Journal of Innovation and Development
ISSN: 2958-4752 | Vol. 1, No. 1, 2022

Residents Consumption Analysis and Countermeasures under Impact of Covid-19

-- In the Case of Hunan Province

Lebin Huang *

Philippine Christian University Center for International Education, Manila, 1004, Philippines
* **Corresponding author**: Email: 348154542@qq.com

Abstract: Residents consumption analysis is important to a country to measure the indicators of national accounts. It can reflect the economic development level of the country and the residents' current living standards. Since the start of 2020, Covid-19 has sweep across the globe. It has great negative impact on the both economic and consumption of China and whole world. This epidemic situation not only influences the resident's consumption level, but also affects the consumption type and consumption patterns. Hunan province is in the middle of China and has large population base. So, this paper takes Hunan province as an example to compare the resident's consumption ability and pattern before and after the Covid-19. Giving suggestions for the countermeasures and future policies.

Keywords: Residents consumption; Covid-19; Hunan province.

1. Introduction

Begin with the spring festival in 2020, Covid-19 epidemic spread around the world. In order to avoid the diffusion of epidemic, China government decided to block the Wuhan city and adopt some policies to restrict the resident going out. Shopping mall, cinema, restaurant, tourist center and other physical consumption places are closed step by step to prevent the people crowded. Those polices have great impact on the resident's consumption and economic development.

Along with the changing time, resident's consumption become more variability and diversification. As one of the key drivers, resident's consumption is significant to country's economic growth. Analysis of resident's consumption will benefit to improve future consumption level and types, and facilitate improvement of the whole economic development level. Since the Covid-19 epidemic still influence the people daily life now, the consumption habit and preference of residents may change accordingly. On the one hand, the decline of movement of population may restrain the consumption in lots of industry, such as entertainment, catering, traveling and film. On the other hand, the 'Otaku Economy' has grown up based on the developing of Internet economy. New consumption pattern such as on-line consumption become more popular.

Hunan province is a large province with populous and economy in China. This paper selects data from Hunan province as example to make research and analysis. The next section will introduce some previous literatures related to this topic. And then, it will analyze the data about the consumption details before and after the Covid-19 epidemic. Discovering the impact of Covid-19 epidemic on the resident consumption level and pattern. The fourth part will give some suggestions for the future policies and countermeasures. Finally, the last part will provide a conclusion and prospect for this paper.

2. Literature Review

There are lots of precious researches have investigated related topics. The impact of epidemic disease on economic and consumption is concerned by the academia of both domestic and overseas. Verikiosa, G. et al. [9] evaluated how H1N1 disease influence the Australia macro economy. It discovers that this flu will have great negative impact on the Australia macro economy. The epidemic will demotivate people engage in investment, meanwhile, lead to the sharp decrease on the demand of Australia resident consumption, especially in the service industry. Meltzer, M. I., Cox, N. J. and Fukuda, K. [7] states that the death of people and stop work and production have directly affect the manufacture and consumption of the commodity. This is the main reason result in the major economic loss. The research from Chou, J., Kuo, N. F., and Peng, S. L. [1] find that the SARS epidemic has significant negative influence on the service and manufacturing industry of Taiwan, Hongkong and mainland of China.

Public health emergencies will also affect the consumer psychology. Liu, Y. [6] analyzed the psychological characteristics of consumers based on safety needs under the SARS epidemic and put forwarded countermeasures from the macro level. Fan, C. L., Ma, M. C. and Wang, Y. D. [2] analyzed the phenomenon of consumer panic buying under public health emergency, which based on the example of panic buying of salt caused by nuclear radiation in Japan. Those researches mainly focus on the psychological perspective.

Under situation of Covid-19 epidemic, many domestic scholars also analyzed the impact of public health emergencies on consumption from the perspective of economics. Li, L. Y. and Wu, J. T. [4] use the micro data of residents to investigates that the Covid-19 has influenced the residents' consumption behaviors at the economic perspective. They indicate that the main reasons of the decline of consumption after epidemic are decrease of future expected

income, incentive of precautionary saving and trend of rational consumption. From the research of Wen, Y., Zhang, T. and Du, Q. Y. [11], the Covid-19 results in shutdown of business and then influence the production. This also leads to the decrease of investment and return on capital employed of companies, and cause the decline of consumption demand. More specifically, the study of Wang, X. and Yang, L. [10] test the average disposable income, average consumption and consumer price index. The result elaborates that in the first half year of 2020, the growth rate of average disposable income dropped rapidly compared with the same period, the growth rate of average consumption dropped to negative, and the consumer price index increased significantly compared with the same period. All above reports reveal that the Covid-19 epidemic has significant impact on both economic and resident consumption. However, those researches mostly are focus on the qualitative discussion. It may need some quantitative analysis and countermeasures on this issue.

3. Data Analysis

The data of this paper is collected from the State Statistics Bureau and Hunan Bureau of Statistics. It selected data related with resident disposable income, average consumption and price index from 2011 to 2020. This research will use traditional data analysis method and the Grey Model to discover the trend between these ten years and impacts result from the Covid-19 epidemic.

Table 1. Various Price Indices

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Consumer price index	105.5	102	102.5	101.9	101.4	101.9	101.4	102	102.9	102.3
Retail price index	105.5	101.7	101.7	101.2	99.9	101	101.3	102.3	102.3	101.3
Producer price Index-Farm Products	121.9	100.2	102.1	98.6	104.1	104.7	98	95.4	118	123.3

From the table 1, it is clear that the growth rate of consumer price index and retail price index are slightly decrease in 2020. In the meanwhile, the producer price index for farm products grows a lot. This result indicates that after Covid-19, the inflation for farm products is greater than other products. Residents may require more living materials especially foods when they cannot go out during the epidemic prevention and control period. Moreover, the prevention policies are led to numerous restrictions on the cross regional production and distribution. The demand and supply relationship become tight, price of basic living materials was increased, especially price of food.

Table 2 shows that the resident average disposable income and average consumption from 2011 to 2020. It also calculated the growth rate of each year. According to the result, the average disposable income and consumption are continuously growing through these years. This is complying with the trend of economic growth. However, it is obvious that the growth rate of both categories in 2020 are much lower than the previous years. Even though the absolute amount of average disposable income and consumption was increased, the Covid-19 still affected the resident standards of consumption. Stopping work and production leads to the decline of people's income, and then influence the consumption level. To be more clearly, this paper further compares the detail data between 2019 and 2020.

Table 2. Resident average disposable income and consumption

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Average disposable income (RMB)	12705	14379	16690	17622	19317	21115	23103	25241	27680	29380
Growth rate	-	13.18%	16.07%	5.58%	9.62%	9.31%	9.42%	9.25%	9.66%	6.14%
Average consumption (RMB)	9291	10239	12350	13289	14267	15750	17160	18808	20479	20998
Growth rate	-	10.20%	20.62%	7.60%	7.36%	10.39%	8.95%	9.60%	8.88%	2.53%

Table 3. Comparison income and consumption in 2019 and 2020

Year	Indicator	The first quarter		First half year		The first three quarter		Annual	
		Amount	Growth rate	Amount	Growth rate	Amount	Growth rate	Amount	Growth rate
2020	Average disposable income	7718	2.20%	13617	5.20%	20731	6.10%	29380	6.10%
	Average consumption	5096	-5.80%	9794	-0.30%	14638	0.60%	20998	2.50%
2019	Average disposable income	7552	9.50%	12949	9.70%	19532	9.70%	27680	9.70%
	Average consumption	5409	9.90%	9820	7.80%	14555	8.60%	20479	8.90%

The Covid-19 epidemic broke out in the first quarter of 2020, the impact of this epidemic is apparently reflected in the data of resident income and consumption. Comparing with the first quarter of 2019, the growth rate of average disposable income decreases 7.3% while the growth rate of average consumption decreases 15.7%. The absolute amount of consumption in 2020 even lower than the amount in 2019. This result demonstrates that the Covid-19 epidemic was significantly and negatively affected the resident's income and consumption.

4. Theoretical framework and results

In order to find more evidences about the effects of Covid-19 caused on the resident consumption, this article will use Grey Model to predict the average disposable income and average consumption amount in 2020 without the outbreak of the epidemic. Using the predictive data compare with the actual data and then estimate how Covid-19 influence the income and consumption indicators. The Grey Model is based on small amount and incomplete information to establish

Grey differential prediction model. After that, making a vague long-term description on law of things development. Liu, X. M. and Han, Z. G. [5] take 6 years historical data of an anonymous city as example to set the Grey Model, forecasts the economic indicators under the situation of without the SARA epidemic in 2003. The research from Song, D. X., Feng, X. Z. and Zhu, Y. M. [8] use data of rural residents' disposable income from Shaanxi province during 2013 to 2018, use Grey Model to predicts the future rural resident's income from 2020 to 2024. According to these previous researches, this paper will also adopt first order uni-variate form Grey Model which denote as GM(1,1) to forecast the data and make comparison.

Suppose the past data as .

$$X^0 = (X^0(1),\ X^0(2),\ \ldots,\ X^0(n)) \quad (1)$$

Then, generate an accumulation of the original data:

$$X^1 = (X^1(1),\ X^1(2),\ \ldots,\ X^1(n)) \quad (2)$$

$$X^1(k) = \sum_{i=1}^{k} X^0(i),\ k = 1, 2, \ldots, n \quad (3)$$

The average generation with consecutive neighbors will be:

$$Z^1(k) = 0.5X^1(k) + 0.5X^1(k-1),\ k = 2, 3, \ldots, n \quad (4)$$

Differential equation model is as follow:

$$\frac{dX^1}{dt} + aX^1 = u \quad (5)$$

a and u are undetermined constants respectively, a is named development of gray value while u is named endogenously controlled gray value. The from of matrix are:

$$B = \begin{bmatrix} -Z^1(2) & 1 \\ \vdots & \vdots \\ -Z^1(n) & 1 \end{bmatrix},\ Y = \begin{bmatrix} X^0(2) \\ \vdots \\ X^0(n) \end{bmatrix},\ \hat{U} = \begin{bmatrix} \hat{a} \\ \hat{u} \end{bmatrix} = (B^T B)^{-1} B^T Y \quad (6)$$

Substitute a and u to the formula (5), will get:

$$\hat{X}^1(k) = \left(X^0(1) - \frac{u}{a}\right)e^{-a(k-1)} + \frac{u}{a},\ k = 2, 3, \ldots, n \quad (7)$$

The prediction function formula will be:

$$\hat{X}^0(k+1) = \hat{X}^1(k+1) - \hat{X}^1(k) = \left(X^0(1) - \frac{u}{a}\right)\left(e^{-ak} - e^{-a(k-1)}\right) \quad (8)$$

After the model is established, appropriate accuracy tests should be performed to verify the feasibility of the model. This paper will use posterior-variance-test to inspect the model.

$$\bar{X} = \frac{1}{n}\sum_{k=1}^{n} X^0(k),\ \bar{E} = \frac{1}{n-1}\sum_{k=2}^{n} E(k),\ \mathrm{E(k)} = \mathrm{X^0(k) - \hat{X}^0(k)}$$

$$S_1 = \sqrt{\frac{1}{n}\sum_{k=1}^{n}[X^0(k) - \bar{X}]^2},\ S_2 = \sqrt{\frac{1}{n-1}\sum_{k=2}^{n}[E(k) - \bar{E}]^2},\ \mathrm{C = S_2/S_1}$$

Imputing the data from table 2 into the above formulas, the forecast amount of average disposable income and consumption in 2020 can be generated as follow table.

From the table 4, the C value is 0.0474 and 0.0768, respectively. Both of them are lower than 0.35. It means that the accuracy of this model is good, and the predict number may reliable. The predict average resident disposable income is 30,207 RMB, which slightly higher than the actual amount. The result indicates that Covid-19 has negative impact on the resident earnings. On the one side, some private companies shut down or delay the production, only provide basic salary or even stop to pay. On the other side, lots of stores closed or operate badly, the revenue of these business owner sharply decreased. The panic caused by the epidemic also significantly influence the economic market, especially in the first quarter of 2020. The risk of financial products increases whereas the earnings and dividend decline.

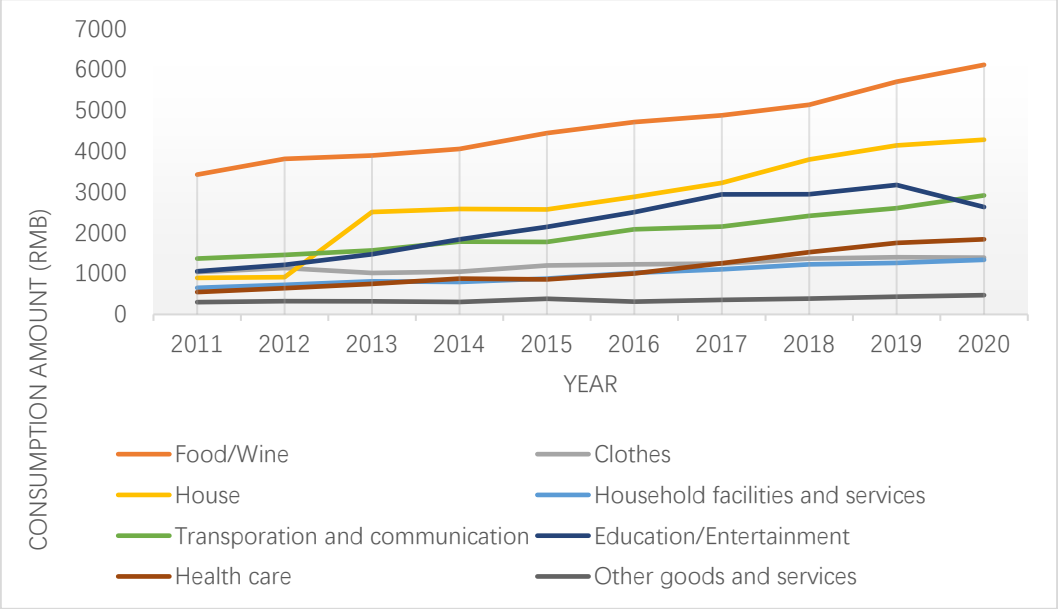


Figure 1. Classified average resident consumption

Meanwhile, the forecast average resident consumption is 22,538 RMB. This signifies that the resident consumption also negatively affected by the Covid-19. Through the report from State Statistics Bureau, the total retail sales of consumer goods fell by 19.0% year on year in the first quarter of 2020. Keynes, J. M. [3] proposes that the resident consumption expenditure will be decided by their current level of income. However, the result in table 4 shows that the influence of the Covid-19 on consumption was significantly stronger than that on earnings. It can be concluded that the decrease of resident consumption may not only caused by the decline of income, but also results from the restrictions on resident activities from the epidemic prevention measures and policies. Moreover, the forecast from some experts' states that the Covid-19 epidemic may exist in a long-term, the intention of precautionary saving will incur and strengthen. Resident may proceed to reduce their expenditures.

For purpose of further analyze the details of resident consumption, this paper outlines the changing condition of the different consumptive constituents during these ten years.

The line chart in figure 1 clearly display that all categories of consumption are gradually increase from 2011 to 2019. This in line with the economic development of Hunan province. Nevertheless, in 2020, the expenditures in clothes, education and entertainment are decrease, while other types of expenditure grow slower than before. The Covid-19 epidemic may have greater impact in clothes, education and entertainment industry than others.

Table 4. Prediction of resident average disposable income and consumption

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual average disposable income (RMB)	12705	14379	16690	17622	19317	21115	23103	25241	27680	29380
Predict income	12705	14771	16153	17664	19316	21123	23099	25260	27623	30207
C value	0.0474									
Actual average consumption (RMB)	9291	10239	12350	13289	14267	15750	17160	18808	20479	20998
Predict consumption	9291	10875	11912	13048	14249	15655	17149	18784	20576	22538
C value	0.0768									

Along with the decrease of disposable income, the consumer mentality may change accordingly. The resident will more likely to pay their money for the essential living needs, such as food, drinks and health care, rather than other unnecessary or non-emergency needs. In the meantime, tourist, education, entertainment and other service industries mainly labor-intensive industries. The prevention and control policies will significantly affect these industries, and then affect the resident consumption.

5. Suggestion

In order to solve the resident disposable income and consumption reduction problem caused by the Covid-19 epidemic in the long-term, relevant departments should accurately make policy decision through aspects of stabilize resident's income expectations, encourage the resident's consumption, promote online consumption and so on. Hunan Government should release more targeted and proactive policy and regulation.

Firstly, securing the resident income and stabilizing the consumption ability. The falling and unstable disposable income is directly affecting the consumer psychology of resident. Government should actively implement the unemployment insurance and grants on employment skill learning. Providing corresponding guarantee mechanism such as economic subsidy and opportunities of employment to safeguard the resident basic living. Besides that, it should not only provide benefits to the large corporation, but also give aid to service industry and small and micro businesses. Through tax preference, concessional loan, subsidized rent and so on to relieve the costing pressure from epidemic, and stabilize the development of enterprises.

Secondly, government need to create good consumption environment to encourage the resident's consumption. The appropriately loose restrictive policy on cars or commercial housing may promote the large amount of consumption effectively. Hunan government can collaborate with local corporate, issue variety of coupon and organize sales promotion activities to motivate the resident consumption. In addition, regards to the phenomenon of precautionary saving, banks can adjust the saving interest to push resident use their idle capital on financial products. Revitalizing the utilization of saving deposit so as to improve the consumption condition.

Finally, promote the development of online consumption market. Due to the restriction policy of Covid-19, many service industries began to develop their online operation. Resident may interest in this new spending pattern such as online education, telemedicine, online shopping and remote working. Government should encourage the development of these related industry, upgrade and transform the traditional offline mode, and achieve the integrate development for both online and offline. Under this situation, the new consumption hot spots and business model may create more motivation for consumption, and stimulate the consumption enthusiasm of residents.

6. Conclusion

Covid-19 epidemic still raging around the world, even though China government already control the situation, there are lots of risk of epidemic import exist. This epidemic may has continuously impact on the economic development and consumption pattern in the long term. Under the circumstance, analyzing how Covid-19 has influence on resident consumption and provide related suggestion and countermeasures is meaningful to the country.

In this paper, it takes Hunan province as an example, select the data from State Statistics Bureau and Hunan Bureau of Statistics during 2011 to 2020 to evaluate the change of various price index, resident disposable income and consumption. It also uses Grey Model to emphatically compared the actual data in 2020 with predict data in 2020 to find the impacts results from the Covid-19 epidemic. According to above results, it found that resident may require more living materials especially foods rather than other products during the epidemic. The epidemic will have larger effects on the consumption on service industry especially the labor-intensive industries. Furthermore, both predict average disposable income and consumption from the Grey Model are higher than the actual amount. This elaborates that the Covid-19 leads to decline of resident earnings and then makes the resident consumption falling. In the meantime, numerous restrictive policies also limiting the resident consumption in another aspect, which caused the descent degree of resident consumption higher than that on income.

Through the research on the reasons and formation mechanism of the resident falling consumption, there are number of countermeasures to solve this problem in the long run. Hunan government can improve social security system to stabilize the resident expected income, publish all kinds of preferential consumption policies to animate the market, and encourage online consumption market to develop new consumption patterns, to address the negative impact of the Covid-19 epidemic on the resident consumption.

Acknowledgment

I acknowledge the support of my schoolmate of the Philippine Christian University, for their grateful comments and insights in improving my paper. Also acknowledge the advice of the reviewers.

References

[1] Chou, J., Kuo, N. F., and Peng, S. L. (2004) Potential Impacts of the SARS Outbreak on Taiwan's Economy. Asian Economic Papers. 3 (1), 84–99.

[2] Fan, C. L., Ma, M. C. and Wang, Y. D. (2003) The Occurrence of Panic Buying Phenomenon under Emergent Crisis and Its Countermeasures. Advances in Psychological Science. 11(4), 368-374.

[3] Keynes, J. M. (1936) The General Theory of Employment, Interest and Money. UK: Palgrave Macmillan.

[4] Li, L. Y. and Wu, J. T. (2020) Analysis of the Impact of the COVID-19 on Consumer Behavior and Its Formation Mechanism, Consumer Economics. 36(3), 8.

[5] Liu, X. M. and Han, Z. G. (2005) Evaluation Model of the Impact of SARS Epidemic on Some Economic Indicators. College Mathematics. (03), 13-17.

[6] Liu, Y. (2004) Analysis of Consumer Psychology and Expansion of Consumer Demand under Emergency - Taking the Consumption Phenomenon during SARS Epidemic as an Example. Journal of Guizhou College of Finance and Economics. (1), 20-22.

[7] Meltzer, M. I., Cox, N. J. and Fukuda, K. (1999) The Economic Impact of Pandemic Influenza in the United States: Priorities for Intervention. Emerging Infectious Diseases. 5(5), 659-671.

[8] Song, D. X., Feng, X. Z. and Zhu, Y. M. (2020) The Prediction Analysis of Rural Residents' Income in Shaanxi Province based on GM(1,1) model. Agriculture and Technology. 40(9), 3.

[9] Verikios, G., McCaw, J.M., McVernon, J. and Harris, A. H. (2012) H1N1 Influenza and the Australian Macroeconomy. Journal of the Asia Pacific Economy, 17(1), 22-51.

[10] Wang, X. and Yang, L. (2020) Assessment of the Impact of COVID-19 on Consumption Level of Residents in Hunan Province. The Guide of Science and Education. 733(35), 172+179-180.

[11] Wen, Y., Zhang, T. and Du, Q. Y. (2020) Quantifying the COVID-19 Economic Impact. Social Science Electronic Publishing.