Analysis of The Social Economic Impact of Epidemic Shocks -- Based on DID Model

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Abstract

This paper analyzes the economic impact of the epidemic in terms of the number of new confirmed cases of coronary pneumonia in 31 provinces in the first quarter of 2020, and draws some conclusions. This paper collects data on economic indicators for 2019 and the first quarter of 2020, as well as data on the epidemic in the first three months of 2020 for 31 provinces. First, based on the epidemic data, the number of confirmed cases was used to represent the severity of the epidemic, and it was found that the epidemic went through a latent period, an outbreak period until March, when the growth rate of the number of confirmed cases gradually slowed down. Second, the descriptive statistical analysis of various economic indicators in the first quarter of 2020 revealed that most of the national economic indicators in the first quarter showed a downward trend, especially in the secondary industry, the restaurant industry, and the accommodation industry. However, there are a few industries with growth trends, such as information technology service industry. And a t-test of two pairs of samples of economic indicators for each month in the first quarter of 2019 and 2020 shows that the epidemic shock has a significant impact on the economy of each industry, especially the transportation and catering industries, while causing the national urban unemployment rate to rise to 20%. Finally, a double difference model was used to model the consumer price index, industrial value added and real estate investment with the occurrence of the epidemic and in Hubei province. The results of the analysis show that the occurrence of the epidemic caused significant changes in industrial value added and consumer price index, and the impact was more severe for Hubei Province, which is at the center of the epidemic, indicating that the more severe the epidemic, the greater the economic impact on the region. As for real estate investment, it is slightly lower than in 2019, but it may affect the progress of real estate construction at a later stage. According to the general analysis of the economic situation under the epidemic, the epidemic caused serious losses to industries that depend on the movement of people, while industries that depend on networks, such as information technology, grew. A comparison of economic indicators for the same period before and after the outbreak in 2019 and 2020 shows that the absence of the epidemic has a significant impact on the economy and that the extent of this impact is highly dependent on the severity of the epidemic.

Keywords

COVID-19; DID Model; Two Paired Samples T Test.

1. INTRODUCTION

The sudden outbreak of the new crown epidemic took everyone by surprise, and the massive movement of people during the Spring Festival accelerated the spread of the epidemic. The epidemic had a double impact on the safety of people's lives and economic development, and

was a major public health emergency with the fastest spread, the largest scope of infection and the greatest difficulty in prevention and control since the founding of New China.

Since the founding of New China, the last major outbreak of public health emergencies was the SARS epidemic in 2003. The new crown pneumonia outbreak was in the Wuhan area, most affected in Hubei, followed by Guangdong and Zhejiang, where population movement is high. And the outbreak coincided with the Spring Festival, the peak of population movement in the country, which had the most serious impact on passenger transportation, shipping and other industries. The prevention and control of the epidemic required the population to avoid large-scale movements and gatherings and isolate for prevention and control, thus significantly reducing consumer demand. The WHO recognized the outbreak as a Public Health Emergency International (PHEIC), and although travel and trade restrictions are not recommended, exports may still be significantly affected. 2019 Spring Festival Box Office 5.859 billion, the box office of the Spring Festival in 2020 granular. 2019 New Year's Eve to the sixth day of the first month (February 4 to 10), the national retail and catering enterprises to achieve sales of about 100.5 billion yuan, the same period in 2020 severely damaged. 2019 Spring Festival holiday, the total number of 415 million people received by the national tourism, to achieve tourism revenue 513.9 billion yuan, the same period in 2020 sharply reduced. The transportation industry is expected to reduce nearly 50% of the number of trips during the Spring Festival. The real estate industry suspended sales activities and delayed resumption of investment. Construction, finance, agriculture, forestry and fishery industries are affected. Private enterprises, small and micro enterprises, flexible pay system employees, and migrant workers are more damaged. Because of the epidemic during the promotion of no party, the first day of the New Year, the King of Glory single-day flow of water, close to 2 billion yuan; because of the cancellation of various New Year activities, Wuhan "Vulcan Mountain" hospital construction site live video, the number of online viewers more than 10 million. From these details, we can roughly feel that the epidemic has brought crisis to many industries, but the emerging information industry has developed a lot as a result.

2. METHODOLOGY

2.1. Paired-sample t-test Theory

Paired data means that the sample sizes of two samples are equal and there is no difference between the two samples other than the mean value. It is generally used to compare the effects of two different treatments given to uniform study subjects (over two paired subjects) separately, and to compare the effects of the same study subject (or two paired subjects) before and after treatment. Let $X_1, X_2, X_3, \cdots, X_n$ is the sample from the population X, $Y_1, Y_2, Y_3, \cdots, Y_n$ is the sample from the population Y, define $Z_i = X_i - Y_i (i = 1, 2, 3, \cdots, n), \mu = \mu_1 - \mu_2,\ \sigma^2 = \sigma_1^2 + \sigma_2^2$, then $Z_1, Z_2, Z_3, \cdots, Z_n$ is the sample from the population $Z \sim N(\mu, \sigma^2)$. At this point, the test problem of μ_1 and μ_2 is equivalent to the test problem of μ. Therefore, the hypothesis testing problem is known from the hypothesis testing of the single-normal overall mean as follow.

(1) $H_0: \mu_1 = \mu_2\ vs.\ H_1: \mu_1 \neq \mu_2 \Leftrightarrow H_0: \mu = 0\ vs.\ H_1: \mu \neq 0$

(Bilateral hypothesis testing)

(2) $H_0: \mu_1 \leq \mu_2\ vs.\ H_1: \mu_1 > \mu_2 \Leftrightarrow H_0: \mu \leq 0\ vs. H_1: \mu > 0$

(one-sided hypothesis test)

(3) $H_0: \mu_1 \geq \mu_2\ vs.\ H_1: \mu_1 < \mu_2 \Leftrightarrow H_0: \mu \geq 0\ vs.\ H_1: \mu < 0$

(one-sided hypothesis test)

Then construct the statistics t:

$$t = \frac{\bar{z}}{S_z / \sqrt{n-1}} \sim t(n-1) \tag{1}$$

Based on the calculated statistics values t, the corresponding P values are derived. If the P value is less than the significance level α, the original hypothesis is rejected, that is, the two sample means are considered to be significantly different; otherwise, the two sample means are not considered to be significantly different.

2.2. Difference-in-Differences Model

The Difference-in-Differences method, also known as the DID method, is an econometric method for estimating causal effects and is generally used mostly for policy analysis. the basic idea of the DID model is to divide the entire sample data into two groups, one group affected by the policy, called the treatment group, and one group not affected by the policy, called the control group. An individual indicator to be considered is selected and differenced twice before and after to finally obtain the net effect of the policy implementation. the DID model implicitly assumes the so-called common trend: if the treatment group does not receive treatment, the same change as the control group occurs. The treatment group would have received the treatment, so this is a counterfactual assumption.

Assuming that an exogenous shock is generated at the time t_1, we can obtain data for the time of t_1 and t_2. As shown in the figure below, a typical model would measure the effect of the shock by the difference $Y(t) - Y(c)$ between the dependent variable in the experimental group and the dependent variable in the control group, but obviously this is not reasonable. This is because the study variables are affected by exogenous shocks as well as by other factors. In the figure, there is a shock to time as an exogenous variable. On the whole, there is a tendency to Y decrease with t. The effect of the shock alone may be overestimated if the effect of t is not removed.
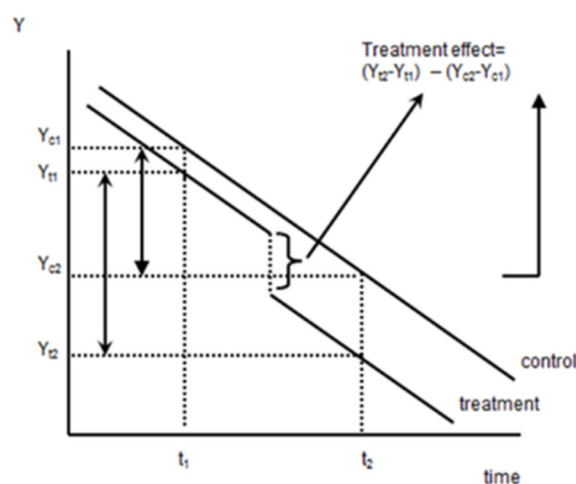

Figure 2. Schematic diagram of DID model

There are multiple reasons why a certain indicator of a region changes over time and may be influenced by various factors. Removing the influencing factors one by one to get the net effect of the impact of a certain change is the purpose of the DID model. In building the model, two dummy variables are needed, $D_1 = 1$ for the treatment group, $D_1 = 0$ for the control group, $D_2 = 1$ for after change, and $D_2 = 0$ for after change, to build the model as follow.

$$Y_i = a_0 + a_1 D_{1i} + a_2 D_{2i} + a_3 D_{1i} D_{2i} + \varepsilon_i \tag{2}$$

Where i represents the province, Y represents the dependent variable indicator of the study, parameter a_0 represents the initial mean value common to the treatment and control groups before the change, a_1 represents the initial difference between the treatment and control groups before the change, a_2 represents the change that occurs before and after the change due to the co-occurrence of the treatment and control groups, that is, the common trend, a_3 represents the additional change in the effect of the treatment group after controlling for the initial difference and the common trend.

3. RESULTS AND DISCUSSION

In this paper, we mainly consider the time period when the epidemic situation is more severe. The historical epidemic data of 31 provinces in China are downloaded from Github website, the time range is from December 1, 2019 to March 31, 2020, a total of 121 days, and the indicators include: date, province, provinceCode, confirmed, suspected, cured, and dead. accordingly, the historical epidemic data from the National Bureau of Statistics (NBS) to download relevant data for analysis, mainly monthly data from 31 provinces, quarterly data from the whole country, and the main indicators include transportation category, retail category, etc.

3.1. Analysis of the Epidemic and Economic Situation

Historical epidemic data from 31 provinces and cities, mainly the number of confirmed patients, were used to measure the severity of the epidemic nationwide. First, the daily number of confirmed patients in each province was summed to pair reflect the national number of suspected suspected patients, and the following line graph as shown in Figure 1 is drawn to reflect the change in the number of confirmed patients nationwide.
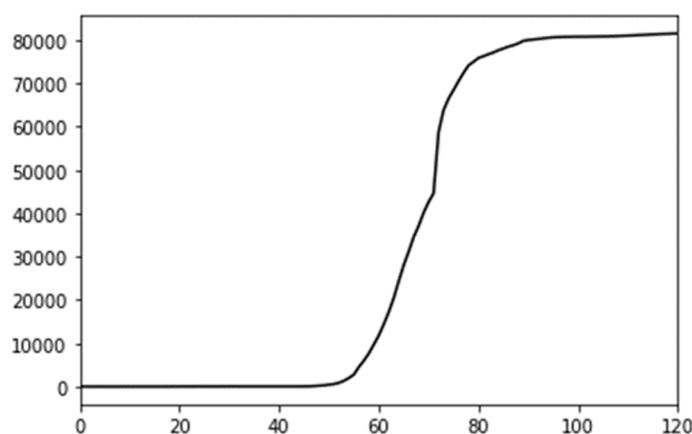

Figure 1. Graph of the change in the number of confirmed diagnoses nationwide from December 1, 2019 to March 31, 2020

As can be seen from the graph above, the number of confirmed cases of New Coronary Pneumonia nationwide follows an S-shaped curve, with the number of confirmed cases remaining level during the period 0-50 days, indicating that in December 2019 the epidemic does not cause much concern and has essentially no impact on the economy and society. Until mid-January 2020, the growth rate of the number of confirmed cases increases rapidly, and this phenomenon continues until the 90-day mark, that is, until March 2020, indicating that this is the period with the greatest impact on the economy and people's lives. Thereafter the growth

rate decreases, but there is still a slow increase, indicating that the epidemic is under control to some extent, but it still has some impact on daily life and work.

According to the research related to the impact of SARS on China's economy, it can be seen that the impact of the epidemic on China's economy includes both negative and positive effects. Structurally, the sectors that are negatively affected are mainly tourism, catering, transportation (including road passenger transport, railroad passenger transport, air passenger transport, air cargo, and road cargo), and commerce; the sectors that have a positive impact are mainly health services, alcohol and beverage alcohol manufacturing, public utilities, residential services, pharmaceutical manufacturing, etc.In this paper, descriptive statistical analysis is conducted by analyzing the GDP, value added of primary industry, value added of secondary industry, value added of tertiary industry and other related indicators in the first quarter of 2020 and comparing them with the relevant data in the first quarter of 2019. The specific data are shown in Table 1.

Table 1. Relevant economic indicators for 2019 and the first quarter of 2020

Indicators(billion yuan)	First quarter of 2020	First quarter of 2019
Gross domestic product quarterly value	206504.3	218062.8
Value added of primary industry for the quarter	10186.2	8769.4
Value added of secondary industry	73638	81806.5
Value added of tertiary industry	122680.1	127486.9
Quarterly value of added value of agriculture, forestry, animal husbandry and fishery	10708.4	9249.4
Industrial value added for the quarter	64642	71064.5
Manufacturing value added for the quarter	53852	60357.1
Construction value added for the quarter	9377.8	11143.1
Wholesale and retail trade value added for the quarter	18749.6	21959.2
Transportation, storage and postal industry value added for the quarter	7865.1	9386.6
Quarterly value added in the accommodation and catering industry	2820.9	4234.9
Financial industry value added for the quarter	21346.8	19650.1
Real estate industry added value for the quarter	15268.3	15979.2
Information transmission, software and information technology services value added for the quarter	8928	8424.8
Rental and business services value added for the quarter	7137.9	7665.1
Value added of other industries in the quarter	39659.6	39306

Relevant descriptive statistical analysis was performed on the above data to calculate the amount of change in value added of the relevant industries before and after the outbreak. First, the year-on-year growth rate of each industry was calculated. Among them, the year-on-year growth rates of value added in the primary industry, value added in agriculture, forestry, animal husbandry and fishery, value added in finance, value added in other industries, and value added in information transmission, software and information technology services are greater than one, indicating a trend of growth in these industries in the first quarter of 2020 relative to the value added in the first quarter of 2019.

The epidemic has had some negative impact on some areas of the economy, but it has also brought growth opportunities to some areas of the economy. The primary sector consists mainly of agriculture, forestry, livestock and fishing, which are concentrated in rural areas. The epidemic is mainly spread based on population movement, and the impact on these industries is minimal in rural areas, where the population is less mobile and less densely populated, and in winter and early spring. Combined with the minimal impact of the epidemic on these industries and the continued development of our agriculture in these two areas, it is normal to have a certain level of growth. At the same time, the financial industry and the information transmission, software and information technology services industry rely heavily on networked information technology because they can work from home in networked form and their industry value added. Therefore, the epidemic did not have much impact on these industries, and the Ministry of Education's promotion of "school closure" has, to a certain extent, promoted the development of the IT industry. The value added of the remaining industries was lower than that of the first quarter of 2019, especially the accommodation and catering industry, which decreased by 33.4% year-on-year, as this industry was in peak season during the Chinese New Year, but restaurants were closed everywhere due to the epidemic, resulting in heavy losses in the epidemic.

Table 2. Year-over-year growth rates by industry in the first quarter of 2020

Indicators	Year-on-year growth rate
Gross Domestic Product	-0.053005373
Value added of primary industry	0.161561794
Value added of secondary industry	-0.099851479
Value added of tertiary industry	-0.037704266
Value added of agriculture, forestry, animal husbandry and fishery	0.157739962
Value added of industry	-0.090375645
Value added of manufacturing industry	-0.107776881
Value added of the construction industry	-0.158420906
Value added of wholesale and retail trade	-0.146161973
Value added of transportation, storage and postal industry	-0.162092771
Value added in the accommodation and catering industry	-0.333892182
Value added of the financial industry	0.086345617
Value added of the real estate industry	-0.044489086
Value added of information transmission, software and information technology services	0.059728421
Value added of leasing and business services	-0.068779272
Value added of other industriesr	0.008996082

In order to study the impact of the different degrees of the epidemic on the economy, this paper will analyze the consumer price index, industrial value added, and real estate investment in 31 provinces. Among them: consumer price index (CPI index) is a macroeconomic indicator most related to people's life; industrial value added reflects the sum of market value of all final products and services produced and provided by a country (region) in a regular period,

reflecting the contribution of production units or sectors to GDP; from the statistics of the past ten years or even longer period There is a strong correlation between real estate investment and other macroeconomic indicators.

For the industrial value added of each province, the main study is the growth rate of industrial value added, and analyze whether the epidemic will lead to a lower growth rate of industrial value added. As shown in the Table 3, the growth rate of industrial value added turns from positive to negative in March 2020 compared to March 2019, and the growth rate varies significantly between provinces. It indicates that the occurrence of the epidemic clearly makes the growth rate of industrial value added decrease.

Table 3. Industrial value added growth rate year-on-year

Time	Mean	Variance
March 2019	8.629032258	12.56012903
March 2020	-0.909677419	126.5495699

In terms of the cumulative value of real estate investment, the table below shows that the average values for February and March 2019 are slightly larger than the corresponding months in 2020, but the difference is not significant.

Table 4. Cumulative value of real estate investment

Time	Mean	Variance
February 2019	389.9941935	178514.5382
March 2019	767.8345161	558344.5763
February 2020	326.3041935	137888.932
March 2020	708.4706452	519351.7212

A comparative analysis of the consumer price index for the first three months of 2019 and 2020 shows that the average value in 2020 is higher than in 2019. It is not only the average value of each province that has increased, but the consumer price index for the country as a whole has increased. As far as the variance is concerned, all 2019 is smaller than 2020, indicating that the difference between the consumer price indexes of the 31 provinces is also increasing. The increase in the consumer price index indicates that the price of purchasing consumer goods and services is increasing and the purchasing power of money is decreasing during a certain period of time. It is possible that the prices are increasing due to the decrease in the supply of various goods and services as a result of the epidemic. Thus, the epidemic has put pressure on people's lives.

3.2. Analysis of the Economic Impact of the Epidemic and Model Construction

As to whether there is a significant difference between the value added indicators of each industry in 2019 and the first quarter of 2020, based on the impact of major public health events on the economy in general, this paper proposes the relevant hypothesis that the occurrence of the epidemic will cause a significant downward trend in the socio-economy. That is, the occurrence of the epidemic will make the economic indicators in the first quarter of 2020 smaller than the values of the indicators in the first quarter of 2019.

Table 5. Cumulative value of real estate investment

Time	Mean	Variance
January 2019	101.7129032	0.212494624
February 2019	101.483871	0.122731183
March 2019	102.2064516	0.098623656
January 2020	105.0354839	0.861032258
February 2020	104.8806452	1.162946237
March 2020	104.0516129	0.877913978

Based on the above hypotheses, the corresponding original and alternative hypotheses for hypothesis testing are proposed as follows.

$$H_0: \mu_1 \leqslant \mu_2 \ \ vs. \ H_1: \mu_1 > \mu_2$$

where μ_1 represents the economy in the first quarter of 2019 and μ_2 represents the economy in the first quarter of 2020. A t-test of two paired samples was performed on the data using the correlation function in Python, and the results were as follow.

$$t = -2.646974$$

$$pvalue = 0.018302$$

Since the p-value is significantly less than 0.05, the original hypothesis is rejected at the 5% level of significance, which means that the economic situation in the first quarter of 2019 is considered significantly better than the situation in the first quarter of 2020.

The descriptive statistical analysis section provides an intuitive understanding of the year-on-year growth rates for each month in the first quarter of 2019 and 2020. Since the epidemic shows a gradual severity in the first three months of the first quarter, a two-paired sample t-test is used to analyze whether the first three months of 2019 are significantly better than the corresponding months of 2020, given the different levels of the epidemic. With the exception of the national urban survey unemployment rate, all indicators are better the larger they are. Therefore, the unemployment rate indicator is converted to a negative number for testing. The results of the t-test for the three months of the first quarter are presented in the following Table 6.

Table 6. Two-pair sample t-test results for each month of the first quarter

Month	t statistic	P value
January	-1.7548	0.1098
February	-2.5748	0.0258
March	-2.4957	0.022

At a significance level of 0.05, the p-value for January shows that it is not significant, while the p-values for February and March show that they are both significant. This means that the economic impact of the epidemic on January is not yet particularly severe, while the impact on February and March can already be significantly determined, with the economic situation in February and March 2019 being better than the corresponding months in 2020.

In order to understand the impact on economic indicators under different epidemic situations, this paper uses the double difference method to analyze the difference between the impact received in Hubei Province, which is the key region of the epidemic, and other provinces.

And because of considering the impact of seasonal factors on economic indicators, for the three economic indicators of industrial value added, cumulative value of real estate investment and consumer price index, this paper selects data for the corresponding months in 2019 and 2020 to reduce the impact of seasonal effects on the indicators. In the epidemic, Hubei Province, as the province with the most serious epidemic and the most strict measures, will be significantly more affected than other provinces. Therefore, when building the double difference model, in addition to differencing the data before and after the epidemic, it is also necessary to differ the data between Hubei Province and other provinces.

First of all, the analysis of industrial value added is limited to the impact of the March 2020 epidemic on industrial value added, as the National Bureau of Statistics does not publish data for January and February. According to the analysis of the epidemic situation in March, it is clear that the number of confirmed cases peaked in March and the growth rate of the number of confirmed cases is gradually slowing down.

Let $D_1 = 1$ for Hubei province, $D_1 = 0$ for other provinces, epidemic exists in March 2020, therefore $D_2 = 1$. The dependent variable is "gyzjz", which represents the size of industrial value added in each province, and a double difference model is established, and the fitting results are shown in the Table 7.

Table 7. Parameter fitting results of the double difference model for industrial value added

	ESTIMATE	STD. ERROR	T VALUE	PR(>|T|)
(Intercept)	8.530	1.066	7.999	6.14e-11 ***
D1	3.070	5.937	0.517	0.607
D2	-7.907	1.508	-5.243	2.32e-06 ***
D1*D2	-50.593	8.396	-6.026	1.24e-07 ***

From the above Table 7, it can be seen that the regression coefficients of D_2 and D_1*D_2 are significant and negative at the 10% significance level, indicating that there is a significant negative correlation between the value added of industry in each province and the occurrence of the epidemic, i.e., the occurrence of the epidemic makes the value added of industry in each province significantly lower. And the value added of industry in Hubei province, where the epidemic occurred, was significantly affected. The F-test of the model shows that the adjusted value of R^2 is 0.6273, $P\ value = 4.283 \times 10^{-13}$ is much less than 0.05. Therefore, the double-difference model passes the test significantly.

Next, the analysis of real estate investment is performed, and the data contains only the cumulative value of real estate investment for February and March of 2019 and 2020. Following the method of building a double difference model for industrial value added, the values of the cumulative value of real estate investment in February and March were analyzed, and the regression results of building a double difference model are shown in the table below.

Table 8. Parameter Fitting Results for a Double Difference Model of Real Estate Investment

	Cumulative value for February	Cumulative value for March
(Intercept)	2.04e-06 ***	6.07e-07 ***
D1	0.938	0.775
D2	0.593	0.847
D1*D2	0.684	0.525

According to the results of the above two DID models, it is clear that the regression coefficients of D_1, D_2, D_1*D_2 do not pass the significance test, indicating that the impact of either the occurrence of the epidemic or the serious epidemic situation in Hubei Province on the real estate investment in February and March 2020 is not significant. It indicates that real estate investment is not significantly affected by the epidemic.

Finally, the consumer price index was analyzed, and the data contained the consumer price index for 31 provinces for three months in 2019 and the first quarter of 2020. The detailed analysis of the consumer price index is carried out according to the method of establishing a double difference model for industrial value added, and the regression results of establishing a double difference model are shown in the table below.

Table 9. Parameter fitting results of the double difference model of consumer price index

	January	February	March
(Intercept)	<2e-16 ***	<2e-16 ***	<2e-16 ***
D1	0.905	0.984	0.8831
D2	<2e-16 ***	<2e-16 ***	2.73e-15 ***
D1*D2	0.716	0.177	0.0194 *

The above Table 9 is a double difference model with the consumer price index in January, February and March as the dependent variable. According to the results of the fitted regression coefficients, the regression coefficients always pass the significance test, indicating that the impact of the epidemic on the consumer price index is significant. The regression coefficient of the cross-sectional term ranges from 0.716 in January to 0.177 in February and finally to 0.0194 in March, which shows that the epidemic did not attract much attention in January, but in February and March the epidemic was serious and the provinces took control measures. In the process of the gradual seriousness of the epidemic situation, the impact of the cross term on the consumer price index is also gradually significant, indicating that the consumer price index in Hubei is the most affected by the epidemic in the seriousness of the epidemic situation.

4. CONCLUSION

Based on the above statistical descriptions, tests, and modeling for various economic indicators, this paper provides a quantitative analysis of the national economic and social impact of the outbreak of neocrown pneumonia during the Chinese New Year in 2020, and concludes that.

(1) The number of confirmed cases gradually increased from January to March, and the epidemic developed rapidly mainly in the eastern region, except for the severe situation in Hubei.

(2) The analysis of economic indicators for the first quarter of 2020 shows that the value added of the primary industry, the value added of agriculture, forestry, animal husbandry and fishery, the value added of the financial sector, the value added of other industries, and the value added of the information transmission, software and information technology service industry have a tendency to increase in the first quarter of 2020. It shows that the epidemic did not have a serious negative impact on these industries in the first quarter, and even had a boost for some industries, which are mainly those with low personnel density, such as agriculture, or those that can do without personnel contact, such as software and information technology services. The accommodation and restaurant sector, on the other hand, decreased by 33.4% compared to the first quarter of 2019, as these sectors are in peak season during the Chinese New Year. However,

due to the epidemic, restaurants were closed everywhere, resulting in an approximate loss of this industry during the epidemic. And according to the results of the t-test shows that the value of indicators for each industry in the first quarter of 2020 is significantly lower than the same period of the previous year.

(3) According to the analysis of economic indicators by month for the first three months of 2020, transportation should be the most severely affected industry in the epidemic, especially passenger transportation. With the gradual severity of the epidemic, the negative year-on-year growth rate of passenger traffic increases from 10% to over 80%. Freight traffic shifted its focus to rail freight, and losses were contained to some extent. This was followed by the restaurant sector, where the negative year-over-year growth rate reached nearly 50% in March. The epidemic also caused the national urban unemployment rate to rise significantly in February, reaching 20% from 5% in January. In March, the provinces gradually pushed ahead with the resumption of production and work, and the unemployment rate dropped to 15%, falling back more slowly and putting a lot of pressure on people's lives. According to the results of the t-test shows that the values of economic indicators in the first three months of 2020 have a significant decline compared to the same month of the previous year.

(4) According to the quantitative analysis of industrial value added, real estate investment and consumer price index, it is found that both industrial value added and consumer price index receive a very significant impact from the epidemic, but real estate investment has an impact, but in general the impact is not as great as the impact of the other two indicators. In particular, as the number of confirmed cases continues to increase, the impact on various economic indicators deepens and becomes more pronounced.

ACKNOWLEDGMENTS

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