	1297.95	1432.96	1578.08	1697.30

Source: The statistical bulletin on the national economic and social development of Zhanjiang from 2012 to 2018, previous years' Guangdong Statistical Yearbook

(2) Population distribution and structure background

For medical insurance, the regional population distribution and structure is a very important factor. Table 2-4 shows the main population indicators of Zhanjiang in recent years.

Table 2-4 The main population indicators of Zhanjiang from 2003 to 2017

Year	Total household registration (10,000)	Household population (10,000)	Agricultural population	Non-Agricultural population	Male	Mean Population (10,000)
2003	173.6751	713.9396	527.5466	186.393	377.2077	710.5568
2004	182.1654	715.9396	524.3893	191.5503	378.2644	714.9396
2005	183.9155	718.0498	525.9349	192.1149	379.3793	716.9947
2006	188.7922	736.5161	463.2539	273.2622	390.0414	727.283
2007	190.0862	744.9934	469.0632	275.9302	394.081	740.7548
2008	194.6482	753.877	475.0015	278.8755	399.1564	749.4352
2009	201.1083	763.1426	481.0027	282.1399	404.2701	758.5098
2010	205.5955	777.77	491.3483	286.4217	412.1593	770.4563
2011	204.4287	792.055	501.9835	290.0715	419.7222	784.9125
2012	202.6602	785.1691	493.5521	291.617	417.9674	788.612
2013	203.9167	804.2298	506.7721	297.4577	427.5881	794.6995
2014	205.5591	818.9976	518.2013	300.7963	435.5200	811.6137
2015	204.1342	822.9609	514.7939	308.1670	438.1341	820.9793
2016	205.6449	834.8094	524.7945	310.0149	444.4226	828.8852
2017	206.4299	838.9362	528.7714	310.1648	446.3086	836.8728

Source: Zhanjiang Statistical Yearbook (2018)

It can be seen from Table 2-4 that currently the total number of registered households in Zhanjiang is 2.064 million, and the total registered population is 8.3894 million, which means households have nearly 4 persons on average. Among the registered population, the agricultural registered population is 5.2877 million, accounting for 63.03% of the total registered population. This means that the relatively high proportion of agricultural registration population needs to be considered when formulating the medical insurance policy system for serious illnesses in Zhanjiang.

In addition to the total population of the region, the spatial distribution and structure of population within the region also need to be considered. Table 2-5 shows the population structure of regions in Zhanjiang in 2017.

Table 2-5 The population structure of regions in Zhanjiang in 2017

County (City, District)	Total household registration	Below 18 years old	Ratio	18-34 years old	Ratio	35-59 years old	Ratio	Above 60 years old	Ratio
Total	8389362	2159954	25.75%	2644647	31.52%	2401535	28.63%	1183226	14.10%
Downtown	1658901	385117	23.22%	481611	29.03%	530395	31.97%	261778	15.78%
Chikan District	245028	51441	20.99%	55635	22.71%	92944	37.93%	45008	18.37%
Xiashan District	377096	76770	20.36%	86240	22.87%	142556	37.80%	71530	18.97%
Potou District	426043	99208	23.29%	145958	34.26%	118608	27.84%	62269	14.62%
Mazhangqu District	301216	79976	26.55%	98550	32.72%	83354	27.67%	39336	13.06%
Development Zone (including East China Sea)	309518	77722	25.11%	95228	30.77%	92933	30.03%	43635	14.10%
Wuchuan country	1205133	314361	26.09%	403770	33.50%	322966	26.80%	164036	13.61%
Xuwen County	776434	194662	25.07%	234048	30.14%	237597	30.60%	110127	14.18%
Leizhou city	1822155	488313	26.80%	614374	33.72%	489697	26.87%	229771	12.61%
Suixi country	1098903	276154	25.13%	346373	31.52%	314526	28.62%	161850	14.73%
Lianjiang City	1827836	501347	27.43%	564471	30.88%	506354	27.70%	255664	13.99%

Source: Zhanjiang Statistical Yearbook (2018)

As can be seen from Table 2-5, the basic population structure of Zhanjiang is as follows: the population proportion in the four age groups including under 18, 18-34, 35-59 and over 60 is 25.75%, 31.52%, 28.63%, and 14.10%, which shows that the population structure is relatively reasonable. The high proportion of the population in the 35-59 age group means that the pressure of population aging problems will gradually increase in the next 30 years, and the prospect of the medical security system in Zhanjiang is not optimistic.

2.9.2 A overview of the basic medical security system

In 2018, Zhanjiang's NCMS and other two types of urban and rural basic medical insurance basically cover all residents of the city.

(1) Basic medical insurance for urban and rural residents

In 2018, the payment standard for Zhanjiang residents was 180 yuan per person, and the treatment for the insured includes: (1) General outpatient treatment. The social security agency pays 20 yuan for a person per year for outpatient consumption at the village (residential) health station. The surplus funds in the card can be transferred to the following year for the outpatient service. Residents who go to the local health center for treatment and pay more than 20 yuan can be reimbursed by 60% of the medical expenditure with the annual limit of 300 yuan. (2) Special outpatient treatment. 26 kinds of diseases are covered. The insured residents shall reimburse medical expenditure according to the regulations through procedures for special diseases. (3) Inpatient treatment. Details see Table 2-6 and Table 2-7.

Table 2-6 Inpatient payment standard and the basic medical payment ratio of medical insurance for urban and rural residents in Zhanjiang in 2018

Hospital category	Minimum payment standard (yuan)	Basic medical payment ratio (within the specified project scope)	The annual maximum payment of the basic medical treatment
Township Health Center	100	85%	200,000.00
Level I hospital	100	80%	
Level II hospital	300	70%	
Level III hospital	500	50%	

Source: The people's Government of Zhanjiang Municipality

Serious disease insurance standards are as follows:

Table 2-7 Proportion of medical insurance payment for serious disease for urban and rural residents in Zhanjiang in 2013-2019

Out-of-pocket payment within the scope of the medical insurance policy	Serious disease insurance payment ratio	The annual maximum payment of basic medical insurance and serious disease insurance		
		2013、2014、2015	2016、2017	2018、2019
20,000—50,000	50%	First gear 300,000 yuan, second gear 500,000 yuan	500,000 yuan	600,000 yuan
50,000—80,000	60%			
80,000—100,000	70%			
Above 100,000	80%			

Source: The people's Government of Zhanjiang Municipality

Zhanjiang City also provides corresponding serious illness insurance for children. For children who are 14 years old and below, medical expenses of more than seven serious illnesses such as patent ductus arteriosus can be reimbursed by 70% with the urban and rural residents' medical insurance. In addition, the urban and rural medical assistance fund subsidizes 20%.

(2) Basic medical insurance for urban employees

The payment of basic medical insurance in Zhanjiang in 2018 is as follows: (1) "Combined payment": According to the payment base of in-service staff, employers pay 6.2%, and employees pay 2%. (2) "Single building to plan as a whole": Employers pay 4.8% of 80% of employees' average salary in previous years. The available medical insurance treatment is as follows: (1) Basic medical insurance treatment: The insured can enjoy the treatment since the seventh month after payment. Those who fail to pay in full cannot enjoy the treatment. The re-insured can enjoy the treatment after paying in full. (2) Special outpatient treatment: 26 kinds of diseases are covered. The insured residents shall reimburse medical expenditure according to the regulations. Details see Table 2-8.

Table 2-8 Inpatient payment standard and the basic medical payment ratio of medical insurance for urban employees in Zhanjiang in 2018

Hospital category	Minimum payment standard (yuan)	Basic medical payment ratio (within the specified project scope)		The annual cumulative maximum payment of the employee basic medical insurance
		In-service staff	Retired staff	
Level I hospital	200	90%	93%	100,000
Level II hospital	500	85%	88%	
Level III hospital	800	80%	83%	

Source: The people's Government of Zhanjiang Municipality

In addition, there is supplementary medical insurance in which the limit of the serious illness pension is 400,000 yuan per year.

2.9.3 An analysis of the basic situation of medical institutions for urban and rural residents

In 2017, there were 3,400 medical institutions in Zhanjiang, with a total of 35,091 beds. Of these, the majority are primary health care institutions (3180), while there are few general hospitals, traditional Chinese medicine hospitals and specialized hospitals, only 64, 12 and 27 respectively, mainly in the downtown. Primary health care institutions are mainly village health clinics (2156). In addition, there are relatively many clinics, health clinics and infirmaries (823). See Table 2-9.

For the basic medical insurance in Zhanjiang, there are 224 fixed-point hospitals in five counties and cities. The distribution is shown in Table 2-10.

In 2016, there were 114 fixed-point outpatient clinics in Zhanjiang. These fixed-point hospitals and fixed-point outpatient clinics are all the medical service institutions with medical insurance for serious illnesses under the basic medical insurance in Zhanjiang.

Table 2-9 Major medical institutions and beds in Zhanjiang in recent years

	Y2015		Y2016		Y2017	
	Number of institutions	Number of beds	Number of institutions	Number of beds	Number of institutions	Number of beds
Total	3448	31037	3487	32216	3400	35091
First, Hospital	92	21706	92	22730	103	25338
1.Hospital	92	21706	92	22730	103	25338
For：General hospital	59	16132	58	16844	64	18662
Traditional Chinese medicine hospital	9	2378	9	2504	12	2885
The specialized hospital	24	3136	24	3322	27	3791
Second, Primary health care institutions	3177	7441	3216	7489	3180	7655
1.Community health center	34	570	34	613	34	650
2.Township health center	95	6862	95	6865	95	6992
3. Village clinic	2212	0	2211	0	2156	0
4. Outpatient department	51	4	54	20	55	13
5. Clinics, health centers, infirmary	765	0	801	0	823	0
Third, Professional public health agency	167	1714	167	1812	100	1922
1.Specialty Disease prevention and treatment institute (institute, station)	12	429	12	466	12	451
2. Maternal and child health hospital (institute, station)	10	1285	10	1346	10	1471
Four, Other health institutions	11	176	12	176	17	176

Source: Zhanjiang Health Bureau information report summary system over the years

Table 2-10 The distribution of basic medical insurance fixed-point hospitals in Zhanjiang.

	Level 3 Hospital	Level 2 Hospital	Level 1 hospital	Town level Hospital
Zhanjiang City	4	15	28	7
Wuchang City (County-level city)	0	4	8	12
Leizhou City (County-level city)	0	7	17	18
Lianjiang City	1	4	18	22
Suixi City	0	4	10	15
Xuwen City	0	4	11	15

Source: Relevant information published on the website of Zhanjiang Social Insurance Fund Administration

2.9.4 Model design of serious illness insurance for urban and rural residents in Zhanjiang

In 2009, according to the actual development needs, a medical insurance model with Zhanjiang characteristics has been explored in the complex relationships of urban-rural unification, municipal coordination, commercial insurance participation, diagnosis and treatment standards, and serious disease insurance. This is a new cooperation mechanism which is promoted by the government among fixed-point hospitals, insurance companies, social security departments. This model has made innovation in management, and at the same time led the construction of multi-level medical security system. In August 2012, the city's medical insurance coverage reached 98.7%.

(1) The level of coordination

Zhanjiang achieved the integration of urban and rural residents, breaking the dual division of urban and rural medical treatment. Meanwhile, as to the level of coordination, it implemented of municipal coordination, achieving the urban and rural consistency in financing standards, treatment level and insurance subsidies. By doing so, it improved the fund-supply level and the ability to resist risks, balanced the difference in policies between counties, and avoided the difference of treatment. (Xiao, 2011)

(2) Funding model

The basic medical insurance sources of Zhenjiang are government financial subsidies and individual contributions. During 2009, the basic medical insurance financing standard for residents was divided into two levels, 50 yuan a person per year and 20 yuan a person

per year. The insured person was free to choose the levels. The government subsidized 80 yuan a person per year, and purchased large-scale medical aid supplementary insurance with 15% of the individual contributions. In 2012, the first level of individual contribution was 30 yuan and the second level was 60 yuan, with the coverage of medical insurance being 98.7%. In 2016, the government abolished the classification and the contribution standard became 120 yuan a person per year. Each person was subsidized 380 yuan per year by the government. In 2019, the contribution standard was changed to 220 yuan a person per year.

(3) Compensation mechanism

In 2009, the government set limits on reimbursement. The maximum payment amount of the 20-yuan level was 50,000 yuan per year, including the hospital coordination fund, 15,000 yuan, and large medical aid, 35,000 yuan. If the payment amount was below 15,000 yuan, the expenditure was paid in proportion by the hospital coordination fund. If the payment amount was above 15,000 yuan and below 50,000, the expenditure shall be paid in proportion to the large medical aid fund. The maximum payment amount of the 50-yuan level was 80,000 yuan per year, including the hospital coordination fund, 15,000 yuan, and large medical aid, 65,000 yuan. If the payment amount was below 15,000 yuan, the expenditure was paid in proportion by the hospital coordination fund. If the payment amount was above 15,000 yuan and below 80,000 yuan, the expenditure shall be paid in proportion by the large medical aid fund. In 2012, the policy was adjusted. The first level of individual contribution was 30 yuan, with the maximum payment amount being 160,000 yuan, and the second level was 60 yuan, with the maximum payment amount being 180,000 yuan. See table for specific insurance treatment from 2016 to 2019 (Table 2-11, Table 2-12).

Table 2-11 Serious illness insurance treatment in 2016

Out-of-pocket expenditure within the scope of the medical insurance policy	Serious illness insurance payment ratio	Total annual maximum payment of basic medical insurance and serious illness insurance
20,000 — 50,000 yuan	50%	
50,000 — 80,000 yuan	60%	500,000 yuan
80,000 — 100,000 yuan	70%	
Above 100,000 yuan	80%	

Source: Documents of serious illness medical insurance policy in Zhanjiang

Table 2-12 Serious illness insurance treatment in 2019

Out-of-pocket expenditure within the scope of the medical insurance policy	Serious illness insurance payment ratio	Total annual maximum payment of basic medical insurance and serious illness insurance
20,000 — 50,000 yuan	50%	600,000 yuan
50,000 — 80,000 yuan	60%	
80,000 — 100,000 yuan	70%	
Above 100,000 yuan	80%	

Source: Documents of serious illness medical insurance policy in Zhanjiang

(4) Operating mechanism

Zhanjiang Social Security Bureau set up a one-stop management service platform with health insurance companies. They set a health insurance policy hotline, "12333", to provide residents with advisory services on medical insurance policies and medical treatment policies. Meanwhile, they built a "integrated payment and settlement platform" to make patients accessible to consultation costs and information, simplifying the reimbursement procedures and approval process. Instead of paying expenses before medical treatment, the insured only needed to pay out-of-pocket expenses after the medical treatment, and the remaining expenses were directly paid by the social security department. In addition, Zhanjiang Social Security Bureau built an "integrated expense advancing and settlement platform" between hospitals and commercial insurance institutions. According to the contract, they used the model of "paying first, auditing and settling unifiedly". In this mdel, serious illness insurance funds were paid to the insurance companies monthly, and at the end of the year, the expenses were settled unifiedly. Meanwhile, a portion of the funds were set aside for audit expenses, and serious illness reimbursement cases were audited one by one. Based on the audit results, overpayment was refunded and deficiency was repaid. This model improved the management of medical and health resources, promoted the service quality and operational efficiency, and made full and reasonable use of medical resources, achieving the "complementary advantages, seamless links, and win-win cooperation" among companies, hospitals, and social security departments. (Wu, 2017)

In 2015, Zhanjiang introduced a third-party institution, and began to use the internet and big data for health insurance fund audit work and other work. This also marks that the Zhanjiang model entered the "2.0" era with the innovation in the management and operation

mechanism of medical insurance.

(5) Profit method

The basic principle of the serious illness medical insurance is “making balance between income and expenditure, preserving the capping lineital and making low profits”, which is also the guarantee and basis for the sustainable operation of serious illness medical insurance. The established basic gain and loss rate of Zhanjiang is 3%.

(6) Supervision method

Zhanjiang established a “sunshine operation” supervision mechanism, where commercial insurance companies and health insurance departments carry out medical service inspection together. They comprehensively work to reduce excessive medical treatment, fake hospitalization and other phenomena, and contain the bahaviour of wasting medical resources. At the same time, health insurance companies also built medical service inspection teams. Authorized by the social security departments, some of these teams accredit in 3A hospitals that own a large number of patients for a long time, others carry out itinerant inspections, which include strict examination of medical expenditure lists, frequent inspections of inpatient areas, and punishment of false medical treatment behaviors. The government also strengthens the supervision and management of commercial medical insurance institutions, builds service quality index evaluation systems, and evaluates the behaviors of commercial medical insurance institutions. Once non-compliance was found, not only the noncompliant behaviours are resolutely stopped, but also rectifications are required within a fixed period. Insurance companies that repeatedly violate the provisions and are still unqualified after rectifications shall exit.

2.9.5 A comparative analysis of Zhanjiang model and the traditional basic medical insurance

Different from traditional basic medical insurance (see Figure 2-3), Zhanjiang model refines the relationship among medical institutions, social security fund institutions and the insured. In its model, urban residents and NCMS residents purchase medical insurance from social security funds. After receiving the medical treatment, social security institutions audit corresponding documents provided by medical institutions, and pay medical expenses within the scope of the social basic medical insurance to medical institutions, as shown in Figure 2-4.

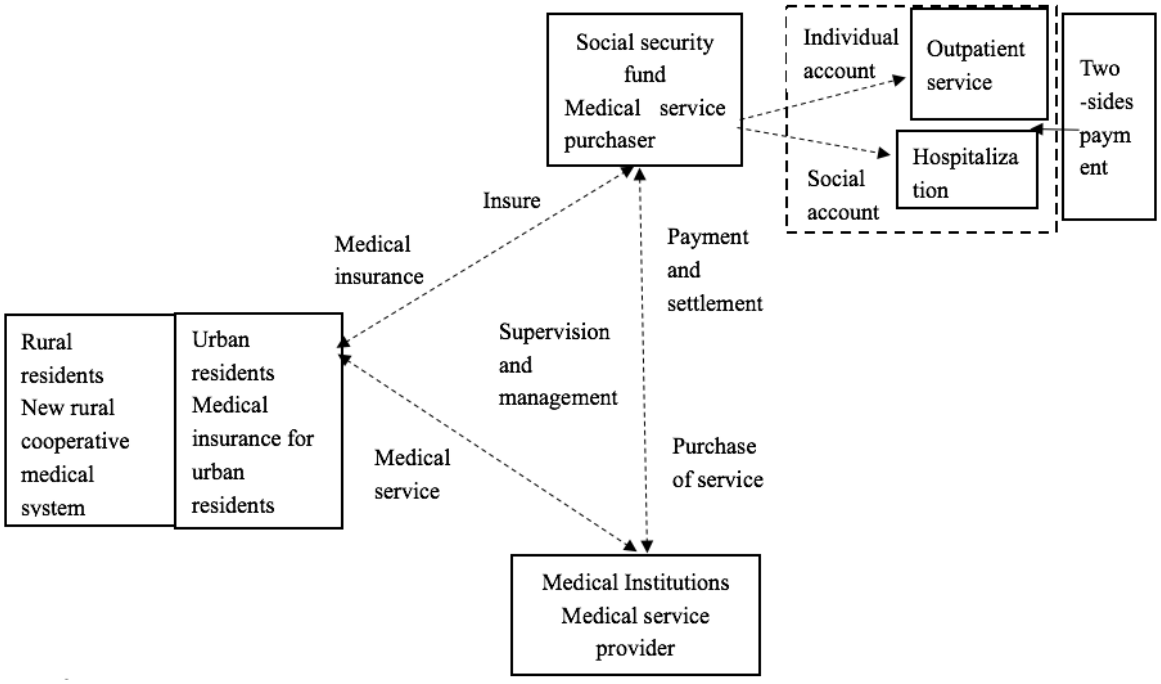

Figure 2-3 Traditional basic social medical insurance model

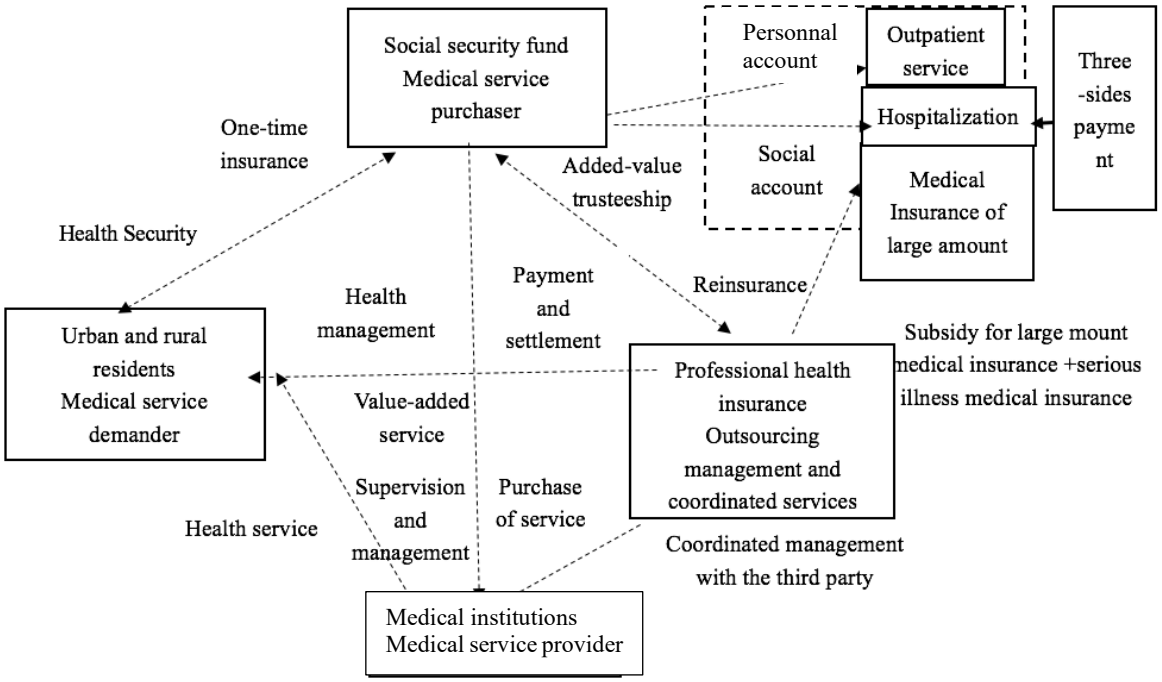

Figure 2-4 The serious illness medical insurance of Zhanjiang model

For the serious illness medical insurance in Zhanjiang model, the most representative feature is the organic combination of commercial insurance and social medical insurance. Specifically, the model is promoted in the way of "government leading, commercial insurance agency underwriting". The insured do not need to pay for the serious illness medical insurance alone. The serious illness medical insurance funds are from part of the

medical insurance funds, and used to reimburse the medical expenditure (excluding out-of-pocket expenditure) of insured people suffering from serious illnesses.

In fact, the serious illness medical insurance of Zhanjiang model can be summarized as the following: (1) the "urban and rural" medical insurance system that has an overall coverage. Since January 2009, Zhanjiang has combined the original urban residents' medical insurance with the NCMS, thus constructing a unified medical insurance system covering all residents. (2) splitting up the original "management and operation" functions. After introducing the serious illness medical insurance, the contribution standard remained unchanged. Eighty-five percent of the insurance funds are used for basic medical insurance expenditure, and the remaining are used for purchasing serious illness medical insurance from commercial insurance companies. The insurance covered all residents of Zhanjiang (Wen & Li, 2016). (3) achieving the "basic and supplemental" integrated operation management. Under the leadership of Zhanjiang medical service management departments, a comprehensive medical service system with the basic medical care as the main and serious illness medical aids as the supplement is established. In this system, commercial insurance companies participate in the management of all residents' basic medical care and serious illness medical insurance. (4) promoting whole-process "information and funds" monitoring. Through the establishment of cooperation among social security management departments, designated hospitals and pharmacies, and the insured, based on the information management system, the hospitalization information of patients with serious illnesses is dynamically monitored (Wen & Li, 2016).

2.9.6 Advantages of the serious illness medical insurance of Zhanjiang model

The serious illness medical insurance of Zhanjiang model has two advantages:

(1) First of all, led by the government, the pressure on medical service institutions when providing serious illness medical insurance is effectively relieved. As is known to all, in the new health care reform, medical institutions, mainly hospitals, were not so willing to change the traditional ways. Hospitals determined their own management, so commercial insurance companies are difficult to enter hospitals without the leadership of the government. When Zhanjiang started promoting the serious illness medical insurance, commercial insurance companies once encountered resistance before entering local hospitals.

Actually, after entering local hospitals, commercial insurance companies can bring economic benefits for them and alleviate the contradiction between doctors and patients.

However, due to the cognitive deviation of this model, the hospitals were not willing to cooperate at the beginning. After the government’s communication and coordination, such cognitive deviation was effectively corrected. Later, with their professional advantages, including unique actuarial abilities as well as regularized, standardized and digitized management, commercial insurance companies promoted the hospital informationalized level, and changed the previous separation of information and operation management, so as to create a complete modern medical information service system. At present, Zhanjiang has basically realized the “separation of management and monitoring”, which gives full play to the advantages of two market subjects: the professional medical supervision by commercial insurance companies and the professional administrative management by pharmaceutical management departments.

(2) Secondly, it gives full play to the incentive compatibility mechanism where serious illness medical insurance can participate in the medical insurance market. Government departments, social security institutions, commercial insurance companies, designated hospitals and pharmacies, and the insured can achieve mutual benefits. Government departments and social security agencies seek to protect patients with serious illnesses to the maximum extent with a certain amount of financial input, and ensure that the local health insurance system can operate healthily and effectively. Commercial insurance companies seek to expand market share and brand influence, and improve professional skills and profit margins. Designated hospitals and pharmacies seek to maximize medical revenue and settle medical expenses in time. Therefore, in Zhanjiang model, the goal of multi-participation can be well realized.

Chapter 3: A Comparative Analysis of Serious Illness Medical Insurance Model for Urban and Rural Residents

3.1 A comparative analysis of fund-raising policies of serious illness medical insurance model for urban and rural residents

3.1.1 Comparison of fund-raising standards

Guidelines in 2012 pointed out that regions shall determine the fund-raising standards for serious illness insurance based on its own characteristics. However, due to the large differences in different regions, economic development, and residents' income in China, there are also large differences in the fund-raising standards for serious illness insurance (Wang, 2014).

At present, there are two models of fund-raising standards in provinces and cities: urban-rural unified standard and urban-rural differential standard, as shown in Table 3-1.

Table 3-1 A comparative analysis of fund-raising standards for serious illness medical insurance in provinces and cities in China

Fund-raising way	Region	Standard of fund-raising
Uniform standards for Urban and Rural	Hubei	25 yuan per person
	Gansu	30 yuan per person
	Qinghai	50 yuan per person
	Guangxi	Below 35 yuan per person
	Sichuan	From10 to 40 yuan per person
	Shaanxi	From 20 to 40 yuan per person
	Henan	6% of local urban and rural residents' financing standard
	Fujian, Inner Mongolia, Xinjiang, Beijing, Shanxi, Guizhou	5% of local urban and rural residents' financing standard
Different standards	Liaoning	Not less than 20 yuan per person for urban residents, and not less than 10 yuan per

between		person for NCMS
Urban and Rural	Anhui	About 30 yuan per person for urban residents, and about 15 yuan per person for NCMS
	Jilin	60 yuan per person for urban residents, and 50 yuan per person for rural residents
Only for rural areas	Shandong (2013 and before)	Limited to rural residents, 15 yuan per person
Others	Zhejiang, Hebei, Hunan	Determined reasonably by themselves

It can be seen from Table 3-1 that there are large differences in fund-raising standards for serious illness medical insurance in different regions:

(1) From the perspective of fund-raising objects, there are currently two models. The first is urban-rural unified standard, including Hubei, Guangxi, Gansu, Qinghai, Sichuan, Shaanxi and other provinces. Since it takes into account the actual rural income and the standard is unified, the overall fund-raising level is relatively low. The second model is the urban-rural differential standard, including Liaoning, Anhui, Jilin and other regions. In this plan, since the fund-raising levels of cities and rural areas are different, urban residents pay more than rural residents for the serious illness medical insurance.

(2) From the perspective of fund-raising methods, there are also two plans. The first uses fixed standards, which means the medical insurance expenses are fixed. As shown from Table 3-1, the expenses in Qinghai and Jilin are relatively high, exceeding 50 yuan per person, while the lowest expense is in rural areas in Shandong, 15 yuan per person. Another plan uses floating standards, which are usually linked to medical insurance. The expenses are a certain percentage of the amount of medical insurance. For example, in 2014, the urban and rural basic medical insurance fund-raising standard was more than 1,000 yuan in Beijing. When the amount of the serious illness medical insurance was 5% of it, the fund-raising standard could be more than 50 yuan per person. In 2015, the national new rural cooperative medical system charged 500 yuan per person, but the fund-raising standard was only 17 yuan per person (Wang, 2014).

3.1.2 Comparison of funding sources

According to *Guidelines* mentioned before, the serious illness medical insurance funds shall establish a multi-channel fund-raising mechanism (Wang, 2014). Presently, though specific policies on the funding sources of serious illness medical insurance in various

regions are basically based on *Guidelines*, expression differences still exist. For example, Hubei Province regulates that cities shall allocate a certain amount of funds from the NCMS and other medical insurance according to the annual fund-raising standard as the serious illness insurance funds, while Jilin Province regulates that "the funding sources shall be from the fund balance or increased funds. In 2013, the funds shall be from the new subsidies for urban and rural residents of the year, 40 yuan per person, and then 20 yuan of the subsidies for every urban resident and 10 yuan for every rural resident". Some provinces regulate the ways of expanding funding sources so as to expand the sources of serious illness health insurance funds (Wang, 2014).

3.1.3 Comparison of overall planning levels

The overall planning levels of serious illness medical insurance vary from region to region. According to Guidelines, serious illness insurance has municipal-level overall planning and provincial-level overall planning. If permitted, a unified system with comprehensive coverage can be established (Wang, 2014).

At present, medical insurance planning for serious illness in various regions of China usually adopts two methods: municipal-level planning and provincial-level planning.

Table 3-2 A comparative analysis of overall planning levels of serious illness medical insurance in various provinces and cities in China

Overall planning level	Region
Provincial-level overall planning	Beijing, Tibet, Jilin, Qinghai, Gansu, Shandong
Municipal-level overall planning	Hubei, Hunan, Guangdong, Guangxi, Guizhou, Ningxia, Shanxi, Shaanxi, Anhui, Inner Mongolia, Zhejiang, Hebei, Xinjiang

Table 3-2 shows that now most regions implement the municipal-level overall planning. The advantage is that the serious illness medical insurance system can be piloted and unified in small areas, and then further promoted to the whole province after summarizing experience and making improvement. For example, in 2013, Ningxia first started the serious illness medical insurance pilot program in Guyuan and Shizuishan, and in 2014 further promoted it to all the cities in Ningxia. Guangdong proposed the "three-step" goal. The first step was to perfect and implement the "Zhanjiang model" in 2012. The second step was to carry out pilot work in four cities, Shantou, Yunfu, Zhaoqing and Qingyuan in 2013, and to

summarize experience and promote the model to prefecture-level cities of the province. The third step was to comprehensively implement the serious illness medical insurance in all areas in Guangdong in 2015. Although most regions implement the municipal-level overall planning, some provinces implement the provincial-level overall planning from the beginning with unified policies and organization. In these provinces including Qinghai, Gansu, Tibet, and Jilin, since the urban-rural gap is usually small and the population density is low, it is easier to promote the serious illness medical insurance and achieve the equity of the serious illness medical insurance policy as well as the expansion of insurance object sources.

3.2 A comparative analysis of serious illness medical insurance protection policies for urban and rural residents

3.2.1 Comparison of security objects

Based on *Guidelines*, the objects of serious illness medical insurance are participants of the medical insurance for urban residents and the NCMS. At present, the serious illness medical insurance in most regions is basically consistent with *Guidelines* in terms of security objects, but a few regions still fail to be consistent.

Table 3-3 A comparative analysis of the security objects of serious illness medical insurance in provinces and cities in China in 2015

Object	Region
Participants of medical insurance for urban residents and NCMS	Hubei, Guangdong, Guangxi, Guizhou, Ningxia, Shanxi, Shaanxi, Anhui, Inner Mongolia, Zhejiang, Hebei, Xinjiang, Beijing, Tibet, Qinghai, Gansu,
Participants of medical insurance for urban employees, medical insurance for urban residents, and NCMS	Jilin, Hunan，Shandong

As can be seen from Table 3-3, some provinces expanded the coverage of serious illness medical insurance from the original "medical insurance for urban residents and NCMS" to "medical insurance for urban employees, medical insurance for urban residents, and NCMS". Taking Shandong as an example, in 2013 and before, the objects of its serious illness medical

insurance were only participants of the NCMS, while in 2014, participants of the basic medical insurance for residents were also included. This is in line with the reform trend of serious illness medical insurance in the future. With the continuous deepening of China's urbanization process, the urban-rural dual structure will definitely be broken. In the future, serious illness medical insurance will inevitably develop in the direction of urban-rural integration.

3.2.2 Comparison of the security coverage

In *Guidelines*, the security coverage of the serious illness medical insurance includes two schemes. The first one uses medical expenses as the basis for determining the security coverage, and the second one uses the type of disease as the basis (The National Development and Reform Commission, the Ministry of Health, the Ministry of Finance, the Ministry of Human Resources and Social Health, the Ministry of Civil Affairs, the Insurance Regulatory Commission, 2012). Most of the regions in China now adopt the first scheme, which ensures that the insured can afford the high medical expenditure (Wang, 2014). A few regions adopted the second one, which covers the medical expenditure of illnesses that exert heavy pressure on the insured. For example, in the early stage of the serious illness medical insurance pilot program, Sichuan limited the coverage into 20 types of illnesses, and gradually increased the coverage later. In 2013 and before, Shandong also included 20 serious illnesses that have large harm, easy-to-control expenses and definite curative effect on its serious illness medical insurance.

3.2.3 Comparison of payment thresholds and the capping lines

In the serious illness medical insurance, an indispensable problem in the setting of payment threshold and the capping line. All provinces have set their own standards of payment threshold and the capping line based on the *Guidelines* (See Table 3-4).

Table 3-4 A comparative analysis of the payment threshold of the serious illness medical insurance in provinces and cities in China in 2015

Method	Region	Payment threshold (ten thousand yuan)
Specific amount	Gansu, Qinghai	0.5
	Ningxia, Shanxi	0.6
	Guangxi, Hainan	0.8

	Jilin	0.96
	Sichuan	1.15
	Hubei, Shandong	1.2
	Liaoning	1.2-1.8
	Heilongjiang	1.5
	Tianjin	2
No specific amount	Zhejiang, Fujian, Guangdong, Xinjiang, Hunan, Beijing, Henan, Hebei, Anhui, Inner Mongolia	Urban residents pay expenses based on the per the capping lineita disposable income of the region in the previous year, and rural residents pay expenses based on the per the capping lineita net income of the region in the previous year.

When setting the payment threshold, all regions basically follow the principle of "compliance and reasonableness". The serious illness medical insurance covers the reasonable medical expenditure, but does not cover unreasonable medical expenditure including the expenses of beauty treatment, organ transplantation and other programs.

Meanwhile, the payment thresholds of different provinces are different. In Gansu and Qinghai the standar is 5,000 yuan, in Shanxi and Ningxia is 6,000 yuan, in Guangxi and Hainan is 8,000 yuan, in Jilin is 9,600 yuan, in of Sichuan is 11,500 yuan, in Hubei and Shandong is 12,000 yuan, in Liaoning is from 12,000 to 18,000 yuan, in Heilongjiang is 15,000 yuan, and in Tianjin is 20,000 yuan. Generally, the payment threshold is inversely proportional to the coverage. A lower standard of the payment threshold means lower fund-raising standards, which can greatly reduce the burden on residents. In Anhui, the payment threshold is from 10,000 yuan to 20,000 yuan, making it difficult to secure most residents and cover the expenses of serious illnesses. In addition, many provinces do not set the payment threshold specifically, but use the income of the region in the previous year as a reference standard.

3.2.4 Comparison of the security level

In addition to the payment threshold, the security level is also very important, as it relates to the specific degree of security for the insured from the serious illness medical insurance. According to the *Guidelines*, the actual payment ratio of serious illness medical insurance shall not be lower than 50%, and to avoid the occurrence of disaster medical payments, the higher the medical expenditure is, the higher the reimbursement ratio is in

principle (Wang, 2014).

Most provinces and cities set a reasonable reimbursement ratio based on their actual situation and the principle of "the higher the medical expenditure is, the higher the reimbursement ratio is".

Table 3-5 A comparative analysis of the reimbursement ratio of serious illnesses medical insurance in provinces and cities in China

	The reimbursement ratio
Beijing	Piecewise calculation, cumulative payment: As to personal out-of-pocket medical expenditure above the payment threshold (excluded) and below 50,000 yuan (included), the serious illness insurance fund shall pay 50%. As to personal out-of-pocket medical expenditure above 50,000 yuan (excluded), the serious illness insurance fund shall pay 60% with no the capping line.
Tianjin	Piecewise calculation, cumulative payment: As to the medical expenditure from 20,000 yuan to 100,000 yuan (included), the reimbursement ratio shall be 50%. As to the medical expenditure from 100,000 yuan to 200,000 yuan (included), the reimbursement ratio shall be 60%. As to the medical expenditure from 200,000 yuan to 300,000 yuan (included), the reimbursement ratio shall be 70%.
Shanxi	As to the medical expenditure above the payment threshold and below 50,000 yuan, the reimbursement ratio shall be 55%. As to the medical expenditure from 50,000 yuan to 100,000 yuan, the reimbursement ratio shall be 65%. As to the medical expenditure from 100,000 yuan to 200,000 yuan, the reimbursement ratio shall be 75%. As to the medical expenditure from 200,000 yuan to 300,000 yuan, the reimbursement ratio shall be 80%. As to the medical expenditure above 300,000 yuan, the reimbursement ratio shall be 85%. The the capping line shall be 400,000 yuan.
Liaoning	The reimbursement ratio of urban residents is in accordance with the medical expenditure and calculated piecewisely. An increase of 50,000 yuan brings an increase of the reimbursement ratio by 5%, and the maximum reimbursement ratio is about 70%. For rural residents, when the medical expenditure is above the minimun amount, the reimbursement ratio shall be no less than 50%. There shall be no the capping line for urban and rural residents.
Jilin	As to the medical expenditure from 0 yuan to 10,000 yuan (included), the reimbursement ratio shall be 50%. As to the medical expenditure from 10,000 yuan to 50,000 yuan (included), an increase of 10,000 yuan brings an increase of the reimbursement ratio by 1%. As to the medical expenditure from 50,000 yuan

	to 100,000 yuan (included), the reimbursement ratio shall be 65%. As to the medical expenditure from 100,000 yuan to 300,000 yuan, the reimbursement ratio shall be 80%. The maximun reimbursement amount shall be 300,000 yuan.
Heilongjiang	As to the medical expenditure from 0 yuan to 40,000 yuan, the reimbursement ratio shall be 85%. As to the medical expenditure from 40,000 yuan to 80,000 yuan, the reimbursement ratio shall be 90%. As to the medical expenditure above 80,000 yuan the maximun reimbursement amount of each medical year shall be 150,000 yuan, and there shall be no the capping line.
Jiangsu	As to the medical expenditure from 15,000 yuan to 60,000 yuan, the reimbursement ratio shall be 55%. As to the medical expenditure from 60,000 yuan to 100,000 yuan, the reimbursement ratio shall be 60%. As to the medical expenditure from 100,000 yuan to 150,000 yuan, the reimbursement ratio shall be 65%. As to the medical expenditure above 150,000 yuan, the reimbursement ratio shall be 70%. There shall be no the capping line.
Anhui	The reimbursement ratio of medical insurance for urban residents shall be 30% to 80%. The reimbursement ratio of the NCMS shall be 40%-80%.
Jiangxi	The reimbursement ratio of medical insurance shall be not less than 50%. For NCMS, if the medical expenditure is from 0 yuan to 50,000 yuan, the reimbursement ratio shall be not less than 50%. If the medical expenditure is from 5,000 yuan to 100,000 yuan, the reimbursement ratio shall be not less than 60%. If the medical expenditure is above 100,000 yuan, the reimbursement ratio shall be not less than 70%.
Shandong	As to the medical expenditure from 12,000 yuan to 100,000 yuan, the reimbursement ratio shall be 50%. As to the medical expenditure from 100,000 yuan to 200,000 yuan, the reimbursement ratio shall be 60%. As to the medical expenditure above 200,000 yuan, the reimbursement ratio shall be 65%.
Hubei	As to the medical expenditure from 12,000 yuan to 30,000 yuan (included), the reimbursement ratio shall be 55%. As to the medical expenditure from 30,000 yuan to 100,000 yuan (included), the reimbursement ratio shall be 65%. As to the medical expenditure above 100,000 yuan, the reimbursement ratio shall be 75%. The the capping line shall not be less than 300,000 yuan in principle.
Hunan	As to the medical expenditure below 30,000 yuan (included), the reimbursement ratio shall be 50%. As to the medical expenditure from 30,000 yuan to 80,000 yuan (included), the reimbursement ratio shall be 60%. As to the medical expenditure from 80,000 yuan to 150,000 yuan (included), the reimbursement ratio shall be 70%. As to the medical expenditure above 150,000 yuan, the

	reimbursement ratio shall be 80%. The annual the capping line shall not be more than 200,000 yuan.
Guangxi	As to the medical expenditure from 0 yuan to 30,000 yuan (included), the reimbursement ratio shall be 50%. As to the medical expenditure from 30,000 yuan to 50,000 yuan (included), the reimbursement ratio shall be 60%. As to the medical expenditure from 50,000 yuan to 100,000 yuan (included), the reimbursement ratio shall be 70%. As to the medical expenditure above 100,000 yuan, the reimbursement ratio shall be 80%.
Chongqing	As to the medical expenditure from the payment threshold to 10,000 yuan (included), the reimbursement ratio shall be 40%. As to the medical expenditure from 100,000 yuan to 200,000 yuan (included), the reimbursement ratio shall be 50%. As to the medical expenditure above 200,000 yuan (included), the reimbursement ratio shall be 60%. The the capping line shall be 200,000 yuan.
Gansu	As to the medical expenditure from 0 yuan to 10,000 yuan (included), the reimbursement ratio shall be 50%. As to the medical expenditure from 10,000 yuan to 20,000 yuan (included), the reimbursement ratio shall be 55%. As to the medical expenditure from 20,000 yuan to 50,000 yuan (included), the reimbursement ratio shall be 60%. As to the medical expenditure above 50,000 yuan, the reimbursement ratio shall be 65%.
Fujian	The reimbursement ratio shall be 50%.
Sichuan	The reimbursement ratio shall be not less than 50%. There shall be no the capping line.
Inner Mongolia	Piecewise calculation, cumulative payment: The payment threshold shall not be less than 50%.
Hainan	Piecewise calculation, cumulative payment: The annual the capping line shall be 220,000 yuan.
Guangdong	Municipal unified planning
Henan	The actual reimbursement ratio shall not be less than 50%
Zhejiang	The the capping line shall be 10 to 15 times the payment threshold. The reimbursement ratio shall not be less than 50%. The higher the medical expenditure is, the higher the reimbursement ratio is.
Shanghai	As to the personal out-of-pocket medical expenditure, the reimbursement ratio shall be 50%.

Table 3-5 shows that in China, most regions have achieved the full coverage of the serious illness medical insurance and specified the reimbursement ratio. Beijing, Tianjin, Shanxi, Jilin and many other provinces have specified the reimbursement ratio piecewisely.

In Beijing, according to the principle of "piecewise calculation, cumulative payment", as to medical expenditure above the payment threshold and below 50,000 yuan (included), the serious illness insurance fund pays 50%. As to the medical expenditure above 50,000 yuan (excluded), the serious illness insurance fund pays 60% with no the capping line. Tianjin follows the same principle. As to the medical expenditure from 20,000 yuan to 100,000 yuan (included), the reimbursement ratio is 50%. As to the medical expenditure from 100,000 yuan to 200,000 yuan (included), the reimbursement ratio is 60%. As to the medical expenditure from 200,000 yuan to 300,000 yuan (included), the reimbursement ratio is 70%. In Shanxi, as to the medical expenditure above the payment threshold and below 50,000 yuan, the reimbursement ratio is 55%. As to the medical expenditure from 50,000 yuan to 100,000 yuan, the reimbursement ratio is 65%. As to the medical expenditure from 100,000 yuan to 200,000 yuan, the reimbursement ratio is 75%. As to the medical expenditure from 200,000 yuan to 300,000 yuan, the reimbursement ratio is 80%. As to the medical expenditure above 300,000 yuan, the reimbursement ratio is 85%. The the capping line is 400,000 yuan.

There are also some regions implementing municipal unified planning, which means the reimbursement ratio is not unified in the whole province, but is set based on the actual situation of each city. The reimbursement ratio is above 50%, and the principle of "piecewise calculation, cumulative payment" is followed.

3.3 A comparative analysis of management models of serious illness medical insurance for urban and rural residents

3.3.1 Fund-raising methods: quota fund raising and proportional fund raising

As to the fund-raising method, there are differences in quota fund raising and proportional fund raising. Both sides have their own advantages and disadvantages. Proportional fund raising makes the fund-raising standard floated with the basic medical insurance fund, which is conducive to the unification of urban and rural serious illness medical insurance fund-raising standards, but also makes it difficult to form an independent fund-raising mechanism in the region. Quota fund raising can obtain relatively stable medical insurance funds, but makes it difficult for regions with large differences in urban and rural development to achieve a unified fund-raising standard. For example, from 2015 to 2017, the fund-raising standard of the basic medical insurance for urban residents in

Guangxi was 35 yuan per person, and that of NCMS was 30 yuan person. In 2015, Henan used the fund-rasing standard of three grades: 22 yuan per person, 24 yuan per person, and 26 yuan per person.

Although the fund-raising standards of serious illness medical insurance in different regions are different, the problem of low-level fund raising for serious illness medical insurance is general. According to a sample survey of 100 million people in China conducted by the Medical Reform Office of the State Council in 2014, the probability of serious illnesses in China in 2014 was 0.35. If the reimbursement ratio is the lowest 50%, the average fund-raising amount should be about 50 yuan, which is higher than the fund-raising level of most regions now.

3.3.2 Fund balance: reasonable security and moderate scale

In the specific implementation, regions basically take the required serious illness insurance funds from the basic medical insurance fund balance or new-raised funds. The problems of this policy are whether there is a balance in the basic medical insurance fund and how to determine the appropriate scale. According to data released by the National Health and Family Planning Commission, the Ministry of Finance and the Ministry of Human Resources and Social Security, the balance in 2011 was 56.6 billion yuan, while the total income of the national basic medical insurance fund for urban workers in 2018 was 1.35378 trillion yuan, an increase of 10.3% over the previous year, and the total expenditure was 1.07066 trillion yuan, up 13.1% year on year. The cumulative balance was 1.87498 trillion yuan. This shows that the scale of China’s basic medical insurance balance fund is growing, which can indeed provide financial security for serious illness medical insurance. However, it also shows that a large number of funds that should be used for “life-saving” are idle in the medical insurance fund account for a long term. The limitation of funds reflects the problem of payment payment thresholds and methods. Objectively speaking, the high payment threshold and the low payment ratio are the main reasons for the large balance and the long-term idleness.

3.3.3 Urban-rural unified planning and separative operations

China’s serious illness medical insurance gradually transfers from the original municipal unified planning to the urban-rural unified planning, but some regions still use the municipal unified planning. Athough it can take into account the differences in economic

development in various regions, it is not conducive to giving full play to the risk-dispersion and economic functions of the serious illness medical insurance. In essence, the serious illness medical insurance is to redistribute income to reduce the risks brought by serious illnesses for the insured. Therefore, according to the law of large numbers, the increase of the insured can strengthen its functions. To conclude, higher level of unified planning can more improve the usage rate of serious illness medical insurance funds, so that the funds can be used in a larger range and the anti-risk ability can be stronger.

The use of serious illness medical insurance funds in different regions is also largely different. Though the overall funds are idle, in some regions, the problem of balance shortage still exists, mainly in regions using municipal unified planning, which led to difficulties in fund raising. In addition, since different regions implement different treatment standards, comparing phenomenon and psychological imbalance also exist.

3.4 A comparative analysis of the operating mechanism of serious illness medical insurance for urban and rural residents

Based on the analysis above, we learned that since the six ministries including the National Development and Reform Commission jointly issued *Guidelines* in August 2012, regions in China have carried out the pilot work of serious illness medical insurance and gradually expanded it to models covering all local residents with urban and rural integration according to their actual situation. In general, models of serious illness medical insurance mainly include the Taicang model, the Zhanjiang model and other models. These models have their own advantages and disadvantages, with differences in payment thresholds, capping lines, subjects, insurance qualitative and other aspects. Summarizing their operation mechanisms is condusive to improving the operation mechanism of serious illness medical insurance in China.

3.4.1 The operating mechanism of serious illness medical insurance in Taicang

Taicang is a developed city of the developed province, Jiangsu. Its urban-rural gap in economic development is not large, and it basically achieved the full coverage of the basic medical insurance in 2012. That year, Taicang raised funds with the standard of 50 yuan per year for urban workers and 20 yuan per year for urban and rural residents, (Yu & Huang, 2014), building a medical insurance system covering all workers and residents in Taicang.

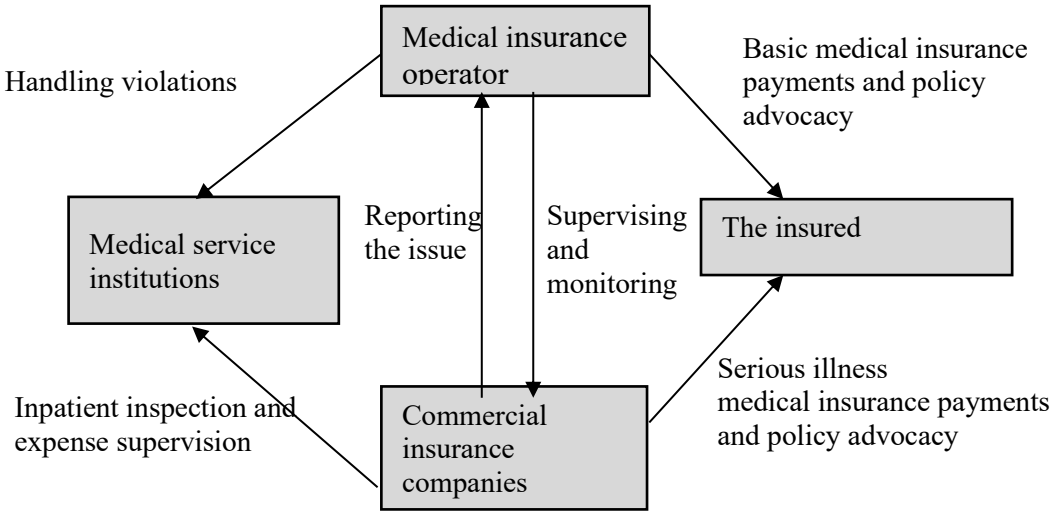

Figure 3-1 A diagram of the operation mechanism of serious illness medical insurance in Taicang

The operation mechanism of serious illness medical insurance in Taicang is shown in Figure 3-1. Through the way of bidding, commercial insurance companies can participate in matters related to the serious illness medical insurance. The medical insurance operator supervises and controls the insurance activities of commercial insurance companies according to strict rules and regulations. In 2012, the payment threshold in Taicang was 10,000 yuan, and the part more than 10,000 yuan was reimbursed based on the principle of "piecewise calculation, cumulative payment" with no capping line. Meanwhile, commercial insurance companies carries out inpatient inspection and expense supervision on medical service institutions (generally hospitals). They usually employ 8 professional staff, 2 of whom 2 are responsible for claims services, the others being responsible for the inspection and supervision of medical service institutions. In addition, commercial insurance companies form expert audit committees to audit problematic cases of serious illnesses. They also report violations of hospitals to the medical insurance operator for further handling (Chou & Huang, 2014). In terms of the responsibility sharing, Taicang sets the basic gain and loss rate as 4.5%. If the rate is exceeded, the expense is split fifty-fifty by commercial insurance companies and the medical insurance center. At the end of the year, the medical insurance association should evaluate these commercial insurance companies and decide whether to refund the 5% reinsurance fund deducted previously. In 2012, 3,086 people in Taicang participated in the serious illness medical insurance, with a total compensation amount of 19.2 million yuan and the compensation rate being 84.5%. The basic service expense and performance service expense extracted by commercial insurance institutions were 1.02 million yuan and 0.95 million yuan respectively, accounting for 4.47% and 4.17%

of the total raised funds respectively. The final balance of medical insurance was more than 1.6 million yuan, which was returned to the special account of "serious disease reinsurance" (Chou & Huang, 2014).

In a word, the Taicang model implements wonderful supervision and stimulation among commercial insurance companies, the medical insurance operator and medical service institutions, and ensures the coverage of the insured's serious illnesses.

3.4.2 The operating mechanism of serious illness medical insurance in Xiamen

In 2010, Xiamen established a serious illness insurance system for urban and rural residents. In 2012, it raised funds with the standard of 10 yuan per person to build a serious illness medical insurance system (Chou & Huang, 2014). The operating mechanism of serious illness medical insurance in Xiamen is shown in Figure 3-2.

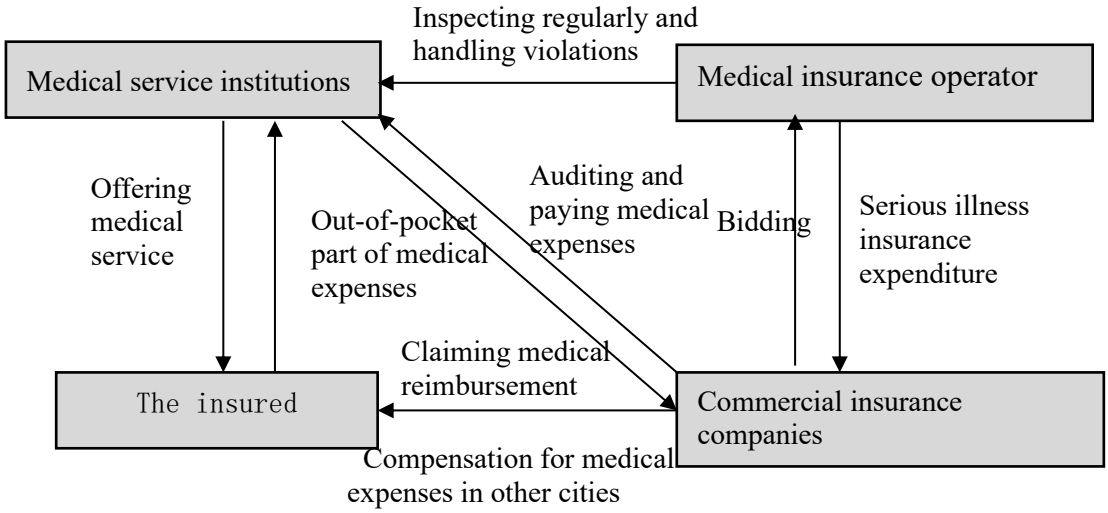

Figure 3-2 A diagram of the operation mechanism of serious illness medical insurance in Xiamen

In the operating mechanism of serious illness medical insurance in Xiamen, through the way of bidding, commercial insurance companies can participate in matters related to the serious illness medical insurance. The Xiamen Municipal Insurance Regulatory Bureau serves as the medical insurance operator to supervise and standardize the bidding. Commercial insurance companies and social security departments agree on serious illness premiums. There is no interference in the running of the company. The insured can enjoy the medical services. When the insured have serious illnesses, they pay for the out-of-pocket part. As to the medical expenses within the scope of serious illness medical insurance, the medical service institutions apply to the commercial insurance companies, and the

companies pay the expenses after auditing. In addition, Xiamen allows the insured to receive medical service in other cities. The medical insurance operator provides specific bills and information to commercial insurance companies, and the expenses will be reimbursed after auditing (Chou & Huang, 2014).

Xiamen set up a professional medical inspection and audit team to inspect medical service institutions regularly and report violations to the medical insurance operator for handling. Based on the local medical insurance information system, the medical insurance operator carries out dynamic monitoring and management with the help of online early warning and audit platform. In terms of responsibility and risk sharing, Xiamen established a dynamic balance and adjustment mechanism for risks, profit and loss. The social security department employed a third-party department to directly audit the insurance companies' loss rate and profit rate. If the direct profit rate is larger than 3%, the insurance companies will return the insurance funds. Otherwise, the insurance companies' loss will be compensated by the medical insurance funds (Chou & Huang, 2014).

Since the operation of the serious illness medical insurance in Xiamen in 2012, the serious illness medical insurance has collected 567 million yuan, and 24,000 people have been reimbursed 532 million yuan in total, leaving a balance of 35 million yuan in the medical insurance fund. To sum up, the serious illness medical insurance system in Xiamen effectively secures the insured and reduces their risks of serious illnesses.

3.4.3 The operating mechanism of serious illness medical insurance in Hangzhou

Since 2008, Hangzhou has explored the management model of "serious illness medical insurance". In this model, the medical service management that was originally attached to the human resources and social security departments, civil affairs departments, health departments and other departments can only be stripped out and unified into the management service framework to achieve unified operation and management from outpatient, hospitalization to medical assistance for serious illnesses (Qiu & Huang, 2014).

According to Figure 3-3, the insured can enjoy medical services in medical service institutions with an iPass. They need to pay for the out-of-pocket part. They can purchase medicines and receive medical treatment at more than 2,000 medical insurance designated hospitals or pharmacies in Hangzhou. The non-self-paid part is connected and settled directly by the designated medical service institutions to the management service center. In the whole operation mechanism, an audit system of medical insurance funds is introduced. Under the

supervision of a confidentiality agreement, the medical management service center uploads the insured information and medicine purchase information to this audit system. A third-party professional institution introduced by the management service institutions audits the information and gives an initial opinion. After receiving these opinions, the designated hospitals and pharmacies can raise objections and provide the medical management service center with the certification materials for auditing, and the latter will make further explanation and inform them of the result. If the initial audit is passed, the management service center will pay the corresponding reimbursement expenses. On the whole, the management authority of the serious illness medical insurance in Hangzhou is mainly vested in the social security departments and the government bears the operation risk. At present, the serious disease medical insurance system in Hangzhou is running well (Chou & Huang, 2014).

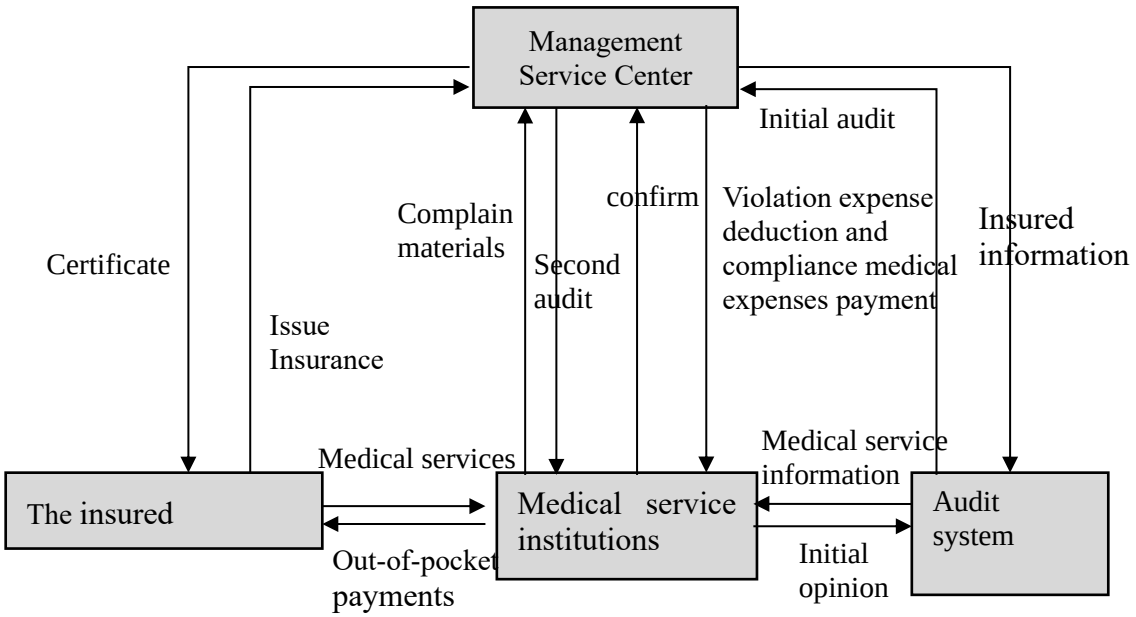

Figure 3-3 A diagram of the operation mechanism of serious illness medical insurance in Hangzhou

3.4.4 Comparison of different models: taking the Zhanjiang model as the benchmark

According to the comparative analysis of Xiamen, Taicang, Hangzhou and Zhanjiang above, it can be found that all the four models have improved the security level of patients with serious illnesses to a certain extent, reduced the risk of illness-induced poverty, and effectively alleviated the government's difficulties in monitoring and managing medical service institutions as well as inadequate personnel allocation. However, there are also significant differences among the four models, see Table 3-6:

Table 3-6 A comparative analysis of different serious illness medical insurance models

Category	Xiamen model	Taicang model	Hangzhou model	Zhanjiang model
The main operator	Commercial insurance institutions	Commercial insurance institutions	Social Security Center	Social Security Center
Fund-raising standard	10 yuan per person per year	Urban employees: 50 yuan per person per year; residents: 20 yuan per person per year	0.2% of the medical insurance funds, 3 yuan per month from employees, and 0.5% of total government subsidies	5% of the fund-raising standard of the year's medical insurance for ocal urban and rural residents
Payment threshold	Above the basic medical insurance payment limit	Above the out-of-pocket part, 10,000 yuan	Above the basic medical insurance payment limit; above the out-of-pocket part, 5,000 yuan	30,000 yuan
Reimbursement ratio	Employees: 95%; Residents: 80%	Increasing by sections	No less than 50%	No less than 50%
Payment coverage	The basic medical insurance list	More than the basic medical insurance list	The basic medical insurance list	The basic medical insurance list
Capping line	Employees: 400,000 yuan; residents: 350,000 yuan	No line	No line	300,000 yuan
Settlement method	By insurance companies and medical institutions	By patients and insurance companies	By the service center and medical institutions	By the social insurance and medical institutions

3.5 Research conclusions and suggestion for the policy

3.5.1 Conclusions of the charter

This chapter analyzes the urban and rural serious illness medical insurance model of several major cities in China, and makes a comparative study with them and the Zhangjiang model. It compares their fund-raising policies by fund-raising standards, funding sources, and overall planning levels, compares their security policies by security objects, security coverage, payment thresholds, the capping lines, and security levels. Meanwhile, it

investigates the management models from fund-raising methods, fund balance, urban-rural unified planning and separative operations, and summarizes the Taicang model, the Xiamen model, the Hangzhou model, and the Zhanjiang model from the payment thresholds, the capping lines, the insurance qualitative and subjects. According to the analysis, though the four Models have some differences, they all improved the security level of patients with serious illnesses and solved some of the government's problems in this respect.

In general, several problems exsit in the serious illness medical insurance as follow.

Firstly, there are obvious differences in the understanding of the serious illness medical insurance. Some regions take it as the "secondary compensation" of NCMS and set very low payment thresholds, covering patients with low expendiure, thus diluting the serious illness insurance resources and weakening the security of patients with serious illnesses. In some regions, the payment threshold is too high, and ultimately some patients in the urgent need for serious disease medical insurance are refused. Some regions lack expense control and has resulted in high medical expenses for illnesses that are not serious, leading to the phenomenon of "the poor help the rich". For example, among the illnesses covered by the serious illness medical insurance in some regions, there are even a series of common illnesses with low expenses including upper respiratory infection, normal labor and other illnesses. This phenomenon obviously violates the original intention of establishing the serious illness medical insurance.

Secondly, there is a lack of stable and sustainable fund-raising mechanisms. The serious illness medical insurance funds are mainly raised from the NCMS funds. However, in recent years, the NCMS funds have been greatly used and facing the risk of overrun. Therefore, the funds of serious illness medical insurance are mostly from the funds raised in the current year, rather than from the balance of funds. In addition, standardized and scientific guidelines are lacked on determining the fund-raising standard. In 2013, the fund-raising standard was about 20 yuan per capita in various regions, but the gap among regions was relatively large. Too high or low fund-raising standard is not conducive to the sustainable development of the policy, and even affects the smooth development and operation of NCMS.

Thirdly, it is urgent to standardize the management of serious illness medical insurance fund. Since its operation model and overall planning levels are greatly different from those of NCMS, there are also some differences in the management of allocating special accounts, establishing the fund, fund balance, and settling the fund, thus the management of the fund cannot fully refer to that of NCMS. The following questions need to be considered: Does the

serious illness medical insurance fund needs to be run closedly? How are the allocation of funds and the establishment of fund accounts implemented? How are the funds settled by the insurance companies? How is the fund balance managed? How should finance and health departments supervise and manage the companies after the fund given to the insurance companies? How can the insured enjoy the reimbursement of medical expenditure from the insurance companies conveniently and timely?

In addition, the supervision and undertaking of commercial insurance companies need to be further improved. In some regions, some insurance companies fail to be sold at auction or collude in bid, hindering the promotion of the serious illness medical insurance work. Some provinces divide the area of serious illness insurance by dividing spheres of influence, making there being no competition among insurance companies. In the regions where commercial insurance companies run serious illness insurance business, uniform requirements for the risk sharing of funds are lacked. In the regions where provincial or municipal unified planning is carried out, the supervision responsibilities of NCMS operators in the districts and counties are unclear. Therefore, if the distribution of rights, responsibilities and benefits has not been effectively recognized by the interested parties, commercial insurance institutions will inevitably lack sufficient enthusiasm to initiatively control the medical costs of serious illness insurance.

Last but not least, the policy designs need to be further improved and adjusted. Currently, there are cognitive deviations in the ceiling line, the payment threshold and the set of compliance medical expenses. In terms of the payment threshold, some regions lower the payment threshold to expand the coverage, while others advocate raising the payment threshold to focus the needs of real patients with serious illnesses. For example, in some regions, the payment threshold is zero, making the threshold of the serious illness insurance too low. In 2013, about 5% of the insurance beneficiaries’ medical expenses were lower than the per capita net income of local farmers, which was contradictory with the regulation that the payment threshold shall exceed the previous year’s farmers’ per capita net income. As to the capping line, in the early stage of the pilot projects in 2013, more than half of the regions did not set the capping line, advocating covering the medical expenditure as much as possible. If the individual maximum reinbursement reached 1.3 million yuan, the fund will be largely consumed and it will face serious risks. The efficiency of its use will also be affected. In terms of medical expenses, most regions simply use the basic medical insurance list as a reference, rather than the principle of the necessary clinical treatment. Therefore, some

special drugs for “serious illnesses” and the medicine expenses of special examination are excluded, making it difficult for the serious illness insurance to take effect.

3.5.2 Suggestion for the policy

Generally speaking, the serious illness medical insurance system in China does not have an independent fund-raising mechanism, and it is more defined as the extension or supplement of the basic medical insurance system. The serious illness medical insurance can narrow the gap between the rich and the poor, and alleviate the medical burden of patients with serious illnesses. Therefore, in the formulation and improvement of the serious illness insurance system, the differences in fund-raising and security policies as well as the impact of such differences should be fully taken into consideration (Wang, 2014). To be specific, the equity of serious illness insurance can be achieved by increasing the fund-raising ratio and unified planning level, and expanding the coverage and level of compensation. The specific implementation needs to be adapted to local conditions.

Meanwhile, the serious illness medical insurance should not carry “unlimited responsibility”. Although it has begun to connect with other systems, currently its position in security measures of critical and extremely serious illnesses is not clear in China. Supplying and extending basic medical insurance policies well, and connecting well the supplementary derivative policies are to be investigated in the next step. In addition, the positioning of the serious illness medical insurance needs to be clarified. With the continuous expansion of the coverage of the basic medical insurance in China, and the extensive establishment of relevant supplementary insurances, the serious illness insurance has also been included in the basic medical insurance system (Wang, 2014).

Chapter 4: The Impact of Urban and Rural Residents' Serious Illness Insurance on Family Catastrophic Medical Expenditure in Zhanjiang

In recent years, with the gradual improvement of China's medical insurance system, the serious illness medical insurance effectively alleviated the illness-induced poverty. In 2015, the reimbursement ratio of urban residents' insurance, employees' medical insurance, urban and rural residents' insurance and NCMS increased to 54.36%, 67.14%, 47.16% and 50.45% respectively. *Guidelines on the Urban and Rural Residents' Serious Illness Insurance* was formulated based on WHO's standard of family catastrophic medical expenditure, taking the amount of medical expenses paid by individuals being greater than or equal to the per capita disposable annual income of local people as the standard of catastrophic medical expenditure (Wang, 2014).

For serious illness medical insurance, a key factor in assessing its effectiveness is to assess whether it has reduced the catastrophic medical expenditure of insured families. Therefore, this chapter first analyzes the impact of Zhanjiang's medical insurance on the catastrophic medical expenditure with macro data, and then takes Zhanjiang as a specific research object from the micro level to examine the effect of its serious illness medical insurance system on reducing the occurrence of the family catastrophic medical expenditure. This chapter uses the data on residents' income and expenditure in Zhanjiang, Guangdong and China from 2013 to 2018, as well as the survey data of the serious illness insurance in Zhangjiang in 2015. Based on the relevant policies of serious illness medical insurance in Zhanjiang, the proportion of per capita medical expenditure before and after the insurance, as well as the probability, gap and concentration index of family catastrophic medical expenditure after participating in the insurance are calculated. With families that do not participate in the serious illness medical insurance as the control group, the change of family catastrophic medical expenditure under the basic medical compensation system and the serious illness medical compensation system is investigated, so as to evaluate the impact of the serious illness medical insurance system on family catastrophic medical expenditure (Wang, 2014).

4.1 Samples, data, indices and models

4.1.1 Samples and data

The author designed *Questionnaire on the serious illness medical insurance and medical expenditure of urban and rural residents in Zhanjiang*. The specific survey commissioned a company in Zhanjiang to conduct a random sample survey of the company's insured personnel. The content of the survey is limited to one year, mainly including the participation of all the respondents' family members in the medical insurances in Zhangjiang, the total medical expenditure of hospitalization, outpatient and medicine, the total amount of reimbursement by medical insurances, the total income, and the expenditure statement.

A total of 785 questionnaires were sent out, 674 questionnaires were collected and 632 questionnaires were valid. The recovery rate and valid rate were 85.9% and 80.5% respectively. The survey was conducted from September 8, 2015 to September 29, 2015. The respondents were families in Zhangjiang with at least one member participated in the medical insurance for urban and rural residents (one of medical insurance for urban workers, medical insurance for urban residents, and NCMS). In the end, 432 samples were valid in the study among the 632 samples.

The valid samples are not much in this study. The study uses the technical methods of Fang Hao, Zhao Yuxin, Wang Jiansheng, Wan Quan, Du Lexun, and Tao Sihai. It does not consider the impact of household population on food consumption expenditure, only considering whether the proportion of medical expenditure in non-food expenditure is higher than catastrophic medical expenditure. According to Wang Chaoqun's method, this study sets the standard of catastrophic medical expenditure at 20%, 30% and 40%.

4.1.2 Variable design and indices

In this study, the following indices are designed:

(1) Household medical expenditure

Household medical expenditure includes the expenditure of medical treatment, medical purchase, hospitalization, traditional medicine and other medical expenditure, and does not include the special nutrition expenditure related to health, transportation expenditure, and reimbursement for health insurance.

(2) Total household expenditure

Total household expenditure includes cash expenditure by all the members on purchases of goods and services. It does not include the value of a family’s own goods. Take food expenditure as an example. The expenditure on food purchases includes all household expenditure on food, but does not include the value of food produced and sold by the family. Similarly, the expenditure of tobacco, alcohol and food purchased outside, including consumption in restaurants, is not included in the household food expenditure.

(3) Household disposable income

Household disposable income refers to expenditure other than those spent on food purchases, including expenditure on daily necessities, communications, recreational activities, transportation and commuting, and durable goods (Wang, 2014).

(4) Proportion of household health expenditure

Proportion of household health expenditure includes the proportion of the medical expenditure paid by the family in household disposable income (non-food expenditure), and the proportion of family medical expenditure before the compensation of medical insurance in household disposable income (non-food expenditure).

(5) Probability of family catastrophic medical expenditure

Probability of family catastrophic medical expenditure means the proportion of families with catastrophic medical expenditure in the total munber of families.

Based on the indices above, the average gap, relative gap and concentration index of family catastrophic medical expenditure are further defined.

(6) Average gap in family catastrophic medical expenditure

The proportion of family catastrophic medical expenditure in household disposable income expenditure subtracts the defined standard of family catastrophic medical expenses is the gap between each family and the defined standard. The total gap divided by the total number of families equals the average gap in family catastrophic medical expenditure, which reflects the severity of catastrophic medical expenditure.

(7) Relative gap in family catastrophic medical expenditure

The relative gap in family catastrophic medical expenditure reflects the average impact on the living standard of families with catastrophic medical expenditure. Relative gap = Σ (the proportion of the medical expenditure paid by the family in non-food expenditure – the defined standard) ÷ number of families with catastrophic medical expenditure (Wang, 2014).

(8) Concentration index of family catastrophic medical expenditure

Some families have catastrophic medical expenditure, while others may not. The catastrophic medical expenditure of some families is large, while that of others is relatively small. Therefore, this study uses the concentration index of family catastrophic medical expenditure to reflect this distribution. Specifically, the exponent ranges from -1 to 1, and the mean value is 0. When the exponent is a negative value, it indicates that family catastrophic medical expenditure occurs more often in poor families and that the gap is greater within poor families. When the exponent is a positive value, it indicates that family catastrophic medical expenditure occurs more often in rich families and that the gap is greater within rich families (Wang, 2014).

As to the concentration index, the calculation method of Wagstaff and Doorslaer is used in this study. r_i is the order in the income distribution of the family i in all families, and N is the total number of families ($w_i \equiv 2\frac{N+1-r_i}{N}$). Weight $E_i\ with\ w_i$:

$$\boldsymbol{W^E \equiv \frac{\sum_n^1 w_i E_i}{N}} \quad \textbf{(4.1)}$$

In this expression, E_i represents specific classification variables. When a family has catastrophic medical expenditure, E_i is 1. Otherwise the value is 0.

In this case, the following expression can be obtained:

$$\boldsymbol{W^E \equiv \mu_E(1 - C_E)} \quad \textbf{(4.2)}$$

In this expression, μ_E is the average gap in family catastrophic medical expenditure, and C_E is the concentration index of family catastrophic medical expenditure.

4.2 Analysis of official data

First of all, the data on residents' per capita consumption expenditure, health care expenditure, food expenditure and other expenditure in Zhanjiang, Guangdong and China from 2013 to 2018 are selected to analyze the impact of medical insurance on medical expenditure.

According to chapter 2, in the medical insurance of Zhanjiang, the reimbursement ratio of urban and rural residents' medical insurance is 50% to 85%, the reimbursement ratio of urban workers' medical insurance is 80%-93%, and the reimbursement ratio of serious illness medical insurance is 50%-80%. This study assumes that the average reimbursement

ratio of all residents is 70%, and per capita medical expenditure is per capita out-of-pocket medical expenditure.Specific data are shown in Table 4-1.

Before receiving medical insurance compensation, the proportion of per capita medical expenditure in Zhanjiang between 2013 and 2018 was about 37%, and reached 39.10% in 2016. In Guangdong, the proportion grew from 21.46% to 28.85%. The proportion in the whole country also showed an upward trend, from 33.43% to 39.50%. According to the catastrophic medical expenditure standard 20%, 30% and 40%, in Zhanjiang, Guangdong and even the whole country, the probability of illness-induced poverty is great. After obtaining medical insurance compensation, the proportion of out-of-pocket medical expenditure in Zhanjiang was close to the national average (about 11%), while the proportion of that in Guangdong was less than 10% with lighter medical burden. Therefore, the implementation of medical insurance effectively reduces the proportion of medical expenditure and the occurrence of catastrophic medical expenditure.

Table 4-1 Per capita income and expenditure and the proportion of medical expenditure in different regions

Region	Year	Disposable income (yuan)	Expenditure (yuan)	Expenditure on food, tobacco and alcohol (yuan)	Medical expenditure (yuan)	Non-food expenditure (yuan)	Proportion of medical expenditure (%)	Medical expenditure before the medical insurance compensation (70%) (yuan)	Proportion of medical expenditure before health insurance compensation (%)
Zhangjiang	2018	21426.90	15302.70	6473.10	1015.80	8829.60	11.5	3386.00	38.35
	2017	19631.60	14513.90	6178.40	938.80	8335.50	11.26	3129.33	37.54
	2016	17934.40	13303.60	5685.40	893.60	7618.20	11.73	2978.67	39.10
	2015	16631.70	12273.80	5263.70	782.80	7010.10	11.17	2609.33	37.22
	2014	15301.80	11438.80	4925.10	717.50	6513.70	11.02	2391.67	36.72
	2013	13822.80	10498.20	4581.90	655.70	5916.30	11.08	2185.67	36.94
Guangdong	2018	35809.90	26054.00	8480.80	1520.80	17573.20	8.65	5069.33	28.85
	2017	33003.30	24819.63	8317.04	1319.46	16502.59	8.00	4398.20	26.65
	2016	30295.80	23448.42	8015.09	1144.87	15433.33	7.42	3816.23	24.73
	2015	27858.90	20975.70	7236.65	976.08	13739.05	7.10	3253.60	23.68
	2014	25685.00	19205.50	6589.77	890.45	12615.73	7.06	2968.17	23.53
	2013	23420.80	17421.00	6097.33	728.89	11323.67	6.44	2429.63	21.46
China	2018	28228.00	19853.10	5631.10	1685.20	14222.00	11.85	5617.33	39.50
	2017	25973.80	18322.10	5373.60	1451.20	12948.50	11.21	4837.33	37.36
	2016	23821.00	17110.70	5151.00	1307.50	11959.70	10.93	4358.33	36.44
	2015	21966.20	15712.40	4814.00	1164.50	10898.40	10.69	3881.67	35.62
	2014	20167.10	14491.40	4493.90	1044.80	9997.50	10.45	3482.67	34.84
	2013	18310.80	13220.40	4126.70	912.10	9093.70	10.03	3040.33	33.43

Source: Zhanjiang Statistical Yearbook, Guangdong Statistical Yearbook, National Bureau of Statistics

4.3 Analysis of field survey data

According to the analysis of official data above, medical insurance can effectively reduce the occurrence of catastrophic medical expenditure, but cannot distinguish the function of different types of medical insurance. With the catastrophic medical expenditure standard 20%, 30% and 40%, the study focuses on the impact of basic medical insurance and serious illness medical insurance on the probability, gap and concentration index of family catastrophic medical expenditure.

4.3.1 Probability of catastrophic medical expenditure

Table 4-2 shows that when the medical expenditure cannot be compensated by medical insurance, the probability of family catastrophic medical expenditure was 16.45%, 11.32% and 5.34% respectively under the refined standard (see Table 4-2).

Table 4-2 Probability of family catastrophic medical expenditure under different compensation standards

Catastrophic medical expenditure	20%		30%		40%	
	Number of families Households	Probability (%)	Number of families Households	Probability (%)	Number of families Households	probability (%)
Having medical expenditure	71	16.45	49	11.32	23	5.34
Basic medical insurance compensation	31	7.18	23	5.34	14	3.14
Serious illness medical insurance compensation (50%)	31	7.18	23	5.34	8	1.89
Serious illness medical insurance compensation (100%)	31	7.18	14	3.25	8	1.89

When the medical expenditure was compensated by basic medical insurance but not compensated by serious illness medical insurance, the probability of family catastrophic

medical expenditure was 7.18%, 5.34% and 3.14% respectively as the reimbursement ratio was 20%, 30%, and 40%. When the medical expenditure was compensated by serious illness medical insurance and the reimbursement ratio exceeded 50%, the probability of family catastrophic medical expenditure was 7.18%, 5.34% and 1.89% respectively. When the reimbursement ratio of serious illness medical insurance exceeded 100%, the probability of family catastrophic medical expenditure was 7.18%, 3.25% and 1.89% respectively. Therefore, under different standards, the urban and rural basic medical insurance compensation can well reduce the probability of family catastrophic medical expenditure. With the reimbursement ratio being 20%, the probability was reduced from 16.45% to 7.18% by the urban and rural basic medical insurance. With the reimbursement ratio being 30%, the probability was reduced from 11.32% to 5.34%. With the reimbursement ratio being 40%, the probability was reduced from 5.34% to 3.14%. As for serious illness medical insurance, whether the reimbursement ratio was 50% or 100%, the probability was not greatly reduced. This means that compared with the basic medical insurance system, the serious illness medical insurance system has not had the expected effect on reducing the probability of family catastrophic medical expenditure.

4.3.2Average gap and relative gap in catastrophic medical expenditure

It can be found from Table 4-3 that when the medical expenditure is not compensated by any medical insurances, the average gap of family catastrophic medical expenditure was 6.45%, 4.88% and 4.25% respectively as the reimbursement ratio was 20%, 30%, and 40%, while the relative gap was 37.45%, 41.83% and 36.24% respectively.

When the medical expenditure was compensated by basic medical insurance, the average gap decreased from 6.45% to 2.76% and the relative gap decreased from 37.45% to 34.77% as the standard ratio being 20%. The average gap decreased from 4.88% to 2.01% and the relative gap decreased from 41.38% to 33.81% as the standard ratio being 30%. The average gap decreased from 4.25% to 1.67% and the relative gap decreased from 36.24% to 29.41% as the standard ratio being 40%. When the medical expenditure was compensated by serious illness medical insurance with the reimbursement ratio being 50%, the average gap decreased to 2.37% and the relative gap decreased to 34.11% as the standard ratio being 20%. The average gap decreased to 1.91% and the relative gap decreased to 32.91% as the standard ratio being 30%. The average gap decreased to 1.62% while the relative gap rose to 104.25% as the standard ratio being 40%. This is mainly because the relative gap measures

the gap between the proportion of family catastrophic medical expenditure in non-food expenditure and the given standard. Taking the standard ratio being 40% as an example, compensated by the serious illness medical insurance, the number of families with catastrophic medical expenditure decreased from 14 to 8, while the proportion of medical expenditure in the remaining 8 uncompensated households was still relatively high, resulting in an increase in the relative gap when the reimbursement ratio is 50%. When the reimbursement ratio of serious illness medical insurance is 100%, the average gap decreased to 2.28% and the relative gap decreased to 32.47% as the standard ratio being 20%. The average gap decreased to 1.76% and the relative gap increased to 37.34% as the standard ratio being 30%. The average gap decreased to 1.38% while the relative gap changed to 100.02% as the standard ratio being 40%. These indicate that the basic medical insurance in Zhanjiang has significantly greater effects than that of serious illness medical insurance on reducing the gap of family catastrophic medical expenditure. Therefore, the effects of the serious illness medical insurance are not significant.

Table 4-3 Relative gap and average gap in family catastrophic medical expenditure under different compensation standards

Catastrophic medical expenditure	Average gap (%)			Relative gap (%)		
	20%	30%	40%	20%	30%	40%
Having medical expenditure	6.45	4.88	4.25	37.45	41.83	36.24
Basic medical insurance compensation	2.76	2.01	1.67	34.77	33.81	29.41
Serious illness medical insurance compensation (50%)	2.37	1.91	1.62	34.11	32.91	104.25
Serious illness medical insurance compensation (100%)	2.28	1.76	1.38	32.47	37.34	100.02

4.3.3 Concentration index of catastrophic medical expenditure

The impact of serious illness medical insurance in Zhanjiang on the concentration index of family catastrophic medical expenditure will be discussed next.

Table 4-4 Concentration index of family catastrophic medical expenditure under different standards

Concentration index	20%	30%	40%
Having medical expenditure	-0.212	-0.324	-0.367
Basic medical insurance compensation	-0.012	-0.148	-0.067
Serious illness medical insurance compensation (50%)	0.066	-0.148	0.672
Serious illness medical insurance compensation (100%)	-0.019	0.078	0.672

From Table 4-4, the concentration index under all standards was negative without any compensation. When being compensated by the basic medical insurance, the concentration index increased from -0.212 to -0.012 as the standard ratio being 20%, increased from -0.324 to -0.148 as the standard ratio being 30%, and increased from -0.367 to -0.067 as the standard ratio being 40%. The concentration indices were all negative, indicating that family catastrophic medical expenditure mainly occurred in poor families under the basic medical insurance compensation system and the gap among the poor families was relatively large. When being compensated by the serious illness medical insurance, whether the reimbursement is 50% or 100%, the values were closer to positive values. This suggests that under the serious illness medical insurance compensation system, family catastrophic medical expenditure mainly occurred in rich families and the gap among the rich families was relatively large. By comparing different standards, it can be found that the higher the standard ratio was, the smaller the corresponding concentration indices were. Therefore, the probability of family catastrophic medical expenditure is higher in low-income families, and corresponding risks are greater.

Table 4-4 also shows that the serious illness medical insurance has a relatively small impact on the concentration index. With the standard ratio being 20%, when the reimbursement ratio of serious illness medical insurance was 50%, the concentration index was 0.066, a positive value, while when the reimbursement ratio was 100%, the concentration index was -0.019, a negative value. With the standard ratio being 30%, when the reimbursement ratio of serious illness medical insurance was 50%, the concentration index did not change compared to the value in the basic medical insurance compensation. With the standard ratio being 40%, since the number of families with catastrophic medical expenditure decreased considerably due to serious illness medical insurance, the concentration index was relatively large. This also shows that serious illness medical

insurance can reduce the unequity of the distribution of medical compensation expenses to some extent, but the effect is not significant.

4.4 Research conclusions and suggestion for the policy

4.4.1 Research conclusions

This chapter uses the official data on residents’ income and expenditure in Zhanjiang, Guangdong and China from 2013 to 2018 to analyze the impact of medical insurance on medical expenditure. With the field survey data of medical insurance and family medical expenditure of urban and rural residents in Zhanjiang in 2015, it also discusses the impact of urban and rural residents’ basic medical insurance and the serious illness medical insurance under different standards on the probability, relative gap, average gap and concentration index of family catastrophic medical expenditure. Conclusions are formed as follow.

(1) Medical insurance can effectively reduce the occurrence of catastrophic medical expenditure.

According to official data, when medical insurance compensation was not obtained, the per capita medical expenditure in Zhanjiang, Guangdong, the whole country was about 37%, 25%, 35% respectively, so the phenomenon of illness-induced poverty due to catastrophic medical expenditure is very likely to occur. After the implementation of medical insurance, the proportion of out-of-hand medical expenditure in Zhanjiang and the whole country was about 11%, and the highest proportion in Guangdong was 8.65%. The proportion of medical expenditure was lower than the standard of catastrophic medical expenditure, 20%. Therefore, medical insurance can effectively reduce the occurrence of catastrophic medical expenditure. However, since there are diverse types of medical insurance, by the analysis of official data the impacts of insurance systems on catastrophic medical expenditure cannot be distinguished.

(2) The effect of serious illness medical insurance on reducing the probability of family catastrophic medical expenditure is not obvious.

The study finds that in the absence of any compensation, under the standard of 20%, 30% and 40%, the probability of family catastrophic medical expenditure was 16.45%, 11.32% and 5.34% respectively, so the phenomenon of illness-induced poverty due to catastrophic

medical expenditure is very likely to occur. After implementing the basic medical insurance system, the probability of family catastrophic medical expenditure was effectively reduced to 7.18%, 3.25% and 1.89% respectively under the standard of 20%, 30% and 40%. As for serious illness medical insurance, whether the reimbursement ratio was 50% or 100%, the probability was not greatly reduced. This means that compared with the basic medical insurance system, the serious illness medical insurance system does not have obvious effects on reducing the probability of family catastrophic medical expenditure.

(3) The effect of basic medical insurance on family catastrophic medical expenditure is significant.

From the above analysis, it can be seen that basic medical insurance has significant effects on reducing the probability, relative gap, and average gap of family catastrophic medical expenditure as well as the unequity of the distribution of medical expenditure compensation. Specifically, when the medical expenditure was compensated by basic medical insurance, the average gap decreased from 6.45% to 2.76% and the relative gap decreased from 37.45% to 34.77% as the standard ratio being 20%. The average gap decreased from 4.88% to 2.01% and the relative gap decreased from 41.38% to 33.81% as the standard ratio being 30%. The average gap decreased from 4.25% to 1.67% and the relative gap decreased from 36.24% to 29.41% as the standard ratio being 40%. As for the concentration index, when being compensated by the basic medical insurance, it increased from -0.212 to -0.012 as the standard ratio being 20%, increased from -0.324 to -0.148 as the standard ratio being 30%, and increased from -0.367 to -0.067 as the standard ratio being 40%. All these reflect the positive effect of basic health insurance on family catastrophic medical expenditure.

(4) The effect of serious illness medical insurance on family catastrophic medical expenditure is not obvious.

Compared with the basic medical insurance system, the effect of serious illness medical insurance on family catastrophic medical expenditure is not obvious (Wang, 2014). Specifically, when the medical expenditure was compensated by serious illness medical insurance with the reimbursement ratio being 50%, the average gap decreased to 2.37% and the relative gap decreased to 34.11% as the standard ratio being 20%. The average gap decreased to 1.91% and the relative gap decreased to 32.91% as the standard ratio being 30%. The average gap decreased to 1.62% while the relative gap rose to 104.25% as the standard ratio being 40%. This means that the effect of the serious illness medical insurance in

Zhanjiang on reducing the average gap and relative gap of family catastrophic medical expenditure is not obvious. In addition, its impact on the concentration index of family catastrophic medical expenditure is also small (Wang, 2014). With the standard ratio being 20%, when the reimbursement ratio of serious illness medical insurance was 50%, the concentration index was 0.066, a positive value, while when the reimbursement ratio was 100%, the concentration index was -0.019, a negative value. With the standard ratio being 30%, when the reimbursement ratio of serious illness medical insurance was 50%, the concentration index did not change compared to the value in the basic medical insurance compensation. With the standard ratio being 40%, since the number of families with catastrophic medical expenditure decreased considerably due to serious illness medical insurance, the concentration index was relatively large.

4.4.2 Suggestion for the policy

(1) Adjusting the security scope, coverage and compensation ratio of the basic medical insurance

The study above shows that the urban and rural basic medical insurance has significant effects on reducing the probability, relative gap, and average gap of family catastrophic medical expenditure as well as the unequity of the distribution of medical expenditure compensation. In China, in 2009, the maximum reimbursement of the three medical insurance systems increased from 4 times the average annual income to 6 times. In 2012, it increased to 6 times in urban areas and 8 times in rural areas, with the minimum account being 60,000 yuan (Wang, 2014).

(2) Adjusting the basic standards of the serious illness medical insurance

The study finds that the impact of serious illness medical insurance on the family catastrophic medical expenditure is not obvious, which is not consistent with the original intention of setting it. Therefore, the problem must be in the design of the basic parameters, especially the payment threshold. The current reimbursement threshold of serious illness medical insurance in Zhanjiang is relatively high, making it fail to be so effective. In conclusion, a moderate balance can be achieved in its catastrophic medical expenditure standard, payment threshold and medical expenditure. On this basis, further adjustment should be maken on the major parameters and standards.

(3) Introducing the market competition mechanism into the operation of urban and rural medical insurance

There are problems including insufficient human resources, lack of incentive mechanism, low level of informationization and low level unified planning in insurance management institutions in Zhanjiang, which leads to the low operating efficiency of the medical insurance systems. In recent years, China has repeatedly proposed to reduce the balance of medical insurance fund, improve the operating efficiency of urban and rural medical insurance, and explore the model of medical insurance management services run by commercial insurance companies (Wang, 2014). At present, Zhanjiang has no experience of letting commercial insurance companies operate all medical insurance activities. Therefore, Zhanjiang can introduce the market competition mechanism into its urban and rural medical insurance operation activities, gradually introduce the operation model of commercial insurance companies, and explore plural insurance systems.

Chapter 5: An Evaluation of the Effect of Serious Illness Medical Insurance in Zhanjiang from the Perspective of Equity and Efficiency

As is known to all, economic researches mainly focus on efficiency and equity. As to the serious illness medical insurance studied in this thesis, equity mainly refers to the equitable distribution, while the efficiency refers to the efficient use of the serious illness medical insurance fund. This chapter evaluates the effect of the serious illness medical insurance from the perspective of equity and efficiency.

5.1 Evaluation of the model: measures of equity and efficiency

The economics mainly focus on efficiency and equity. Equity mainly involves the equity of income distribution brought by the policy. When studying equity, it is necessary to measure equity first. Presently Gini coefficient is the main index to measure the equity of income distribution, so this chapter also uses it to measure the equity of compensation for the insured participating in the serious illness medical insurance. The smaller the Gini coefficient is, the more equitable the serious illness medical insurance is. The bigger the Gini coefficient is, the fewer people the serious illness medical insurance compensates, which means most people’s needs for the serious illness medical insurance needs are not met. Residents’ contribution to the serious illness medical insurance is input, and the compensation obtained is output. The equity is analyzed through input and output.

In welfare economics, efficiency is usually measured by Pareto Optimality. However, it is more of a theoretical state and difficult to be measured in practice by data. Therefore, the efficiency in this chapter is measured by the improvement of effectiveness of distribution and reimbursement in the system. In particular, this chapter uses cardinal utility to measure the effectiveness of the income distribution, and then use the total utility of different distribution plans to measure the economic efficiency.

5.2 The building and evaluation of the model

With large internal differences in the serious illness medical insurance system, it is difficult to use mathematical models to describe the system completely. Therefore, this chapter only mathematically describes the details of serious illness medical insurance, studies the efficiency and equity of different plans, and explores problems including defining "serious illnesses" according to the serious illness catalogue.

5.2.1 Assumptions of the model

Assuming that two closed areas have different serious illness medical insurance systems. All things are the same except the medical insurance systems memtioned above. In their serious illness medical insurance systems, the reimbursement amount are limited, which means there are budgetary constraints on the reimbursement of the serious illness medical insurance.

Plan one is to examine the serious illness medical insurance without budgetary constraints, which means the insured can enjoy the reimbursement as long as the medical expenditure exceeds the payment threshold. The number of the insured in this system is H, the payment threshold is x_0, and the total funds for reimbursement is M. The number of people with the qualification of participating in the insurance is n, and the collection of ordinal ranking is Ω (i belongs to Ω when the person whose order is i is qualified for reimbursement).

In plan two, not all diseases can be reimbursed in the serious illness medical insurance. The medical service management institutions make a list of diseases that can be reimbursed. Therefore, constraints on diseases should be considered. When the medical expenditure exceeds the payment threshold and the serious illness is covered by the insurance, it can be reimbursed. The number of the insured is H, the payment threshold is x_0, the total funds for reimbursement is M, the number of people who can obtain the reimbursement is m, and the ordinal collection of the insured with reimbursement right is Ω' (j belongs to Ω' when the insured person whose order is j with serious illnesses that can be reimbursed).

5.2.2 The basic framework of the model

The medical expenditure above the payment threshold of number i who is insured is x_i, and β is the reimbursement ratio above payment threshold, the expenses that the number

i person can reimburse are βx_i, and the out-of-pocket expenses are $(1-\beta)x_i$. For the insured, the higher the expenditure can be reimbursed, the higher the utility level, and the higher the out-of-pocket ratio, the lower the utility.

The change in the utility level resulting from the increase in the out-of-pocket medical expenditure is shown by the function $f(x_i)$. The function is as follow.

$$\boldsymbol{f(x_i) = x_i^{\alpha}, \alpha > 1} \quad \textbf{(5.1)}$$

$f(x_i)$ has a concave nature. When an insured person is reimbursed for βx_i, the reduced utility portion becomes $f\big((1-\beta)x_i\big)$, indicating that the utility level resulting from reimbursement should be the reduction level of negative utility resulting from reimbursement, shown as follow:

$$\boldsymbol{f(x_i) - f\big((1-\beta)x_i\big) = x_i^{\alpha} - \big((1-\beta)x_i\big)^{\alpha}} \quad \textbf{(5.2)}$$

Then the total utility TU of those eligible for reimbursement will become:

$$\boldsymbol{TU = \sum_i \big[x_i^{\alpha} - \big((1-\beta)x_i\big)^{\alpha}\big]} \quad \textbf{(5.3)}$$

In reality, there may be a fund balance or position after the serious illness medical insurance reimburses the insured. In this study, assuming that all the serious illness medical insurance funds M are used for the reimbursement, the total funds TM for reimbursement that the insured can gain will be:

$$\boldsymbol{TM = \sum_i \beta x_i = M} \quad \textbf{(5.4)}$$

Compared to plan one, plan two adds a limit to the types of serious illnesses that can be reimbursed, which means that the insured are the subset of the plan without restraints on illnesses, thus $\Omega' \in \Omega$, and $m \leq n$.

Assuming that the expenditure of the number j exceeds the payment threshold, the exceeding part is x_j, which means that the insured can receive reimbursement for $\beta' x_j$ within the medical insurance for serious illnesses, and the corresponding out-of-pocket part is $(1-\beta')x_j$. In this case, the total utility that m insured people who can be reimbursed is:

$$\boldsymbol{TU = \sum_j \Big[x_j^{\alpha} - \Big((1-\beta')x_j\Big)^{\alpha}\Big]} \quad \textbf{(5.5)}$$

In plan two, the total funds for reimbursement is TM', and the relationship between the serious illness medical insurance fund and the total amount of medical insurance fund should be as follow:

$$\boldsymbol{TM' = \sum_j^n \beta' x_j = M} \tag{5.6}$$

Comparing formula (5.4) with formula (5.6), $\sum_i \beta x_i = \sum_j \beta' x_j$ can be concluded. Since $\Omega' \in \Omega$, $\sum_j x_j \leq \sum_i x_i$。

5.2.3 Equity comparison of different plans

Next, the equity and efficiency of the two plans are comparatively analyzed.

Firstly, in plan one, the total number of people is H, and the number of those who can be reimbursed is n . The medical expenditure above the payment threshold of the number i person is x_i , and the expenditure amount is βx_i . Then the cumulative medical expenditure of all the insured persons before the number i person (included) are X, and the expected total amount of reimbursement B_1 is:

$$\boldsymbol{B_1 = \beta X,\ \ X = \sum_i x_i} \tag{5.7}$$

The insured of plan one is divided into two groups. One group is the insured who can be reimbursed, and the total number is n. The other group is the insured who cannot be reimbursed, and the total number is $H - n$. The Gini coefficient of plan one is drawn. In plan two, the cumulative medical expenditure of all the insured persons before the number j person (included) are X', and the expected total amount of reimbursement B_2 is:

$$\boldsymbol{B_2 = \beta' X',\ \ X' = \sum_j x_j} \tag{5.8}$$

Using the formula (5.7) and (5.8), the Lorenz curve of the two plans is as follow：

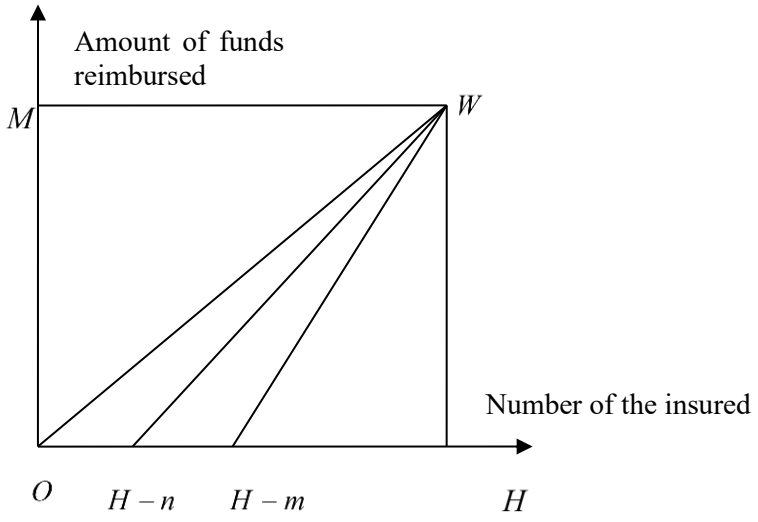

Figure 5-1 A comparative analysis of the Lorenz curve of two plans

According to Figure 5-1, the Gini coefficient of the two plans can be calculated, which are:

$$\boldsymbol{G_1 = \frac{H-n}{H}},\ \boldsymbol{G_2 = \frac{H-m}{H}} \tag{5.9}$$

According to the above analysis, after setting the number of insured people, the budget constraints of the reimbursement funds for serious illnesses, and the reimbursement payment threshold, the restraint on serious illness types means $n \geq m$. In other words, when there is no limit to the type of serious illnesses, the number of insured will increase, thus $G_1 \leq G_2$. This means that the use of serious illness medical insurance can compensate more insured people when there is no limit to the type of serious illnesses, more insured people can be reimbursed. When there is a limit to the type of serious illnesses, the payment threshold will be increased indirectly, and the insured person with some illness will be excluded from the scope of reimbursement. Therefore, from the perspective of equity, the plan one can better ensure the overall equity of the insured.

After setting the number of insured people and the budget constraints of the reimbursement funds for serious illnesses, enlarging the scope of reimbursement and lowering the payment threshold can increase the number of insured *m*, thereby increasing the overall utility level of the plan. Meanwhile, the individual reimbursement ratio and amount will be decreased. In other words, reducing the constraints on serious illnesses makes more people eligible for reimbursement, but at the same time reduces the amount of reimbursement, thereby decreasing the overall utility level. This means it is necessary to form a reasonable mechanism of serious illness medical insurance reimbursement and design the payment threshold, reimbursement ratio and the capping line reasonably, maximizing the utility of the serious illness medical insurance reimbursement system.

5.2.4 Economic efficiency comparison of different plans

The analysis of economic efficiency can be expressed by the increase of utility level of the serious illness medical insurance system brought about by the increase of budget constraints on the serious illness medical insurance fund. ΔM means the change in the utility of the different plans. In plan one, if the reimbursable funds increase, then:

$$\boldsymbol{\Delta\beta = \frac{\Delta M}{\sum_i x_i}} \tag{5.10}$$

In plan one, the value of utility change due to the increase in budget constraints is ΔU_1. According to the definition of the utility function, the function is as follow:

$$\Delta U_1 = [(1-\beta)^{\alpha} - (1-\beta-\Delta\beta)^{\alpha}] \sum_i x_i^{\alpha} \tag{5.11}$$

As for $(1-\beta-\Delta\beta)^{\alpha}$, it can be expanded by the Taylor theorem and be put into the formula (7.11):

$$\Delta U = \alpha\Delta\beta(1-\beta)^{\alpha-1}\Sigma_i x_i^{\alpha} = \alpha\Delta M(1-\beta)^{\alpha-1}\Sigma_i x_i^{\alpha-1} \tag{5.12}$$

According to the formula (5.12), the marginal utility of the reimbursable funds ΔM without limitations on serious illness is as follow:

$$MR_1 = \frac{\Delta U_1}{\Delta M} = \alpha(1-\beta)^{\alpha-1}\Sigma_i x_i^{\alpha-1} \tag{5.13}$$

Similarly, utility changes in the budget constraints of reimbursable funds in plan two can be recorded as ΔU_2:

$$MR_2 = \frac{\Delta U_2}{\Delta M} = \alpha(1-\beta')^{\alpha-1}\Sigma_j x_j^{\alpha-1} \tag{5.14}$$

The marginal utility ratio of the two plans can then be obtained:

$$\frac{MR_1}{MR_2} = \frac{(1-\beta)^{\alpha-1}\Sigma_i x_i^{\alpha-1}}{(1-\beta')^{\alpha-1}\Sigma_j x_j^{\alpha-1}} \tag{5.15}$$

Since $\beta' \geq \beta$, $\Sigma_i x_i \geq \Sigma_j x_j$, $0<\beta<1$, $\alpha>1$, with the formula (5.15), $MR_1 \geq MR_2$ can be obtained. It means that when other conditions remain the same, the marginal utility of plan one will be higher. By definition, it can be concluded that:

$$\Delta U_1 = MR_1 \Delta M$$
$$\Delta U_2 = MR_2 \Delta M \tag{5.16}$$

Then, total utility levels of the two plans can be obtained:

$$U_1 = \int dU_1 = \int_0^M MR_1 \Delta M$$
$$U_2 = \int dU_2 = \int_0^M MR_2 \Delta M \tag{5.17}$$

Since $MR_1 \geq MR_2$, with the formula (5.16) and (5.17), it can be found that the $U_1 \geq U_2$. This means that setting the same budget constraints, a greater total utility can be obtained in plan one. Therefore, it is better to implement the plan without limits to serious illnesses, which can improve the level of utility.

5.3 Study conclusions

Currently, China’s serious illness medical insurance system shows significant local characteristics, and great differences exist in the serious illness medical insurance system in various regions. The differences in fund-raising standards and reimbursement standards lead to obvious differences in the equity and efficiency of serious illness medical insurance. In the chapter 4, this thesis compares and analyzes the differences of the serious illness medical insurance system in several major regions, but does not give a direct proof of which system is better or whose equity and efficiency are better. In this chapter, the thesis uses mathematical models to demonstrate this problem.

According to the study, when the number of insured persons, the budget of reimbursable funds and the payment threshold are the same without limiting the types of serious illnesses that can be reimbursed, the equity and efficiency are significantly higher than the plan that limits the types of serious illnesses. Based on the efficiency of using the funds, not setting limits on serious illnesses being reimbursed better than setting limits. In addition, for serious illness medical insurance systems with limits on serious illnesses, the efficiency and equity can be improved by lowering the payment threshold or expanding the scope of serious illnesses being reimbursed. When the insured do not have to pay for the serious illness medical insurance, the distribution efficiency and equity of the serious illness medical insurance reimbursement funds are not affected, but the equity of the starting point of different insured people is influenced.

Though expanding the scope of serious illnesses being reimbursed can improve the level of equity and efficiency, it does not mean that everyone should be included in the scope of reimbursement. Because of the budget constraints, the insured can only receive limited compensation. If limited compensation fails to lift them out of poverty, more people will be included in the insurance, and the compensation available to all insured will be reduced, thereby further worsening the economic situation of existing insured people and affecting the equity of the system. Meanwhile, when the insured pays the out-of-pocket medical expenditure, if the reimbursement ratio is increased, the plan without limits on serious illnesses being reimbursed is better than the plan that sets the reimbursement ratio and scope. In essence, the way to improve the overall utility of the insured is to increase the budget of reimbursable funds and to implement a more equitable reimbursement plan.

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Chapter 6: Conclusions and Suggestion for the Policy

6.1 Conclusions

With the development of market economy, the traditional structure of family and society is gradually disintegrating, weakening the ability of urban and rural residents to shoulder risks. Medical expenditure for serious illnesses especially threatens the survival of individuals and the development of the whole family, which may lead to the “illness-induced poverty”. In order to alleviate the illness-induced poverty and reduce families with catastrophic medical expenditure, most countries and regions currently establish prepayment mechanisms by taxing residents or collecting insurance premiums. If some families fail to afford the out-of-pocket medical expenditure, prepayment mechanisms will give them financial compensation to reduce their medical expenditure.

At present, many regions in our country have implemented the policy of serious illness medical insurance, but they show the trend of “fragmentation”. There are great differences among the level of economic development, population structure, basic medical insurance systems, regional medical and health conditions, and types of illnesses, which leads to the differences in local serious illnesss medical insurance system. Then, what are the differences in operating mechanisms and the scope of the serious illnesss medical insurance system? Are thses systems as effective as expected in our country currently? From the perspective of “equity” and “efficiency”, how should the system be formulated and optimized? These all need further study. To better answer the questions above, taking Zhanjiang as an example, this thesis has a discussion on the models and effects of the local serious illnesss medical insurance systems, and an investigation into the design of the payment threshold, reimbursement ratio and other standards based on the principle of equity and efficiency.

After discussion, following conclusions are drawn:

6.1.1 The model of the serious illness medical insurance in Zhanjiang and its advantages

The serious illness medical insurance of Zhanjiang model can be summarized as a “urban and rural” system that splits up the original “management and operation” functions,

achieves the “basic and supplemental” integrated operation management, and promotes whole-process “information and funds” monitoring. It mainly has two advantages. First of all, led by the government, the pressure on medical service institutions when providing serious illness medical insurance is effectively relieved. Secondly, it gives full play to the incentive compatibility mechanism where serious illness medical insurance can participate in the medical insurance market. Through the reinsurance, it increases the reimbursement limit for insured patients with serious illnesses.

6.1.2 Implementation of targeted serious illness medical insurance policy

This thesis analyzes the urban and rural serious illness medical insurance model of several major cities in China, and makes a comparative study with them and the Zhangjiang model by the management model, fund-raising policy and security policy. It summarizes the Taicang model, the Xiamen model, the Hangzhou model, and the Zhanjiang model from the payment thresholds, the capping lines, the insurance qualitative and subjects. According to the analysis, though the four Models have some differences, they all improved the security level of patients with serious illnesses, reduced the risk of illness-induced poverty, and effectively alleviated the government’s difficulties in monitoring and managing medical service institutions as well as inadequate personnel allocation.

6.1.3 China’s medical insurance system effectively reducing the personal medical expenditure

According to official data, when medical insurance compensation was not obtained, the per capita medical expenditure in Zhanjiang, Guangdong, the whole country was about 37%, 25%, 35% respectively, so the phenomenon of “illness-induced poverty” due to catastrophic medical expenditure is very likely to occur. After the implementation of medical insurance, the proportion of out-of-hand medical expenditure in Zhanjiang and the whole country was about 11%, and the highest proportion in Guangdong was 8.65%. The proportion of medical expenditure was lower than the standard of catastrophic medical expenditure, 20%. Therefore, medical insurance can effectively reduce the occurrence of catastrophic medical expenditure. However, since there are diverse types of medical insurance, by the analysis of official data the impacts of insurance systems on catastrophic medical expenditure cannot be distinguished.

6.1.4 The effect of serious illness medical insurance on family catastrophic medical expenditure being not obvious

Whether the reimbursement ratio was 50% or 100%, current serious illness medical insurance system cannot greatly reduce the probability of family catastrophic medical expenditure. This means that compared with the basic medical insurance system, the serious illness medical insurance system does not have obvious effects on reducing the probability of family catastrophic medical expenditure.

Specifically, when the medical expenditure was compensated by serious illness medical insurance with the reimbursement ratio being 50%, the average gap decreased from 2.76% to 2.37% and the relative gap decreased from 34.77% to 34.11% as the standard ratio being 20%. The average gap decreased from 2.01% to 1.91% and the relative gap decreased from 33.81% to 32.91% as the standard ratio being 30%. The average gap decreased from 1.67% to 1.62% while the relative gap rose from 29.41% to 104.25% as the standard ratio being 40%. This means that the effect of the serious illness medical insurance in Zhanjiang on reducing the average gap and relative gap of family catastrophic medical expenditure is not obvious. In addition, its impact on the concentration index of family catastrophic medical expenditure is also small. With the standard ratio being 20%, when the reimbursement ratio of serious illness medical insurance was 50%, the concentration index was 0.066, a positive value, while when the reimbursement ratio was 100%, the concentration index was -0.019, a negative value. With the standard ratio being 30%, when the reimbursement ratio of serious illness medical insurance was 50%, the concentration index did not change compared to the value in the basic medical insurance compensation. With the standard ratio being 40%, since the number of families with catastrophic medical expenditure decreased considerably due to the serious illness medical insurance, the concentration index was relatively large.

6.1.5 The effect of basic medical insurance on family catastrophic medical expenditure being significant

The basic medical insurance has significant effects on reducing the probability, relative gap, and average gap of family catastrophic medical expenditure as well as the unequity of the distribution of medical expenditure compensation. Specifically, when the medical expenditure was compensated by basic medical insurance, the average gap decreased from 6.45% to 2.76% and the relative gap decreased from 37.45% to 34.77% as the standard ratio being 20%. The average gap decreased from 4.88% to 2.01% and the relative gap decreased

from 41.38% to 33.81% as the standard ratio being 30%. The average gap decreased from 4.25% to 1.67% and the relative gap decreased from 36.24% to 29.41% as the standard ratio being 40%. As for the concentration index, when being compensated by the basic medical insurance, it increased from -0.212 to -0.012 as the standard ratio being 20%, increased from -0.324 to -0.148 as the standard ratio being 30%, and increased from -0.367 to -0.067 as the standard ratio being 40%. All these reflect the positive effect of basic health insurance on family catastrophic medical expenditure.

6.1.6 Setting limits on serious illnesses being detrimental to the equity and efficiency of the serious illness medical insurance policy

When the number of insured persons, the budget of reimbursable funds and the payment threshold are the same without limiting the types of serious illnesses that can be reimbursed, the equity and efficiency are significantly higher than the plan that limits the types of serious illnesses. Based on the efficiency of using the funds, not setting limits on serious illnesses being reimbursed better than setting limits. In addition, for serious illness medical insurance systems with limits on serious illnesses, the efficiency and equity can be improved by lowering the payment threshold or expanding the scope of serious illnesses being reimbursed. When the insured do not have to pay for the serious illness medical insurance, the distribution efficiency and equity of the serious illness medical insurance reimbursement funds are not affected, but the equity of the starting point of different insured people is influenced.

6.2 Suggestions for the policy

6.2.1 Further improving the supporting policies of serious illness medical insurance

Firstly, as to the participation of commercial insurance institutions, corresponding policies should be formulated to regulate commercial medical insurance institutions and prevent irregularities for favoritism, so as to create a fair, healthy and stabe medical insurance market. Meanwhile, the participation of commercial insurance institutions should be encouraged, and a relaxed policy environment for their participation should be created, since their participation can effectively relieve the pressure of the government and share some of the government's management functions. The government can give appropriate concessions to commercial insurance institutions through tax policies, including appropriate tax breaks, and encourage them in investment policies. For example, the policy of

commercial insurance institutions to participate in hospitals can be appropriately relaxed to make hospital management more refined and risk control more professional. In addition, the government can supervise medical services in medical institutions to control the arbitrary growth of medical expenses. Secondly, on the medical reform, the medical service system, the medicine purchase and marketing system, and the medical insurance system complement each other, none of which can be lacked. Therefore, the three systems need to achieve mutual coordination and common development. Thirdly, as to the medical service, the focus of medical services should be determined. With appropriate profits, technologies and investment, the quality of service should be improved as much as possible. Furthermore, with regard to the drug reform, high drug prices remain the focus of the current reform. The government should conduct tenders for the procurement, distribution and production of some common drugs and expensive drugs that are too expensive to supervise the drug prices uniformly. In this way, drug prices can be controlled, and monopoly in the sale of drugs can be prevented so that consumers can make comparative choices. Meanwhile, as to the supporting facilities, the supporting facilities of primary medical institutions are relatively backward, which may lead to poor accuracy of the test results. Since primary medical institutions help tp prevent serious illnesses and chronic illnesses, their equipment should be appropriately improved. Last but not least, China should learn from the United States on setting the capping line on medical expenditure and provide different medical services for special groups, thus achieving the goal of “effective prevention and treatment”.

6.2.2 Improving the overall planning level and fund utilization efficiency of the serious illness medical insurance

Low overall planning level of serious illness medical insurance will reduce the the utilization efficiency of the serious illness medical insurance and undermine the principle of equity. Currently, the low overall planning level and the relatively single fund-raising channel make insurance companies that operate the serious illness medical insurance face losses. Therefore, it is necessary to scientifically set fund-raising standards and the reimbursement ratio for the serious illness medical insurance.

The serious illness medical insurance in Zhangjiang now takes the municipal overall planning rather than the provincial overall planning, which greatly makes the serious illness medical insurance fund fail to full achieve it mutual support function. Therefore, it is important to build the serious illnesses medical insurance system at a higher level, build a

unified provincial medical insurance monitoring and management system, and constantly build and expand the medical settlement platform for medical treatment in different regions in the province. In addition, the government should build a high-level serious illness medical insurance fund system and also upgrade the overall planning level. On the one hand, this can reduce the costs of government administration and help the government implement the policy system, security treatment, fund-raising standards, business operations, fund accounting,and fund supervision unifiedly, which improves the security ability and reduce operating risks. On the other hand, it can realize the connection of medical systems in the whole province as soon as possible, alleviate the historical problem of difficulties in transfering the medical insurance relationship, and clear the obstacles for the insured to seek medical treatment in different regions and settle the expenses in time.

In addition, the fund-raising level directly impact the level of reimbursement. At present, the reimbursement ratio recommended internationally is between 70% and 80%, while China is below this standard. According to the theory of welfare pluralism, the fund-raising of the serious illness medical insurance cannot rely the government’s financial supplement and the allocation of basic medical insurance too much. The exploration of plural channels and socialized fund-raising methods should be speeded up, and the fund-raising level can be improved properly to increase the reimbursement ratio, so the establishment of a multi-channel fund-raising mechanism is a top priority. Since the fund-raising source of serious illness medical insurance in China is now only basic medical insurance fund, the fund-raising sources should seek be dervisified to spread the risk of medical insurance fund. Through adjusting the tax policy, the government can guide enterprises to donate to the serious illness medical insurance fund, broaden the fund-raising sources. Meanwhile, the government can appropriately raise the amount of individual contributions, allocate funds from the social security pension, receive charitable funds from social organizations and enterprises, and introduce the social welfare fund. With the help of the professional technology of insurance institutions, the serious disease insurance balance fund can also be entrusted to commercial insurance institutions for operation and management under the condition of “capital preservation and few profits”, so as to achieve capital profits. At the same time, scientific measurement methods of the fund-riasing standard should be explored according to the size of medical insurance fund, the level and scope of basic medical insurance, the distribution of high medical expenditure and other factors. In regions that commercial insurance companies are entrusted to manage the basic medical insurance or serious illness medical

insurance, the operating service expenses had better be arranged separately by the local government, rather than using serious illness medical insurance fund or the basic medical insurance fund.

6.2.3 Building a diversified dynamic adjustment mechanism for the fund-raising of serious illness medical insurance

The fund-raising source of serious illness medical insurance in various regions of China, including Zhanjiang, is basically from the basic medical insurance fund. During the pilot period, although some regions require the insured to pay 20 to 50 yuan per person as the insured fund, most regions now do not need the insured to pay this fund and directly deducted it from the basic medical insurance fund. The single fund-raising channel greatly restricts the long-term development of serious illness medical insurance fund with the rising serious illness medical expenditure. Therefore, it is necessary to build a diversified dynamic adjustment mechanism for the fund-raising of serious illness medical insurance.

To build the mechanism, the government can allocate the funds from the nation finance regularly so that the serious illness medical insurance fund can be effectively guaranteed, or expand the fund-raising sources by tax policies. As a quasi-public product, the serious illness medical insurance can have a variety of sources, including government funds and social donations from charities and other non-profit organizations. Based on the different levels of development in different regions, the government can create corresponding incentive mechanism to help poor regions develop and constantly improve the local medical insurance system. It can also encourage developed regions to improve the security level, broaden the scope of security, make residents pay corresponding premiums according to their own income level, and even consider to reduce or even exempt the premiums as to those are really poor. While increasing the personal premiums and the financial resources from the government, the government can encourage the support of various charitable organizations. In a word, the government can provide stable long-term financial allocation and levy a certain amount of special taxes from the society to expand the fund-raising sources and ensure the diversification. The serious illness medical insurance fund can be established by social donations as well as donations from individuals and enterprises. For residents, the payment standards can be set based on the regional income level, and the medical insurance expenses of different classes can be reduced by subsistence insurance policies and the serious illness assistance system, so as to relieve the burden on low-income residents.

6.2.4 Exploring multiple cooperation mechanisms with commercial insurance institutions

The effect of serious illness medical insurance on family catastrophic medical expenditure is not obvious, while the effect of basic medical insurance is significant. This does not mean that the serious illness medical insurance does not work, but indicates that the problem is in the design of the policy, especially in the payment threshold and limits on serious illnesses being reimbursed. The essential problem is the lack of budget. For example, the study finds that limits on the scope of serious illness being reimbursed will reduce the benefits of the insured. Therefore, multiple cooperation mechanisms with commercial insurance institutions can be explored to relive the financial pressure of the serious illness medical insurance fund and expand its coverage and security level. In addition, various dynamic supervision should be strengthened by commercial insurance institutions and medical institutions to complete the policy of serious illness medical insurance. In charge of bidding for the commercial medical insurance, the social security department and the medical department should actively respond to the reform of serious illness medical insurance, formulate standardized contracts and procedures for bidding, and create a completed evaluation system. The primary goal should be the improvement of the satisfaction and security level of the insured. As to supervision departments, they should supervise commercial insurance institutions by evaluating the service quality, creating multiple complaint channels, conducting random surveys and visits regularly and irregularly, and constantly urging commercial insurance institutions to improve the service quality. At the same time, the insurance supervision department, as the management and supervision department of commercial insurance institutions, needs to assess whether the institutions are qualified for operating the serious illness medical insurance in the personnel ability, service network, experience and other aspects. It should also strengthen the supervision on the institutions' daily business processing and insurance services, strictly deal with their illegal behaviors and inform the society in time. Furthermore, the insurance supervision department should make corresponding regulations on commercial insurance institutions that withdraw from the program as to the withdrawing conditions, incentives and penalties. A withdrawing mechanism is also required for institutions with bad reputation and poor service quality to ensure the efficient and healthy operation of the serious illness medical insurance market.

6.2.5 Implementing targeted serious illness medical insurance policy according to local conditions

This thesis analyzes the urban and rural serious illness medical insurance model of several major cities in China by the management model, fund-raising policy and security policy. It summarizes the Taicang model, the Xiamen model, the Hangzhou model, and the Zhanjiang model from the payment thresholds, the capping lines, the insurance qualitative and subjects. According to the analysis, current serious illness medical insurance policies all have improved the security level of patients with serious illnesses, reduced the risk of illness-induced poverty, and effectively alleviated the government’s difficulties in monitoring and managing medical service institutions as well as inadequate personnel allocation.

Since there are great differences among the level of economic development, population structure, basic medical insurance systems, regional medical and health conditions, and types of illnesses, regions should implement the serious illness medical insurance policy according to local conditions. On the premise of efficiency and equity, the policy should be implemented based on the local conditions and its publicity should be increased. For example, when determining the reimbursement ratio, the government should consider not only the local economic development, but also the residents' income, the fund-raising level, the capping line and the payment threshold. In poor regions, the payment threshold can be lowered appropriately. In addition, with the development of economy, people’s needs are also increasing, so the reimbursement ratio of serious illness medical insurance should be adjusted periodically.

Furthermore, the serious illness insurance mechanism should tilt for the poor, and the serious illness insurance fund should be allocated according to the comprehensive factors including the family annual income, the insurance type and the age. Preferential treatment can be given to the poor by freeing the payment, lowering the threshold of reimbursement, implementing differential security, refining reimbursement ratios, appropriately lowering or cancelling the payment threshold, and improving the “secondary compensation” for special groups including the disabled, the elderly and children. The incentive mechanism can also be tried to improve the reimbursement ratio and payment limit for continuous insured persons so that the individual affordability can be matched with the increase of medical expenditure, the medical economic pressure of low-income groups can be relieved as much as possible, and the security level can be improved. As to families with heavy burden of medical expenditure after the reimbursement, they can apply for medical assistance. For

families with needs beyond the coverage of serious illness medical insurance, the government can guide them to participate in commercial medical insurances.

6.2.6 Considering the principle of "efficiency" and "equity"

According to the study, when the number of insured persons, the budget of reimbursable funds and the payment threshold are the same without limiting the types of serious illnesses that can be reimbursed, the equity and efficiency are significantly higher than the plan that limits the types of serious illnesses. Though expanding the scope of serious illnesses being reimbursed can improve the level of equity and efficiency, it does not mean that everyone should be included in the scope of reimbursement. Because of the budget constraints, the insured can only receive limited compensation. If limited compensation fails to lift them out of poverty, more people will be included in the insurance, and the compensation available to all insured will be reduced, thereby further worsening the economic situation of existing insured people and affecting the equity of the system. Meanwhile, when the insured pays the out-of-pocket medical expenditure, if the reimbursement ratio is increased, the plan without limits on serious illnesses being reimbursed is better than the plan that sets the reimbursement ratio and scope. In essence, the way to improve the overall utility of the insured is to increase the budget of reimbursable funds and to implement a more equitable reimbursement plan.

Therefore, the scope of reimbursement should be expanded and adjusted in a timely manner. First of all, based on the 2017 version of the national catalog and the local high-incidence serious illnesses, the scope can be adjusted. For example, examination and treatment expenses including liver and kidney failure transplant surgery, as well as expensive drugs, which are irreplacable and hard for the insured to afford, can be included in the reimbursement of the serious illness medical insurance. Secondly, through the negotiation mechanism, clinically necessary drugs with clear effects that press heavy burden on individuals can be included in the serious illness drug list or the basic medical catalogs. The economic evaluation of drugs is also needed to analyze the impact on the budget of serious illness funds. Finally, the scope of reimbursement can be appropriately expanded to improve the accessibility of patients to advanced treatment options, reduce the insured people's financial burden, and increase the security level.

6.2.7 Strengthening the operational supervision and publicity of the serious illness medical insurance policy

After the reform of institutions, the former medical, finance, audit and other relevant government departments were merged to the National Healthcare Security Administration, which assumed the responsibility of supervising the serious illness medical insurance and the basic medical insurance. The insured, the news media, and social institutions enjoy the supervision rights. No matter what operation model is adopted, the management department of serious illness medical insurance should constantly strengthen the supervision of the operating institutions in case of the malicious deception of the insurance funds and the unreasonable growth of medical expenditure. Currently, the operation theory of China's medical insurance system mainly depends on relevant provisions, rules and regulations, and guidelines, lacking strict enforcement and high level of legislation. Therefore, there is an urgent need for special regulations on medical insurance to improve the legal status and main content of China's serious illness medical insurance. In the process of legislating, the principle of people oriented should be obeyed and the social equity should be achieved. In regulations, the rights and obligations of various participants should be clearly defined, the powers and responsibilities should be balanced, and the participants' behaviors as well as the operation process should be regulated. The supervision responsibilities of the government departments and policy implementers should be clear in case of the phenomenon of inaction. In addition, the scope and specification of using the medical insurance funds as well as the punishment for violating the law should be regulated, so as to creat a stable environment for the development of serious illness medical insurance in China. The operating institutions can also promote penalties to decrease the malicious deception of the insurance funds. Being quasi-public, compared to the full coverage of the basic medical insurance, the publicity of the serious illness medical insurance system is relatively weak. Relevant departments should take the initiative to publicize the serious illness medical insurance system with all kinds of activities. The grass roots should be especially focused. in addition to use the news media, propaganda columns, and radios, the government departments can also organize medical personnel to regularly carry out medical consultation, voluntary consultation, free medical examination and other activities, or explain the policy face to face, including its operating mechanism, reimbursement ways, insurance procedures, and treatment. At the same time, residents' suggestions and opinions should be taken. Thses methods can make the masses more understand the medical insurance system and promote

the effective implementation of the serious illness insurance policy. Meanwhile, relevant departments should regularly announce to the public the operation and results of the serious illness insurance fund, making the work transparent to receive people’s supervision. Patients with serious illnesses who have already enjoyed the benefits of the insurance are the direct beneficiaries of the policy, who can also help increase other people’s recognition and awareness of the policy. For the insured people’s unintentional irregular behaviors, insurance institutions can guide or remind them through the slogans or advertisements to ensure the stable and healthy development of serious illness medical insurance.

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Appendix 1

Notice of the adjustment in serious illness medical insurance

Date: January 13, 2017

Document of the Human Resources and Social Security Bureau of Zhanjiang

[2016] No.514

Notice of the Adjustment in serious illness medical insurance

To the Human Resources and Social Security Bureau of all counties (municipal and district-level) and the Municipal Social Insurance Fund Administration Bureau:

According to *Notice of further improving the serious illness medical insurance in Guangdong province from the General Office of People's Government of Guangdong Province* ([2016] No.85), with the consent of the Municipal People's Government of Guangzhou, adjustments on the serious illness medical insurance are made as follow in order to make further improvements.

1. **People in dire poverty**. For people in dire poverty who participated in the serious illness medical insurance, the payment threshold will be lowered and the reimbursement ratio will be raised. For the hospitalization expenses that are in the coverage of the basic medical insurance policy, 85% of the expenses can be reimbursed by the serious illness medical insurance if the annual self-paid expenses reach up to 4,000 yuan, with no annual maximum payment limit.

2. **Documented people in poverty and recipients of subsistence allowances.** For documented people in poverty and recipients of subsistence allowances, the payment threshold will be lowered and the reimbursement ratio will be raised. For the hospitalization expenses that are in the coverage of the basic medical insurance policy, 80% of the expenses can be reimbursed by the serious illness medical insurance if the annual self-paid expenses reach up to 6,000 yuan, with no annual maximum payment limit.

3. **Other people.** For other people who are insured in the serious illness medical insurance, the range of payment is determined by the self-paid expenses. For the

hospitalization expenses that are in the coverage of the basic medical insurance, reimbursement will be provided if the annual self-paid expenses reach up to 20,000 yuan. The reimbursement of the serious illness medical insurance will increase in different phases. For the insured people who are hospitalized, if the self-paid medical expenditure are above 20,000 yuan (excluding 20,000 yuan, the same below) and below 50,000 yuan (including 50,000 yuan, the same below), 50% of the medical expenditure will be covered by the serious illness insurance. If the self-paid medical expenditure are above 50,000 yuan and below 80,000 yuan, 60% of the medical expenditure will be covered by the serious illness insurance. If the self-paid medical expenditure are above 80,000 yuan and below 100,000 yuan, 80% of the medical expenditure will be covered by the serious illness insurance. The annual maximum reimbursement amount of the basic medical insurance combined with serious illness medical insurance is 600,000 yuan.

This notice shall come into effect on January 1, 2017.

The Human Resources and Social Security Bureau of Zhanjiang

December 23, 2016

Appendix 2

Report on Zhanjiang's being the first to use the model of "management and operation" in China to promote the construction of urban and rural residents' medical insurance

Date: May 21, 2010

People's Government of Guangdong Province:

After the implementation of the basic medical insurance for urban employees in 2000, NCMS and basic medical insurance for urban residents were implemented respectively in 2004 and 2007. In January 2009, the two systems were implemented in parallel. The government purchased commercial insurances and introduce commercial insurance institutions to manage the two systems, being the first city to use the model of "management and operation" in China. Through one year of practice, good benefits have been achieved. The government did not need to increase investment, the burden on people did not increase, the security level greatly improved, and the coverage was more extensive. A win-win situation has been achieved by the insured, the government, medical institutions and commercial insurance companies. This model has been fully affirmed by relevant departments of the country and the province, and it is called the "Zhanjiang model". The relevant situation is now reported as follow.

In order to deeply implement the scientific outlook on development and solve the problem of "difficult and expensive medical treatment", the municipal party committee and municipal government decided to take the promotion of urban and rural medical insurance reform as a major livelihood project and establish an urban-rural integrated medical insurance system for residents. Zhangjiang, as a populous city and a large agricultural city, has a registered population of 7.66 million in 2009 with a large number of poor rural residents. As an economically underdeveloped region, with weak financial resources and limited investment, tha government had great difficulties in raising medical insurance funds and management services. Therefore, Zhangjiang gave up the traditional medical insurance management model and introduced commercial insurance institutions to use the model of "management and operation". The essence of this model is the organic combination of government and market mechanisms, which is "government leading, profession operating". On the one hand, by purchasing commercial insurance services, the government can provide

more medical insurance services at a lower cost, improve the level of medical security, and better play the leading role. On the other hand, commercial insurance institutions can make full use of their professional advantages in participating in medical insurance management services and operating the medical insurance funds to makes the use of medical insurance funds more efficient and the quality of management services of higher.

Firstly, the government purchased commercial medical insurance services, effectively increasing the security level. The medical insurance services purchased by Zhangjiang come from the state-owned People’s Health Insurance Company of China Limited Zhanjiang Central Branch (hereinafter referred to as the People’s Insurance Company Zhanjiang Central Branch). According to the agreement between the two parties, the insurance fund paid by urban and rural residents is split into two parts. First, 85% of the fund is used for the basic medical insurance, and the original reimbursement amount does not change. For example, the minimum reimbursement amount is still 15,000 yuan. Second, 15% of the fund is used to purchase the large-scale medical subsidy insurance services directly operated by the People’s Insurance Company Zhanjiang Central Branch. Without the increase of the amount paid by the government and the people, allocating 3 yuan from the annual payment of urban and rural residents can make residents enjoy a large medical subsidy of 50,000 yuan, and and 7.5 yuan from the annual payment can make residents enjoy a large medical subsidy of 80,000 yuan. The subsidy has been amplified by more than 2 times, and the insured can enjoy more medical insurance funds and higher-level services. So far, Zhangjiang has purchased commercial insurance services for 45,000 civil servants, 260,000 employees in enterprises and institutions, and 5.87 million urban and rural residents, benefiting 6.2 million people, accounting for more than 88% of the city’s permanent population. Commercial insurance companies are responsible for more than 120 billion yuan of the medical insurance annually.

Secondly, the medical insurance system has been improved and the coverage has been effectively expanded. In cooperation with the municipal social security department, commercial insurance institutions participate in the design of medical insurance integration systems, plan designing, policy formulation, and specific operations, integrating the systems of urban and rural areas, and establishing an integrated medical insurance system. The system implements unified policy, unified organization, unified accounting, and unified management, which breaks down the urban-rural dual division and institutional barriers, and the implements the requirements of “wide coverage”. At the same time, the asymmetry in

medical insurance information, the large number of medical institutions, and the uneven understanding of policies by participatants are considered to improve inclusiveness and convenience. Increasing the average reimbursement ratio of medical expenditure and the annual cumulative reimbursement amount has greatly enhanced the attractiveness of the the medical insurance integration system to the residents, and effectively promoted the medical insurance integration process. In 2009 in Zhanjiang, 5.46 million residents participated in the medical insurance, of which 580,000 were urban residents and 4.88 million were rural residents. In 2010, 5.87 million residents in Zhanjiang participated in the medical insurance, accounting for 99% of all residents in Zhanjiang, completing in advance the task proposed by the provincial party committee and the provincial government that by 2011 the urban residents’ participation rate of the medical insurance should be more than 95% and the rural residents’ participation rate should be more than 98%.

Thirdly, scientific and efficient management is realized to effectively reduce the operational risks of the medical insurance fund. First of all, using the technology, equipment, talents, and experience of commercial insurance institutions for management, government departments focus on macro things including institutional arrangements, overall planning, policy formulation, and fund supervision, which improves the management efficiency, reduces the government’s direct management costs, and prevents problems including irregularity, opacity, and low efficiency in government operations. Secondly, the participation of commercial insurance institutions in operations achieves the integrated information sharing. Providing full monitoring services for insured patients enhances the timeliness and transparency of diagnosis and treatment information, and reduces the management risks caused by information asymmetry. In addition, the diagnosis and treatment of medical institutions are effectively supervised so as to restrict the unreasonable supply of medical services and avoid excessively high medical expenditure as well as fake hospitalization. The municipal social security agencies and commercial insurance companies adopt a “total control, monthly prepayment, and yearly settlement” approach to designated medical institutions, ensuring that designated hospitals settle personal medical expenditure in a timely manner when the insured are discharged. Finally, the internal audit and external control of the medical insurance fund are strengthened. While strictly implementing the financial and accounting systems, the application, prepayment, settlement, deduction and other links of the medical insurance fund is also strictly monitored to ensure the safety and integrity of the fund. Scientific and efficient management has made the use of the medical

insurance expenditure more reasonable and effectively restrained the rapid increase in total medical expenditure. In 2009, the per capita hospitalization expenses of insured people in Zhanjiang was reduced by 1,552 yuan compared with 2008, a decrease of 34%.

Meanwhile, medical insurance services are improved to effectively alleviate the problem of "difficult and expensive medical treatment". The overall goal of medical reform is to provide safe, effective, convenient, and affordable medical services to people. The implementation of the "management and management" model in the medical insurance in Zhanjiang is to strive to achieve this goal. First, it is convenient for people to choose hospitals. With the municipal unified planning, insured residents can choose any of the 182 designated hospitals in Zhanjiang for medical treatment. Second, the medical services are more completed. Social security administration departments set up service windows of commercial insurance institutions in the service halls with the requirements of "four ones" (one window, one platform, one system, one-time settlement). The service windows provide fund collection, voucher review, expense reimbursement and other services for the insured, realizing the seamless link of the basic medical insurance and the supplementary medical insurance. In addition, the insured's expenditure is synchronously settled at the designated hospitals in the city, and they only need to pay the out-of-pocket expenditure, which changes the original situation of reimbursing after raising funds. Third, equal distribution and utilization of medical resources are promoted. The payment threshold and reimbursement ratios are different in different hospitals. In 2010, in the first, second, and third grade hospitals, the payment threshold was 100 yuan, 300 yuan, and 500 yuan respectively, and the reimbursement ratio was 75%, 65%, and 45% respectively. At the same time, the designated hospitals are required to implement step-by-step medication and treatment in accordance with the relevant provisions of the *Medical Insurance Diagnosis and Treatment Routine*. This not only facilitates residents to seek medical treatment, but also guides them to choose the nearest hospital, reducing the pressure on medical treatment in key hospitals and solving the problem of idling resources in primary medical institutions. Fourth, the problem of "expensive medical treatment" has been effectively alleviated. In 2009, the average reimbursement ratio of the medical insurance was 51.2%, an increase of 12.6% compared to the per capita reimbursement ratio of NCMS in 2008. In 2010, the number of outpatient special illnesses that could be reimbursed increased from 7 in 2008 to 23. The medical reform plan of Guangdong proposed that the cumulative maximum payment limit of NCMS in 2009 shall be no less than 50,000 yuan, and the reimbursement ratio for

hospitalization outside counties shall be no less than 40%. At present, the medical insurance in Zhanjiang exceeds these two standards.

Last but not least, the development of health care and commercial insurance are promoted to achieve a win-win situation for all parties. By introducing commercial insurance companies, the management efficiency and operational efficiency of the medical insurance have been greatly improved. This is an effective attempt to use social resources to meet the growing demand for medical insurance, achieving the “sustainable development”. Firstly, it reduces the government’s management costs, improve service levels and management, and makes up for the lack of personnel, management strength and service conditions of government social security agencies. It promotes the construction of universal medical insurance, in line with the requirements of streamlined and efficient function. Secondly, it promotes the development of commercial insurance business. The People’s Insurance Company Zhanjiang Central Branch established a team with more than 90 professional doctors for auditing medical cases, created a risk management service platform with professional operations, expanding the coverage of the commercial insurance market and gaining good benefits. In 2009, this project alone achieved a profit of 3.32 million yuan. Thirdly, the operating income of designated medical insurance hospitals is increased. Since the model of “management and operation” not only facilitates medical treatment and settlement, but also increases the reimbursement ratio, the number of patients seeing doctors has increased significantly. In 2009, designated hospitals in Zhanjiang received more than twice the number of insured persons compared to 2008, and the annual business income increased by more than 20% on average.

The practice of introducing commercial insurance institutions to participate in the medical insurance and implementing the model of “management and operation” proves that in the reform of the medical insurance system, adhering to the government’s leading status and appropriately introducing market mechanisms can achieve the social participation and mobilizing all parties to participate in the construction of the medical insurance. The practice improves the equity, efficiency and quality of medical insurance services, adapts to the national medical reform guidelines and policies, reflects the correct direction of medical reform, and promotes the comprehensive, coordinated and sustainable development of the social medical insurance, truly achieving the vision of “everyone enjoys health” with broad and far-reaching significance. Zhanjiang will further consolidate and perfect this “Zhanjiang model” with the scientific outlook on development and the spirit of the national medical

reform as the guide, effectively solving the problems in medical treatment to make the people benefit from the results of reforms, enjoy medical equity, and have a harmonious and happy life.

May 21, 2020

Appendix 3: Tables and Figures

Appendix 3 Table 2-1 National Health Insurance" policy formation

Year	Policy Documents	Objects
1998	“Decision of the State Council on Establishing a Basic Medical Insurance System for Urban Employees”	Urban workers
2003	“Opinions on Establishing a New Type Rural Cooperative Medical System”	Farmer
2007	“Guiding Opinions of the State Council on Piloting Basic Medical Insurance for Urban Residents”	Students, children, non-employed urban residents