



Determinants of Household Savings in China: An Empirical Analysis Based on the VAR Model

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Abstract. Savings constitute a crucial source of a nation's capital and hold significant implications for national economic development. This paper constructs a VAR model using the savings rate as the independent variable and selecting per capita gross national product, national fiscal expenditure, the proportion of the population aged 25-34 with higher education, and the dependency ratio as dependent variables for the period 1988-2022. The results indicate that: (1) There exists a long-term cointegration relationship among these four variables, with the proportion of the population aged 25-34 with higher education showing a positive correlation with the savings rate, while the other variables exhibit negative correlations. (2) Based on impulse response and variance decomposition analyses, both the proportion of the population aged 25-34 with higher education and per capita gross national product exert substantial influences on the savings rate. Drawing from these findings, this paper proposes the following recommendations for government regulation of the savings rate: (1) Implement reasonable adjustments to the dependency ratio, balancing family economic pressures with future labor supply; (2) Exercise prudent control over national fiscal expenditure, strengthen fiscal supervision, and guide the allocation of economic resources; (3) Enhance the educational attainment of residents to promote human capital accumulation and foster proper savings attitudes; (4) Vigorously develop production and strive to improve per capita gross national product.

Keywords: Savings Rate; VAR Model; Impulse Response and Variance Decomposition; Cointegration Analysis; Economic Development

1 Introduction and Literature Review

Savings represent a primary source of capital formation for a nation and have consistently played a pivotal role in the development of a country's economy^[1, 2]. The high savings rate has emerged as a distinctive phenomenon in China's economic development trajectory following the implementation of the reform and opening-up policy^[3]. China's savings rate not only significantly surpasses that of developed nations such as the United States, the United Kingdom, Germany, and France, but also exceeds that of developing countries like Brazil, India, and Mexico. A relatively high savings rate can exert a positive influence on economic development: on one hand, it implies that a

greater pool of funds is available for investment purposes ^[4]. Specifically, a higher savings rate indicates that more individuals and households allocate their income toward capital accumulation, which can be channeled into productive investments such as infrastructure development, industrial expansion, and technological innovation. This, in turn, enhances the nation's productive capacity and elevates its overall output levels ^[5]. On the other hand, a high savings rate facilitates capital accumulation, which can enhance labor productivity, promote technological advancement, and drive economic structural upgrading, thereby fostering long-term economic growth. Additionally, a high savings rate contributes to an abundant supply of funds, providing enterprises and governments with more accessible financing channels, which in turn reduces financing costs and stimulates investment and economic activities. However, an excessively high savings rate may also pose certain challenges: on the one hand, it implies a tendency for individuals to allocate a larger portion of their income to savings rather than consumption, potentially leading to insufficient consumption. This, in turn, may diminish the incentives for investment, adversely affecting domestic market demand and economic growth^[6, 7]; On the other hand, although a high savings rate provides more funds for investment, the absence of sufficient effective investment channels and opportunities may result in the underutilization of these funds. This could lead to a decline in economic efficiency and competitiveness, thereby negatively impacting the potential for long-term economic growth. To ensure that the savings rate is maintained within a reasonable range to align with the needs of economic development, it is essential to investigate the factors influencing the savings rate.

Through a comprehensive review of existing literature, the reasons for China's high savings rate can be broadly categorized as follows: the demographic age structure characterized by declining birth rates and aging populations^[8], the traditional cultural emphasis on "raising successful children," which creates a crowding-out effect on non-educational household expenditures ^[9], "income inequality and targeted consumption," as well as the increasing intergenerational income and liquidity during the marketization process ^[10]. Numerous scholars have investigated the factors influencing household savings rates and proposed diverse perspectives. On one hand, the coverage and contribution levels of pension insurance have a significant positive impact on household savings^[11]; on the other hand, rising housing prices compel households to save for home purchases, thereby increasing the savings rate. Additionally, increased labor mobility significantly elevates household savings rates^[12]. Furthermore, the design of pension plans plays a crucial role in determining savings behavior, with privately held pensions exhibiting a negative correlation with the savings rate^[13]. Regional variations in external orientation are also an important factor influencing state-level household savings rates^[14].

Based on

$$S = s \cdot Y \quad (1)$$

Household savings are determined by the product of the savings rate and national income. While the impact of national income on savings is well-established, this study further investigates other factors influencing the savings rate.

The potential marginal contributions of this paper are as follows: (1) This study reveals a positive correlation between the level of education among residents and the savings rate, suggesting that enhancing educational attainment can promote savings—a relationship not previously explored in the existing literature. (2) Furthermore, prior research on the savings rate has predominantly relied on regression analysis for quantitative analysis, often overlooking potential non-stationarity issues in the time series data used. This paper addresses this gap by employing cointegration analysis to establish the long-term relationship between the savings rate and other independent variables, and by utilizing impulse response and variance decomposition to assess the short-term (10-period) impact of dependent variables on the savings rate.

2 Empirical Model

This study selects China's savings rate (*s*) from 1988 to 2022 as the dependent variable, with per capita gross national product (*DP*), national fiscal expenditure (*fis*; unit: trillion yuan), the proportion of the population aged 25-34 with higher education (*educ*), and the dependency ratio (*adopt*) as independent variables. Among these, the level of national fiscal expenditure serves as a proxy for changes in the economic environment, reflecting whether the economic conditions are favorable or unfavorable. The proportion of the population aged 25-34 with higher education (*educ*) acts as a proxy for the level of societal education, representing the educational attainment of the population. Per capita gross national product (*DP*) reflects the level of economic development, while the dependency ratio (*adopt*) captures the demographic age structure. Considering that the savings rate may be influenced by lagged values of the independent variables, this study applies logarithmic transformations to all variables to mitigate heteroscedasticity and constructs a Vector Autoregressive (VAR) model for analysis.

2.1 Unit Root Test

Using EViews software, this study conducts unit root tests on each variable and determines the optimal lag order based on the Akaike Information Criterion (AIC). The results indicate that the original data for all variables are non-stationary, but they become stationary after first-order differencing. The detailed results are presented in **Table 1**.

Table 1. Test for Stationarity of First-Differenced Series

Variable	ADF Statistic	Test Type	P-Value
<i>d(lns)</i>	-2.554986	<i>None</i>	0.0127
<i>d(lnDP)</i>	-6.26866	<i>Trend and intercept</i>	0.0001
<i>d(lnfis)</i>	-3.030049	<i>Intercept</i>	0.0447
<i>d(lneduc)</i>	-4.901207	<i>Trend and intercept</i>	0.0028
<i>d(lnadopt)</i>	-3.706843	<i>None</i>	0.0006

2.2 Johansen Test and the Establishment of Long-Term Cointegration Equations

The logarithmic series of all variables are integrated of order one, $I(1)$, satisfying the necessary conditions for conducting cointegration tests. Following the Johansen cointegration test, this study determines the optimal lag order to be 2. Consequently, the lag interval for the cointegration test should be set to $[1, 1]$. The detailed results are presented in **Table 2** and **Table 3**.

Table 2. Unrestricted Cointegration Rank Test (Trace)

<i>Hypothesized No. of CE(s)</i>	<i>Eigenvalue</i>	<i>Trace Statistic</i>	<i>0.05 Critical Value</i>	<i>Prob.</i>
None	0.747004	71.23909	60.06141	0.0043
At most 1	0.450558	31.38204	40.17493	0.2865
At most 2	0.279003	14.01532	24.27596	0.5359

Table 3. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

<i>Hypothesized No. of CE(s)</i>	<i>Eigenvalue</i>	<i>Trace Statistic</i>	<i>0.05 Critical Value</i>	<i>Prob.</i>
None	0.747004	39.85705	30.43961	0.0025
At most 1	0.450558	17.36672	24.15921	0.3159
At most 2	0.279003	9.486495	17.7973	0.5405

The cointegration equation is obtained as follows:

$$\ln s = -1.18 \cdot \ln adopt + 2.12 \cdot \ln educ - 0.23 \cdot \ln fis - 0.003 \cdot \ln DP + \mu \quad (2)$$

This equation demonstrates the long-term stable relationship among the aforementioned five variables.

From the long-term cointegration relationship among $\ln s, \ln adopt, \ln educ, \ln fis$ and $\ln y$, the following conclusions can be drawn: First, the dependency ratio, per capita gross national product, and national fiscal expenditure are all negatively correlated with the savings rate. The reasons for this are speculated as follows: When the dependency ratio is high, the proportion of employed individuals in households is relatively small, while the proportion of non-working dependents is large. As a result, the income of a single worker must meet the consumption needs of a larger number of household members. This leads to a significant portion of income being allocated to consumption to fulfill basic household needs, leaving little remaining income for savings, thereby reducing the savings rate. When national fiscal expenditure and national income are high, the overall economy tends to be robust, and individuals are more optimistic about future economic prospects, leading to a greater inclination toward consumption rather than savings. Second, in the long term, per capita gross national product has a relatively small impact on household savings propensity. Since per capita gross national product serves as a proxy for the level of economic development, it can also be inferred that the level of economic development has a limited influence on household savings propen-

sity. Third, the proportion of the population aged 25-34 with higher education is positively correlated with the savings rate and has the greatest impact on it. A 1% increase in this proportion leads to a 2.12% increase in the savings rate. As a proxy for societal education levels, this may be attributed to the fact that the widespread availability of higher education has, to some extent, transformed individuals' mindsets. For instance, individuals with higher education typically possess greater financial literacy and awareness of financial management, enabling them to better understand the importance of savings and how to effectively plan their finances. Education also makes individuals more attentive to future risks, including education expenses, potential medical costs, and other contingencies. This heightened awareness of the future motivates individuals to save more actively.

2.3 Construction of the VAR Model, Impulse Response Analysis, and Variance Decomposition

Given that the original time series are non-stationary, this study applies first-order differencing to obtain stationary series. The optimal lag order is determined to be 2, and a Vector Autoregressive (VAR) model is constructed. To ensure the stability of the VAR model, an AR root test is conducted, and the resulting test graph is presented as **Fig. 1**.

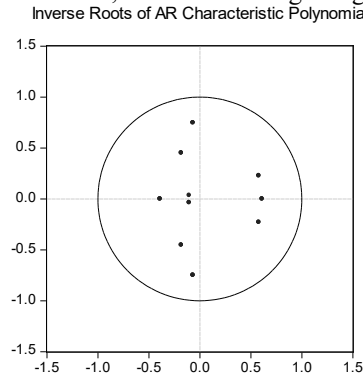


Fig. 1. AR Root Test

Based on the established VAR model, impulse response analysis and variance decomposition are conducted.

2.3.1 Impulse Response Analysis

Impulse response analysis examines the reactions of other variables in the VAR model when a positive shock is applied to one variable. The impulse response graphs as the **Fig. 2**, **Fig. 3**, **Fig. 4**, **Fig. 5** and **Fig. 6**.

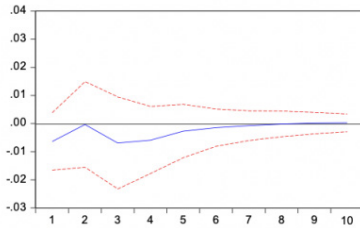


Fig. 2. Response of $Dlns$ to $DlnDP$

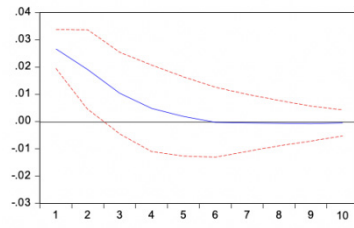


Fig. 3. Response of $Dlns$ to $Dlns$

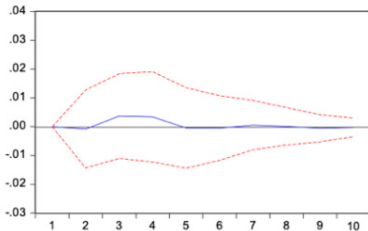


Fig. 4. Response of $Dlns$ to $Dlnfis$

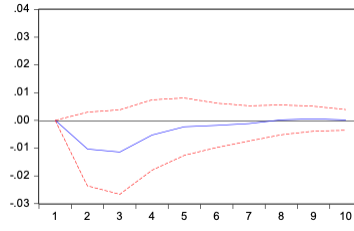


Fig. 5. Response of $Dlns$ to $Dlneduc$

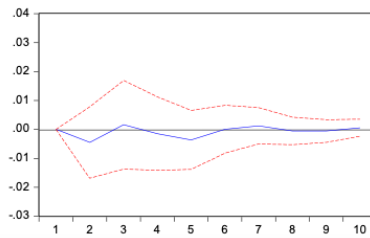


Fig. 6. Response of $Dlns$ to $Dlnadopt$

The results of the impulse response analysis are as follows: (1) Changes in per capita gross national product exert a negative impact on the growth rate of the savings rate in the current period, followed by fluctuations. The negative effect reaches its maximum in the third period. This variable consistently exerts a negative influence, which gradually converges as the number of periods increases. (2) The savings rate of the previous period has a significant positive impact on the growth rate of the current period's savings rate. After the sixth period, it begins to exert a negligible negative influence, gradually converging as the number of periods increases. (3) The impact of changes in fiscal expenditure on the growth rate of the savings rate initially increases, then decreases, and eventually approaches zero. This influence fluctuates around the zero axis, reaching its maximum positive value in the fourth period. (4) The impact of changes in educational attainment on the growth rate of the savings rate initially increases, then decreases, and turns positive by the eighth period. (5) The impact of changes in the dependency ratio on the growth rate of the savings rate exhibits frequent fluctuations,

alternating between positive and negative six times, with the amplitude of fluctuations gradually diminishing.

2.3.2 Variance Decomposition

This study employs variance decomposition to analyze the contribution of each structural shock to changes in the endogenous variables, thereby assessing the relative importance of different structural shocks. Based on the established VAR model, variance decomposition is conducted for the variables. The results are as follows:

Table 4. Variance Decomposition

Period	S.E.	<i>DlnDP</i>	<i>Dlns</i>	<i>Dlnfis</i>	<i>Dlneduc</i>	<i>Dlnadopt</i>
1	0.129173	5.4608	94.5392	0	0	0
2	0.145635	3.311454	86.38097	0.053072	8.602283	1.652223
3	0.146993	5.78188	76.41957	0.917089	15.39269	1.488777
4	0.153918	7.542685	73.19943	1.563472	16.15834	1.536083
5	0.156326	7.846285	72.10628	1.549838	16.18707	2.310524
6	0.157648	7.952884	71.85767	1.559573	16.32734	2.302529
7	0.157766	7.970385	71.70659	1.572503	16.36634	2.384187
8	0.158183	7.968331	71.6962	1.572396	16.36045	2.402617
9	0.158247	7.961565	71.66359	1.589397	16.3644	2.421046
10	0.158358	7.961146	71.6503	1.593078	16.35904	2.436434

As shown in **Table 4**, the following observations can be made:(1) Apart from the intrinsic factors of the savings rate itself, the proportion of the population aged 25-34 with higher education exerts the greatest influence on the growth rate of the savings rate. This impact increases rapidly during the first three periods, stabilizes after the seventh period, and then experiences a slight decline.(2) Per capita gross national product also significantly affects the growth rate of the savings rate, with its influence reaching a maximum by the seventh period as time progresses.(3) The impacts of fiscal expenditure and the dependency ratio on the growth rate of the savings rate are relatively smaller compared to the aforementioned factors. However, their contributions gradually increase over time.

3 Conclusions and Recommendations

This study employs a vector autoregressive model, utilizing cointegration theory, impulse response functions, and variance decomposition to conduct a quantitative analysis of the relationship between China's savings rate and per capita gross national product, national fiscal expenditure, the proportion of the population aged 25-34 with higher education, and the dependency ratio. Based on the findings, the following policy recommendations are proposed to assist the government in regulating the national savings rate.

3.1 Rational Adjustment of the Dependency Ratio

From the perspective of household economics, an increase in the dependency ratio tends to reduce household savings rates (Lü Zhichen and Liu Shenglong, 2021). However, population economics posits that "children are the future labor force" (Wang Chunchao and Lin Junjie, 2021), suggesting that children, as human capital, have a positive impact on economic growth. Therefore, when adjusting the dependency ratio, it is essential to balance the economic pressures on households with the future supply of labor.

Given China's large population, the government can continue to refine its family planning policies and tailor them to the needs of different regions and demographic groups. Additionally, the government can alleviate household economic pressures by providing comprehensive public services such as child education, healthcare, and social welfare. For instance, strengthening compulsory education, expanding access to affordable preschool education, promoting universal health insurance, and increasing basic pension levels can reduce household burdens, thereby increasing disposable income and savings propensity. Sweden, for example, offers free kindergarten and preschool education, enabling parents to balance work and family life, which enhances household savings willingness.

3.2 Prudent Control of National Fiscal Expenditure

Public finance theory highlights the significant role of fiscal policy in economic development. The government can guide the allocation of economic resources by rationally adjusting fiscal expenditure, promoting industrial upgrading and technological innovation, thereby enhancing productivity and economic growth. Furthermore, from the perspective of new institutional economics, the government must strengthen fiscal oversight to prevent the misuse and waste of fiscal funds, establishing robust systems and regulations.

When the savings rate is low, the government should prioritize investments in infrastructure, education, healthcare, and technological innovation to meet the public's demand for high-quality public services. Additionally, the government must enhance fiscal supervision to ensure the efficient use of resources. Simultaneously, attention should be paid to balanced regional development, particularly in central and western regions and rural areas, to promote equitable income distribution.

When the savings rate is high, the government can incentivize individuals and businesses to increase consumption and investment through tax cuts and various preferential policies. Examples include reducing personal income tax rates, optimizing corporate tax systems, and providing subsidies for research and innovation. Accelerating the improvement of the social security system, particularly in pensions, health insurance, and unemployment insurance, can boost public confidence in future risk management and reduce savings propensity.

3.3 Enhancing the Educational Attainment of Residents

According to human capital theory, education is a critical means of improving labor productivity and innovation capabilities. Higher education provides advanced knowledge and skills training, enhancing employment competitiveness and income levels. Additionally, based on economic growth theory, the accumulation of human capital drives economic development. By prioritizing investments in higher education, the government can promote human capital accumulation, increase labor productivity, and foster sustained economic growth. Moreover, improving residents' educational attainment can positively influence their attitudes toward savings.

The government can increase investment in higher education, expand university enrollment, and increase the supply of degrees; improve educational quality, promote the intrinsic development of higher education, and cultivate high-quality talent that meets economic development needs; strengthen publicity and guidance for higher education; encourage collaboration between universities and industries, drawing on Germany's "dual education" model to enhance graduates' employability by integrating higher education with practical experience, providing students with training and work opportunities relevant to real-world jobs; and guide residents to adopt a correct perspective on savings.

3.4 Increasing Per Capita Gross National Product

On one hand, the government should advance technological innovation to improve production efficiency and product quality, thereby raising productivity levels. On the other hand, it should optimize the industrial structure by developing high-value-added industries. Expanding openness to international markets can increase export income and foreign exchange reserves.

By integrating these measures with China's specific conditions, the government can more effectively control the savings rate within a reasonable range, promoting stable and sustainable economic development.

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