Current Drug Pricing Mechanism in China

-- Based on the Analysis of New Structural Economics

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Abstract: Drug pricing is an important issue concerning human health and social equity. Reasonable and orderly drug pricing mechanism is particularly important for a country's medical and health care system. A country's drug pricing mechanism should be adapted to its basic national conditions and economic structure. Since 1984, China has carried out a series of reforms to the drug pricing mechanism, gradually forming the current market-oriented drug pricing mechanism. Based on the theoretical framework of New Structural Economics, this paper proposes an analysis of the current drug pricing mechanism in China from the perspective of viability and endowment structure. The analysis of this paper concludes that pharmaceutical enterprises and public hospitals in China lack the viability under the current drug pricing mechanism, which conflicts with China's endowment structure.

1. Introduction

The Drug Administration Law of the People's Republic of China defines drugs as "Substances used for the prevention, treatment and diagnosis of human diseases with prescribing indications, functions, usage and dosage." Economically, drugs are defined as a kind of special commodity with its noteworthy relevance towards health and public welfare. The price of a drug is the embodiment of its value and the supply-demand relationship. On the one hand, the price related to the accessibility of drugs and medical services, while on the other hand it affects the positivity of pharmaceutical departments for R&D and reproduction. Therefore, it is particularly important to set reasonable price for drugs.

The formation of drug price is constrained by the market's supply-demand relationship and the regulation of government's policies. A country's drug pricing system consists both of the market regulation mechanism and the policy regulation mechanism. In reality, the emphasis on these two drug pricing mechanisms varies from country to country. For example, Britain adopts the Value-

Based Pricing system, dominated by profit control. Germany adopts the drug cost control system of social medical insurance, and Japan adopts the classified management system dominated by government pricing. China has been reforming its drug pricing system since 1984, and the current drug pricing system was established during the ongoing New Medical Reform[1]. This pricing system combines the major market regulation mechanism and the government's price supervision.

In recent years, researches on the current drug pricing system in China have been enriched. Li Yasi (2019)[2] analyzed China's drug pricing mechanism from the perspective of institutional transaction costs. Shi Wunan (2018)[3] conducted an empirical analysis using Country Product Dummy. Yao Yinying (2018) used the principal-agent model under information asymmetry to analyze this issue.

It can be seen that there are various perspectives and methods to analyze China's current drug pricing mechanism. The basic consensus of these studies is that the drug pricing system of a country should adapt to its basic health status and reflect its level of economic development. As a new branch of economics born in China, the New Structural Economics analyzes the optimal structure of the economy from the perspective of viability and factor endowments, and its analytical logic conforms to the gradual reform of the drug pricing system in China. Thus, it is natural to think that the New Structural Economics has the potential to provide new methods in the study of this issue.

Based on the theory of New Structural Economics, this paper proposes a new attempt to analyze the current drug pricing system in China. The rest of this paper is arranged as follows: the second part introduces the history and current condition of drug pricing in China; the third part elaborates the New Structure Economics theory's viewpoint; the fourth part expounds the influence of pharmaceutical enterprises, public hospitals and government on drug prices; the fifth part proposes a New Structural Economics analysis of the current drug pricing mechanism. The sixth part makes the full text summary.

2. The History and Status Quo of Drug Pricing in China

China's drug pricing system was formed for the first time in the early days after the founding of the People's Republic of China. This system has gone through four stages in the procedure of reform and opening up and the medical and health system reform.

2.1. Government-Imposed Pricing under the Background of Planned Economy (1954-1984)

In the early days of the People's Republic of China, there was a serious shortage of medicines in the country. At this stage, drugs, as a scarce medical resource, was strictly controlled by the government. In 1954, the Chinese government introduced the policy of "drug mark-up", stipulating that the exfactory price of drugs should not be higher than 105% of the cost price while the retail price should not be higher than 115% of the cost price. Under this policy, indexes such as the production quantity, purchasing quantity and transfer quantity were all stipulated by the government's planning department, which meant the drug manufacturers can only passively implement government's indications and accept government-imposed pricing. The emergence of this policy marked the formation of the government-imposed pricing system under the background of China's planned economy.

In 1984, "The Decision of the Central Committee of the Communist Party of China on Economic System Reform" was adopted at the third plenary session of the 12th Central Committee of the Communist Party of China, which marked the transition from the first stage to the second stage of China's drug pricing system.

2.2. The Open-End Pricing in the Early Stage of Reform and Opening up (1984-1996)

On October 12, 1984, the third plenary session of the 12th Central Committee of the Communist Party of China was held in Beijing. The meeting adopted "The Decision of the Central Committee of the Communist Party of China on Economic System Reform", which clearly pointed out the necessity to "establish a reasonable price system" and "enhance the vitality of enterprises". In the same year, the former State Medicine Administration of China promulgated "The Price Management Catalogue of Pharmaceutical Commodity" setting government prices for drugs within this catalogue, allowing drug manufacturers to adjust prices for drugs outside this catalogue according to the actual situation. This document marked the beginning of the second stage of China's drug pricing system.

After 1984, with the advancement of economic system reform, administrative control over China's drug pricing was gradually relaxed. At this stage, except for several special drugs, which were still uniformly priced by the government, most of the drugs were independently priced by the pharmaceutical manufacture and sale departments according to the relationship between market supply and demand. The price management department of the government did not directly participate in the specific process of drug pricing, but only supervised it by referring to the amount of costs reported by the enterprises. Therefore, this stage of drug pricing system is called "price liberalization" by some scholars. Although the open-end pricing did break through the disadvantages formed in the planning economic period, such as the lack of incentives for enterprises and the misallocation of drug resources, it led to the serious market failure acting as the artificially high drug prices, the disorder of price competition and the high rebate in the drug industry. Thus, in 1996, the Chinese government began to solve the appeared problems in this system, which contributed to the establishment of the third stage drug pricing system.

2.3. The Restrictive Pricing under Government's Leading (1996-2015)

In 1996 the former State Planning Commission of China issued "Interim Measures for Drug Price Control". This document stipulated that the government shall impose government-led restrictions on the pricing of monopolistic drugs, basic therapeutic drugs and special drugs such as psychotropic drugs, narcotic drugs and contraceptives. It also stipulated that the price of drugs should be controlled by interest rate. This regulation marked China's drug pricing formally incorporated into the national scope of consolidated supervision.

In 1997, the former State Planning Commission of China issued "Supplementary Provisions to the Interim Measures for Drug Price Control" stipulated that drug producers whose products were listed in government's Price Management Catalogue were allowed to determine specific prices according to market conditions without breaking the official maximum prices of ex-factory, wholesale and retail. This document also issued specific formulas for calculating the reasonable prices of various drugs, marking the beginning of using the "price plus fixed rate" in government-led restrictive pricing.

In 2000, with the State Planning Commission's introduction of series documents including "Opinions on the Reform of Drug Price Control", "Catalogue of Drugs Priced by State Planning Commission" and "Governmental Methods on Drug Pricing", the government started to introduce the Maximum Retail Price System in drug pricing and gradually established the National Essential Drug System.

Since the launch of the New Medical Reform in 2009, the drug pricing system has ushered in new mechanisms such as "The Centralized Drug Bidding and Procurement Mechanism", "Drug Price Comparison Rules" and new payment methods for medical insurance, which have strongly promoted the combination of governmental regulation and market regulation in drug pricing. At this stage, drug

prices in China fall in stages, laying the foundation for the formation of a follow-up market-led drug pricing system.

2.4. Market-Oriented Pricing in the New Medical Reform Period (Since 2015)

In 2015, the National Development and Reform Commission issued "Opinions on Promoting Drug Price Reform" stipulating that "with the exception of narcotic drugs and the first category psychotropic drugs, the governmental drug pricing should be abolished, drug procurement mechanism should be improved, medical insurance payment control should be exerted, and drug actual transaction prices should be mainly formed by market competition." This document marked the beginning of a market-oriented drug pricing system.

In 2017, seven ministries, including the National Health and Family Planning Commission, jointly issued "Notice on Comprehensive Reform of Public Hospitals" which stipulated that drug mark-up for public hospitals in China should be abolished no later than September 30, 2017. This policy put an end to the drug mark-up system in public hospitals that had been implemented for half a century since the period of planned economy, which was conducive to fundamentally eliminating the practice of covering hospital expenses with medicine revenue.

Under the current market-oriented drug pricing system, the Chinese government plays a major role in supervising and managing drug pricing through "National Medical Insurance Payment Standards" and "Centralized Drug Bidding and Procurement Mechanism", promoting the effective drug price reduction measures. At the fifth meeting of the Central Commission for Comprehensively Deepening Reform in November 2018, "The State's Pilot Program for Organizing Centralized Drug Procurement" was deliberated and adopted, which marked the beginning of the pilot program of "Centralized Drug Bidding and Procurement Mechanism". This mechanism is expected to play a positive role in improving the current market-oriented drug pricing system, reducing the burden of drug costs on the public and standardizing drug circulation.

3. New Structural Economics

The term "New Structural Economics" was formally coined by Justin Lin at a seminar marking the first anniversary of his tenure as senior vice president and chief economist of the World Bank. This term is used to describe a new theoretical framework of Development Economics which differs from structuralism. In 2011, Justin Lin formally announced the birth of new structural economics to the Economists by elaborating the basic views of New Structural Economics in the title of "New Structural Economics: a Theoretical Framework for Rethinking Development" in the annual Yale Kuznets Lecture.

The theory of New Structural Economics came from the study of China's economic transformation and development. In 1988, Justin Lin's research on the Chinese government's policy of controlling inflation was regarded as the beginning of the research on new structural economics. In 1994 Justin Lin, Fang Cai and Zhou Li published "China's Miracle: Development Strategy and Economic Reform", which proposed the prototype of New Structural Economics theory basing on the Chinese experience. In 2007, the "Economic Development and Transition: Thought, Strategy and Viability" extended this theory to the global historical background.

In terms of the research method, the New Structural Economics takes the nature of modern economic growth and its determinants as the starting point, takes "the study of nature and causes" as the research direction, aiming at understanding various facts and their causes in the process of economic structural changes[4].

In terms of the theoretical framework, the New Structural Economics adopts the basic standpoint of Neoclassical Economics. It takes the endowment structure of the economy as the entry point, and

the price theory of structural change as the core principle. On the microscopic basis of viability, ten theoretical points have been formed[5]: (1) Supply principle of endowment structure: at any given point in time, the endowment structure of any unit of analysis is given and variable in long run. (2) Demand principle of endowment structure: different production structure has different demand for endowment structure. (3) Relative price principle of endowment structure: the supply and demand equilibrium of endowment structure determines the relative price of endowment structure. (4) Principle of optimal production structure: the marginal value of optimal production structure is equal to its marginal cost. (5) Supply and demand principle of production structure: different sub-demands of production structure generate different endowment structure demands. (6) Progressive principle of structural change: endowment structure and production structure are mutually cyclic and progressive. (7) Principle of viability: viability refers to an enterprise's ability to obtain socially acceptable normal profits in an open and freely competitive market without relying on external protection subsidies. (8) Principle of optimal transformation speed: maximum transformation speed meets marginal cost equals marginal revenue. (9) Government positioning principle in structural changes: the government needs to generate market incentives beyond the ideal positioning. (10) Optimal intervention principle of the government's role: the optimal government intervention degree satisfies the marginal benefit equals to the marginal cost.

In terms of subject system, the application of the New Structural Economics' theoretical framework in various branches of Development Economics has resulted in several sub research areas, such as the New Structural Industrial Economics, New Structural Labour Economics, New Structural Finance etc.

4. The Influence of Pharmaceutical Companies, Public Hospitals and the Government on Drug Prices

As mentioned above, the current drug pricing mechanism in China is "the market-oriented drug pricing mechanism during the new medical reform period". This mechanism abolished the government pricing of most drugs and stipulated the price of drugs was mainly determined by market competition. Under this mechanism, drug manufacturers occupy the dominant position in pricing, and their pricing is applicable to the basic theory of microeconomics. Public hospitals and the government do not play a dominant role in the process, but they can exert influence on the final price of drugs through certain ways, such as drug mark-up and "secondary bargaining", price regulation and centralized drug procurement,

4.1. The Price Impact of Pharmaceutical Companies

Under the current market-led drug pricing mechanism in China, drug manufacturers, as the main body of pricing, choose appropriate pricing methods and determine the producer price of drugs based on the cost, competition and demand characteristics of their products. According to the basic theory of microeconomics, the producer price determined by enterprises will not be lower than the cost, which determines the bottom line of producer price and the boundary between public hospitals and government price control. At the same time, enterprises can exert a positive influence on producer prices through cost control. Enterprises' cost control includes production cost control and rent-seeking cost control. The reduction of production cost can be realized by upgrading technology and optimizing management, while the reduction of rent-seeking cost can be realized mainly by the implementation of the government's market standardization policy, the government's promotion of the reform of the pharmaceutical system, and the government-led drug bidding and procurement.

4.2. The Price Impact of Public Hospitals

The influence of public hospitals on drug prices mainly includes the drug mark-up system before 2017 and the hospitals' "secondary bargaining" after 2017. Before 2017, the drug mark-up system had long been the main cost compensation method for public hospitals in China, namely "using drugs to pay for doctors". In 2017, "Notice on Comprehensive Reform of Public Hospitals" was issued, which cut off the drug mark-up system. After 2017, public hospitals mainly purchased drugs through bidding. The government negotiates the price with the manufacturer on behalf of the purchaser to determine the maximum retail price and purchase price of the drug. Then public hospitals sign contracts with manufacturers and purchase drugs according to the purchase price. In the actual process of bidding, due to the information asymmetry between the enterprise and the government, it is unable to grasp the actual cost of the enterprise which resulting in the artificially high bidding price of some drugs. In order to compensate for their own operating costs public hospitals, take the second negotiation with enterprises, which is called "secondary bargaining".

4.3. The Price Impact of the Government

As the manager and supervisor of the medical system, the government's starting point of influencing drug prices is to reduce the actual use price of drugs for patients, promote rational distribution of medical resources, save medical insurance funds, and optimize the structure of the drug market. The government's influence on drug prices is mainly reflected in the government's role in market supervision, the organization of bidding and procurement and price negotiation, and the reduction and exemption of import drug tariffs. In China's current drug pricing mechanism, the government's price influence is indirect.

5. A New Structural Economics Analysis of the Current Drug Pricing Mechanism in China

As mentioned above, the New Structural Economics adopts the basic standpoint of Neoclassical Economics, takes the endowment structure of economy as the entry point, and takes viability as the micro foundation. Based on the theory of New Structural Economics, this paper analyzes the current drug pricing mechanism in China in three steps: introduce definition, logical analysis and sum up:

5.1. Introduce Definition

5.1.1. Viability

According to the description of viability in New Structural Economics, the viability of Chinese pharmaceutical enterprises is defined as "the ability of pharmaceutical enterprises to carry out sustainable production and R&D without external support, and to obtain normal profits in a healthy drug market". The definition of "external support" includes government transfer payments to enterprises, tax concessions, granting special market status and other compensatory or protective measures. "Sustainable production and R&D" refers to the ability of enterprises to expand scale and upgrade technology on a profitable basis. "Healthy drug market" refers to a drug market without rent-seeking behaviour, with smooth flow of information, strong regulation and orderly operation.

The viability of China's public hospitals is defined as "the ability to balance their own income and expenses and maintain a certain scale of expansion potential relying only on financial subsidies and medical income". In the definition, "financial subsidies" refers to the transfer payments received by public hospitals from the government within the budget. "medical income" refers to the remuneration received by public hospitals for providing medical services, such as medical services fee. "expansion

potential" refers to the ability of public hospitals to upgrade equipment, expand buildings and hire more staff.

5.1.2. Economic Objective and Policy Burden

Define the economic objective and policy burden of drug manufacturers. The economic goal of drug manufacturers is to gain market dominance and positive profits. The policy burden of pharmaceutical enterprises is derived from drug's relevance of life and health and the characteristics of public good, which is manifested as the contradiction between the social goals of the government to promote equitable access to drugs and to reduce the cost of pharmaceuticals and the economic goals of pharmaceutical enterprises.

Define the economic objective and policy burden of public hospitals. Public hospitals in China are generally non-profit in nature, that is, the operating income of hospitals is only used to compensate for their own costs, rather than seeking direct positive profits. Therefore, the economic goal of public hospitals can be defined as: to achieve the balance between financial subsidies plus medical income and operating costs. The policy burden of public hospitals comes from the limitation of financial subsidies and the expansion of medical demand, that is, public hospitals cannot obtain enough government transfer payments and cannot provide medical services to meet the needs of the society after the abolition of drug mark-up system.

5.1.3. The Factors and Endowment Structure of China

As the world's largest developing country and the second largest economy, China's GDP in 2019 were about 14.5 trillion dollars, with per capita GDP exceeding 10,000 dollars. In 2019, China's GDP accounted for nearly 70% of the US GDP, and its per capita GDP reached 15% of the US level. It can be seen from this that although the overall size of China's economy is relatively large, there is still a certain gap between China and developed countries in terms of per capita capital. At present, China's economy is in the process of transforming from labour-intensive to capital-intensive. Labour factors are relatively abundant, the price of labour is still lower than that of capital, and the comparative advantages of demographic dividend and labour-intensive industries still exist. Therefore, the factors and endowment structure of China is defined as the endowment structure of developing countries with more labour factors than capital factors.

5.2. Logical Analysis

Analyse the current drug pricing mechanism in China from the following questions:(1) whether drug manufacturers have viability under the current mechanism; (2) whether public hospitals have viability under the current mechanism; (3) whether the current drug pricing mechanism is suitable for China's factors and endowment structure.

5.2.1. Whether Drug Manufacturers Have Viability under the Current Mechanism

Drug manufacturers lack viability under the current mechanism. As mentioned above, the viability of drug manufacturers is "the ability to carry out sustainable production and R&D without external support, and to obtain normal profits in a healthy drug market". At present, the main products of pharmaceutical manufacturers in China are generic drugs, and the approval numbers of generic drugs accounts for more than 95% of the total drug approval numbers in China. Generic drugs are characterized by open product information, large number of producers, and high degree of product similarity. To exam the composition of viability of Chinese pharmaceutical manufacturers as followed:

Firstly, the production and R&D of pharmaceutical manufacturers under the current mechanism depends on a certain degree of external support. At present, the Chinese government has not issued a special tax concession policy for pharmaceutical enterprises, and the external support for pharmaceutical enterprises mainly comes from the guarantee of special market status. Since 2018, as the new procurement policy conducted with 7 provinces and 4 municipalities, the enterprises which winning the bid are thought to have gain the market monopoly in a matter of fact, both to ensure their competitiveness and good business reputation. Therefore, their products on the retail market could also have a good performance.

Secondly, there is still room for improvement in the health of the drug market. Although the current drug pricing mechanism restricts the rent-seeking cost in the drug price through the government's market supervision and bidding procurement, the rent-seeking behaviour still exists in the drug sales link through the grey transaction. The reason is that pharmaceutical enterprises are unable to effectively control production costs under the pressure of price reduction, so they have to seek for rent to ensure sales volume. As the rent-seeking costs of enterprises must be passed on to consumers through prices, rent-seeking behaviours in turn lead to the artificially high drug prices, making enterprises fall into a vicious circle.

Therefore, drug producers under the current mechanism lack viability. The root cause is the contradiction between the economic goal of drug producers and the policy burden they bear.

5.2.2. Whether Public Hospitals Have Viability under the Current Mechanism

Under the current mechanism, public hospitals have incomplete viability. As mentioned earlier, the zero mark-up policy in 2017 completely eliminated drug mark-ups in China's public hospitals. Some scholars studied this policy's influence on the income and expenditure structure of public hospital, Lang Ying (2019)[6] taking 6 public hospitals in Ningxia as an example. Their study believed that the initial implementation of this policy has caused a negative impact on the operation of public hospitals. As a result, the income of public hospitals has significantly increased its dependence on government subsidies. Zhang Min (2019)[7] believed that after the abolition of drug mark-ups, the supply of government subsidies to public hospitals was insufficient, and political losses became high probability events. It can be seen that the current drug pricing mechanism has brought a policy burden to public hospitals. Although public hospitals can achieve income and expenditure balance through quality management, it is difficult to maintain the potential of expansion at the same time. Therefore, public hospitals have incomplete viability under the current mechanism.

5.2.3. Whether the Current Drug Pricing Mechanism is Suitable for China's Factors and Endowment Structure

At present, the main products of Chinese pharmaceutical companies are generic drugs. Generic drugs are drugs with the same ingredients and effects produced by other enterprises. The production of generic drugs mainly relies on technology introduction rather than technology research and development, and the production process tends to be labour-intensive rather than capital-intensive. Therefore, it can adapt to the factors and endowment condition that labour factors are richer than capital factors in developing countries.

As mentioned above, generic drug manufacturers under the current drug pricing mechanism in China lack viability, and their market position is closely related to the bid winning. Although there are many companies producing the same generic drug, there is usually only one company that obtains a dominant position in the market through a single round of bidding. That is, the sales status of homogeneous products produced by other companies cannot be guaranteed for a certain period of

time, so smaller companies may choose to withdraw from the competition and completely cede the market to the monopolist.

5.2. Sum up

Based on the analysis from the perspective of New Structural Economics, it is concluded that: under the current drug pricing mechanism in China, drug manufacturers bear policy burdens contradictory to their economic goals, so they lack viability. Public hospitals bear the policy burden which hindering their economic goals, so they have incomplete viability. The existing mechanism threatens the survival of some pharmaceutical manufacturers and is in conflict with China's factor endowment conditions to some extent.

6. Conclusion

Drug pricing is an important issue concerning human health care and social equity. A reasonable and orderly drug pricing mechanism is particularly important for a country's medical and health care system. China's drug pricing system was formed in the early days of the founding of the People's Republic of China. It has gone through four stages of development before the form of the market-oriented drug pricing mechanism today. There are various methods to analyse and evaluate a country's drug pricing mechanism. Based on the perspective of New Structural Economics, this paper starts from the theory of viability at the micro level and the theory of factors and endowment at the macro level to analyse the current drug pricing mechanism in China. By introducing the definition and logical deduction, this paper concludes that under the current drug pricing mechanism in China, drug manufacturers lack viability, public hospitals have incomplete viability, and the current mechanism is in contradiction with China's endowment structure.

At present, China's economy is in the process of transforming from labour-intensive to capital-intensive. On the one hand, it is very important to improve the R&D and production capacity of the original drugs. On the other hand, it is necessary to ensure the survival and development of generic drug enterprises, to promote the capital accumulation of generic drug enterprises, and to explore the transformation and technological innovation of these enterprises. Therefore, the future drug pricing mechanism policy should focus on resolving the contradiction between economic objective and policy burden, and the contradiction between the pricing mechanism and endowment structure, giving consideration to both of cultivating the R&D capability of pharmaceutical enterprises and maintaining the survival of pharmaceutical enterprises.

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