The Relationship Between Urban and Rural Residents' Consumption and Economic Growth in China Since the Reform and Opening-up: An Empirical Analysis Based on Econometric Models

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Abstract

Over the past 40-plus years since the reform and opening-up, China' s economic development has achieved remarkable accomplishments, with consumption activities, including household consumption, playing an indispensable role. Consumption activities constitute both the endpoint and the starting point of economic activities: they are the endpoint because the ultimate purpose of all other economic activities is to satisfy consumption demand, and they are the starting point because consumption can drive economic and social development. This study selects economic data spanning more than 40 years since the reform and opening-up, and employs Vector Autoregression (VAR) models and Vector Error Correction (VEC) models to analyze the impact of urban and rural residents' consumption levels and total consumption of urban and rural residents on economic growth. The findings indicate that increases in both urban residents' consumption and rural residents' consumption can lead to an increase in Gross Domestic Product (GDP), and that urban residents' consumption demonstrates a stronger capacity to promote economic growth than rural residents' consumption in the long run. Based on these conclusions, the underlying reasons are analyzed and policy recommendations are proposed.

Full Text

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Abstract

Over the 40 years since reform and opening-up, China' s economic development has achieved remarkable accomplishments, with consumption activities—including household consumption—playing an indispensable role. Consumption activity represents both the endpoint and starting point of economic activity: it is the endpoint because the ultimate purpose of all other economic activities is to satisfy consumer demand, and it is the starting point because consumption can drive economic and social development. This paper selects economic data spanning more than 40 years since reform and opening-up and employs Vector Autoregressive (VAR) and Vector Error Correction (VEC) models to analyze the impact of urban and rural residents' consumption levels and total consumption on economic growth. The analysis concludes that increases in both urban and rural residents' consumption can lead to GDP growth, and that urban residents' consumption demonstrates stronger capacity to promote economic growth than rural residents' consumption in the long run. Based on these findings, this paper analyzes the underlying reasons and proposes policy recommendations.

Keywords: Consumer Economics, Econometrics, Empirical Analysis, Household Consumption, Economic Development

1 Introduction

Consumption plays a crucial role in national economic development. Over the past 40 years of reform and opening-up, China' s economic achievements have attracted worldwide attention, with consumption activities—including household consumption—making indispensable contributions. Consumption activity is the endpoint of economic activity because the ultimate aim of all other economic activities is to meet consumer demand; simultaneously, it is the starting point because consumption can drive economic and social development [1]. The renowned Chinese economist Yin Shijie studied the relationship between household consumption structure and improvements in living standards [2], while Pan Wenxuan, based on Western income hypotheses, concluded that consumption behaviors differ significantly between urban and rural residents in China, suggesting that policy formulation should account for these disparities [3]. Eco-

nomic growth reflects the magnitude and speed of a country' s economic expansion compared to the previous year and serves as a measure of its overall economic strength. Generally, consumption comprises household consumption and government consumption, with household consumption playing the dominant role. Therefore, studying the relationship between household consumption and economic growth holds substantial value.

2 Household Consumption and Economic Growth

Consumption represents the final stage of social reproduction, referring to the process by which people utilize social products or services to satisfy various needs. It primarily includes productive consumption and personal consumption. Productive consumption involves the use of labor and means of production during the production process, whereas personal consumption refers to individuals using social products or services to meet their needs—a process vital for restoring and stimulating productivity. Unless otherwise specified, all subsequent references to consumption denote personal consumption.

Consumption levels effectively reflect the degree to which social members' material and cultural needs are satisfied. According to Keynesian economic theory and the marginal propensity to consume effect, consumption levels are influenced by income levels. While rising income leads to higher consumption, the growth rate of consumption lags behind that of income, causing delayed consumption growth and consequently reduced demand.

China' s economic development can be divided into two stages: the planned economy stage from the founding of the People' s Republic of China in 1949 to the initiation of reform and opening-up in 1978, and the socialist market economy stage from 1978 to the present.

In the early years following the founding of the PRC, the country had just emerged from the Anti-Japanese War and civil war. The economic system suffered severe damage during the wartime period, and substantial gold outflows further deteriorated economic conditions. The government had to implement various measures to restore the economy and accumulate wealth. The low-consumption economic policy adopted during this period achieved preliminary economic development and laid the foundation for reform and opening-up.

In 1978, the implementation of reform and opening-up policies effectively leveraged China' s demographic and policy dividends by introducing capital and expanding production through investment. Simultaneously, the market economy was gradually introduced to replace the long-standing planned economy. Thereafter, consumption was liberalized, market operations offset many problems arising from competition, and the overall economy demonstrated healthy development. During the 2008 financial crisis, China's economy was less affected than those of European and American countries.

The relationship between household consumption and economic growth man-

ifests in two aspects. First, economic growth drives household consumption through two primary channels: quantity and quality improvements. Economic growth generates more income for residents, which directly stimulates consumption. In macroeconomics, scholars widely recognize income as one of the most important factors influencing consumption. Regarding quality improvements, over the past decade, Chinese residents have made critical strides from a moderately prosperous to an affluent society, particularly against the backdrop of poverty alleviation completion and rural revitalization strategy implementation, leading to significantly improved consumption quality. Economic development also encourages enterprises to research and produce higher-quality products, thereby enhancing residents' consumption quality.

Second, household consumption can directly and indirectly stimulate economic growth. Directly, Marx' s consumption theory posits that consumption creates labor subjects, and labor production can drive social production. Satisfying residents' own consumption demand can generate certain economic output. Indirectly, residents' consumption demand can stimulate other types of demand, thereby promoting economic development. For instance, when residents' consumption demand increases, manufacturers expand production scale and may increase investment in production technology improvement. Thus, increased household consumption indirectly drives economic growth by stimulating investment.

3.1 Selection of Variables

This paper selects Gross Domestic Product (GDP) as the measure of economic growth. Residents' consumption levels include urban and rural residents' consumption levels, reflected through the quantity and quality of products and services purchased by urban and rural populations. Total urban residents' consumption equals the urban consumption level multiplied by urban population, while total rural residents' consumption equals the rural consumption level multiplied by rural population, reflecting the entire consumption market in urban or rural areas. This paper discusses urban and rural residents' consumption separately to enable comparison.

In summary, this paper selects five indicators: GDP, urban residents' consumption level, rural residents' consumption level, total urban residents' consumption, and total rural residents' consumption. After appropriate processing, econometric methods are employed to explore their intrinsic relationships.

3.2 Source and Processing of Data

This paper selects data from 1978 to 2019 as the total sample. Data before 1980 were excluded because China' s economy was relatively closed before reform and opening-up, creating a vastly different operating environment from subsequent periods. Data for 2020 and 2021 were excluded because China' s economic development and residents' consumption levels were affected to varying degrees

by the COVID-19 pandemic during these two years, making them unsuitable for inclusion in the analysis. Therefore, our study examines 42 years of data spanning the 1980s-1990s and the 2000s-2010s.

Original GDP data were obtained from the National Bureau of Statistics, measured in hundred million RMB. To eliminate price factors, we adjusted the data using the GDP index to obtain the variable GDP. Original data for urban and rural residents' consumption levels also came from the National Bureau of Statistics, with relevant indices similarly applied to remove price effects. Per capita urban consumption level is denoted as urc, and per capita rural consumption level as rrc, both measured in RMB. Multiplying urc and rrc by annual urban and rural populations yields total urban and rural residents' consumption, measured in hundred million RMB, denoted as URC and RRC, respectively.

To eliminate heteroscedasticity in the time series data, we applied natural logarithmic transformations to GDP, URC, and RRC, obtaining three variables: LGDP, LURC, and LRRC. The same logarithmic transformation was applied to urc and rrc, yielding lurc and lrrc. The data analysis software used in this paper is EViews 7.2.

The trend of LGDP over time is shown in Figure 1 [Figure 1: see original paper]. The figure indicates that LGDP exhibits an almost linear trend over time. The trends of LURC and LRRC over time are shown in Figure 2 [Figure 2: see original paper]. Before 1993, due to the large rural population, the LURC line lies below the LRRC line. After 1993, as urbanization levels increased, total urban residents' consumption exceeded total rural residents' consumption, causing the LURC line to lie above the LRRC line.

3.3 Selected Models

The VAR (Vector Autoregressive) model represents a simultaneous form of autoregressive models that can describe dynamic relationships among multivariate time series. The VAR model appears in a multi-equation simultaneous form, with identical right-hand side variables in each equation. It estimates dynamic relationships by regressing all endogenous current variables in the model on their own and other variables' lagged values.

The VEC (Vector Error Correction) model is a constrained VAR model that primarily restricts variables' long-term relationships to satisfy cointegration while allowing short-term fluctuations.

4 Empirical Analysis A

This section presents empirical analysis of the relationship between residents' consumption levels and economic growth, using variables lurc, lrrc, and LGDP to represent urban residents' consumption level, rural residents' consumption level, and GDP, respectively.

4.1 Stationarity Test

The trends of lurc, lrrc, and LGDP over time are shown in Figure 3 [Figure 3: see original paper]. The horizontal axis represents time, and the vertical axis represents values after natural logarithmic transformation (without specific labeling). The upper line represents LGDP, the middle line represents lurc, and the lower line represents lrrc.

It is readily apparent that after logarithmic transformation, the three lines for GDP, urban residents' consumption level, and rural residents' consumption level remain non-horizontal, showing clear trend changes. This suggests that LGDP, lurc, and lrrc are non-stationary time series. To verify this conjecture, we can conduct stationarity tests on these three variables. The Unit Root Test is a stationarity test developed specifically for identifying particular statistical characteristics in macroeconomic data series and similar datasets [4]. We employ the Augmented Dickey-Fuller (ADF) test, a widely used method among various unit root tests such as ADF, PP, and NP tests. If a unit root exists, the time series is non-stationary. The test results are presented in Table 1 .

The test results show that for variable LGDP, the significance P-value is 0.463, which is not significant at conventional levels, leading to failure to reject the null hypothesis and indicating that the series is non-stationary. For variable lurc, the P-value is 0.807, and for variable lrrc, the P-value is 0.998, both indicating non-stationary series. In summary, the conjecture holds: all three series are non-stationary time series.

4.2 Establishment of Regression Equations

We first attempt linear regression fitting of lurc, lrrc, and LGDP using ordinary least squares (OLS). The results are shown in Table 2 . The regression equation is obtained as follows:

However, the VIF values for variables lrrc and lurc are 32.411, exceeding 10, indicating multicollinearity. Under these conditions, ridge regression can yield more accurate results. We therefore proceed with ridge regression modeling. The ridge regression results are presented in the table below.

The ridge regression results show that the F-test yields a significance P-value of 0.000, indicating significance and demonstrating that independent variables lurc and lrrc have a regression relationship with dependent variable LGDP. Meanwhile, the model' s goodness-of-fit R^2 is 0.996, indicating excellent model performance. The ridge regression equation is:

This equation applies to the time period of the given data and a short period before and after. The ridge regression equation illustrates the relationship between lurc, lrrc, and LGDP: both lurc and lrrc are positively correlated with LGDP, sharing the same directional trend, with lurc' s impact on LGDP being greater than lrrc' s impact. Quantitatively, a 1 percentage point increase in urban residents' consumption level raises the economic development level by

1.02 percentage points, while a 1 percentage point increase in rural residents' consumption level raises it by 0.441 percentage points.

Johansen Cointegration Test

The figure shows that the three trend lines move almost synchronously, suggesting that the three variables may have a cointegrating relationship. We can verify this conjecture using the Johansen cointegration test. The results are presented below.

The Johansen cointegration test results indicate that GDP, urban residents' consumption level, and rural residents' consumption level have a long-term cointegrating relationship. Because LGDP, lurc, and lrrc have passed the cointegration test, demonstrating a long-term equilibrium relationship, we can employ the VEC model to regress each variable on its own lagged terms, other variables' lagged terms, and lagged terms of the error correction term.

We then use EViews software to construct the VEC model.

5 Empirical Analysis B

This section presents empirical analysis of the relationship between total residents' consumption and economic growth, using variables LURC, LRRC, and LGDP to represent total urban residents' consumption, total rural residents' consumption, and GDP, respectively.

5.1 Stationarity Test

Under the condition of equal time intervals, subtracting the previous value from the subsequent value yields first-order differencing. Applying the same operation to first-order differenced data yields second-order differencing. Based on ADF test results, we analyze whether we can significantly reject the null hypothesis of non-stationarity. Significance indicates rejection of the null hypothesis, confirming a stationary series, while non-significance leads to acceptance of the null hypothesis, indicating a non-stationary series. When significance is not achieved, we may consider continuing tests with differenced data, but for economic meaningfulness, differencing generally does not exceed second order.

Table 5 shows ADF test results for variable LGDP. Table 6 shows ADF test results for variable LURC. Table 7 shows ADF test results for variable LRRC.

The above ADF test results indicate that the time series for variables LGDP and LURC are stationary at levels, first difference, and second difference, while the LRRC time series is stationary at first difference. Therefore, we can proceed with first-differenced LGDP, LURC, and LRRC for subsequent analysis.

5.2 Choice of Lag Order

Table 8 presents lag order evaluation test results. LR, FPE, AIC, SC, and HQ are multiple criteria for evaluating lag order optimality. Asterisks indicate the optimal lag order under each criterion, and the lag order with the most asterisks is selected as the optimal lag order. Based on the results of LR, FPE, AIC, SC, HQ, and other evaluation criteria, the lag order can be selected as 8. Therefore, we can establish a VAR(8) model.

5.3 Establishment of VAR Model

Based on the above analysis, we can construct a VAR(8) model using first-differenced data through EViews software.

5.4 Impulse Response Analysis

Impulse response analysis describes how an endogenous variable reacts to shocks from another endogenous variable—specifically, the impact on another variable' s current and future values after applying a one-standard-deviation shock to one endogenous variable.

The impulse response results show that D(LGDP)' s response to its own shock changes sign after period 3, its response to D(LURC) shock has relatively large magnitude and stabilizes after period 7, while its response to D(LRRC) shock has relatively small magnitude overall.

5.5 Variance Decomposition

Variance decomposition divides fluctuations in endogenous variables into components based on their causes. The variance decomposition figure shows that D(LGDP)' s variation is primarily due to itself in the initial period, with its contribution rate reaching nearly 100% in period 1. In periods 2 and 3, the contribution rates of D(LURC) and D(LRRC) to D(LGDP)' s variation increase, after which they essentially stabilize.

6 Conclusion and Cause Analysis

Based on the equation obtained from Empirical Analysis A, we conclude that increases in both urban and rural residents' consumption levels can lead to GDP growth, with urban residents' consumption demonstrating stronger capacity to promote economic growth than rural residents' consumption. Specifically, a 1 percentage point increase in urban residents' consumption level raises the economic development level by 1.02 percentage points, while a 1 percentage point increase in rural residents' consumption level raises it by 0.441 percentage points.

Combining results from both empirical analyses, we also find that GDP has a long-term equilibrium relationship with urban and rural residents' consumption

levels. In other words, economic development and urban-rural consumption maintain long-term equilibrium. Both urban and rural consumption can promote economic development, but the former' s contribution rate exceeds the latter' s in the long run. Conversely, GDP growth can drive increases in both urban and rural residents' consumption, meaning economic development can stimulate consumption across urban and rural areas. Therefore, to raise China' s economic development level in the long term, we can enhance residents' consumption, particularly in urban areas. Improved economic development levels can then further promote urban and rural residents' consumption, creating a virtuous cycle.

China possesses inherent advantages in consumption-driven economic growth. As a developing country with significant urban-rural disparities and regional differences between eastern and western areas, China still has substantial room for urbanization development. There remains considerable potential in living standards, consumption levels, and income levels compared to developed countries. Additionally, China' s vast territory and large population provide a super-large domestic market with enormous development space.

From the demand perspective, urban areas with concentrated populations exert significant pulling effects on consumption, particularly service consumption. Population agglomeration means concentrated market demand. Service industries mostly face customers directly—such as cinemas, opera houses, and stadiums—many of which impose high requirements on spatial distance between supply and demand sides. Excessive spatial distance, such as cinemas or opera houses being far from residential areas, substantially reduces their attractiveness to residents. Similarly, the food delivery industry is far less developed in rural areas than in urban areas, partly due to rural residents' lifestyle habits and traditions, but also because rural residents live scattered with low population density, which is unfavorable for food delivery industry development. From the supply perspective, due to economies of scale, urban areas have lower information costs, logistics costs, and transaction costs, making economic operation more efficient. Urbanization facilitates the development of service consumption.

Meanwhile, we should recognize that highly developed cities may create a "siphon effect" on surrounding cities, which is detrimental to sustained and effective economic and social development. If the siphon effect of highly developed cities on their surroundings exceeds the spillover effect, it will exacerbate regional development imbalances and hinder urban agglomeration construction [5].

7 Policy Suggestions

Based on the empirical analysis results and China' s actual conditions, we propose the following policy recommendations:

Establish and improve the social security system to increase income for low-income groups and those affected by the pandemic. Providing better social se-

curity facilities and services can enhance residents'consumption security, thereby increasing consumption willingness and driving up consumption levels and total consumption. China' s social security system includes medical care, pensions, education, housing, employment, and other aspects closely related to residents' lives. This system still faces issues such as incomplete coverage and requires further improvement through exploration and practice [6]. Under the shadow of COVID-19, many enterprises have encountered operational difficulties, and many residents face unemployment risks. Helping them solve current problems and overcome difficulties through various methods represents an effective assistance policy to stimulate consumption.

Strengthen rural revitalization efforts to enhance rural population consumption capacity. In 2020, China achieved the complete elimination of poverty under current standards, with all impoverished areas "removing their poverty labels." This great feat helps fully tap the consumption potential of the rural population and drive high-quality economic development. In subsequent rural revitalization strategies, attention should be paid to improving the social security system in rural areas and tapping rural consumption potential.

Narrow the income gap among residents and reduce the Gini coefficient. Excessive urban-rural income disparities are detrimental to economic development and may even severely hinder it. Under conditions of excessive income disparity, residents' economic risk resistance and consumption willingness decline. While the economy and society develop rapidly, historical 遗留 problems such as China' s urban-rural dual structure have not been fully and effectively resolved, resulting in large urban-rural income gaps that are unfavorable for social harmony and stability.

Increase urbanization levels and optimize the proportion of the three industries in the national economy. Currently, an increasing number of rural residents choose to work in cities, where their income and consumption capacity have improved compared to agricultural activities in rural areas. China's urbanization has accelerated in recent years, accomplishing in a relatively short time what took Western countries many more years to achieve. Consequently, during the post-reform and opening-up period, China's economic development has achieved remarkable accomplishments, creating an economic miracle recorded in history. With continued technological development and progress in the future, we can further reasonably increase urbanization levels and the proportion of the primary industry in the national economy, thereby raising economic development levels and residents' quality of life.

Adjust and optimize the industrial structure to build a modern industrial system. For traditional industries with substantial development potential, such as heavy metal industries in Northeast China and coal mining industries in Shanxi, technological transformations are needed to improve labor productivity and resource utilization efficiency.

Encourage technological innovation, deepen reform of the science and technology

system, increase investment in innovation, and promote the innovation-driven development strategy. Encourage enterprises, practitioners, and universities to propose innovative solutions. Increase education investment, strengthen the construction of innovative talent teams, and cultivate more innovative talents.

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Note: Figure translations are in progress. See original paper for figures.