

Research on the impact mechanism of major public health emergency on China's economic growth

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Abstract. Under different transmission mechanisms, major public health emergencies have different effects on economic growth. Based on the specific economic impact of COVID-19, a literature analysis method was used to systematically explain the economic impact of different channels and specific transmission mechanisms caused by major public health emergencies. Major public health emergencies caused serious damage to life and health, and had a huge impact on the entire economic environment. However, different economic sectors have different levels and channels of impact from the pandemic. The existing literature has analysed the various impact mechanisms of major public health emergencies on the economic development process from many angles, but there are still problems that need in-depth discussion and supplementary research.

1 Introduction

Public health emergencies can be classified into grades I, II, III and IV according to their nature, degree of harm, and scope. Grade I is a particularly major public health emergency. Major emergencies refer to emergencies with a high degree of social harm and a large scope of influence. On January 20, 2020, China's National Health Commission (NHC) listed COVID-19 as a Class B statutory notifiable infectious disease and managed it as class A, making COVID-19 a typical major public health emergency. The occurrence of public health emergencies often has different degrees of negative impact on the economic activities of different subjects, making them deviate from the normal operation track, causing various short-term shocks and long-term impacts. Judging from the frequency of individual losses and major disasters, in the past 20 years, especially since 2003, public health emergencies have caused no less damage to cities than natural disasters such as earthquakes and floods, resulting in staggering economic losses and casualties. Due to the impact of COVID-19, the growth rate of GDP in 2020 was only 2.3%, and the number of new jobs and the growth rate of industrial added value both dropped by varying degrees. The occurrence of public health emergencies usually causes various short-term shocks and potential long-term impacts on the daily activities of micro-subjects and the macroeconomic operations of specific regions and

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even the entire country. The research on sudden shock in existing literature mainly focuses on the level of micro consumer psychology, medium level and industry level.

2 Path research on the economic impact of public health emergencies

2.1 Macroeconomic level

In the short term, public emergencies have an impact on the development of an economy. The pandemic could reduce GDP by 1% and 4.25% under both moderate and severe scenarios according to the CBO (Congressional Budget Office). The World Bank estimates that the outbreak of the pandemic will cause a loss of 0.8% to 12% of global GDP, and some countries or regions may even be as high as 50%. Since the outbreak of COVID-19, the impact of the black Swan incident on the economy and society has attracted extensive attention from domestic and foreign scholars, who have analysed the impact of public health emergencies on the macro economy from different perspectives and paths. Studies have shown that the COVID-19 pandemic has had varying degrees of impact on economic growth, and the government's response to the pandemic largely determines the severity. In the long run, most scholars show that public health emergencies will not destroy the foundation, structure and other factors on which economic development depends, and will not have too much negative impact on the economy [1]. However, there is also literature confirming that exogenous shocks may have long-term negative impacts on the development of a city.

2.2 Medium level

Different industries and regions show significant differences when reflecting the impact of public emergencies on them [2]. Some industries with relatively concentrated personnel contact but not particularly important to residents' life will be directly impacted, but also provide development opportunities for some industries, such as the new digital industry. In addition, areas with higher levels of economic development and richer medical and health resources are less negatively affected. Sudden shocks have different effects on the capital-labor ratio of different sectors. If an emergency reduces the capital-labor ratio of a sector, the output growth rate of the sector will decrease [3]. After the outbreak of COVID-19, the stock trend of medical devices and medical supplies is a typical response to major public health emergencies. In addition, the internal characteristics of the economy will be affected by the external environment, which is mainly manifested in the different responses of the economy to the heterogeneous shock [4].

2.3 Micro level

Different families have different psychological expectations for the same public health incident, leading to different economic decisions. Because of the increased uncertainty, households are likely to respond to the crisis by severely restricting consumption levels, but there is also the possibility of desperate consumption, leading to higher consumption levels in the short term. In addition, the damage to social trust caused by public crisis incidents will destroy the public's trust in society and government, affect the operation of social order, and reduce the public's sense of security and happiness. For enterprises, major public health emergencies not only directly affect their daily production activities through the demand channel, but also have a significant impact on the supply of factors of production. Especially in the context of globalization, the COVID-19 situation is severe and complex, and the secondary crisis brought by it will further hinder the development of enterprises [5].

3 Discussion on transmission mechanism of impact of public health emergencies on economic growth

The impact of public health emergencies on China's macro, medium and micro levels has a great negative economic impact, but the specific transmission mechanism of the impact on economic growth is not clear. Following the clue that public health emergencies affect economic growth and relying on the driving factors of economic growth, this paper constructs the transmission mechanism related to economic growth, refines the two paths of element transmission mechanism and channel transmission mechanism, and discusses the impact of public health emergencies on economic growth.

3.1 Channel transmission mechanism

Public health emergencies will disrupt the normal order of politics, economy, production and life, and have a certain impact on the consumption and psychology of enterprises and residents. The government will also invest a huge amount of human and material resources for post-disaster reconstruction, which will have a certain impact on government expenditure and government trust. Different from other natural disasters, public health emergencies do not directly damage physical property such as infrastructure, so the micro losses all come from the health maintenance and behavior change of people. At the macro level, macro-economic activities in a country or a certain region cannot be carried out normally due to the pandemic, resulting in losses to specific industries and the overall economy, which will eventually affect the overall economic system.

Barro was the first economist to study health human capital at the macro level [6]. He constructed a three-sector economy including material capital, health human capital and education human capital, focusing on how health human capital can promote economic growth by affecting labor productivity [7]. Public health emergencies can have a certain degree of negative impact on the health of the workforce in the short term, but in the long run, they can help change public health habits and improve public health. With the widespread prevalence of unhealthy lifestyles and the rapid spread of young and middle-aged people, the prevalence of some infectious diseases is being affected both by the ageing of the population and by the younger onset of the disease, with implications for labor productivity. The relationship between healthy human capital and economic growth is complicated. Some scholars believe that healthy human capital can promote economic growth more effectively, while others believe that health investment may have both positive and negative effects on economic growth [8].

Socioeconomic conditions have a significant impact on residents' immediate response and post-disaster reconstruction, and those with lower incomes are more disadvantaged in comparison. Compared with the period of economic contraction, the pandemic will be more severely impacted during the economic expansion, that is, the period of high economic growth is also a relatively fragile period, and the impact will be more severe. Toya and Skidmore [9] took the annual disaster data of 151 countries from 1960 to 2003 as samples, and established regression models respectively with the data of death toll and economic loss caused by disasters. The results showed that the increase of income level could reduce the loss caused by natural disasters, and at the same time, the education level and the degree of external openness were relatively high. A better financial system and a smaller government also played a positive role in reducing disaster losses.

Air transport and tourism are two important fields that are very sensitive to public emergencies, which will bring great impact both from the actual loss level and from the psychological level [10]. Emergencies will also affect the investment field, and different investment fields will be affected differently. For example, the performance of the real estate

market deserves special attention [11]. Empirical results showed that the SARS outbreak caused a 1.6% drop in average prices for all properties. Property prices in cholera communities remain significantly different 160 years later. In addition, public health emergencies can also affect the import and export sector. With the deepening of global economy, economic cooperation among countries is becoming more and more complex. The outbreak of this health crisis increases the risk of "rupture" in the global industrial chain, which is undoubtedly frost on the snow for industries that rely on import and export. Governments at all levels will properly allocate pandemic prevention funds based on economic characteristics, turn the crisis into an opportunity, and realize strategic transformation of enterprises and industrial optimization and upgrading in the process of resuming work and production, thus promoting stable economic development and minimizing disaster losses [12].

Adequate financial resources, efficient organizations, advanced technology, and coordinated action are all crucial for governments to reduce the impact of public health emergencies. The ability to rebuild after disasters depends as much on technical and organizational constraints as on government finances [13]. Public emergencies will lead to the increase of local social demand and the impact of government expenditure. Major public emergencies will not only suddenly magnify the demand of industries related to the resumption of work and production, but also lead to an increase in government expenditure [14]. The damage to social trust caused by public health emergencies will destroy the public's trust in the society and the government, affect the orderly operation of the society, and reduce the public's happiness and security.

Public health emergencies have a significant impact on the overall social structure and promote social reform and improvement of security system. For example, due to institutional changes during SARS, the speed of economic, political, medical and social security system reform was improved, laying a stable institutional foundation for China's long-term economic development. Public health emergencies will be accompanied by the conflict between public interests and private rights, which reflects the existence of institutional problems. The COVID - 19 outbreak hit in the highlight of our country's institutional advantages at the same time, also exposed in public health pandemic prevention and control in our country, although our country has preliminarily established the emergent public health incident emergency management system, but the reality of different institutions perform effect is poor, such as rural schools of emergent public health emergency system can't effectively play a role. The fundamental reason lies in the existence of some institutional regulatory barriers.

Trust is an interactive social relation, which exists in many aspects such as economic relation, political relation and social relation, and has great capital value. When the pandemic occurs, the public will be dissatisfied with individual local governments. Especially when the pandemic begins to spread, the local governments' response is not timely enough, the information disclosure is not accurate enough, and the spread of various false information is constantly consuming the trust capital among economic entities. The weakening of social trust hinders the circulation of social resources, which leads to the failure of the social system to play its due social function and is not conducive to the establishment of government credibility. The lower the level of trust, the greater the damage to the economy and society. The government's discursive response has a significant positive impact on the public cognitive bias, thus aggravating the degree of public cognitive bias. However, the government's action response has a significant negative impact on public cognitive bias, which can significantly reduce the degree of public cognitive bias. The practice shows that the substantial punishment to the trusted person can often achieve more positive trust repair effect [15]. There is a positive correlation between government self-inspection and regulation and social trust after public health emergencies.

3.2 Factor transmission mechanism

The mainstream framework of economic growth was focused on from capital accumulation, human capital and exogenous technological progress, to endogenous technological progress and policies that affect technological progress, and to spatial factors that affect long-term economic growth. The impact of major public health emergencies on economic growth is also transmitted through factors of production [16]. Due to the significant improvement of globalization and urbanization rate, the popularization of global transportation network and social network has greatly promoted the large-scale and rapid flow of personnel and factors within cities, between cities, between regions and across countries. This paper will sort out the transmission mechanism of public health emergencies affecting economic growth for different factors of production.

Capital factor is the first factor that affects economic growth. Rapid economic development depends on the rapid growth of the capital stock [17]. Public health shocks affect physical capital accumulation by crowding out other fiscal expenditures or affecting investment, and then impact economic growth [18]. In addition, as uncertainty increases, investors such as individuals and businesses will reduce their investment activities when they do not receive sufficient market signals. But in the long term, the impact of health emergency shocked on capital investment is uncertain. The impact of major public health emergencies just reflects the shortcomings of local governments in social governance, health facilities and emergency response capacity. Therefore, the impact of public health emergencies may lead to a rapid increase in capital accumulation in some areas, shaping the external environment for economic development and leading economic development.

Human capital factor is the second factor that affects economic growth. From the perspective of labor supply, the impact of public health emergencies on human capital is reflected in two aspects: first, the sudden impact may affect the number of workers, the carrier of human capital. When the pandemic breaks out, a large number of people will be quarantined or treated. Even healthy workers who have not been infected will be forced to travel less because of the pandemic, further reducing the supply of workers. Second, sudden shocks may have an impact on education. According to UNESCO (United Nations Educational, Scientific, and Cultural Organization), as of 17 March 2020, 850 million children and adolescents around the world have been suspended from school because of COVID-19, about half of the global total, and this number is expected to continue to grow [19]. In addition, public health emergencies restrict the daily operation of enterprises, and enterprises tend to hire temporary workers to replace regular employees to reduce production costs, which will lead to a large number of unemployed labor force and increase social instability factors [20].

Technological factor is the third factor that affects economic growth. Sudden shocks may promote or hinder technological progress or change the external environment of technological innovation. For developing countries, sudden shocks have a negative impact on technology spillover in foreign trade. In the face of the impact of emergencies, the importance of technology is increasingly obvious. The tech sector has been less affected than labor-intensive industries, and the pandemic has even created opportunities for early-stage growth tracks, especially for technology-based industries such as online education, telecommuting and internet health care, which are in the early stages of business development. In the long term, the pandemic will inevitably force industrial transformation and upgrading to optimize China's industrial structure and promote long-term economic development.

Space factor is the fourth factor that affects economic growth. Public health emergency impacts not only directly affect industrial and regional development, but also further affect economic growth through spatial spillover, it is mainly reflected in the restricted flow of personnel, reduced timeliness of logistics, and sharp decline in demand. To be specific, different local governments have adopted different levels of emergency and pandemic

prevention measures, which has increased the cost of inter-regional movement and greatly reduced logistics and transportation capacity. The flow of products and factors is crucial for the survival of enterprises. However, in the face of public health emergencies, the policies of provinces and countries are different, and cross-border transportation has a great impact on enterprises, which also brings great pressure for survival. When a region suffers sudden shocks, it will further cause changes in the scale of consumption and investment in related regions, leading to further economic decline. No matter the spread of the pandemic, government prevention and control policies or economic and social risks, there are strong spatial spillover effects at multiple scales [21].

4 The regulatory role and means of government emergency response

In the face of any crisis, government has two equally important responsibilities: Solve the problem at hand and prevent it from happening again. The government plays an extremely important role in dealing with public emergencies. The current global spread of COVID-19 is a public crisis that needs to be addressed urgently. With the rapid development of economy and society, various uncertain factors have soared, and economic and social levels have become complex and diverse. Especially in recent years, public security incidents have occurred continuously, such as social security accidents. In the Internet era, the speed of information dissemination is accelerated, causing a certain degree of influence on social emotions. With the devolution, the governance of the local government plays a leading role in dealing with public crisis, required the government to improve the ability of disaster warning beforehand, rapid response ability and disaster recovery ability, to the fastest speed to eliminate the crisis, ensure the safety of residents' lives and property to the maximum extent and economic and social activities to the normal track.

After the outbreak of COVID-19, more and more scholars began to realize the decisive role of government as a main body in resolving major urban crises. On the one hand, the improvement of government governance capacity can effectively deal with the direct impact of sudden public health crisis, significant intervention on public health can effectively control the spread of COVID-19. Strict lockdown, social isolation, faster detection speed, government stimulus policies and faster intervention and implementation can effectively suppress the spread of COVID-19 and to counter its negative impact on the economy and society. The speed and intensity of the government's response to the pandemic determines the negative impact of public health emergencies on the economy and society. On the other hand, there could be indirect beneficial economic effects through the channel of reducing the number of confirmed cases. Ashraf used daily data of 77 countries from January 22, 2020 to April 17, 2020 to analyse the impact of government intervention on the stock market to test the expected economic impact of government actions, and found that social policies announced by the government (such as home quarantine, closing of public places, etc.) had a direct negative impact on the stock market. Preferential policies have brought positive market reactions to a large extent. Feng also verified that effective government intervention reduced the fluctuation of exchange rate market.

Up to now, the whole country is in the stage of normal pandemic prevention and control. The situation abroad is not optimistic, and there are still small-scale outbreaks in China. Most virologists in the world believe that the virus will not disappear in a short period of time. In addition, to maximize the integration of all levels of government resources and strength, in the limited and the shortest possible time to effectively cope with public health emergencies, and establish a good cooperation mechanism, emergency management as a whole the related materials reserves, do zone linkage, maximum limit to control the outbreak scale minimum range, reduce the negative impact on the economic and social disease.

5 Conclusions

In this paper, the transmission mechanism of major public health emergencies on economic growth is sorted out, and the research is carried out from channel and factor perspective. There are still problems that need further discussion and supplementary research in the future: First, the existing research about the impact of public health emergency on economic growth focus mostly around the whole macro economy, and the research of micro family and industry medium subject related study is less. Therefore, micro theories can be introduced to further analyse the economic consequences of public health emergencies. Second, from the perspective of the impact mechanism of public health emergency on economic growth, in the past were independent incidents, making it difficult to conduct comparative analysis and research on policy intervention. In the context of rapid population movement and pandemic spread across the world, there is room for comparison and quantitative policy exploration in the emergency management capacity and policies of different local governments. Therefore, it is particularly important and urgent to study the transmission mechanism of public health emergencies from the dimension of dynamic tracking. Third, the government's emergency response measures play a leading role in dealing with the pandemic, which can reduce and eliminate the crisis in the fastest speed. Disaster warning ability, rapid response ability and post-disaster recovery ability are closely related to the efficiency of inter-departmental linkage and coordination, and ultimately restore the economic and social operation to the normal track.

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