

The Impact of the Pandemic on Chinese Economy

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ABSTRACT

The COVID-19 outbreak is an unprecedented and unexpected event in Wuhan, China, in Jan 2020. This fast-spreading influenza disease has great influence on the Chinese economy. This paper explores the impact of the COVID-19, distinguishing these as impacts on the economy's demand and supply sides. For the demand side, the pandemic greatly depresses consumption, investment, government expenditure and exports. A short-term IS-LM model shows the immediate slowdown of the economic activities due to the impacts. Meanwhile, the economy's supply side is largely affected when people are physically restrained, and the pandemic will lead to a 15.6% loss in labour. Although telecommuting is widely adopted, the effect of such practice is limited. In addition, rising costs of production in many industries also took place during the pandemic.

Keywords: Covid-19, Chinese economy, IS-LM model, economic shocks

1. INTRODUCTION

The COVID-19 pandemic is at first diagnosed in December 2019 in Wuhan, China. The pandemic is highly contagious, causing respiratory illness ranging from mild symptoms to severe disease. And it soon spread around the world. However, the impact of the COVID-19 is far from merely physical damages, it also inflicts significant distortions on individuals' economic life and economies' productions. Many governments formulate policies to confront the various impacts brought by the pandemic. According to the National Bureau of Statistics of China, the GDP growth rate slowed down by 6.8% in 2020 Q1 [1]. The Chinese authorities adopt expansionary fiscal and monetary policies to stimulate the Chinese economy. The government also settles the quarantine policy and a lock-down schedule to ensure the economy will recover its production during the pandemic. This paper explores the impacts of the COVID-19, distinguishing these as impacts on the economy's demand side and supply side. For the demand side, the pandemic significantly depressed the consumption, investment, government expenditure and exporting of Chinese economy. And the short-term IS-LM model is used to show the immediate slowdown of the economic activities. The IS-LM model is a Keynesian macroeconomic model developed by John Hicks in 1936. It illustrates the short-term equilibrium

between the market for real goods and the financial market, which results in a balanced real interest rate and gives us the total output. The model hence provides a grasp of how the pandemic affects the economy with the perspective of the real output. Meanwhile, this paper also finds the economy's supply side being primarily affected when people are physically restrained. This will cause a 15.6% loss in labour. Although telecommuting is widely adopted, the effect of such practice is limited. In addition, rising costs of production in many industries also took place during the pandemic.

2. THE IMPACTS ON THE DEMAND SIDE

In order to clarify the overall changes in the demand side of the Chinese economy during the pandemic, this paper uses the idea from the IS-LM curve to illustrate how the four different perspectives in the IS curve, namely consumption, investment, government spending, and export, are affected by the COVID-19. During the discussion, this paper assumes the LM curve to be constant as the real interest rate is pinned down by the policy rate.

2.1 Consumption

In general, fear of the coronavirus reduces consumer demand in China, as the consumption per capita in 2020 Q1 decreased by 12.5%, according to the National Bureau

of Statistics of China. Although the adverse demand shock on consumption tends to be more serious in areas with severe pandemic conditions like Wuhan, the psychological shock ripples around the country affecting people's consumption in the whole economy just like the SARS in 2003 that Jong-Wha Lee and Warwick Mckibbin suggest the disease caused a national wide panic, and it distorted people's economic life [2]. The shrink in citizens' consumption is especially significant in entertainment, travel, and retail sales services. As people have to stay at their homes, the consumption changes in the three industries are -36.13%, -17.01%, and -11.28%, respectively, according to [2]. Another factor attributed to the decline in consumption is the decrease in the general income brought by cash-flow problems within the economy. The decline in income also results from a lower disposable operating income within the economy. Because the pandemic soon leads to the shutdown of operation by many enterprises and factories. Even more, revenue is forgone as the local authorities further prolong the time for workers returning to work to constrain the pandemic, during which many firms encounter financial difficulties while some small businesses choose to close down.

$$C_t = C_d(Y_t, T, Y_{t+1}, r_t) \quad (1)$$

Consumption is assumed to be positively related to the disposable income at the current period and the period ahead. It is negatively related to the real interest rate. At the outbreak of the COVID-19, an individual's marginal propensity to consume drops. Disposable income declines, and so does the expected future income, given that the pandemic and the quarantine policy last for a long time with several resurgences. The consumption within the economy therefore decreases.

At the same time, there is a shift in consumption habits. As Li Zhimeng and Sheng Fangfu discovered, during the pandemic, the consumption related to providing a guarantee for the fight against the pandemic increases largely, and the development of structural change within the economy is encouraged [3]. While consumption in catering, tourism, transportation, and off-line retail industries decline dramatically, the consumption of health products soars. At the same time, the demand for sports, fitness products, and insurance increased as people became more aware of health. Moreover, a report by Deloitte discloses that contactless economic activities compensated for the decrease in conventional consumption during the pandemic to some extent and made the economy under COVID-19 different from the precedent epidemics [4]. The most obvious example is the boom in fresh food orders on e-commerce platforms. It is shown by the data on QuestMobile that Chinese fresh food e-commerce applications received more than 10 million Daily Active Users during the outbreak of the pandemic [5]. Other evidence can be

found in areas like restaurant delivery, online shopping, virtual classrooms.

2.2 Investment

The pandemic suppressed the investment in several ways. The temporary shut-down of intensive contact firms and business cuts the economy's output and the need for investment. The quarantine policy slows down the flow of workers, goods and capital. The return on investment drops. Moreover, uncertainty about the resurgence of the pandemic further discourages investments. These effects threaten domestic and foreign investors. In the studies of Hu Bin's team and Wu Feng's team, they both derived an increase in the risk premium and a decrease in the investment within the economy [6] [7].

$$I_t = I_d(Y_t, r_t, x) \quad (2)$$

Investment is assumed to be positively related to the total output but negatively related to the real interest rate and the risk premium. As the aggregate output declines, risk premium rockets, the investment in the economy decreases consequently.

2.3 Government Spending

A depressed economy can also discourage government expenditure. According to the Ministry of Finance of the People's Republic of China, in the first quarter of 2020, expenditure in the national general public budget decreased by 5.7%. The return on government expenditure would be disappointing when the pandemic constrains economic activity. For example, there seems to be less government spending on entertainment and construction when people are stuck at home. The gloomy prospect of the pandemic and the great uncertainty about the future economy also deterred the government from allocating more resources to programs like community construction, transportation, culture, tourism, sports and media.

At the same time, the Chinese government plays a vital role in the national scale of disease prevention and treatment. The government pays for the treatment bill so that the treatment is free for all citizens when he/she is diagnosed as infected by COVID-19. The Chinese government also subsidized the equipment and facilities needed by hospitals and medical staff, and it funded the construction of capsule hospitals.

The statements above explain the change in government expenditure in the first half of 2020. The government cut its expenditure on all of its programs, with only two exceptions as shown in Table 1: interest on government debt and sanitation & health. The former is because of the previous government expenditure decisions; the latter is due to the pandemic.

Table 1. the change in government expenditure in 2020H1 [8].

| Program | % Change in expenditure | Program | % Change in expenditure |
|------------------------------------|-------------------------|--|-------------------------|
| Education | -7.1 | Energy conservation and environmental protection | -15.1 |
| Science and technology | -26.4 | Constructing communities in city and rural areas | -22.36 |
| Social welfare and employment | -0.7 | Water supply in rural areas | -3.6 |
| Culture, tourism, sports and media | -8.9 | transportation | -16.5 |
| Sanitation and health | +4.8 | Interest on government debt | +4.6 |

2.4 Export

Export in China is also negatively affected by the COVID-19. Firstly, as the pandemic broke out in January 2020, export orders of many Chinese exporting firms were cancelled. In a study conducted by Li Jie and Wang Na, they suggest the decrease in export is either because the demand from foreign customers declined during the pandemic or since Chinese firms cannot complete the orders on time [9]. Many exporting firms shut down their production during the quarantine and thus could not produce the required amount. Secondly, those shutdown firms also included many multinational logistics companies like DHL and FEDEX. They returned to work much later than many manufacturing firms, and they operated in a much smaller capacity even after returning to work. These conditions made it impossible for

domestic firms in China to transport their product to their customers.

During the pandemic outbreak, the decrease in disposable income leads to a decline in consumption—the fear and uncertainty result in a smaller marginal propensity to consume but a higher risk premium. Though broadly expanding on the medical program, the government expenditure decreased in general due to the uncertainty about the future and the constrain of the pandemic. Finally, export decreases due to both domestic and foreign conditions. These give us a decrease in the real output under the COVID-19. As shown in Figure 1, the IS curve under COVID-19 shifts downward, which result in a reduction in the equilibrium output (See Figure 1).

$$IS: Y_t = C_t + I_t + G_t + X_t - M_t \quad (3)$$

$$LM: r = r_{policy\ rate} \quad (4)$$

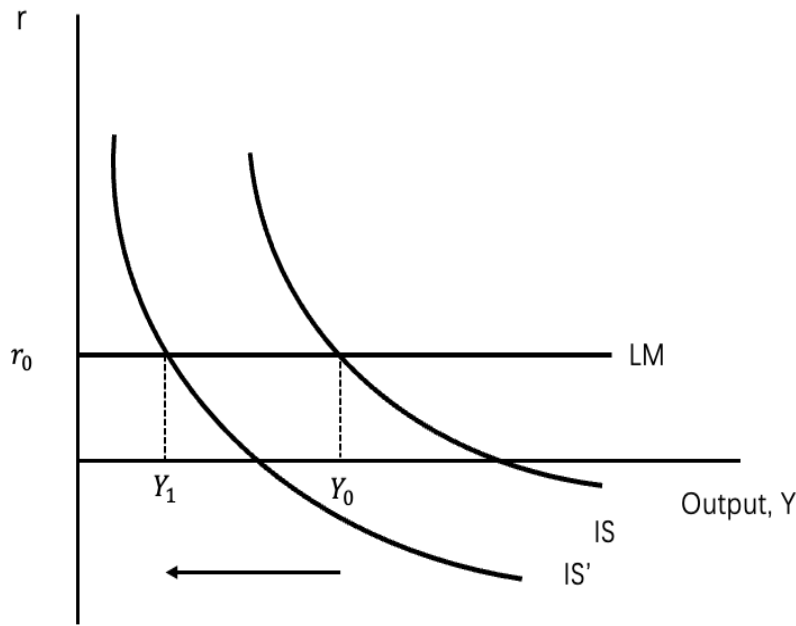


Figure 1. the demand shock on Chinese economy illustrated by an IS-LM model.

3. THE IMPACTS ON THE SUPPLY SIDE

The impact on the economy's supply-side by the COVID-19 is mainly through its impact on the supply of labour. Because the virus can cause physical illness and mental unease, workers who are infected will find themselves unfitted to work; others may change their employment decisions. Other effects the pandemic brings can be found in the change in production in several industries due to telecommuting and other more flexible working practices. The extent of change in productivity largely depends on the efficiency of the practice of telecommuting. In addition, the pandemic also raised the cost for firms.

3.1 Loss in labour

As defined by the classic Grossman (1972) [10], health is input in one of the forms of human capital, determining the person's labour market proposition and efficiency in the labour market. This definition corresponds to our finding on the loss of labour during the pandemic outbreak using an approach based on the conventional approach of exploring the influence of an infectious disease. The conventional approach focuses on the mortality and morbidity implication and estimates the loss of future income due to early death and temporary

disability. However, since the COVID-19 is highly transmissible without rigorous collective restrictions imposed by the government, i.e. quarantine, the conventional approach is thus limited to grasp the disruption the pandemic brings to people's working life. One adjustment that could help explore its impact on the labour supply is to include the effect of quarantine.

This paper recognizes that the labour supply of different economic sectors is mainly through two channels. The first one is through infection, and the second one is through quarantine policy. After that, the aggregate effect can be derived by summing up each sector. The equation below summarises the percentage loss in labour supply during the initial outbreak of the pandemic in China. It includes both the fraction of loss in labour supply as the consequences of people hurt by the virus and people who stay healthy but have to stay at home under the government's quarantine policy. The two parts are mutually independent since theoretically, people cannot get infected after everyone stays at their own house, assuming no family member is infected in the first place.

$$L_i = \left[\frac{t}{T} (1 - Infect_i) \times Ne_i + Infect_i \times Ne_i \right] \times \frac{1}{Ne_i} \times 100\% \quad (5)$$

Table 2. the annotation of the letters in the equation.

| | |
|------------|-------------------------------------|
| L_i | the loss of labour in sector i |
| T | the total length of the examination |
| t | the length of the quarantine |
| $Infect_i$ | the infection rate |
| Ne_i | the infection rate |

Table 2 indicates that T is set to be three months since China is mainly affected by the pandemic during the first quarter of 2020. The quarantine time t lasts for 14 days, according to the quarantine policy of China. This paper also assumes the difference in the infection rate of the component industries in each sector to be ignorable, which is not the case in reality. For example, some labour-intensive industries like the textile industry in China are exposed to a higher possibility of infection than highly mechanized industries. In addition, the two reasons for the absentees of labour are not the whole picture. For example, Warwick McKibbin and Alexandra Sidorenko also consider people who are absent from work to take care of their family members, like mothers who need to take care of the infected children [11].

The number of COVID-19 cases in different provinces of China at the end of 2020Q1 is used to find the infection rate. This paper categorizes different provinces by their leading economic sector. Therefore, as shown in Table 3, we can get the infection rate by taking an average of the rate of cases over the province's total population whose leading economic sector is primary or secondary or tertiary. This paper also reduces the effect on infection rate by the geological distance from one

province to Wuhan, where COVID-19 breakouts from through eliminating Wuhan and its neighbouring provinces from our observation and excluding some isolated provinces.

Our result shows that the loss of labour for the first quarter of 2020 in China is in total 15.56% (See Table 4). Although a significant difference in the infection rates for each sector is found, the percentage loss of labour does not vary much among the three sectors. This result suggests that the impact of the COVID-19 pandemic on the supply side of the Chinese economy is primarily due to the government's decisive quarantine policy, which restrains the economy's production as workers have to stay at home. This finding to some extent agrees with Kilbourne's insist that absenteeism, together with other reasons, are the principal impact [12].

However, this result is not the same as saying abandoning quarantine policy would lead to a fewer losses on the economy's production. Because it is reasonable to assume that the consequently jump in the infection rate could also limit the labour supply. The physical damage it brings can only last for even longer, leading to more workers being affected by the virus.

Table 3. the average infection rate of different sectors.

| | primary | secondary | tertiary |
|--|--|------------------------------------|--|
| Representative provinces | Shandong, Henan, Sichuan, Heilongjiang | Fujian, Jiangsu, Liaoning, Tianjin | Beijing, Shanghai, Guangdong, Zhejiang |
| Average infection rate | 0.0010564546% | 0.0007940887% | 0.0019654750% |
| $\frac{Ne_i}{\text{total employment}}$ | 23.60% | 28.70% | 47.70% |

Table 4. the loss in labour in different sectors.

| Sector | primary | secondary | tertiary | (weighted) total |
|------------------------------------|--------------|-------------|-------------|------------------|
| Loss in labour due to infection % | 0.001056455 | 0.000794089 | 0.001965475 | 0.000141 |
| Loss in labour due to quarantine % | 15.55539122 | 15.55543203 | 15.55524981 | 15.55534 |
| Total Loss of labour % | 15.555644767 | 15.55622612 | 15.55721529 | 15.55656 |

In order to avoid getting an overestimated infection rate by the geological distance from one province to Wuhan where COVID-19 breakouts from, this paper eliminates Wuhan and its neighbouring provinces from our observation, together with excluding some isolated provinces.

In McKibbin's works, infection rates are taken from the scenarios of three influenzas, namely: Hong Kong flu, Asian flu and Spanish flu [11]. Nevertheless, this paper

chooses to use the real-life data of the Chinese COVID-19 case is to give a representative measurement that suits China under the pandemic. Unlike the relatively large attract rate and morbidity rate used in McKibbin's work, which ranges from 10% to 40% [11], the infection rate here is significantly low. The low infection rate is primarily because the local government announced the quarantine policy soon after the COVID-19 breakouts. This also justifies our formula, which separated the effect

of the pandemic on labour into physical damage and political regulation. Using the morbidity rate without quarantine (i.e. 10% to 40%) may sacrifice accuracy as it cannot include the loss in labour due to quarantine because some fraction of the infected patient would not have been infected under quarantine policy.

3.2 Telecommuting

One trend during the pandemic was that many people used telecommuting to do their job rather than going to the office. In China, the use of WFH (work-from-home) practice fulfilled some of the gaps in production within some industries of the manufacturing and tertiary sector. According to a report in 2020 of HR research centre of “51job”, a Chinese HR resource consulting company, among all the industries that practised telecommuting, 25% are from machine building and electronic manufacturing industry; 13.4% are from the computer and communication industry; 11.6% are from the internet industry; and 10.7% from FMCG industry [13].

However, whether this trend of telecommuting has a significant effect on the economy’s production is subject to doubt. Firstly, it can be proved that WFH does not bring profound change to the way of production. Only 23.2% of the firms allowed their employees to work from home after the pandemic got controlled. Most Chinese companies only regard telecommuting as an auxiliary practice adopted under emergency. Secondly, the efficiency of telecommuting is controversial. On the one hand, a report about the 1,004 full-time employees of Airtasker, a gig economy platform, in 2019 suggests that remote workers work 1.4 more days every year and take fewer breaks every day; meanwhile, they are less likely to avoid a task [14]. Furthermore, according to the finding from the Office for National Statistics (ONS), WFH has been overwhelmingly embraced by workers in some areas, saying they feel they have a better work-life balance [15]. However, on the other hand, the report of 51job shows that whilst 2/5 of the interviewees say their efficiency stays the same no matter they are working in the office or at home, about 1/3 of the interviewees say they are feeling a lack of security and isolated from the company and colleagues [12]. In another research in the UK, A quarter of Londoners said their well-being has “suffered WFH and feel they have received fewer perks than workers in other regions.” [16].

3.3 Increased in cost burden

Another shock to Chinese firms is the rise in operating costs. Li Mengbo’s study explained the reason for the rising cost [17]. During the pandemic, firms need to make an extra payment on storing material and inventory goods, production equipment and office facilities. They also need to pay the rent and bills regularly. In addition, firms have to bear high labour

costs even if they temporarily shut down their operation, as the firms are obliged to pay and support their workers during the pandemic. Moreover, there are also costs incurred after workers return to work, including purchasing virus prevention appliances like disposable masks, gloves and disinfectants. These all enlarge firms’ cost burden during the pandemic.

Li Mengbo suggests, in the first two months of 2020, the average cost of each 100RMB revenue of an enterprise above designated size in China is 94.19RMB, reaching the highest level in many years. For small or medium-sized firms, their cost becomes even larger concerning their smaller revenue [17].

4. CONCLUSION

In conclusion, the impact of the outbreak of the pandemic is mainly negative and profound. The impact can be found both on the demand side and the supply side. Furthermore, the three economic sectors all experienced adverse shocks. The pandemic significantly depressed the consumption, investment, government expenditure, and exporting within the Chinese economy for the demand side. The IS-LM model shows a decrease in overall economic output when the pandemic causes an immediate slowdown of economic activities. Meanwhile, this paper also finds the economy’s supply-side being primarily affected when people are stuck at home. This will cause a 15.6% loss in labour. Although telecommuting is widely adopted, the effect of such practice is controversial. In addition, rising costs of production in many industries also took place during the pandemic because of firms’ obligation to pay for their storage, rent, bills, wages and virus-prevention appliances.

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