

Financial Law Review

No. 33 (1)/2024

UNIVERSITY OF GDAŃSK • MASARYK UNIVERSITY • PAVEL JOZEF ŠAFÁRIK UNIVERSITY
<http://www.ejournals.eu/FLR>

KLEMENS KATTERBAUER*, LAURENT CLEENEWERCK**

ARTIFICIAL INTELLIGENCE AND ITS IMPACT ON HEALTHCARE FINANCING IN CHINA – A LEGAL ANALYSIS

Abstract

The Chinese national health system has undergone massive changes in the last several decades with financing becoming a cornerstone of the development of the Chinese healthcare environment. Several private companies have entered the sector private healthcare with consumers being more health conscious and aware. Furthermore, the Chinese government have transformed the healthcare insurance system to expand the coverage of the population and initiate more market-oriented reforms. AI has been another major game changer in the healthcare sector and the financial industry with driving both patient evaluation as well as enhancing finance related investments. Within China, AI has several important functions via its integration in the regulation process and becoming a vital part of the regulatory process. AI may provide some vital opportunities for healthcare financing, but this requires a more solid framework to support broader utilization of AI for the financing of the sector. The article provides a solid legal analysis of artificial intelligence regulations and its applications to healthcare within China. It outlines the advances in cybersecurity and artificial intelligence regulations in China and the changing regulatory ecosystem, demonstrating the challenges that may be faced by the Chinese healthcare system.

Key words: healthcare, financing, artificial intelligence, China, pharmaceuticals

JEL Classification: K33, O53, K24, K32

* Professor of Earth Science and Global Management, EUCLID (Pôle Universitaire EUCLIDE/Euclid University), Banjul, The Gambia. Specializes in artificial intelligence for financial law and Islamic finance. Author of more than 50 peer-reviewed journal and conference articles and publisher of 3 books.

Contact email: katterbauer@euclidfaculty.net, ORCID: 0000-0001-5513-4418.

** Contact email: cdk@euclidfaculty.net, ORCID: 0000-0002-9267-0428.

1. Introduction

Emerging Markets will play a more crucial role in the coming decades and continue to be the dominant driver of real gross domestic product growth across the world. This is primarily due to their significant population growth as well as their path from a developing to a developed nation. The GDP growth rates achieved relatively strong resilience even during external shocks, such as the global economic crisis, and they have consistently led to an increase in wealth of these nations. China has been a major driver of this growth with it focusing on the strengthening domestic consumption and supply. While economic growth has been strong, several countries have experienced signs of an aging population. With improved standards of living, life expectancies have risen while there has been a decline in birth rates. Fiscal sustainability is another challenge given the need to provide home-based care for the elderly in a time when family caregivers are becoming fewer in number as a result of population aging. There are significant gaps in the delivery of healthcare to large rural and remote communities, which are located far from metropolitan and industrialized coastline and megalopolis zones. Growing socioeconomic disparities between the affluent and the poor may increase the discrepancy between the healthcare options provided to the population. However, there are several new initiatives to enhance health outcomes that are addressing these inefficiencies and encourage individuals to take care of their own health outcomes. Most emerging countries have been able to steadily raise their overall health expenditures as a percentage of GDP [Yi 2021].

The concept of the relaxation of policies, streamlining administration and delegating powers, raising funds from various sources and broadening the horizon in developing health undertakings was first put forth in the Report on Several Policies Concerning Health Reform by the former Chinese Ministry of Health in 1985. This marked the official start of China's medical system reform. During this time, the state and businesses paid for the medical expenses. Issues like hospitals producing a rapid development in medical bills and an unjustifiable distribution of medical resources were caused by a lack of access to finance and preventative actions to support the health of the population [Hougaard, Østerdal, & Yu, 2011].

Furthermore, according to the report, state-owned business employees' average medical costs grew at an average rate of 8.7 percent, from 35.46 yuan in 1978 to 63.61 yuan in 1985. In Zhenjiang, Jiangsu Province, and Jiujiang, Jiangxi Province, the Chinese government introduced a trial program of social medical insurance in 1994. This scheme combined social assurance with individual payments to support the population. In 1998, the urban

employees' medical insurance reform was initiated, signaling the beginning of China's social medical security system's transition to a socialist market economy.

It was made abundantly evident in the October 2002 decision of the CPC Central Committee and The State Council on Further Strengthening Rural Health Work that a new rural cooperative medical system with an emphasis on major disease cost planning was supposed to be implemented gradually. The SARS outbreak in 2003 highlighted China's shortcomings in prioritizing clinical practice above public health. Since then, the government has accelerated China's health system reform as it has come to understand the significance of a strong health system for social and economic growth [Mao, Yip, & Chen 2019].

In 2005, the Shanghai Shenkang Hospital Development Center and Jiangsu Wuxi Hospital Management Center served as the primary representatives of the hospital's separation of management and operation. The results of the trial indicated that China's efforts to reform its medical and health systems were not sufficiently effective, which represented a significant turning point in the transformation of China's healthcare system. Between 2006 and 2008, the Chinese government assembled a range of stakeholders to investigate potential medical and health system reforms and sought public feedback.

China started a new medical and health care system reform in 2009 with the goal of providing access to health care and financial security as well as inexpensive and accessible medical treatment. By 2011, all urban and rural residents in China were covered by the basic medical security system, which is a national system of essential drugs. The community-level medical service system was supposed to be improved, with the aim of providing equal basic public health services.

In order to implement the public hospital reform pilot program, China established 37 pilot areas at the provincial level and 16 pilot cities in 2010. 2011 saw the complete implementation of zero-margin medication sales in government-run community-based medical and health facilities, as well as the first establishment of a fundamental national drug supply system. The reform of county-level public hospitals was initiated in 2012 and was completed by 2015. This reform was crucial in providing rural regions with inexpensive and easily accessible medical care [Zhang, Chen, & Zhang 2019].

China combined its new rural cooperative medical insurance with its medical insurance for non-working urban residents in 2016 to create a single, comprehensive medical insurance program for both non-working urban and rural inhabitants. With 93.9 percent of urban public hospitals canceling medication markup in 2017, the complete reform pilot program of urban public hospitals was fully implemented, significantly curbing the rise in medical costs

in public hospitals. The National Healthcare Security Administration was created as an official organization in May 2018 and is now directly accountable to The State Council. China's medical security initiatives reached a more uniform stage of development with the implementation of new regulations such as DRGS, official medication procurement with volume, drug markup cancellation, and thorough reform of public hospitals [Tang & Thomson 2019].

More than 1.36 billion individuals in China had full-coverage basic medical insurance by the end of 2020, with coverage exceeding 95%. Additionally, there is a basic healthcare system that serves both rural and urban inhabitants. The focus was on the creation of a diversified medical systems that made sure that everyone has access to basic medical and health services and that their multi-level medical and health care needs are met, and established relatively sound public health service systems, medical service systems, medical security systems, standard drug supply security systems, scientific management and operational systems of medical and health institutions. While state provided medical care has become more efficient, there are several challenges that still prevail within the Chinese medical system. Specifically, the growing aging population within China and the reduction in fertility rates represents a major challenge for the future financing of the Chinese healthcare sector and requires advances in efficiency [Qian 2017].

2. Chinese Healthcare characteristics

China's health system reform has advanced significantly over the last ten years or more with several improvements materializing, but there are still several obstacles to overcome. First, China has made great strides toward strengthening financial protection and expanding access to health care, particularly for those with low incomes. Second, there is still more work to be done in the areas of controlling non-communicable diseases, increasing delivery efficiency, and reducing health care costs. A major challenge is the disparity in the distribution of health resources and satisfying the growing demand for high-quality, paid services. Additionally, the enhancement of public health represents a cornerstone that requires solid financial backing.

China has committed to building a healthy China by 2030 and attaining universal healthcare, therefore the nation must carry on with the process and implement the required legislative changes to make sure it is successful. First, as rural and floating populations become more urbanized, their demands for medical security are growing and becoming more unmet. The distribution of resources for medical security is impacted by urbanization, particularly when

rural residents move into cities, which creates challenges. There is a significant population of women, children, and the elderly in rural regions. One of the biggest obstacles to providing medical security services in rural areas is figuring out how to better fulfill their demands. Having outlined this, there is also a sizable floating population that is directly tied to urbanization [Wang, Wang, Ma, Fang, & Yang 2019].

A total of 280 million individuals were living apart from their homes in the nation in 2019. Of these more than 236 million of them were floating population. The rights to medical treatment security and the interests of cross-medical insurance groups, such as the floating population, are connected to the settlement of off-site medical care. Specifically, there is a need to expedite the off-site medical care payment procedure for outpatient charges.

The second is the conflict between the steady growth of the senior population and the long-term viability of the funding for basic health care. According to predictions, China's population of those 60 and older would expand from 263 million to 522 million between 2020 and 2050. After 2030, in particular, the share of the elderly who are 80 years of age or older is forecast to climb quickly, reaching 54.48 million in 2030 and 133 million in 2050 [Feng, Hong, Qian, Hu, & Shi 2020].

The findings indicate that the age group with the fastest growth in total medical expenses is 47–63 years old. From the age of 71 until the time of death, there is a sharp rise in total medical expenses, placing significant strain on the basic medical insurance fund's spending. Furthermore, it is challenging to modify the basic medical insurance payment obligation structure for the senior group to meet the ongoing demands of the large-scale elderly group. The older urban workers who paid for fifteen years in a row before reaching the legal retirement age are exempt from having to pay when they retire. However, the older populations in both urban and rural areas have a low percentage of individual financial responsibility and rely mostly on government funding.

The third is the unequal allocation of resources for public health among areas. The disparity and unfair distribution of public health resources among regions continue to grow, notwithstanding the Chinese government's preference for funding the poor provinces in the central and western regions. In order to address the glaring disparities in medical care and public health across regions, China implemented a thorough reform. As a result, public health spending has increased dramatically in underdeveloped provinces in the country's west and center [Baird 2016]. Since 2008, all 31 Chinese provinces have seen increases in the per capita spending on public health. Several provinces have seen a massive increase in health

expenditure and both government and private spending have seen major increases due to the significant demand.

Even yet, it remains challenging to reduce the disparity and imbalance in the distribution of public health resources by merely raising public health spending in the central and western areas. Both in 2008 and 2018, there is a decline in the number of medical and health facilities and medical professionals from east to west. The provinces with the most resources for public health in 2008 were Beijing, Shanghai, and Tianjin; the provinces with the least resources were Tibet, Xinjiang, and Inner Mongolia. Additionally, in 2018, the public health resource ranking remained consistent. Furthermore, there is still a growing disparity and imbalance in the distribution of public health resources among the regions [Ma et al. 2020]. By contrast, over the same period in Tibet, the number of health workers per thousand square kilometers per million inhabitants grew from 2.62 to 4.51, while in Beijing, it increased from 517.83 to 724.40. This indicates that from 2008 to 2018, the resources available for public health are still not keeping up with the differences between Tibet and Beijing, which have the least resources.

3. Artificial Intelligence

China's AI market was estimated to be worth RMB 150 billion around 2022, and the expectation is that the market would be valued RMB 400 billion by the year 2025. The expectation by a government estimate is that the associated businesses may generate more RMB 10 trillion annually, with the AI sector alone to generate RMB 1 trillion in income yearly by 2030. China's economy might benefit from artificial intelligence [AI] technology, which has several uses in industrial operations, medical research, autonomous cars, etc., for as much as US\$600 billion yearly according to industrial estimates. This estimated future value is equivalent to around 3.7% of China's GDP in current terms (Wu, et al., 2020). Nevertheless, significantly larger financial incentives will be needed in order to realize this and optimize value generation. In 2021, venture capital and private equity investors provided US\$17 billion in funding to AI start-ups in China, accounting for approximately one-fifth of the total worldwide. Investments are needed in a number of areas, including as the technology and data that AI systems rely on, the skilled personnel needed to develop the systems, and the creation of new business models, industry standards, and alliances that foster data ecosystems [Knox 2020].

When it comes to creating AI legislation, China has been very active in regulating the sector that has encompassed several new regulations. The nation has several more comprehensive

plans in place to encourage the growth of the AI sector, including the Next Generation Artificial Intelligence Development Plan (2017), Made in China 2025, and the Action Outline for Promoting the Development of Big Data (2015). China has also accelerated the process of enacting certain regulations governing AI, with relation to algorithms and industrial ethics, in recent years. Stricter regulation of the largest internet businesses in China was instituted by regulators, which also increased their supervision over data security and foreign listing guidelines. There have been several regulatory challenges that arose from limiting the ability of companies to freely utilize data of citizens, which has been primarily aimed at bringing in line larger companies, such as Alibaba and Tencent. Nevertheless, the IT industry has been a major focus for the government to achieve stronger growth overall and develop the industry of the future.

The Shenzhen government enacted the Regulations on Promoting Artificial Intelligence Industry in Shenzhen Special Economic Zone (the Shenzhen AI Regulation) on September 6, 2022. The regulation went into effect on November 1, 2022, and it is China's first local law aimed at advancing AI development. By encouraging governmental entities to be the leaders in exploiting related technology and by expanding financial support for AI research in the city, the Shenzhen AI Regulation seeks to advance the AI sector. It also creates criteria for firms and organizations operating in the industry to share public data.

The Shenzhen AI Regulation states that, if they meet international criteria, Shenzhen-based AI services and products that are deemed to be "low risk" may be tested and trialed outside of local and national regulations. The Shenzhen government will create rules for risk management and classification independently. This risk-based approach to management will support industry innovation. The Shenzhen AI Regulation also mandates the creation of an AI ethics committee, whose duties include creating safety guidelines and analyzing the potential effects of technology on employment, data protection, and other societal issues.

In a similar initiative, Shanghai's AI industry development has increased significantly within the last several years. The size of the AI industry in the city has grown dramatically over the last several years. The total output value of Shanghai's AI businesses that are above the authorized size reached more than RMB 305.68 billion in 2021. In Shanghai, the number of skilled workers in the AI industry increased dramatically from 100,000 in 2018 to 230,000 in 2021 alone, and Shanghai aims to develop three key industries with focused efforts. These are biomedicine, integrated circuits, and artificial intelligence (AI).

The Shanghai Regulations on Promoting the Development of the AI Industry [the Shanghai AI Regulation], which went into effect on October 1, 2022, is the first provincial-level

regulation pertaining to AI development in China. It was approved on September 22, 2022, in Shanghai. By growing the key AI sectors and fortifying the alliance of AI firms, the Shanghai AI Regulation aims to foster innovation and discoveries. The Shanghai AI Regulation, which mentions "sandbox" supervision and grading management, will further pave the way for the sound and sustainable development of AI technology. These two management approaches are designed to give businesses enough room to experiment and explore with their technologies.

The Shanghai AI Regulation is notable for its provision of a certain amount of leeway for small violations, which serves to stimulate scientific research and spur creative thinking. The argument is that since the area of artificial intelligence is still in its infancy, a "disclaimer" clause can provide some room for experimentation and testing while also enhancing institutional flexibility and inclusivity. Lists of these infraction behaviors, with an indication that small offenses would not result in administrative penalty, are available from the relevant municipal agencies [Lee 2021].

By establishing an ethics committee, the Shanghai AI Regulation also emphasizes fundamental principles and moral standards for the growth of the sector. To guarantee the sector develops responsibly, organizations engaged in AI-related research, development, and applications should adhere to legal requirements and raise ethical awareness.

Shenzhen has garnered media attention for enacting China's first autonomous vehicle (AV) rules on August 1, 2022. A driver must remain inside the vehicle, however registered AVs are now permitted to run throughout much of the city without a driver in the driver's seat. The COVID pandemic has definitely been a major accelerator for the introduction of driverless vehicles. The laws of Shenzhen offer an essential foundation for accountability in the case of an accident. Once more, with over 1200 businesses producing RMB 106.6 billion in 2021, the city is a leader in the autonomous car industry. By 2025, it hopes to generate RMB 200 billion in revenue overall [Hine 2023].

China established its initial national guidelines for rating autonomous vehicles in 2021. Official definitions of self-driving automobiles may be found in the nation's Taxonomy of Driving Automation for Vehicles. With approval from local authorities, robo-taxis have been operating in limited locations in Chinese cities. China is quickly becoming a major player in the international robotics market as the government wants the sector to be able to compete with the most inventive economies in the world. This has a significant effect on healthcare options and the financing of healthcare activities. With operating costs being potentially lowered by the efficient utilization of robots, the utilization of robots may have a

considerable impact on the financing opportunities. The Chinese Institute of Electronics (CIE) reported that in 2021, the value of China's robotics sector was RMB 83.9 billion. Out of this, the value of industrial robots was RMB 44.6 billion, while the value of service robots was RMB 39.3 billion [Li & Miao 2023].

The Chinese government has been pushing the country's robotics sector forward. The current Five-Year Plan for the industry was jointly launched on December 28, 2021, by the MIIT and many other agencies. The plan aims to enhance China's position as a robot producer and expand the use of robots. According to the strategy, China is expected to lead the world in robotics innovation by 2025, leading the way in both core robotics technology and high-end robotics goods. China should have some of the greatest robotics in the world by 2035, and robotics should be incorporated into everyday Chinese life, economic growth, and social governance [Guo, Chen, Zhao, & Yang 2022].

4. Artificial Intelligence Regulations China - Financing

According to the Organization for Economic Co-operation and Development (OECD), artificial intelligence is the ability of a machine-based system to forecast, recommend, or make decisions that impact real or virtual environments, given a set of human-defined objectives. Generative AI is a subtype of artificial intelligence and focuses on the creation of output [such as literature, music, or visuals] from input data by utilizing deep learning techniques. One of the best examples of this technology is ChatGPT, an interactive AI language model that has gained attention since its November 2022 public release. The PRC has seen the debut of Baidu's generative AI-powered "Ernie Bot," and rivals have either launched or plan to release other tools of a similar nature. These regulations play a critical role in the healthcare sector as well as advancing the incorporation of AI into the financing of healthcare [Lin 2019].

AI has several benefits, but there are also risks that are associated with the deployment of this technology. This includes the loss of personal data, the distribution of illicit information, and the propagation of false news and content. These concerns also pose a challenge to the existing legal system including financing for the healthcare sector. In order to address these issues, a number of countries have passed new legislation or are in the process of doing so [Wu et al. 2020].

Like in other countries, the PRC may have regulations pertaining to the use of AI that are already in place, including those regarding data protection, cybersecurity, unfair competition, and e-commerce. Nonetheless, the Cyberspace Administration of China (CAC) has

introduced new, specialized regulations to control AI. The Algorithm Recommendation Regulation was the first AI-specific law proposed in the People's Republic of China. It went into effect on March 1, 2022. In the PRC, it controls the application of algorithmic recommendation technology for online service delivery. Another significant legislation was the deep synthesis legislation that was enacted as the second one [Cao, Zhai 2022].

The Deep Synthesis Regulation was jointly enacted by the CAC, the Ministry of Industry and Information Technology (MIIT), and the Ministry of Public Security (MPS) on November 25, 2022. It became operative on January 10, 2023. Filing suitable algorithms with the CAC is one of the obligations under the Deep Synthesis Regulation. In order to remove any remaining uncertainty regarding algorithm filing requirements, the CAC released the first batch of submitted deep synthesis algorithms in the PRC (AI Algorithm Filing List) on June 23, 2023. The next significant AI regulation was the Generative AI regulation. The Generative AI Regulation was jointly published on July 13, 2023, by the CAC, the National Development and Reform Commission, the Ministry of Education (MOE), the Ministry of Science and Technology (MST), the MIIT, and the MPS. It aims to regulate generative AI technologies more broadly and went into effect on August 15, 2023 [Cheng, Zeng 2023].

Another important measure is the new draft on ethical evaluation measures. The MST released the Draft Ethical Review Measure on April 14, 2023, and the measure focuses on the ethical evaluation of science and technology-related activities that include ethical hazards, like the creation and research (R&D) of artificial intelligence (AI) technologies. Another draft AI law was presented to the National People's Congress of the PRC's Standing Committee for discussion in 2023, as per the State Council of the PRC's Legislative Work Plan for 2023, which was made public on May 31, 2023. The main laws governing AI-related services and products in the PRC going forward, including generative AI and AI-generated content (AIGC), are the Algorithm Recommendation Regulation, the Deep Synthesis Regulation, the Draft Ethical Review Measure, once it becomes effective, and the Generative AI Regulation (collectively, AI Regulations). These laws represent an important area for the healthcare industry and the incorporation of AI for healthcare financing and the healthcare industry [Dixon 2023].

In terms of the material scope, there are several regulations that apply. The Generative AI Regulation covers the use of all generative AI technologies to provide services to the public in the PRC, specifically excluding development and application of generative AI technologies that have not been used to provide services to the public in the PRC. This is an important distinction for AI algorithms that may be utilized in other areas. Furthermore, the Algorithm Recommendation Regulation covers any use of algorithm recommendation technologies to

provide internet information services in the PRC, and the Deep Synthesis Regulation covers any use of deep synthesis technologies to provide internet information services in the PRC. Finally, the Draft Ethical Review Measure, once implemented, would apply to any science and technology activities involving humans, lab animals, or other ethical risks.

The AI Regulations do not restrict their application to PRC people or businesses in terms of territory. If foreign people or organizations are engaged in the R&D of AI technology in the PRC or in the use of AI technologies to deliver services, they may also be apprehended. The Generative AI Regulation, however, expressly states that it cannot be used to AI technology R&D in the PRC if the pertinent services have not been made available to the general public inside PRC borders. This is an important restriction on the utilization of modern AI regulations for healthcare financing within the PRC [Roberts et al. 2023].

5. Regulatory challenges in the Chinese Healthcare System

First, there is a significant amount of resource waste in China's medical insurance and public health systems, which significantly lowers the effectiveness of public health spending. The market-oriented reform of governmental hospitals has been implemented by the Chinese government, which mandates that these institutions bear the profit and loss responsibility [Lemonnier 2017].

Therefore, since everyone in the medical field is primarily responsible for making a profit, doctors will often treat minor illnesses instead of serious ones, force patients to submit to a plethora of physical examinations, prescribe a lot of safe, ineffective, and highly profitable medications, and ultimately charge patients and the medical insurance system for these services. In addition, a lot of government hospitals use economies of scale to boost their revenue. For instance, Zhengzhou University's First Affiliated Hospital has nearly 10,000 beds. In the US and the UK, such a large-scale hospital would be unthinkable, but in China, there are many of them [Ma et al. 2020].

While providing medical services to residents is convenient, it will not only be a huge waste of resources but also unlikely to increase residents' sense of gain because a hospital of this size requires the majority of the expenditures to be covered by the residents and the medical insurance system. In the end, there is a significant waste of money, a deficit in the medical insurance fund, and a poor sense of patient acquisition. These are indicative of China's inefficient public health spending and the financing challenges, where AI may provide significant opportunities.

China's social economy has advanced significantly since reform and opening up, but there are still gaps in urban and rural development, especially when it comes to basic medical services. These gaps are mostly caused by differences in government investment, the medical security system, regional economic growth, and residents' income. They are also reflected in differences in health care financing, medical resource distribution, medical security level, and the concept of health consumption, as well as the effects on people's health and the general development of society [Mao, Yip, Chen 2019].

In terms of the equalization of health and medical services, there are various considerations that have to be taken into account. Most agree that it is imperative to provide the general public with access to the most fundamental and nearly identical medical and health services. Medical and health equalization is a relative concept that may not have the identical meaning. Rather, it refers to the objective of maximizing the right to health and achieving a combination of efficiency and fairness in the provision of medical and health services, with needs-based distribution, so that we can provide our citizens with the medical care they require [Zielińska-Lont 2020].

There is inequity in medical and health services among people, across regions, and between urban and rural areas in China due to the country's enormous population, differences in regional growth, and the development gap between urban and rural areas. There is a significant disparity between Beijing's urban and rural areas because of a number of reasons, including the sort of medical insurance that each group has and how easily accessible medical resources are. Furthermore, there is a clear difference in how many people in urban and rural areas use paid medical and health services [Yi 2021].

A survey carried out in the Ningxia Autonomous Region to investigate the northwest region of China revealed a significant disparity between urban and rural areas with respect to total medical care expenditure, medical care expenditure per capita, distribution of medical resources, and residents' health status, which was primarily influenced by the pattern of resource allocation and the supervision system. According to Guo et al.'s investigation, medical insurance coverage, funding, resource allocation, and policy operation effects differ significantly between urban and rural areas. The primary factors influencing these differences are non-communicable diseases, the number of people over 65, and financial burden.

Government agencies and experts are very concerned about equitable access to health care in China, a rising nation with a social economy that is expanding quickly. The Chinese government outlined a comprehensive plan in 2008 to build a basic medical and health

system and give the people of China a higher quality of life. The proposal included the strategic aim of "delivering everyone access to basic medical and health services." In an effort to provide a more equal health care system, the Chinese government began offering basic health care services to its citizens in 2010.

Delivering accessible and reasonably priced healthcare to the general people is another goal of China's 2009 health system reform, which aims to guarantee that everyone has access to basic healthcare services. In addition to the reform, the Chinese government put in place a basic drug system, a family doctors' agreement, a reform of public hospitals, a hierarchical diagnostic and treatment system, and universal health insurance. Using the medical insurance system as an example, China has been effective in offering financial assistance to individuals with varying levels of medical cost capacity [Zhang, Chen, Zhang 2019].

For workers, the insurance premium is split 12 to 9 between the employer and the person; for non-working urban and rural people, the insurance premium is split between the government and themselves. The complete coverage of medical insurance is guaranteed in this way.

China has made improvements to its urban and rural health systems, reduced the distance between urban and rural regions, and intensified the reform of its public health and basic medical systems in recent years. By guaranteeing that there are physicians, hospitals, and institutional guarantees for rural impoverished patients, the Chinese government has constructed a more effective long-term system that eliminates poverty brought on by disease and gives them everyone a healthier life.

China established the triple system of basic medical insurance, serious sickness insurance, and medical aid, which provided coverage to all those living in poverty. Above all, China has achieved significant success in progressively overcoming barriers to equitable access to medical care in both urban and rural districts.

Many years ago, the global healthcare business saw a significant shift toward market-oriented reform, particularly in industrialized nations like North America and Europe. Numerous reasons contributed to this phenomenon, such as the pressure of rising healthcare costs, the growing demand for high-quality medical services, and expanding health. The two primary goals of the market-oriented reform's particular initiatives are to increase supplier numbers and patient autonomy. China presently uses the latter method, although European nations, like the United Kingdom, primarily utilize the former [Yi, 2021].

In 2009, the Chinese government initiated a fresh wave of extensive and national healthcare reform aimed at resolving the issues summed up as expensive and challenging access to

healthcare. With this reform, a number of market-oriented policies were brought into the healthcare sector to provide access to treatment for the diverse requirements of the populace and to boost hospital rivalry to raise standards of service and efficiency.

The primary specific policies fall into three different categories. The first is to remove the government regulatory division's surveillance from the operational system of public hospital administration. The second is to ease the entry of private investments into the healthcare system. Finally, there should be a change in the role of the government in the healthcare system's financial model from supplementary suppliers to supplementary demanders, i.e., medical insurance.

The hospital market, which is the primary target of this market-oriented reform and one of the most significant in the healthcare sector, is changing significantly as a result of the adoption of pro-competition laws, regardless of its size or composition. Use the number of hospitals to succinctly summarize the changes in the hospital market [Wang, Wang, Ma, Fang, Yang 2019].

However, the argument over the place of private hospitals and competition in the healthcare system is still very much alive and has progressively divided into two camps: pro-government and pro-market. The former hold that more private hospitals would be more efficient due to improved internal management and lower operating costs, and that the pressure from increased competition from more private hospitals would force public hospitals to carefully consider patient-attractive measures like raising management standards and efficiency, which would ultimately lead to lower medical costs and higher-quality care.

The textbook's apparent distinctions between the healthcare and general goods markets, according to pro-government activists, would lead to market failure and perhaps worsen patient outcomes. For instance, the significant information asymmetry that exists between doctors and patients gives hospitals or doctors the chance to engage in "unwanted behavior" within the specific system context [such as the irrational financial incentive design], such as overprescription and induced demand. The hospital might behave differently from general goods providers when under pressure from competition, and the "medical arm races" phenomenon was the primary adverse consequence of hospital competition that many academics in pro-government organizations opposed.

Owing to the specificity and intricacy of healthcare, one cannot gain evidentiary or convincing proof just by theoretical deduction. Numerous research provides empirical support based on real-world retrospective data. The majority of research, particularly empirical data, was generated using industrialized nations or areas as a basis. Evidence from

industrialized nations cannot be readily applied to the examination of China's healthcare sector due to differences between the two nations' healthcare systems, economies, and system designs. The issue surrounding the role of market-oriented reform remains unresolved, despite the United States conducting several research in this area.

The data for health services is scarce due to the shortcomings in the medical information system, which makes relevant research in China more difficult. To the best of our knowledge, the majority of the empirical evidence based only on Yearbook regional data and the theoretical viewpoint on private hospitals has addressed market-oriented change or the role of competition. Even if a number of studies were carried out on an individual patient basis, they are still unable to resolve the aforementioned controversy and offer the authorities adequate ramifications [Ma et al. 2020].

The efficacy of competition and private hospitals has steadily lost prominence in recent years, with the focus instead being on the role of the government or authority in the market-oriented reform of healthcare. A rising body of research indicates that market-oriented change in China will likely go in the direction of organized competition, also known as managed competition, and that these reforms would be beneficial. For instance, the government's proposed payment reforms, such as diagnosis-related groups (DRGs) and the reform of medical services item prices, would help remove the financial incentive for suppliers to engage in "unwanted behavior" in the face of competition pressure, thereby mitigating the negative effects of market-oriented reform.

Furthermore, additional empirical data should be supplied in the future to offer implications for the government, particularly for longitudinal studies based on patient-level data. Recent implementations of market-oriented policies have also made it possible to conduct "natural experiments" to determine causal effects, which will then yield stronger evidence to resolve the argument over market-oriented reform in China.

6. AI - Chinese Healthcare Financing

Healthcare decision-making for the purpose of fostering an equitable, effective, and high-quality health system is informed by health technology assessment [HTA], a multidisciplinary activity that employs explicit methods to assess the value of health technologies, pharmaceuticals in particular, at various stages of their lifecycle. This includes also applications of AI for the utilization in the healthcare sector and for supporting healthcare financing. When HTA was first brought to China in the 1980s, it has progressively influenced healthcare decision-making, thereby helping to more effectively distribute health

technology. Shanghai Medical University established the first HTA center in 1994 with funding from the Ministry of Health (MOH), technical help from the World Bank Loan Project, and advice from global HTA specialists.

Before two national HTA centers were established under the National Health Commission (NHC) and the National Healthcare Security Administration (NHSA) in 2018 and 2019, HTA in China had very little institutional achievements closely linked with policy making. Instead, HTA had been continuously developing since 1994 in the areas of technology assessment, capacity building, and case-based policy translation. There are numerous HTA centers/units at various levels of government-affiliated research or administration centers, universities, some professional associations, public hospitals, foundations, and consultative companies in addition to the two national HTA centers established by the central government [Apell, Eriksson 2023].

Furthermore, a plethora of possible associated fields exist for HTA, including evidence-based medicine, health systems, and policy research. HTA is significant at the macro level since it may assist in formulating policy and guiding decision-making. HTA in China has gradually moved from its pure academic research to policy- or decision-oriented research, which plays an essential role in health project evaluation, resource allocation, and reimbursement drug/services list adjustment. This shift is due to policies and programs to address rising health care costs associated with pharmaceuticals and health technologies, and AI has seen massive applications in both adjustments and determining adequate costs of pharmaceuticals and health technologies. The key integration is the utilization of both health outcomes of patients in connection with the financing needs and ability to efficiently analyze and modify the financing terms [Saraswat et al. 2022].

The development of health technology assessment has several obstacles that must be overcome. For instance, there isn't a clear policy structure in place to apply HTA to decision-supporting healthcare. Just as expected, the NHSA started pricing negotiations for the national medication reimbursement lists in 2017, although the full potential of HTA development in China in terms of its effect on healthcare decision making has not yet been realized. Technical staff members doing HTA research and evaluating HTA evidence are in low supply of HTA expertise.

Furthermore, China lacks the data infrastructure and accessibility needed to establish a strong HTA system. Finally, in order to coordinate the scope of HTA among decision-making concerns regulatory, pricing & reimbursement, and hospital and clinical settings, as well as to define standards for implementing HTA, national-level institutionalization of HTA is still

pending. While there are significant advances in terms of the utilization of AI for financing of healthcare instruments, and the existing regulations encourage the sector, it still requires a more solid integration.

One essential component of health systems, particularly in China with its sizable population, is the pharmaceutical industry. China had been dealing with the problem of medicine shortages for its healthcare system since the PRC was founded in 1949. China was not even able to manufacture the most basic medications back then because of a historical absence of an industrial foundation. The Soviet Union's assistance, which terminated suddenly in 1960 as a result of the Soviet Union and China splitting, was crucial to the early growth of the medicine production capability [Cheng, Zeng 2023].

Following that, until China's Reform and Open-up in the 1980s, the domestic pharmaceutical sector faced a protracted standstill in increasing its manufacturing capacity on its own. China started to improve its manufacturing skills in the 1990s through a variety of means, such as experimenting with joint ventures with foreign pharmaceutical companies, directly acquiring manufacturing tools and processes from Western nations, promoting private investment in drug manufacturing, etc. Through these initiatives, China's capacity to fulfill its significant domestic demand for generic medications has dramatically improved in the early twenty-first century.

The discovery, creation, and production of novel medications in China began even later than the supply of generic drugs has improved. China has been using the "me-too," "me-better," and "fast-follow" catch-up tactics in the field of novel pharmaceuticals since the 1990s. China established eight robust drug technology innovation systems, formed over ten national comprehensive technology platforms, and organized ten major disease plans—including those related to diabetes, autoimmune diseases, cancer, and viral infections—all with the help of the National New Drug Innovation Project [Mao, Yip, Chen 2019].

Additionally, China offered incentives to foreign scientists and biopharmaceutical entrepreneurs to transfer capital and cutting-edge technology to China in order to launch their enterprises, thanks to its robust regulatory backing of the financial sector (such as IPOs). China has advanced in the field of novel pharmaceuticals from "me-too" to "me-better" and "fast-follow" thanks to these initiatives. Chinese pharmaceutical businesses are able to keep up with worldwide advancements in the fields of immunotherapeutic medications like PD-1/PD-L1 and advanced gene and cell treatments, hence facilitating their commercialization in the global market. China still lacks innovation in first-in-class pharmaceuticals, though.

Although China made significant strides in the 2000s to advance "me-too" and "me-better" medications and to increase its capacity to offer generic pharmaceuticals, its healthcare system was heavily criticized for lacking access to expensive medications. At the time, physicians were encouraged to prescribe expensive and useless medications to patients by state hospitals, which exploited the 15% drug price-adding policy to boost hospital income. As a result, patients and their families were forced to shoulder excessive medicine costs or were even forced back into poverty as a result of their disease, which progressively raised concerns among the general public and the government. As such, one of the cornerstones of China's comprehensive health reform was the implementation of the critical medication policy in August 2009.

The National Essential Medicine List was created by the national health ministry and consists of the medications that are most often used in primary care and public hospitals. The essential medicine policy mandated that all public medical facilities, regardless of level, obtain and maintain critical medications. Patients should only be prescribed necessary medications by public hospitals and primary care providers, without any additional cost added to the purchase price. Furthermore, in order to guarantee the successful execution of the essential medication policy, yearly evaluations of the essential medicine usage rate—one of the primary care and public hospital key performance indicators—will be carried out by the various government health departments [Zhang, Chen, Zhang 2019].

In order to facilitate the execution of the essential medication policy and control public medical insurance access to novel pharmaceuticals, China simultaneously launched the National Drug Reimbursement List policy. China established the National Healthcare Security Administration (NHSA) in more recent times in order to centralize authority and accountability for financing and payment for public health insurance, including the ability to dynamically modify the list of medications that are covered by medical insurance (70). The NHSA has established the drug price negotiation procedure for the addition of novel medications to the NDRL. The NHSA carries out independent technical and pharmacoeconomic studies, and pharmaceutical firms are expected to submit documentation regarding the pharmacology, clinical evidence, and pharmacoeconomics of targeted therapies.

The NHSA would negotiate prices directly with relevant pharmaceutical firms after these reviews. A successful price negotiation frequently results in a 40–50% price decrease over what the pharmaceutical corporations had first suggested. NHSA has implemented a coordinated drug procurement strategy for generic medications in addition to its price negotiating policy for novel drugs. Pharmaceutical businesses are required by this policy to

submit bids for the public health system's medicine orders. Successful bids always entail substantial price reductions from current market rates, sometimes even reaching 80%–90% of initial pricing, in order to get the upper hand over rivals. By implementing a coordinated procurement policy and engaging in price negotiation, NHSA has effectively achieved its goals of managing and reducing medicine prices for the Chinese healthcare system.

China has created a comparatively dependable pharmaceutical system to deliver the majority of generic medications and certain cutting-edge medications to its populace through a series of legislative initiatives and reforms spanning several decades. But there is still a problem with its pharmaceutical system's viability. Notably, strict pricing control laws implemented recently have made it more difficult for local pharmaceutical companies to create novel medications, especially "first-in-class" medications, and have made international pharmaceutical companies more reluctant to sell their most cutting-edge medications in China.

7. Conclusion

The Chinese national health system has undergone massive changes in the last several decades with financing becoming a cornerstone of the development of the Chinese healthcare environment. Several private companies have been in the area of private healthcare with consumers being more health conscious and aware. Furthermore, the Chinese government have transformed the healthcare insurance system to expand the coverage of the population and initiate more market-oriented reforms. AI has been another major game changer in the healthcare sector and the financial industry with driving both patient evaluation as well as enhancing finance related investments. Within China, AI has several important functions via its integration in the regulation process and becoming a vital part of the regulatory process. AI may provide some vital opportunities for healthcare financing, but this requires a more solid framework to support broader utilization of AI for the financing of the sector.

References

- Apell, P., & Eriksson, H.: Artificial intelligence (AI) healthcare technology innovations: the current state and challenges from a life science industry perspective. *Technology Analysis & Strategic Management*, vol. 35, no. 2, 2023.
- Baird, K.: High out-of-pocket medical spending among the poor and elderly in nine developed countries. *Health Services Research*, vol. 51, no. 4, 2016.
- Cao, Y., & Zhai, J.: A survey of AI in finance. *Journal of Chinese Economic and Business Studies*, 2022.
- Cheng, J., & Zeng, J.: Shaping AI's future? China in global AI governance. *Journal of Contemporary China*, vol. 32, no. 143, 2023.
- Dixon, R.: A principled governance for emerging AI regimes: lessons from China, the European Union, and the United States. *AI and Ethics*, vol. 3, no. 3, 2023.
- Feng, J., Hong, G., Qian, W., Hu, R., & Shi, G.: Aging in China: an international and domestic comparative study. *Sustainability*, vol. 12, no. 12, 2020.
- Guo, Y., Chen, W., Zhao, J., & Yang, G. Z.: Medical robotics: opportunities in China. *Annual Review of Control, Robotics, and Autonomous Systems*, 2022.
- Hine, E.: Governing Silicon Valley and Shenzhen: Assessing a New Era of Artificial Intelligence Governance in the US and China. *2023 AAAI/ACM Conference on AI, Ethics, and Society*, 2023.
- Hougaard, J. L., Østerdal, L. P., & Yu, Y.: The Chinese healthcare system: structure, problems and challenges. *Applied health economics and health policy*, vol. 9, 2011.
- Knox, J.: Artificial intelligence and education in China. *Learning, Media and Technology*, vol. 45, no 3, 2020.
- Lee, J. Y.: Artificial Intelligence Cases in China: Feilin v. Baidu and Tencent Shenzhen v. Shanghai Yingxin. *China and WTO Review*, vol. 7, no. 1, 2021.
- Lemonnier, M.: Interpretation of the tax law in France. *Financial Law Review*, vol. 7 (3), 2017.
- Li, X. W., & Miao, H. Z.: How to Incorporate Autonomous Vehicles into the Carbon Neutrality Framework of China: Legal and Policy Perspectives. *Sustainability*, vol. 15, no. 7, 2023.
- Lin, T.: Artificial intelligence, finance, and the law. *Fordham L. Rev.*, vol. 88, 2019.
- Ma, C., Zhang, Y., Li, Y., Wang, Y., Jiang, Y., Wang, X., Ma, S. Healthcare, insurance, and medical expenditure of the floating population in Beijing, China. *Frontiers in Public Health* vol. 375, 2020.
- Mao, W., Yip, C. M., Chen, W.: Complications of diabetes in China: health system and economic implications. *BMC public health*, vol. 19, no. 1, 2019.
- Qian, J.: Reallocating authority in the Chinese health system: an institutional perspective. *The Chinese National Health Care Reform*, 2017.
- Roberts, H., Cows, J., Hine, E., Morley, J., Wang, V., Taddeo, M., & Floridi, L.: Governing artificial intelligence in China and the European Union: Comparing aims and promoting ethical outcomes. *The Information Society*, 2023.
- Saraswat, D., Bhattacharya, P., Verma, A., Prasad, V. K., Tanwar, S., Sharma, G., & Sharma, R.: Explainable AI for healthcare 5.0: opportunities and challenges. *IEEE Access*, 2022.
- Tang, N., & Thomson, L. E.: Workplace violence in Chinese hospitals: the effects of healthcare disturbance on the psychological well-being of Chinese healthcare workers. *International journal of environmental research and public health*, vol. 16, no. 19, 2019.
- Wang, L., Wang, Z., Ma, Q., Fang, G., Yang, J.: The development and reform of public health in China from 1949 to 2019. *Globalization and health*, vol. 15, no. 1, 2019.
- Wu, F., Lu, C., Zhu, M., Chen, H., Zhu, J., Yu, K., Pan, Y.: Towards a new generation of artificial intelligence in China. *Nature Machine Intelligence*, 2020.
- Yi, B.: An overview of the Chinese healthcare system. *Hepatobiliary Surgery and Nutrition*, vol. 10, no. 1, 2021.
- Zhang, S., Chen, Q., & Zhang, B.: Understanding healthcare utilization in China through the Andersen behavioral model: review of evidence from the China health and nutrition survey. *Risk management and healthcare policy*, 2019.
- Zielińska-Lont, K.: Sustainable finance initiatives and their impact on financial stability. *Financial Law Review*, vol. 20, no. 4, 2020.