The Research on the Relationship between Consumption Downturn and COVID-19─Analysis of Survey Data from China

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Abstract

Under the background of COVID-19's prevalence, this study analyzes the impact of the severity of COVID-19 on household consumption in some regions of China from an economic perspective, and introduces three variables: household income, household economic stability and consumer confidence to explore its impact mechanism. Using an online questionnaire, the research team collected data (110 women and 100 men) from a sample of 210 heads of household (or family members with a good understanding of household consumption) to analyze this problem.

The results show that the higher the severity of COVID-19, the greater the reduction in household consumption. In addition, we also found that household economic stability and consumer confidence play a negative moderation role in the impact of the severity of COVID-19 on household consumption, that is, the higher the household economic stability and consumer confidence, the weaker the impact of the severity of the epidemic on household consumption.

Keywords: COVID-19, household consumption, household income, household economic stability, consumer confidence

1. Introduction

According to the weekly epidemiological update data of WHO COVID-19, as of November 14, 2021, more than 252 million confirmed cases and more than 5 million deaths have been reported worldwide. The WHO data show that the highest incidence rate of every 100,000 people is Europe and America, and the United States is the largest number of new cases. China ranks the lowest number of COVID-19 deaths per 100,000 people by country, territory and region. At the initial stage of COVID-19 outbreak, China, as the outbreak area, has rapidly reduced new cases by implementing effective epidemic prevention policies (Remuzzi & Remuzzi, 2020). According to authoritative data released by the National Health Commission of China, the number of COVID-19 infections in China has shown a wave-like feature in the past six months, that is, the rapid emergence of infected people and the rapid measures taken by the government to eliminate them, so that the epidemic in China has been well controlled.

1.1 Current Situation of low Consumption

According to the report released by IMF in October this year, the world economy is expected to grow by 5.9% in 2021, which is 0.1 percentage point lower than the report in July. IMF pointed that the reason for the reduction was mainly due to the deterioration of the epidemic situation. As an effective country in preventing and controlling COVID-19, China's GDP growth rate has reached 8% and is expected to exceed 10% this year.

Although the global economy is showing signs of recovery, consumption is still in a relatively low state compared with that before the epidemic. According to the statistics of World Bank, the growth rate of global household final consumption expenditure was 2.54% in 2019 and -5.341% in 2020 affected by COVID-19. As the world's largest economy, the actual personal consumption expenditure of the United States in the third quarter of 2021 increased by only 1.6% compared with the previous period. Personal consumption expenditure has not fully recovered from COVID-19. According to the data of the National Bureau of Statistics of China, consumption has been an important factor in stimulating economic growth in the past at least seven years.

Especially in the context of China's introduction of a new development pattern to expand domestic demand, consumption plays a decisive role. Affected by the outbreak of the epidemic, China's GDP decreased by 6.8% in the first quarter of 2020, and GDP decreased by 4.3% due to the decline in final consumption expenditure alone, which shows the important position of consumption in China 's economy. Although China's consumer market continued to recover in October this year, the recovery remains uncertain as the epidemic changes. At the same time, local governments have also introduced corresponding financial subsidy policies to stimulate consumption. For example, Jiaxing City, Zhejiang Province issued 200 million yuan of electronic consumption vouchers at a time to encourage night economy and street-stall economy.

1.2 Variables

Although some scholars have studied the impact of COVID-19 on the economy and consumption (Amory et al., 2020). For example, the uncertainty brought about by COVID-19 has risen, which Baker describes as historically rare. Baker et al. explored household consumption in the face of COVID-19 outbreak for the first time in the short term, using US personal financial transaction data in 2020 (Baker, Bloom, et al., 2020; Baker, Farrokhnia, et al., 2020).

Coibion O explored the causal relationship between macroeconomic expectations and household consumption using customized survey data (Coibion et al., 2020). Alexander and Karger analyzed the impact of home restrictions on household consumption expenditure and found a significant increase in illiquid consumption (Diane & Ezra, 2020). Chen et al., (2021) discussed the impact of the epidemic on consumption in the initial stage of the outbreak in China by analyzing the daily transaction data of 214 cities in China. Using the data of China Household Finance Survey (CHFS) in the first quarter of 2020 and the ordinary least square (OLS) method to analyze the impact of the pandemic on household consumption, Liu et al., (2020) came to the conclusion that China's household consumption expenditure decreased significantly during the epidemic. Some other scholars have discussed the impact of COVID-19 on household consumption from the perspective of specific macroeconomic indicators and different types of expenditure (Dimitris et al., 2020; Chang & Chad, 2020; Asger et al., 2020). However, in the context of the current economic recovery, the research on the impact mechanism of the epidemic on household consumption is still insufficient. Therefore, this paper mainly supplements the existing academic research on the mechanism of affecting household consumption of the epidemic.

At present, scholars have basically formed a consensus that income is the decisive factor of household consumption. Whether Keynes' absolute income hypothesis (Keynes, 2018), Duesenberry's relative income hypothesis (Duesenberry, 1949) or Friedman's persistent income hypothesis (Friedman, 1957), Ando's life cycle hypothesis (Ando & Modigliani, 1963), all fully proved the importance of income for consumption. Based on Keynes' theory, this paper holds that household income plays an important role in household consumption and introduces the key variable of household income into the research model.

Research by Gruber and Yelowitz found that health risks lead households to increase precautionary savings, which in turn reduces household spending (Gruber & Yelowitz, 1999). Bernheim's research examined the impact of death risk on families from different angles according to the economic vulnerability index based on life cycle theory (Bernheim et al., 2001; Bernheim et al., 2003). In addition, other scholars have explored the household economy from the aspects of household economic vulnerability, household risk defense ability and household economic structure (Lioyd, 1995; Pheeha & Umakrishnan, 2020; Wang et al., 2021). The corollary of conservation of resources theory (COR) holds that people with more resources are less likely to suffer resource loss and abler to obtain resources when facing risks. On the contrary, people with fewer resources are more likely to suffer resource loss (Hobfoll et al., 2018). Based on the above considerations, this paper holds that the stability of household economy is an important variable for families to cope with risks, that is, the higher the stability of household economy, the stronger the ability of families to resist risks, and the less susceptible household consumption is to the impact of COVID-19.

Research by Carlsson-Szlezak et al. has found that the normalization of COVID-19's prevention and control and the resulting social distance measures would lead to negative judgments about the economic outlook, which in turn can reduce consumer confidence (Philipp et al., 2020a). According to Acemoglu and Scott (1994), consumer spending will also be affected by non-economic factors, which will increase the uncertainty of consumers' perception, and then affect consumption intention. Keynes put forward "animal spirit" in 1936 and regarded it as an irrational psychological state that is susceptible to various environmental factors. He believes that expectations are variable, which is often driven by "animal spirits". Many scholars used it to explain consumer confidence and believe that "animal spirits" can be used to analyze household consumption (Dow & Dow, 2013).

At present, scholars have divided consumer confidence into basic confidence level and animal spirit level (Barsky & Sims, 2012). Stephane Dees's research found that in some cases, consumer confidence can even be used as a very effective indicator to predict future consumption (Dees & Brinca, 2011). Therefore, we also incorporate consumer confidence into the research model.

1.3 Objectives and Hypothesis

The purpose of this study is to analyze the impact mechanism of COVID-19 on household consumption, including: a) The impact of the severity of COVID-19 on household consumption expenditure; b) Whether COVID-19 affects household consumption by influencing household income, that is, whether household income plays a mediating role; c) Whether family economic stability and consumer confidence play a moderation role. We used Tencent questionnaire platform to send questionnaires to various household heads through graduate students and teachers. Since November 2021, our research has investigated 230 heads of households or family members who have a sufficient understanding of the family situation in the form of online questionnaire, excluding invalid questionnaires and generating 210 sample data. The space-time lag caused by macro data research can be avoided by using the current period of micro data. Under the background of normalization of prevention and control of COVID-19 and economic recovery, our conclusions will provide some reference for future economic policy formulation.

We formulated the following hypotheses:

Hypothesis 1. There is a positive correlation between the severity of COVID-19 and the reduction in household consumption in the family area, that is, the higher the severity of COVID-19, the greater the reduction in household consumption.

Hypothesis 2. We assume that household income plays an mediating role in the impact of the severity of COVID-19 on household consumption.

Hypothesis 3a. We assume that household economic stability plays a moderation role in the impact of the severity of COVID-19 on household consumption.

Hypothesis 3b. We assume that consumer confidence plays a moderation role in the impact of the severity of COVID-19 on household consumption.
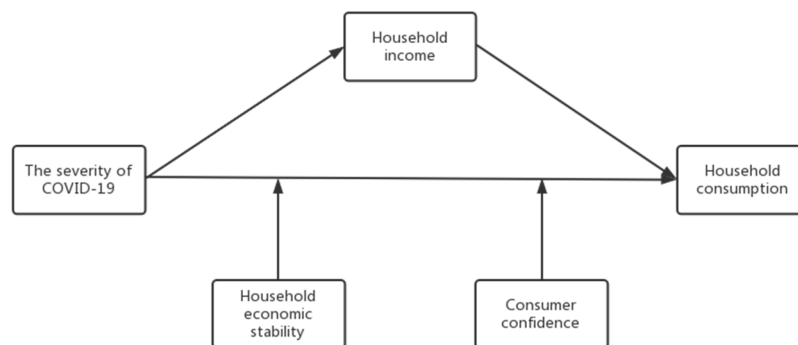

Figure 1. Conceptual model

2. Materials and Methods

2.1 Study Sample

Our data collection efforts began in November 2021. COVID-19 in China is at the beginning of the winter rebound. Due to the active and effective control of the government, COVID-19 in China has not been greatly spread. November and December are the peaks of online consumption in China. In order to make the survey results more universal, we extended the data collection work. In this survey, we collected 210 valid samples (100 males and 110 females) in the form of online questionnaire. Participants came from Hebei (71%), Beijing (8%), Tianjin (13%), Zhejiang (2%), Jiangsu (1%) and other regions (5%). Of those surveyed, 32.9% were civil servants or employees of public institutions; 18.6% were employees of State-owned enterprises; 33.8% were employees of private enterprises; 1.9% were employees of foreign capital or joint ventures; 5.7% were individual

businesses and 7.1% were unemployed. 91% of the respondents with higher education. The data collection process lasted about three weeks and restricted to the head of household or family members with sufficient understanding of the family situation. In order to prevent over concentration of sample sources, we controlled the maximum sample collection while issuing the questionnaire.

The attached text of our survey is: Hello, thank you very much for participating in this survey. This questionnaire is a survey of the impact of COVID-19 on family behavior, only for the head of household or family members (non-students) with sufficient understanding of the family situation. Please fill in the questionnaire according to the actual situation of your family. This questionnaire will be anonymous. All the contents you fill in will only be used for academic research. Your personal information will not be recorded in the background. Please feel assured to answer. In order to ensure anonymity, we set up the questionnaire system to ensure that the questionnaire is collected without leaving personal information other than the required research data.

2.2 Instruments

Participants responded the following questionnaires:

Sociodemographic data: We need respondents' answers on gender, age, marital status, education level, occupation type, etc. In addition, it refers to the viewpoint of urban-rural dual economic structure mentioned by Liu et al., (2020): there is significant heterogeneity in urban and rural household consumption in China. Therefore, we also investigated the type of family residence of the respondents.

The severity of COVID-19: In this variable, we selected a single item, that is, "the severity of COVID-19 in the area where your family lives (measured in county level)?". Seven-level Likert scale is adopted for this question option to more objectively reflect the severity of COVID-19 in the region where the respondents are located.

Reduced proportion of household income and consumption: Because of the epidemic, we think it's more scientific to take negative questions. we each choose one question about household income and consumption, that is, "If your household income decreases, what is the reduction rate?"; "If your household consumption decreases, what is the reduction rate?". The options are "Do not decrease" "0-20%" "20%-40%" "40%-60%" "60%-80%" and "Over 80%".

Household economic stability: Because there are few studies on this aspect and there is no available scale, we divided the household economic stability from the perspective of economic sources: household income stability; job stability; social support and others' support. We set up 4 questions in the form of five-level Likert scale based on the above. By inspection, Cronbach's alpha was 0.77.

Consumer confidence: We referred to the survey used by the Conference Board and the University of Michigan to measure the overall consumption index (Sydney, 2004). The index is considered to be the most widely used index to measure consumer confidence (Godovykh et al., 2021), which has been used for more than 60 years. While reference to the scale, we adjusted the scale and added two questions: "the value of consumption consideration" and "the willingness to purchase non-essentials". The questionnaire finally formed six questions in the form of five-level Likert scale. By inspection, Cronbach's alpha was 0.76.

According to the needs of the research, this paper adds the gender, age, marital status, education level, occupation type, residence of the head of household (the respondent) as control variables into the research model. Among them, gender, marriage, marital status, occupation type and residence are dummy variables, age is quantitative variable, and education level is expressed by years of education. Descriptive statistical results of main variables are shown in Table 1.

Table 1. Descriptive statistics for the main variables.

Variable		Mean	SD	Min	Max
The severity of COVID-19		1.933	1.409	0	6
Reduced proportion of household consumption		1.105	1.369	0	5
Reduced proportion of household income		0.886	1.070	0	5
Household economic stability	Household income stability	0.657	0.977	-2	2
	Job stability	0.571	1.097	-2	2
	Social support	0.438	1.053	-2	2
	Others' support	0.067	1.038	-2	2
Consumer confidence	Personal expectations for the economy in one year	1.090	0.981	-2	2
	Personal expectations for the economy in five years	1.129	0.952	-2	2
	Opportunity to buy large durable goods	0.695	0.950	-2	2
	The value of consumption consideration	0.086	0.979	-2	2
	The willingness to purchase non-essentials	0.743	0.988	-2	2
	The Willingness to consume credit in the future	0.252	0.800	-2	2

2.3 Model Settings and Methods

we designed three types of models. They are direct effect model, mediation effect model and regulatory effect model. Among them, the mediation effect model adopts the stepwise regression method.

Direct effect model:

$$CONSUME_i = \alpha_0 + \alpha_1 DEGREE_i + \alpha_c Z_i + \varepsilon_i \qquad (1)$$

Mediation effect model:

$$CONSUME_i = \alpha_0 + \alpha_1 DEGREE_i + \alpha_c Z_i + \varepsilon_i$$

$$INCOME_i = \beta_0 + \beta_1 DEGREE_i + \beta_c Z_i + \varepsilon_i \qquad (2)$$

$$CONSUME_i = \delta_0 + \delta_1 DEGREE_i + \delta_2 INCOME_i + \delta_c Z_i + \varepsilon_i$$

Moderating effect model:

$$CONSUME_i = \alpha_0 + \alpha_1 DEGREE_i + \alpha_c Z_i + \varepsilon_i$$

$$CONSUME_i = \beta_0 + \beta_1 DEGREE_i + \beta_2 MED_i + \beta_c Z_i + \varepsilon_i \qquad (3)$$

$$CONSUME_i = \delta_0 + \delta_1 DEGREE_i + \delta_2 MED_i + \delta_3 MED_i * DEGREE_i + \delta_c Z_i + \varepsilon_i$$

In the above formulas, Z represents the control variable and ε_i represents random disturbance term, and MEDi represents the regulating variable, which respectively refers to the household economic stability and consumer confidence.

Since previous relevant studies mostly focused on macro data, and our research was based on questionnaire data, we made an empirical analysis with reference to Professor Wen's research methods (Wen et al., 2005). We selected stata16.0 (Stata Corp, College Station, TX, USA) for statistical analysis. Firstly, descriptive statistics are conducted on the main variables, as shown in Table1. We conducted principal component analysis and factor analysis on two variables: household economic stability and consumer confidence. Secondly, we conducted descriptive statistics on the data. Finally, we conducted a mediation effect test and a moderating effect test to evaluate the mediation effect of household income, the moderating effect of household economic stability and consumer confidence.

3. Results

3.1 Preliminary Analysis

For the variable of household economic stability, we obtain four basic variables: household income stability; job

stability; social support and others' support. Then the fitness test is further carried out. In Barrett's test of sphericity, chi-square statistic is 250.493 and P < 0.001; The KMO and SMC test results are shown in Table 2. The four basic variables basically meet the requirements of sample adequacy, and the variables have sufficient correlation, so principal component analysis can be performed. After principal component analysis, we extract a common factor (eigenvalue > 1), which can explain 58.93% of the variance. After calculation, the comprehensive score Z1 is obtained.

Table 2. KMO and SMC test of household economic stability variables

Variable	KMO	SMC
Household income stability	0.652	0.408
Job stability	0.666	0.387
Social support	0.645	0.456
Others' support	0.641	0.426
Overall	0.651	—

As with the extraction of household economic stability variables, we also tested the six basic variables of consumer confidence. In Barrett's test of sphericity, chi-square statistic is 666.020 and P<0.001; The KMO and SMC test results are shown in Table 3. We found that these six variables are suitable for principal component analysis, and extracted two common factors (eigenvalue>1), which can explain 65.24% of the variance, so as to obtain the comprehensive score Z2.

Table 3. KMO and SMC test of consumer confidence variables

Variable	KMO	SMC
Personal expectations for the economy in one year	0.620	0.909
Personal expectations for the economy in five years	0.620	0.905
Opportunity to buy large durable goods	0.852	0.418
The value of consumption consideration	0.731	0.239
The willingness to purchase non-essentials	0.750	0.071
The Willingness to consume credit in the future	0.922	0.190
Overall	0.691	—

3.2 Mediation Effect Testing

Stata software and stepwise regression method are used to test the mediation effect of household income on the impact of the severity of COVID-19 on household consumption. The results are shown in Figure 2.

Firstly, from the perspective of the severity of the COVID-19 to the reduction in household consumption, the coefficient value is 0.58, SE is 0.05, p<0.001. Hypothesis 1 is verified. The higher the severity of COVID-19, the greater the reduction in household consumption.

After that, we found that COVID-19 could affect the proportion of reduction in household income. There is a positive correlation between them, and the correlation coefficient is 0.22 and p<0.001. The variable of reduction in household income is put into the research model as an mediation variable. The correlation coefficient between the severity of COVID-19 and the reduction in household consumption is 0.49 and p<0.001. The regression coefficient between the proportion of reduction in household income and the proportion of reduction in household consumption is 0.39 and P<0.001. In summary, hypothesis 2 is verified. The mediation effect of the severity of COVID-19 on household consumption by affecting household income is 0.08, accounting for 14.23%.
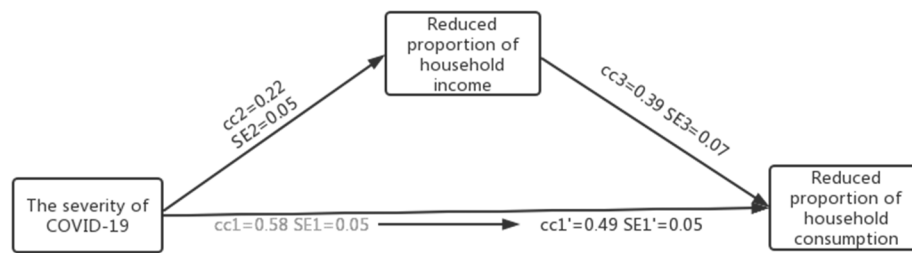
Figure 2. Mediation effect model

3.3 Moderating Effect Testing

The moderating effect of household economic stability: As above, we have concluded that the severity of COVID-19 has a positive correlation with the proportion of reduction in household consumption. We put the comprehensive score Z1 of household economic stability into the moderating model to test and get the results: The F value is 41.25, the degrees of freedom is 210 and the cross-item coefficient is -0.2003 ($p=0.065<0.1$); The R^2 statistic is 0.38 and the adjusted R^2 is 0.37, which indicates that the model has good goodness of fit and meets the expectation. The results show that household economic stability plays a moderating role in the impact of the severity of COVID-19 on reduction in household consumption. Hypothesis 3a is verified, as shown in Figure 3.
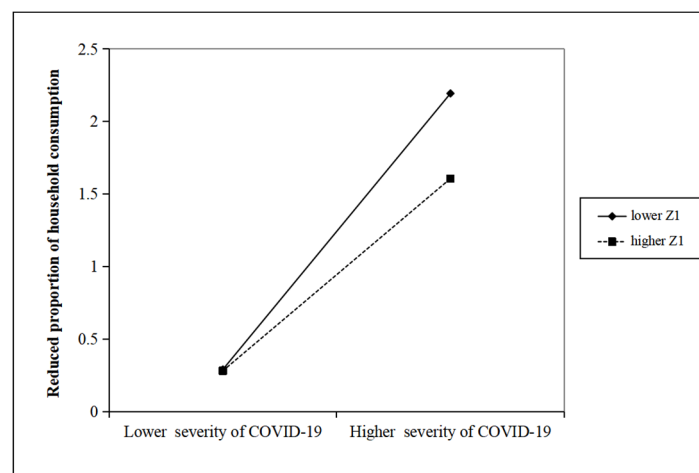

Figure 3. Moderating effect 1

Note. The more severe the COVID-19, the more economic stability households are that their household consumption is not inhibited

The moderating effect of consumer confidence: We put the comprehensive score Z2 of consumer confidence into the moderating model to test and get the results: The F value is 43.56, the degrees of freedom is 210 and the cross-item coefficient is -0.2017 ($p= 0.053 < 0.1$); The correlation coefficient of the severity variable of COVID-19 is 0.55 ($p < 0.001$); The R^2 statistic is 0.39 and the adjusted R^2 is 0.38, which indicates that the model has good goodness of fit. The results show that consumer confidence plays a moderating role in the impact of the severity of COVID-19 on reduction in household consumption. Hypothesis 3b is verified, as shown in Figure 4.
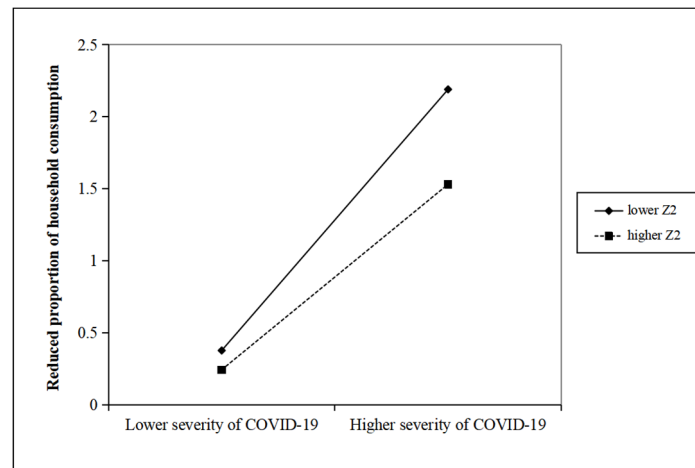
Figure 4. Moderating effect 2

Note. The more severe the COVID-19, the more confident households are that their household consumption is not inhibited.

4. Discussion

We investigated the severity of COVID-19, the reduction in household income, consumption confidence, household economic stability and the reduction in household consumption expenditure in 210 families in China. The results are as follows: The higher the severity of COVID-19, the greater the reduction in household consumption, which verifies hypothesis 1. Through the mediation effect test, we concluded that household income plays a mediating role in the impact of COVID-19 on household consumption, which verifies Hypothesis 2. We put household economic stability and consumer confidence into the moderating model to verify their moderating effect.

From the data, we can conclude that the control of COVID-19 in China is effective, and there are very few cases where COVID-19 is very serious. That is why household incomes have declined modestly. Although COVID-19 is prone to outbreak at this time, most sample households showed optimistic and positive consumer confidence, with positive judgments about future expectations. Of course, many scholars have demonstrated the impact of COVID-19 on household consumption from different perspectives, and have confirmed the negative impact of COVID-19 on household consumption (Coibion et al., 2020; Diane & Ezra, 2020; Chen et al., 2021; Liu et al., 2020; Dimitris et al., 2020; Chang & Chad, 2020; Asger et al., 2020). The impact of COVID-19 on the economy is uncertain (Baker, Bloom, et al., 2020) and long-term (Gautam & Hens, 2020). With the development of COVID-19 and the recovery of the economy, it is time-sensitive to the current study of household consumption. Different from previous studies on the household consumption of COVID-19 (Chen et al., 2021; Liu et al., 2020), we analyzed the transmission path of COVID-19 to household consumption in depth.

5.Conclusions

Studies have confirmed that COVID-19 can affect household consumption by affecting household income. Consumer confidence and household economic stability negatively moderate the impact of COVID-19 on household consumption. This paper not only combines previous scholars ' research on household consumption under the background of COVID-19, but also combs the transmission path of the impact of COVID-19 on household consumption in China. On the one hand, our study provides important policy implications for China's economic recovery from COVID-19. On the other hand, it provides important theoretical analysis for consumption recovery in the era of COVID-19. It should be emphasized that even if consumption is in the recovery stage, the risk of COVID-19 should still be vigilant. As Carlsson-Szlezak et al. have said, research on the economic recovery patterns in COVID-19 is hard to accomplish overnight (Philipp et al., 2020b). Cooperation among countries should be strengthened to prevent a recurrence of the global economic crisis caused by COVID-19 in response to the linkage effects of global economic fluctuations (Susskind & Vines, 2020).

6. Limitations and Future Research

By constructing the mediation effect test model and the moderating effect test model, we analyzed the impact of COVID-19 on household consumption and draw the corresponding conclusions. It is worth noting that, due to

the uncertainty of COVID-19, our study, like Baker, Farrokhnia, et al., (2020), is based only on the current consumer response. On the other hand, although the sample data we collected are representative, the representativeness of the sample size is slightly insufficient. Researchers can conduct extensive data collection in the future to make the sample more comprehensive. Moreover, we did not conduct stratified sampling for different regions of China, but adopted the method of random sampling. Although this method is simple, the overall dispersion can not form a study of spatial structure. In addition, although the micro data obtained in our survey avoids the lag of macro data to a certain extent, it can not avoid the subjectivity of subjects and the limitations of survey conditions. Cross-sectional data are often unable to clearly determine the causal relationship and therefore can only be studied from a relevant perspective (Aiken et al., 2012). Longitudinal data is more scientific than single-section survey data when studying complex problems (Hsiao, 2007). We suggest that scholars use household tracking data for analysis in the future, so as to conduct a deeper study of household consumption. The stepwise regression method we have adopted is still used by many economists, but many shortcomings have been discovered.

At present, some scholars have noticed the issue of retaliatory consumption after the relaxation of the control of COVID-19 (Nguyen & Chao, 2021; Khan, 2021). Research can focus on the analysis of retaliatory consumption based on this paper in the future, and explore the relationship between COVID-19 situation and retaliatory consumption. Some scholars have also found that household consumption in China is also affected by credit consumption by using panel data in 2013, 2015 and 2017, that is, there is a positive correlation between digital finance and household consumption (Li et al., 2020). In the future research can analyze the relationship between credit consumption and reduction in household consumption in view of the current situation of consumption downturn under the influence of COVID-19.

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