

Article

A Study on the Impact of Income Gap on Consumer Demand: An Empirical Test Based on the Spatial Panel Durbin Model

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Abstract: The study utilizes China Household Panel Survey (CFPS) data from 2010 to 2020 to create a spatial panel Durbin model and examines the spatial spillover effect of the income gap on consumer demand using spatial econometric techniques. Studies have shown that the income gap has a notable inverted U-shaped influence on consumer demand, and there is a strong inverted U-shaped spatial spillover effect between surrounding locations. Expanding the income difference within a specific range boosts consumer demand in both local and surrounding areas. Further increasing the income difference impedes the growth of consumer demand in both local and surrounding regions. Regional variations significantly impact how the income gap affects consumer demand through spatial spillover. From the perspective of consumption quantity, the “inverted U-shaped” inflection point in economically developed regions and eastern regions is on the left side of economically underdeveloped regions and western regions; from the perspective of consumer quality, this result is exactly the opposite. China should persist in enhancing efforts to advance income distribution system reform and improvement, bolster the development of inclusive, fundamental, and grassroots livelihoods, manage residents’ income gap amid evolving income levels, and stimulate consumer demand in local and neighboring regions.

Keywords: income gap; consumer demand; spatial Durbin model



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1. Introduction

Since the Second World War, the world has continuously encountered energy crises, population crises, resource consumption crises, unemployment, poverty, and a gap between the rich and the poor, which have attracted the attention of a large number of scientists, sociologists, politicians, etc. [1,2]. Against this background, the United Nations has held several issues related to sustainable development, and the theory of sustainable development has been continuously applied to real life. The theory of sustainable development has summarized the following three consensuses in the exploration and practice of the past three decades: (1) we should adhere to scientific and technological innovation and provide new impetus for economic growth; (2) the accumulation of wealth should not be at the expense of the environment to ensure high-quality economic development; (3) we should promote fair and orderly development, promote social harmony, and reduce social unrest and imbalance [3]. Sustainable development involves a wide range of contents, including politics, economy, culture, society, and other aspects, while the economic basis (economic development) determines the superstructure (politics, culture, etc.), which is the most basic consensus. The development inequity caused by the imbalance and insufficiency in the process of economic development is one of the important contents of sustainable development research [4]. Therefore, the problem of income gap and consumer demand involved in this study is an important part of sustainable development and has important practical and theoretical significance for achieving sustainable development.

In 2021, the Central Economic Work Conference highlighted that China’s economic development was encountering three main challenges: demand contraction, supply shock,

and weakening expectations. It is crucial to expedite the establishment of a new development model centered on domestic circulation and with domestic and international dual circulation mutually reinforcing each other. The Party and administration prioritize the significant consideration of home consumption. The 2017 report from the 19th National Congress of the Communist Party of China highlighted the importance of expanding institutional mechanisms to boost consumption and strengthen the fundamental role of consumption in economic development. The 14th Five-Year Plan Outline of China, established in March 2021, emphasizes the importance of a robust domestic market and the interconnectedness of production, distribution, circulation, and consumption to achieve a balanced economy and stimulate demand and supply effectively. The phenomenon of “low consumption and high savings” among Chinese inhabitants has not significantly changed. (In the short term, high savings rates and low consumption rates may suppress economic growth by reducing total demand, weakening multiplier effects, and leading to an imbalance between investment and savings; in the long run, it may affect the expansion of market size, consumer-driven innovation, and optimization of the economic structure, which is detrimental to the sustained and healthy development of the economy. Therefore, high savings and low consumption may be detrimental to economic growth.) The household consumption rate, calculated as household consumption expenditure divided by GDP expenditure, has consistently decreased according to statistics from the National Bureau of Statistics. After hitting a record low of 35.36% in 2010, it has since stayed at a low and unstable level, consistently below 40% up to the present (part of the reason is the impact of COVID-19). It is far lower than industrialized countries in Europe and America, as well as below the world average and even lower than East Asian countries in the Confucian cultural circle, like Japan, and growing economies, like India. This contrasts sharply with the consistent rise in the GDP growth contribution rate to China’s final consumption. China must achieve high-quality economic development by removing obstacles that impede inhabitants’ spending and fully tapping into their consumption potential.

Attaining commonwealth is a fundamental necessity of socialism. The 20th National Congress of the Communist Party of China’s report emphasized that Chinese-style modernization aims to achieve common prosperity for all citizens and highlighted the importance of standardizing the process for wealth growth. The wealth disparity among Chinese people remains significant, with the income gap being a crucial element in the index system used to gauge shared prosperity [5]. China’s Gini coefficient has consistently exceeded 0.4, the international warning threshold, over the last twenty years. At its peak, it reached 0.491, and some researchers and organizations have reported even higher values. For instance, in 2010, the Gini coefficient from the Southwestern University of Finance and Economics’ China Household Finance Survey was recorded at 0.61. China now ranks among the countries with the most significant income gap globally [6].

China has a significant income difference, which hinders achieving common prosperity and limits the growth of aggregate demand. The Central Committee of the Communist Party of China and The State Council released the Outline of the Strategic Plan for Expanding Domestic Demand (2022–2035), emphasizing the importance of promoting common prosperity and enhancing the development potential of domestic demand to prevent income gaps and stimulate economic growth. Many studies focus on analyzing the phenomenon of “low consumption and high savings” among Chinese citizens by considering the income gap [7,8]. However, there is limited research that integrates spatial considerations into the analytical framework for investigation. This paper thoroughly examines the relationship between “promoting common prosperity” and “building a new development pattern” in the context of China’s economic development and transformation, focusing on the institutional obstacles hindering household consumption expansion and improvement. The report investigates ways to enhance people’s consumption across different regions in China by analyzing the spatial impact of the income gap on consumer demand using the spatial panel Durbin model. This paper innovatively incorporates the income gap and consumer demand into the research framework to explore the nonlinear relationship between them.

This expands the scope of previous research and serves as a valuable addition to the literature on the economic impacts of the income gap. This paper examines the phenomenon of “low consumption and high savings” in China by analyzing the income gap from a spatial perspective, aligning with the country’s regional characteristics.

2. Literature Review

Research on the correlation between the income gap and consumer consumption, both domestically and internationally, was overlooked before the 2008 financial crisis. Mainstream consumption theories including Modigliani’s life cycle theory, Friedman’s lasting income hypothesis, and Hall’s rational expectation life cycle hypothesis all suggest that income redistribution does not impact total consumption [9–11]. The growing income gap increases income variation, leading to greater income uncertainty. As a response, consumers tend to increase precautionary savings. Recently, foreign scholars have increasingly focused on studies about income gap and household consumption due to the growing importance of consumption. Current domestic and international studies on income gap and consumption patterns focus on the relative income hypothesis at the individual level and the theoretical concept that differences in marginal consumption tendencies can impact overall consumption at the national level. Existing investigations do not provide a uniform conclusion.

2.1. Microscopic Perspective

The microcosm theory, based on the relative income hypothesis “keep up with your neighbor”, suggests that the income gap leads to higher levels of consumption. Traditional economic theory assumes that consumers are rational economic agents, and their income determines their final consumption. However, from the perspective of behavioral economics, consumer consumption behavior is also influenced by subjective factors such as psychology and social habits [12]. Therefore, by introducing social psychology into the relationship between consumption and income, it can be inferred that in the short term, individual consumption will be influenced by economic fluctuations, while in the long term, individual consumption will also be influenced by demonstration effects. The basic idea is that individuals influence and compare with each other in consumption. Whether to use income for consumption is not only determined by their absolute income but also by their relative income level with others. The existing consumption theory and Chinese practice have shown that many factors affect the consumption of Chinese residents. The first explanation is based on the life cycle theory, which believes that the proportion of China’s labor force is an important factor affecting household consumption. However, this explanation is not consistent with the consumption/savings behavior of micro households in China [13], and the explanatory power of macro data is also greatly questioned [14]. The second explanation is based on the liquidity constraint theory, which suggests that the underdevelopment of China’s financial market is an important factor in the insufficient consumption rate of residents [15]. However, the efficiency of China’s financial system has improved, at least in recent years, while the consumption rate of residents continues to decline. The third explanation involves factors such as culture, habits, and family preferences [16–18]. Similarly, cultural factors with strong sustainability are unlikely to explain the rapid decline in consumption rates among Chinese residents since 2000. The fourth explanation is mainly based on the theory of preventive savings, which suggests that the reform of China’s elderly care, education, and housing systems has increased the uncertainty of residents’ income and expenditure. At the same time, the unemployment risk in the labor market has also increased, enhancing residents’ motivation for preventive savings, leading to an increase in savings rates and a decrease in consumption rates. However, there is no direct evidence to suggest that the decline in consumption rates in recent years can be fully explained by the uncertainty of income and expenditure in labor market risks, healthcare, and other aspects. In recent years, some scholars have argued from the perspective of income distribution among residents that the widening income gap is an important factor

affecting household consumption [19], because in the consumption decisions of residents, household income level usually plays a decisive role, and the relationship between the two is relatively stable. At the same time, there are often differences in consumption decisions and tendencies among households with different income levels. The relevant literature has extensively characterized and discussed this based on different assumptions. Based on differences in consumption tendencies among different income groups, adjusting the income gap between residents may affect the overall consumption scale of residents. Frank et al. (2010) suggest that the spending behaviors of wealthy families can influence others to mimic them, resulting in a widening income difference and a trend known as “expenditure waterfall” [20]. Drechsel-Grau and Schmid (2014) confirmed this perspective using the relative income hypothesis. The study revealed that a family’s consumption is influenced by the average consumption level of a reference group, namely, a family with a higher income. The study discovered that for each unit rise in the average consumption of the reference group of homes, there would be an approximate 0.3% increase in the household’s consumption [21]. Bertrand and Morse (2016) conducted an empirical study in the United States, finding that as the wealth gap widens, medium- and low-income groups tend to mimic the consumption behaviors of high-income groups, known as the “demonstration effect”. This phenomenon has prompted low- and middle-income households to decrease their savings rates and consequently boost their consumption expenditure to achieve a higher quality of life [22].

2.2. Macro Perspective

According to the law of diminishing marginal consumption tendency, an increase in the income gap is expected to reduce the average consumption tendency and marginal consumption tendency of the entire society, resulting in lower consumption by residents [23]. San-taeulalia-Llopis and Zheng’s (2018) research shows that household income uncertainty in China has been increasing. The impact of this uncertainty on rural and urban household consumption has risen from 10% to 28% for rural households and from 5% to 25% for urban households, before and after 1997 [24], respectively. This widening income gap is a result of the increased uncertainty. Increasing income instability restrains residents’ consumption. Keynes’ absolute income hypothesis, proposed in 1936, examines the connection between income and consumption at a macro level. It suggests that the gap in consumption levels due to income differences is primarily influenced by varying marginal consumption tendencies among different income groups. Specifically, high-income groups tend to have a lower marginal consumption tendency, whereas low-income groups exhibit a higher tendency. Low-income groups have a desire for consumption but lack purchasing power, whereas high-income groups possess the purchasing capacity but lack a strong desire for spending, therefore hindering consumer demand [25]. Yang Tianyu (2001) applied Marx’s social reproduction framework to study how the income gap between urban and rural areas affects consumer demand. The research concluded that redistributing income would increase consumer demand, and narrowing the gap in the organic composition of urban and rural capital was essential to expand effective demand [26]. Furthermore, the widening wealth disparity will decrease the average spending tendency of the entire society [27–29], hindering the “trickle-down effect” of consumption and industrial upgrading in middle-income economies [30,31].

In conclusion, the income gap can have both a promoting and inhibiting effect on residents’ consumption. (Zhu Guolin et al. believe that in theory, there is a U-shaped relationship between Chinese residents’ savings motivation and income, so the unequal distribution of income will restrict residents’ consumption [32]. Yang Tianyu and Liu Xiaoxia believe that there is an optimal income gap that can maximize the consumption of Chinese residents [33].) This means there is a nonlinear relationship between the income gap and residents’ consumption, and the varying income gap will impact residents’ consumption differently through these effects. When the income gap is below a particular threshold k , the “promotion effect” is predominant, and an increase in the income gap will encourage locals

to consume more. When the income gap is beyond a specific threshold k , the “inhibitory effect” takes over, causing the expanding income gap to hinder residents’ consumption. Thus, hypothesis H1 is proposed:

H1: *The effect of the income gap on residents’ spending typically follows an “inverted U-shaped” pattern, initially increasing and then decreasing.*

Furthermore, recent research has also focused on the spatial correlation of income gap and consumption [34,35]. The demonstration effect of Duesenberry suggests that in general, low-income groups tend to imitate high-income groups more significantly. It can be seen that the demonstration of high-income groups and the imitation of low-income groups provide a classic theoretical basis for the spatial spillover effect of consumption [21]. The widening income gap within a certain range can not only stimulate local consumption demand but also create a “demonstration effect” in space, that is, a region can have a positive impact and promoting effect on neighboring areas. The spatial “demonstration effect” is shown in the expanding income difference in the region, which will result in the accumulation of wealth and the formation of a high-income group [36]. The high-income group’s recent increase in wealth will lead to a new consumption trend due to the “demonstration effect”. As the “long-tail market” gradually receives attention, consumers’ demand for uniqueness is fully released, and cross-regional consumption behavior is significantly increasing [21]. This will not only increase consumer demand among the high-income group in neighboring areas but also prompt some middle-income groups in the region to increase their consumption tendencies, thereby expanding consumer demand in the neighboring areas [37,38].

As the income gap continues to widen, it will not only increase the number of middle- and low-income groups but also limit their income levels through the “squeezing effect” on these groups, resulting in their consumption needs not being effectively improved due to the limitation of the total social wealth. The expanding income gap will lead to a concentration of wealth among high-income groups, who will allocate more affluent monies towards investment or savings. As income levels rise, the marginal propensity to consume will not continue to increase. Currently, the low- and middle-income populations in the region, who make up a significant portion of the population, are facing challenges in increasing their purchasing power due to income limitations. This situation may lead to a decrease in the quality of available consumer goods, known as “consumption downgrade”. As a result, the initial market demand in nearby locations would decrease, which will hinder the enhancement of consumer demand in the region [39]. Hypothesis H2 is proposed:

H2: *The income gap’s effect on consumer demand exhibits an “inverted U-shaped” pattern, characterized by an initial increase followed by a decrease, in both local and adjacent regions.*

3. Data Sources, Variable Selection, and Empirical Model

3.1. Data Source and Processing

This study analyzed data from the China Household Tracking Survey (CFPS) spanning from 2010 to 2020. It highlights that household consumption is a complex behavior and suggests that solely relying on macro data to examine the connection between the income gap and consumption might obscure specific details at the individual level. Hence, it is essential to investigate the correlation between income gap and consumer demand across various income brackets at a micro level. The CFPS questionnaire consists of four primary types of questionnaires: community, family, adult, and children questionnaires. The study utilized data from the adult and family databases, and outliers were identified and removed. The balanced panel data created in this study covered the period from 2010 to 2020 and consisted of 2527 homes, totaling 15,162 data samples.

3.2. Variable Declaration

The study utilized indicators and questionnaire content from the CFPS to extract data on household income, property, household head information, and consumption structure from the database. The data were organized and calculated based on the model's significance and requirements, and the income gap variable data were computed using STATA15.1. The study aimed to establish a benchmark model to analyze the relationship between residents' income gap and consumer demand by regressing residents' consumption and consumption upgrading. Finally, the model tested the relationship between income gap and consumer demand, as well as the geographical influence between them.

3.2.1. Explained Variable

The research object of this paper was consumer demand. The consumer demand described in this paper had two dimensions, namely quantity and quality. Therefore, the explained variables selected were resident consumption expenditure reflecting consumption quantity and consumption upgrading reflecting consumption quality respectively. Household consumption expenditure is the result of taking the logarithm of comparable consumption. (Due to the fact that CFPS involves comparisons between different years, it was necessary to eliminate price level factors through price adjustment. This article used the Consumer Price Index (CPI) corresponding to the province where the sample households were located as the deflator, and used 2010 as the base period to deflate the total consumption in 2010, 2012, 2014, 2016, 2018, and 2020, ensuring comparability between different years.) To further analyze the impact of residents' income gap on different consumption types, this paper made a structural subdivision of residents' consumption expenditure concerning the existing literature by dividing the eight categories of consumption into three categories: survival type, development type, and enjoyment type. Survival type consumption included food consumption expenditure, clothing consumption expenditure, and residential consumption expenditure [40,41]. Developmental consumption expenditure included expenditure on household equipment and daily necessities and expenditure on transportation and communication. Enjoyment expenditure included medical insurance expenditure, culture, education and entertainment expenditures, and other consumption expenditures. According to the study of Qiao Zhen and Xu Hongxin (2023), the index of consumption upgrading is finally determined according to the weight of 1:2:3 for the three types of expenditure, that is, consumption upgrading = survivability ratio \times 1 + development consumption ratio \times 2 + enjoyment consumption ratio \times 3 [42]. In addition, this paper also used the average propensity to consume as an alternative indicator of consumer demand to conduct a robustness test. The average propensity to consume is comparable to total household consumption/comparable total household income.

3.2.2. Core Explanatory Variable

In this paper, the Gini coefficient, the most widely used index, was adopted as the core explanatory variable. Since status-seeking mainly comes from peers, and people are mainly compared with the nearby population, this paper chose to calculate the Gini coefficient at the district and county level by referring to the practice of Ma Hongge, Xi Heng (2020), and Yi Xingjian (2023) [43,44]. According to the income of the sample families in each district and county, the Gini coefficient values of 162 districts and counties were calculated using STATA15.1 (the household income items included in the cross-year questionnaire in the CFPS database are different, and the changes in the same batch of household income between different rounds need to exclude income changes caused by different questionnaire questions; therefore, to achieve research accuracy, variables with the "2" suffix in the questionnaire, namely, comparable household income in 2010, were used as the basis for calculating the Gini coefficient), with a total of 972 values, which was used as an indicator to measure the income gap of residents. In addition, this paper selected the income proportion of the top 10% of the household income as the alternative index of the robustness test to re-estimate the main model in this paper.

3.2.3. Control Variables

To effectively measure the impact of residents' income gap on consumer demand, in addition to the variable of the income gap, it was necessary to control other variables affecting consumption. The different states of household heads and families may also have different impacts on household consumption behavior. The paper controlled variables that affected consumer demand, such as household income (since CFPS database includes different household income items in the New Year's Eve questionnaire, the changes in the same group of household income between different rounds needed to exclude the income changes caused by different contents of the questionnaire; therefore, in order to achieve research accuracy, the variable with a "_2" suffix in the questionnaire was used, that is, the household income compared with 2010), household assets, age of the head of the household, health status, education level, elderly dependency ratio (ratio of the total population of the household aged 65 and above), child dependency ratio (ratio of the total population of the household aged 16 and below), marital status, family size, and number of real estate properties, etc. In the empirical analysis, a logarithmic treatment was carried out on the income.

3.3. Model Setting

The study primarily examined the regional spillover impact of the income gap on consumer demand. A broad panel regression model was created to confirm the presence of a nonlinear relationship between the variables. A spatial econometric model was created to study the geographical spillover effect of the income gap on consumer demand.

3.3.1. Setting of Baseline Regression Model

This section examines the potential nonlinear correlation between income gap and consumer demand by utilizing the modeling concepts proposed by Loayza et al. (2000) [45] and Yi Xingjian et al. (2015) [46]. It focuses on resident consumption and consumption upgrading as key indicators of consumer demand. The Gini coefficient, a crucial measure of the income gap, was used as the primary explanatory variable. The square of the Gini coefficient was included to examine the nonlinear relationship between residents' income gap and consumer demand. Consumer demand is influenced by various factors. This work established a set of control factors based on previous research to enhance the accuracy of the estimation, encompassing households and individuals. The control variables chosen in this paper followed the principle outlined by Zhao Xiliang (2017) [47] and the 2021 Nobel economics laureate Angrist (2009) [48]. These variables manage the "common causes", which are factors that could impact both residents' income gap and consumer demand simultaneously, while also minimizing the issue of "bad control variables". This study specifically examined and regulated various factors at the family level, such as family income, family size, family assets, number of family residences, proportion of senior family members, and proportion of children. Individually, it accounted for the head of household's age, health, education, and marital status. To mitigate the impact of heteroscedasticity, this study applied a logarithmic transformation to the continuous variables used in the estimation. The benchmark regression model constructed with the term income gap squared was as follows:

$$\text{Cons}_{it} = \alpha_0 + \beta_1 \text{Gini}_{it} + \beta_2 \text{Gini}_{it}^2 + \beta_3 Z_{it} + \alpha_i + \text{year}_t + \varepsilon_{it} \quad (1)$$

The home code is represented by i , and the time is represented by t . Cons_{it} represents household consumption, consumption upgrading, and Gini_{it} and Gini_{it}^2 represent income gap in its square term. Z_{it} represents a set of control factors influencing consumer demand, α_i represents the fixed effect of the district and county where the family resides, and year_t represents the fixed effect of the year while representing residual terms.

3.3.2. Spatial Durbin Model

The study utilized a spatial econometric model to examine the spatial spillover effect of the income gap on consumer demand, as identified by Tian Wei et al. (2018) and Wu Shunli et al. (2023) [49,50]. The study chose the spatial panel Durbin model to address the endogeneity issue during estimation [51]. The basic form of the model was as follows:

$$\begin{aligned} \text{Cons}_{it} = & \rho \sum_{j=1}^N \omega_{ij} \text{Cons}_{jt} + \beta_1 \text{Gini}_{it} + \beta_2 \text{Gini}_{it}^2 + \beta_3 Z_{it} \\ & + \lambda_1 \omega_{ij} \text{Gini}_{jt} + \lambda_2 \omega_{ij} \text{Gini}_{jt}^2 + \lambda_3 \omega_{ij} Z_{jt} + \mu_i + \gamma_t + \varepsilon_{it} \end{aligned} \quad (2)$$

where w_{ij} represents the geographical adjacency matrix, which is a commonly used spatial weight matrix at present. The article chose the queen adjacency rule (which sets regions with common edges or vertices as adjacent) to establish a spatial weight matrix and used the *spatwmat* command in Stata software 15.0. <https://www.stata.com/stata15/> (accessed on 16 May 2024) to complete the establishment of the spatial adjacency matrix. $w_{ij} \text{Cons}_{jt}$ is the spatial lag term of consumer demand, and ρ represents the spatial autoregressive coefficient. μ_i is the space-fixed effect, γ_t is the time-fixed effect, and ε_{it} is the random error term.

4. An Empirical Analysis of the Impact of the Income Gap on Consumer Demand

4.1. Baseline Regression Result

To preliminarily verify the relationship between residents' income gap and consumer demand, this part used STATA15.1 software to test the benchmark regression model (1) by using the bilateral fixed-effect method (FE). The estimated results are shown in Table 1.

Table 1's results demonstrate a consistent "inverted U-shaped" link between income gap and consumer demand, independent of the inclusion of control factors. The regression coefficients for the income gap in residents' consumption were 1.057 before adding control factors and 0.945 after adding control variables. Both coefficients were statistically significant at the 1% level. The regression coefficients for the square term of income gap on residents' consumption, before and after adding control variables, were -2.017 and -1.328 , respectively. They were statistically significant at the 1% level, suggesting that the impact of the income gap on residents' consumption followed a consistent "inverted U-shaped" pattern. After including control variables, the regression coefficients for the income gap on consumption upgrading were 1.289 and 1.147, both statistically significant at the 1% level. The regression coefficients for the square term of the income gap on consumption upgrading were -1.366 and -1.267 before and after adding control variables, respectively. These coefficients were statistically significant at the 1% level, suggesting a consistent "inverted U-shaped" relationship between income gap and consumption upgrading. The results above confirm hypothesis H1, suggesting that widening the income gap appropriately will enhance consumer demand. As the income gap continues to grow, its positive impact on residents' consumption will shift to a negative impact. This study results align with the conclusion drawn by Li Shuyu and Zhao Xindong (2019), indicating that there is an "inverted U-shaped" relationship between the income gap and consumption not only for urban residents but for all residents [52]. One potential explanation for the phenomenon mentioned is that appropriately increasing the income gap can lead to the concentration of wealth among high-income individuals [53]. This, in turn, might result in high-income individuals becoming the primary consumers in the market and boosting effective demand [54]. The widening income gap will reduce demand from low-income individuals and cause high-income earners to invest funds in foreign countries, leading to a decrease in the domestic consumer base and constraining overall consumer demand. This conclusion aligns with the concept of allowing certain individuals to accumulate wealth initially and then having them guide others to achieve prosperity. Rich individuals can boost the spending demand of other wealthy individuals, expand the income gap, stimulate consumption in others through "comparison psychology", and subsequently encourage another portion of

the wealthy population, ultimately aiding in closing the income difference. Currently, the newly wealthy individuals raise their need for consumption. Hence, the initial rise and subsequent decline in the income difference positively affect consumer demand, resulting in an “inverted U-shaped” influence of the income gap on consumer demand.

Table 1. Overall estimated results.

Variable Name	Consumption		Con-Upgrading	
	(1)	(2)	(3)	(4)
Gini	1.057 *** (2.660)	0.945 *** (2.604)	1.289 *** (6.95)	1.147 *** (6.233)
Gini ²	−2.017 *** (−4.020)	−1.328 *** (−2.852)	−1.366 *** (−5.87)	−1.267 *** (−5.543)
Income		0.200 *** (36.239)		0.029 *** (9.868)
Assets		0.038 *** (8.915)		0.003 (1.403)
Age		−0.009 *** (−14.648)		−0.001 *** (−3.350)
Health		−0.033 *** (−6.281)		−0.040 *** (−14.101)
Education		0.025 *** (16.280)		0.005 *** (5.941)
Old ratio		−0.067 *** (−2.857)		−0.025 * (−1.912)
Child ratio		0.019 (0.495)		−0.116 *** (−5.830)
Matrimony		0.161 *** (7.954)		0.030 *** (2.786)
Family size		0.069 *** (16.484)		0.029 *** (14.071)
Number of properties		0.080 *** (7.524)		0.024 *** (4.746)
Constant term	10.294 *** (132.690)	7.775 *** (86.343)	1.372 (37.69)	1.670 *** (34.212)
Year	Yes	Yes	Yes	Yes
County	Yes	Yes	Yes	Yes
N	15,162	15,162	15,162	15,162
R-squared	0.247	0.448	0.060	0.095

Explanation: 1. The logarithmic values of the consumption and income are shown. 2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ***, **, and * are significant at 1%, 5%, and 10% levels, respectively. 3. The values in brackets are the t statistic values. (1) (3) are the result of a regression without control variables, and (2) (4) are the results of a regression with control variables.

4.2. Spatial Spillover Effect Analysis

In the previous part, we examined the “inverted U-shape” change in residents’ income gap and its impact on consumer demand by creating a benchmark regression model in the preceding section. What is the spatial spillover effect of the residents’ income gap on consumer demand while taking spatial correlation into account? Does this spatial spillover effect vary by region? Recently, these issues have increasingly captured the interest of scholars. Addressing the aforementioned issues is crucial for thoroughly assessing the influence of residents’ wealth disparity on consumer demand and provides valuable insights for shaping pertinent government policies. This section thoroughly examines the spatial spillover effect of residents’ income gap on consumer demand through a spatial correlation test of the main variables.

Before doing the spatial panel regression analysis, a three-step correlation test must be performed. Initially, we assessed whether the primary variables exhibited spatial correlation across different locations.

The global Moran's I index of consumer demand in 30 regions of China was consistently above zero from 2010 to 2020, with each year's index fluctuating around 0.2, all passing the significance level test (Table 2). The results indicate a notable spatial positive correlation in consumer demand across various regions of China on a global level. This means that consumption behavior, which includes both quantity and quality of consumption such as household spending and consumption upgrades, is not randomly distributed but influenced by consumption patterns in neighboring regions. Thus, it illustrates the features of spatial clustering distribution among regions.

Table 2. Results of Moran's I test of income gap and consumer demand.

Year	Gini Moran's I	Consumption Moran's I	Con-Upgrading Moran's I
2010	0.195 ** (1.962)	0.179 ** (2.056)	0.254 *** (2.490)
2012	0.195 ** (1.965)	0.182 ** (2.100)	0.216 * (2.171)
2014	0.188 * (1.899)	0.183 ** (2.092)	0.222 ** (2.217)
2016	0.203 ** (2.029)	0.183 ** (2.086)	0.207 ** (2.086)
2018	0.186 * (1.880)	0.190 ** (2.153)	0.184 * (1.894)
2020	0.210 ** (2.087)	0.180 ** (2.054)	0.273 *** (2.669)

Explanation: 1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ***, **, and * are significant at 1%, 5%, and 10% levels, respectively. 2. The values in brackets are the z-statistic values.

In the second step, the LM test was carried out to determine the applicability of the spatial measurement model. The LM test results rejected the null hypothesis that there was no spatial lag model and spatial error model. Thus, utilizing a spatial econometric model was more suitable than a non-spatial econometric model.

The third step was to select the spatial measurement model form using the LR test and Wald test. Both the LR and Wald tests rejected the null hypothesis that the spatial Durbin model could be reduced to a spatial lag model or a spatial error model. Table 3 displays the precise test findings. Hence, selecting the spatial Durbin model was a more logical choice for examining the spatial spillover impact of the income gap on consumer demand.

Table 3. LM, LR, and WALD test results.

Model	LM	LR	WALD
Spatial lag	26.337 ***	352.64 ***	434.14 ***
Spatial error	38.060 ***	329.99	419.77 ***

Explanation: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 1. ***, **, and * are significant at 1%, 5%, and 10% levels, respectively.

4.2.1. Analysis of Overall Empirical Results of Spatial Spillover Effect

The data in Table 4 show that the coefficient of the square term for the residents' income gap was negative and statistically significant, aligning with the benchmark regression's conclusion (the analysis data of spatial spillover effects were based on micro data (CFPS), and the median of the corresponding variables was taken to obtain the relevant variable data within the region). The spatial lag coefficient of the square of the residents' income gap was significantly negative, suggesting that the influence of the residents' income gap on consumer demand exhibited a positive spatial spillover effect initially, followed by a negative spatial spillover effect. A rise in the income gap among people in a region creates positive incentives for consumer demand through the "demonstration effect" in nearby areas, therefore enhancing consumer demand in those regions. The expanding income difference has a severe negative spillover effect on consumer demand in neighboring areas, restraining consumption levels in the region and reducing demand in nearby locations. The results above confirm hypothesis H2.

Table 4. Overall estimation results of spatial panel Durbin model.

Variable Name	Consumption	Con- Upgrading	Variable Name	Consumption	Con- Upgrading
Gini	0.217 *** (0.066)	7.148 *** (0.250)	W Gini	0.802 *** (0.136)	3.519 *** (0.801)
Gini ²	−0.215 *** (0.071)	−7.581 *** (0.274)	W Gini ²	−0.468 *** (0.150)	−3.683 *** (0.859)
Income	0.008 ** (0.004)	0.012 *** (0.004)	W Income	0.035 *** (0.002)	0.086 *** (0.009)
Assets	0.005 *** (0.000)	0.008 *** (0.002)	W Assets	0.005 *** (0.001)	0.027 *** (0.004)
Age	−0.002 *** (0.000)	0.002 *** (0.000)	W Age	−0.001 ** (0.000)	0.004 *** (0.001)
Health	0.020 *** (0.001)	0.017 *** (0.003)	W Health	−0.015 *** (0.002)	−0.032 *** (0.006)
Education	0.002 *** (0.000)	0.002 * (0.001)	W Education	0.006 *** (0.001)	−0.013 *** (0.002)
Old ratio	0.062 *** (0.006)	0.242 *** (0.021)	W Old ratio	0.256 *** (0.015)	0.225 *** (0.061)
Child ratio	−0.037 *** (0.004)	0.100 *** (0.015)	W Child ratio	0.031 *** (0.008)	0.058 ** (0.029)
Matrimony	−0.004 (0.004)	−0.091 *** (0.016)	W Matrimony	0.159 *** (0.009)	−0.429 *** (0.038)
Family size	0.007 *** (0.001)	0.008 *** (0.003)	W Family size	0.005 *** (0.002)	0.036 *** (0.006)
Number of properties	0.001 (0.002)	−0.001 (0.008)	W Number of properties	−0.006 (0.005)	0.036 * (0.019)
			rho	0.063 * (0.036)	0.148 * (0.085)
			Log-L	847.545	605.401
			Sigma ²	0.000 *** (0.000)	0.000 *** (0.000)
			R-squared	0.364	0.921
			N	180	180

Explanation: 1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ***, **, and * are significant at 1%, 5%, and 10% levels, respectively.
 2. The values in the brackets are standard errors.

4.2.2. Empirical Analysis of Spatial Effects of Heterogeneity

1. Analysis of the empirical results of each region divided by geographical location

The national sample was separated into eastern, central, and western regions to test for regional variability and study the geographical spillover effect of the income gap on consumer demand. The projected outcomes are displayed in Table 5.

The data in Table 5 shows that the flat direction and spatial lag terms of the income gap among residents in all regions were significantly negative. This suggested that as the income gap widened in all regions, it initially boosted consumer demand within the region. However, as the income gap widened further, it had an “inverted U-shaped” impact on the consumer demand of neighboring regions by suppressing consumer demand within the region. There was first a positive spatial spillover impact followed by a negative one. The spatial panel Durbin model’s regression results by geographical location align with those of the previous section. (According to the Fifth Session of the Eighth National People’s Congress and the development strategy of the western region formulated by the State, the samples of the country were divided into eastern, central and western regions. The samples used in this paper were based on the balanced panel data constructed in 2010. The survey data in 2010 involved 25 regions, and the follow-up survey involved more regions. The reason for the 30 regions involved in this sample was that there were relocated families in the later period, and the CFPS family tracking survey data did not involve Hainan Province, Taiwan Province, Hong Kong, and Macao Special Administrative Region).

Table 5. Estimates of spatial panel Durbin model for each region by geographical location.

Variable Name	Eastern		Central		Western	
	Consumption	Con- Upgrading	Consumption	Con- Upgrading	Consumption	Con- Upgrading
Gini	0.174 * (0.090)	7.097 *** (0.555)	0.289 * (0.149)	8.463 *** (1.189)	0.788 *** (0.287)	7.925 *** (0.705)
Gini ²	−0.221 * (0.116)	−7.587 *** (0.593)	−0.345 * (0.180)	−8.766 *** (1.266)	−0.882 *** (0.336)	−8.709 *** (0.824)
W Gini	1.663 *** (0.608)	2.569 * (1.325)	0.435 * (0.225)	2.544 * (1.892)	0.331 ** (0.270)	6.212 *** (1.106)
W Gini ²	−1.757 *** (0.669)	−2.802 * (1.450)	−0.335 * (0.174)	−2.776 * (1.456)	−0.241 * (0.126)	−6.953 *** (1.198)
Control	Yes	Yes	Yes	Yes	Yes	Yes
rho	0.286 ** (0.125)	0.248 ** (0.124)	0.123 * (0.07)	0.092 * (0.052)	0.323 ** (0.148)	0.425 ** (0.166)
Log-L	266.536	202.199	214.316	165.982	336.549	248.935
Sigma ²	0.000 *** (0.000)	0.000 *** (0.000)	0.000 *** (0.000)	0.000 *** (0.000)	0.000 *** (0.000)	0.000 *** (0.000)
R-squared	0.210	0.619	0.001	0.006	0.258	0.963
N	60	60	48	48	72	72

Explanation: 1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ***, **, and * are significant at 1%, 5%, and 10% levels, respectively.
 2. The values in the brackets are standard errors.

The spatial spillover effect of the income gap on resident consumption in the eastern region shifted from positive to negative earlier than in the western region. The inflection point in the eastern region (0.47) was to the left of that in the western region (0.69). The spatial spillover effect of the income gap influenced residents' consumption quality differently in the eastern and western regions. The inflection point for consumption upgrading was 0.45 in the western region and 0.46 in the eastern region, showing opposite trends in consumption quantity. The main contradiction in this finding is that residents in the eastern region were more affected by the income gap compared to those in the western region, making them more susceptible to reduced consumption in both their region and neighboring areas. Residents in the eastern region were not discerning when it comes to the quality of consumption. This research argues that it can be elucidated through macro and micro levels. The eastern region has abundant factor endowments and efficient interconnectedness with other regions from a macro perspective. Thus, a higher number of adjacent regions in space facilitates the movement of production elements, resulting in the earlier satisfaction of basic needs for people in both the region and its bordering areas. Consequently, the eastern region experienced an earlier shift in consumption patterns. If this hypothesis is correct, the inflection point phenomena should still be detected after dividing the sample into "economically developed areas" and "economically underdeveloped areas". This paper conducted a regression based on this concept, and the regression outcomes are presented in Table 6. The paradox at the micro level arises from the citizens' desire for prestige. Consumption serves as a means for individuals to ensure their survival and also signifies their social standing by acquiring goods and services. Residents' quest for status alters the geographical spillover process of how the income gap affects residents' consumption. The per capita income in the western region is lower than in the eastern region, leading to a widening economic disparity that may hinder the motivation of low-income groups to strive for improvement [55]. The inflection point of the spatial spillover impact of consumption upgrading in the western region is more sensitive to the income gap compared to the eastern citizens. Residents in Western China suppress their drive for status, leading to a diminished positive impact of wealth disparity on consumption.

Table 6. Estimates of spatial panel Durbin model for each region according to the degree of economic development.

Variable Name	Developed		Undeveloped	
	Consumption	Con- Upgrading	Consumption	Con- Upgrading
Gini	0.406 *** (0.155)	6.791 *** (0.436)	0.139 (0.249)	6.644 *** (0.764)
Gini ²	−0.452 *** (0.165)	−7.171 *** (0.466)	−0.119 (0.301)	−7.079 *** (0.929)
W Gini	−0.221 (0.474)	3.394 *** (0.794)	0.753 *** (0.191)	5.008 *** (1.500)
W Gini ²	0.205 * (0.209)	−3.571 *** (0.844)	−0.575 *** (0.206)	−5.815 *** (1.699)
Control	Yes	Yes	Yes	Yes
rho	0.050 * (0.028)	0.048 * (0.026)	0.311 *** (0.118)	0.195 * (0.113)
Log-L	416.673	313.834	359.880	267.731
Sigma ²	0.000 *** (0.000)	0.000 *** (0.000)	0.000 *** (0.000)	0.000 *** (0.000)
R-squared	0.448	0.846	0.602	0.676
N	96	96	84	84

Explanation: 1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ***, **, and * are significant at 1%, 5%, and 10% levels, respectively.
 2. The values in the brackets are standard errors.

2. Analysis of empirical results of each region according to the degree of economic development

The national sample was segmented into economically developed and underdeveloped areas for the regional heterogeneity test in this section. The estimated findings are displayed in Table 6.

The findings in Table 6 indicate that the square term and spatial lag term of the income gap in economically developed regions were significantly negative at the 1% level. This suggested that the widening of the income gap in economically developed areas initially boosted the enhancement of regional consumer demand. An increase in the income gap had an “inverted U-shaped” impact on the consumer demand of neighboring regions. This impact was characterized by an initial positive spatial spillover effect followed by a negative spatial spillover effect. The findings from the underdeveloped regions aligned with the regression outcomes from the developed regions. The regression analysis of residents’ consumption in developed areas indicated that the spatial lag term of the resident’s income gap was significantly negative at a 10% level, suggesting that the widening of the income gap among residents did not significantly affect the region. Household consumption growth was mostly affected by variations in income gaps in nearby regions.

When regressing data based on the economic development status, the inflection point aligned with the previously drawn conclusion. In economically developed places, the inflection point for consumption quantity was 0.54, which was lower than in less economically developed areas where it was 0.65. In economically developed locations, the inflection point (0.48) was positioned to the right of less economically developed places (0.43) in terms of consumption quality. Figure 1 illustrates the changing trend in income gap heterogeneity among individual people and its impact on consumer demand.

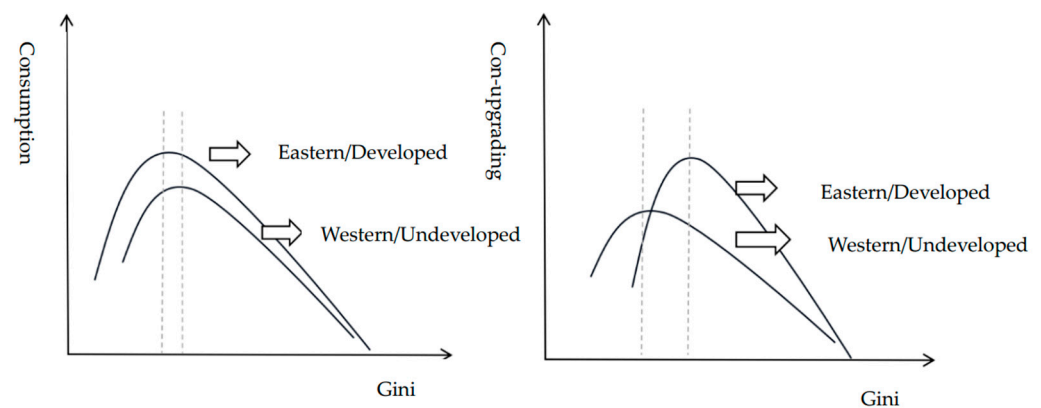


Figure 1. The changing trend in spatial heterogeneity of consumer demand is influenced by the income gap.

4.3. Robustness Test

In this section, we conducted a robustness test by using the Gini coefficient as an alternative indicator to evaluate the income gap, and we present the test findings in Table 7 to assess the reliability of the empirical data. The regression analysis indicated that when replacing explanatory variables, the regression coefficient of the income gap changed slightly in value, but the symbolic direction and significance level remain consistent. This suggested that the empirical results were still robust when using the Gini coefficient to measure the income gap. The estimated outcomes of substituting the explained variables aligned closely with the regression results, indicating the robustness of the empirical findings in this section.

Table 7. Robustness estimates of alternative explanatory variables and explained variables.

Variable Name	Replace Explanatory Variable		Replace Explained Variable
	Consumption	Con-Upgrading	Average Consume Propensity
Top 10% of income	0.086 *** (0.025)	2.774 *** (0.096)	
Top 10% of income squared	−0.063 *** (0.165)	−2.223 *** (0.466)	
W-Top 10% of income	0.367 *** (0.052)	1.373 *** (0.310)	
Top 10% of income squared	−0.137 *** (0.044)	−1.080 *** (0.252)	
Gini			0.019 *** (0.006)
Gini ²			−0.019 *** (0.006)
W Gini			0.072 *** (0.012)
W Gini ²			−0.042 *** (0.013)
Control	Yes	Yes	Yes
rho	0.063 * (0.033)	0.148 * (0.085)	0.066 * (0.035)
Log-L	847.575	605.540	1282.048
Sigma ²	0.000 *** (0.000)	0.000 *** (0.000)	0.000 *** (0.000)
R-squared	0.364	0.921	0.363
N	180	180	180

Explanation: 1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ***, **, and * are significant at 1%, 5%, and 10% levels, respectively.
2. The values in the brackets are standard errors.

In addition, the article drew on the Han Philips dynamic spatial econometric model to robustly estimate the impact of the income gap on consumer demand by analyzing the lagged dependent variable for one period. The estimation results in Table 8 show that the influence of time variables did not exist, and the regression coefficient value of the income gap slightly changed, but the sign direction and significance level remained consistent. The regression results of other variables were consistent with the previous results, indicating the robustness of the results.

Table 8. Robustness estimates using the time dimension.

Variable Name	Consumption	Con-Upgrading	Variable Name	Consumption	Con-Upgrading
L. Cons	−0.004 (0.023)				
L. Con-up		−0.010 (0.045)			
Gini	0.170 ** (0.081)	7.270 *** (0.300)	W Gini	0.805 *** (0.159)	2.979 *** (0.881)
Gini ²	−0.154 * (0.089)	−7.697 *** (0.328)	W Gini2	−0.460 *** (0.176)	−3.077 *** (0.944)
Income	0.002 * (0.001)	0.011 ** (0.005)	W Income	0.037 *** (0.003)	0.089 *** (0.010)
Assets	0.005 *** (0.000)	0.008 *** (0.002)	W Assets	0.006 *** (0.001)	0.023 *** (0.004)
Age	−0.002 *** (0.000)	0.002 *** (0.000)	W Age	−0.001 *** (0.000)	0.005 *** (0.001)
Health	0.021 *** (0.001)	0.019 *** (0.004)	W Health	−0.015 *** (0.002)	−0.027 *** (0.009)
Education	0.002 *** (0.000)	0.002 * (0.001)	W Education	0.006 *** (0.001)	−0.012 *** (0.002)
Old ratio	0.058 *** (0.006)	0.262 *** (0.022)	W Old ratio	0.251 *** (0.017)	0.232 *** (0.066)
Child ratio	−0.036 *** (0.005)	0.092 *** (0.017)	W Child ratio	0.037 *** (0.010)	0.036 (0.036)
Matrimony	−0.002 (0.004)	−0.086 *** (0.016)	W	0.160 *** (0.009)	−0.426 *** (0.038)
Family size	0.007 *** (0.001)	0.011 *** (0.003)	W Family size	0.004 ** (0.002)	0.034 *** (0.007)
Number of properties	−0.001 (0.002)	−0.004 (0.009)	W Number of properties	−0.006 (0.005)	0.031 (0.020)
			rho	0.031 * (0.018)	0.126 * (0.072)
			Log-L	672.517	466.859
			Sigma ²	0.000 *** (0.000)	0.000 *** (0.000)
			R-squared	0.382	0.928
			N	150	150

Explanation: 1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ***, **, and * are significant at 1%, 5%, and 10% levels, respectively. 2. The values in the brackets are standard errors.

5. Conclusions and Suggestions

Despite several governmental initiatives in recent years to enhance the consumption system and stimulate residents' consumption potential, there is still a significant opportunity for improvement in the contribution of residents' consumer expenditure to economic growth. This study utilized data from China's 2010–2020 Household Tracking Survey (CFPS) to undertake empirical research on leveraging consumption's driving role in the economic cycle by focusing on the income gap. It is important for China to firmly advance common prosperity, fully boost citizens' consumption, and finally establish a new growth model. The income gap must be reduced within a controllable range to mitigate the negative impact of inequality on economic growth. The primary study indicated that the

income gap had a notable “inverted U-shaped” influence on consumer demand, and there was a considerable “inverted U-shaped” spatial spillover effect between the two regions. Expanding the income gap within a specific range enhanced consumer demand in the region and nearby areas. Outside the threshold, the income gap increased, hindering the growth of consumer demand in the region and nearby areas. Following tests for geographical differences and robustness, this pattern remained consistent. Based on the research conclusions of this paper, the policy recommendations are as follows:

- (1) The income gap significantly influences consumer demand. Therefore, managing the income gap among people has become a crucial strategy to boost consumer demand amidst changing income levels. Managing the income gap among inhabitants involves boosting the income of low-income groups through various means throughout fluctuations in income levels, rather than just taking from the wealthy to give to the poor. Efforts should focus on prioritizing employment, increasing employment opportunities, raising the income of the middle- and low-income groups, and subsequently boosting overall societal demand by expanding the middle-income segment. This will help stimulate a positive consumption cycle.
- (2) Enhancing residents’ income levels will boost consumer demand by diversifying income sources through initiatives like labor mobility, employment training, financial transfers to low- and middle-income groups, increased government transfer payments to low-income groups, and targeted subsidies for social fairness. We aim to increase consumer spending.
- (3) To increase the amount of consumption among its citizens, the state ought to give priority to assisting the western region and places that are less developed. Creating platforms for the exchange of technology and knowledge to facilitate the movement of factors between regions, promoting the free flow of production factors across regions, and addressing obstacles to residents’ consumption by leveraging spatial relationships between regions are all ways in which this can be accomplished in order to boost the demand from customers in the region and the communities that are adjacent to it.

To address the endogenous problem, the research made use of the spatial metrology approach. It also identified a link that was “inverted U-shaped” between the income difference and consumer demand, in addition to a considerable spatial spillover impact. The research, on the other hand, was restricted by a lack of data, particularly the absence of information from Taiwan, Macao, Hong Kong, and Hainan. The findings and conclusions of the research were unaffected by this constraint, even though it existed. In subsequent study endeavors, this particular facet will continue to be improved upon.

Although significant progress has been made in understanding this topic in this study, there are still certain limitations. To further explore whether there is regional heterogeneity in the spatial spillover effect of income inequality on consumer demand, this study conducted a spatial Durbin model analysis and divided the research sample into regions, although some scholars have also conducted a regional division [56]. But inevitably, they all face the problem of small sample sizes, which is also a limitation of this study. Future research should make more detailed regional divisions on this basis to solve the practical problem of small sample sizes.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Biomedical Ethics Committee of Peking University (protocol code: IRB00001052-14010; Approval Date: Due to the fact that the CFPS project is a continuous tracking investigation project, after the initial review, we submitted an application for continuous review to the Ethics Review Committee in the following years).

Informed Consent Statement: Not applicable.

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