

## **An Empirical Analysis of the Factors Affecting China's Residents Savings**

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*Abstract: Since the economic system reform, the national income distribution pattern has changed dramatically. One of the changes is the proportion of household income in national income increase rapidly. Since 1949, China's savings rate with the economic growth and income levels increase the rising trend, and a high savings rate is also considered to explain China's rapid economic growth of a major factor. Although high savings rates will always lead to higher incomes and higher rate of economic growth, but not saving rate is higher, the better, is bound to the existence of an optimal saving rate. The residents' consumption and saving behavior has become more and more important significance for the development of the economy. To explore the rule of Chinese residents' savings behavior, find out main determinants, and on this basis to make a preliminary forecast the change trend of saving, be sure one of the purpose of this paper research topic.*

*Keywords: Household savings, Price index, Multiple co-linearity, variance and autocorrelation*

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### **1. INTRODUCTION**

Rapid growth of residents savings, is becoming the main source of funds for the development of China's economy. However, excessive savings is bound to be accompanied by investment or consumption of less than [3]. Therefore, we analyze the main factors affecting the residents' savings in order to take appropriate measures in the formulation of macroeconomic policies, so that the savings rate is maintained at an appropriate level, to promote economic growth. In order to explain the reasons for the change of residents' savings, it is necessary to introduce the resident saving function [4]. So the impact of the relevant variables on the changes of residents' savings is analyzed from the quantitative aspect.

## 2. AN EMPIRICAL ANALYSIS OF THE FACTORS AFFECTING RESIDENTS SAVINGS

In order to study the main factors affecting the residents' savings, this paper chooses five indexes, such as income level, interest rate, price level, inflation rate and other investment channels. According to the 1995 to 2013 China's SAV,GDP, Rate, RPI, CPI,SMV and other relevant statistical data [1] ,We build the model. Then, the model is tested by the goodness of fit test, the test of different variance test, the autocorrelation test and the multiple linear test. The main factors influencing the saving of our country are analyzed.

### 2.1 The Establishment of Econometric Model

According to the characteristics of economic development in recent years, China's household savings function can be expressed as [5]:

$$SAV = f(GDP, Rate, RPI, CPI, SMV, \mu_t) \tag{1}$$

In the function, SAV the total household savings, GDP for gross domestic product, Rate for a one-year deposit rate RPI, the retail price index, consumer price index for CPI, SMV for each period of the stock market, U is a random disturbance, Period of representation is A .

The established model can also be expressed as:

$$SAV = \beta_1 + \beta_2GDP + \beta_3Rate + \beta_4RPI + \beta_5CPI + \beta_6SMV + \mu_t \tag{2}$$

### 2.2 Parameter Estimation and Statistical Test of Model

#### 2.2.1 Parameter estimation

In this paper, the least square method is used for regression analysis of the model [6], and the results are as follows:

Table 1 Regression result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	498242.7	114272.1	4.360141	0.0008
GDP	1.096014	0.068946	15.89665	0.0000
RATE	1596.326	1154.774	1.382371	0.1901
RPI	-2249.668	592.2352	-3.798606	0.0022
CPI	-727.8477	186.2121	-3.908702	0.0018
SMV	-0.090578	0.022915	-3.952825	0.0017
R-squared	0.998651	F-statistic		1924.725
Adjusted R-squared	0.998132	Durbin-Watson stat		1.901024

The regression results are summarized as follows:

$$\begin{aligned}
 \hat{S}AV &= 498242.7 + 1.0960GDP + 1596.326RATE - 2249.668RPI - 727.848CPI - 0.09058SMV \\
 &\quad (114272.1) \quad (0.06895) \quad (1154.774) \quad (592.2352) \quad (186.2121) \quad (0.022915) \quad (3) \\
 t &= (4.360141) \quad (15.8967) \quad (1.382371) \quad (-3.79861) \quad (-3.7986) \quad (-3.79861) \\
 R^2 &= 0.998651 \quad \bar{R}^2 = 0.998132 \quad F = 1924.725 \quad DW = 1.901024 \quad n = 19
 \end{aligned}$$

Model estimation results can be explained, on the assumption that other variables remain unchanged, GDP growth of 1% per year, the average total household savings growth 1.096014%; on the assumption that other variables remain unchanged, Rate growth of 1% per year, the average increase of 1596.326% in the total household savings etc. These are consistent with the theoretical analysis and empirical analysis.

### 2.2.2 Statistical Test of Model

(1) goodness of fit test:  $R^2 = 0.998651$  can be obtained from the table 1, the correction coefficient is  $\bar{R}^2 = 0.998132$ , which shows that the model of the sample is very good.

(2) F test: for  $H_0 : \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$ , a given significance level is  $\alpha = 0.05$ . Degree of freedom is  $k - 1 = 5$  and  $n - k = 14$ , and the critical value is  $F_\alpha(5, 14) = 2.96$  by the F distribution table. From table 1,  $F = 1924.725 > F_\alpha(5, 14) = 2.96$ , we should reject the null hypothesis  $H_0 : \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$ , indicating a significant regression equation, namely "GDP, Rate, RPI, CPI, SMV variables such as combining to have a significant impact on China savings of urban residents.

(3) t test: T statistics corresponding to Rate is 1.382371, from table 1 that the P value is 0.1901. That in effect, Rate is not significant to Chinese urban residents savings, which indicates that the statistical variables in the model are likely to be multiple Co-linear.

### 2.3 Multiple Linear Test of Econometric Model

In this paper, we use the simple correlation coefficient test method [2], construct a simple correlation coefficient matrix, as follows:

Table 2 Correlation matrix

	CPI	GDP	RATE	RPI	SMV
CPI	1.000000	0.989657	-0.324020	0.009504	0.833715
GDP	0.989657	1.000000	-0.313147	0.068537	0.843386
RATE	-0.324020	-0.313147	1.000000	0.711654	-0.278696
RPI	0.009504	0.068537	0.711654	1.000000	0.051520
SMV	0.833715	0.843386	-0.278696	0.051520	1.000000

As can be seen from the correlation coefficient matrix, the correlation coefficient between GDP, CPI and SMV is higher, which confirms the existence of multiple linear. Therefore, we use the stepwise regression method to examine and solve the problem of multiple co linearity, as follows:

Step 1: Make Mono-regression respectively SAV to GDP, RATE, RPI, CPI, SMV respectively .The results as shown in table 3. Variable parameter estimation T statistic.

Table 3 Mono-regression results

variable	GDP	RATE	RPI	CPI	SMV
parameter estimation	0.782636	0.989657	1098.131	2192.789	0.990215
T statistic	54.70161	-1.472864	0.144322	22.79482	5.901389
$R^2$	0.994351	0.113167	0.001224	0.968319	0.671982
$\bar{R}^2$	0.994018	0.061000	-0.057528	0.966456	0.652687

Among them, the GDP equation is the largest.

Step 2: Based on GDP, in order to join the other variable stepwise regression, the results are shown in table 4.

Table 4 regression results of adding new variables

variable	GDP	RATE	RPI	CPI	SMV	$\bar{R}^2$
GDP,RATE	0.776057 (53.10508)	-1698.204 (-1.437553)				0.994372
GDP,RPI	0.784439 (59.25297)		-1052.199 (-1.987137)			0.994903
GDP,CPI	0.889293 (8.963544)			-305.9862 (-1.086274)		0.994081
GDP,SMV	0.831370 (35.62291)				-0.088935 (-2.475979)	0.995405

After comparison, the new addition of the SMV equation  $\bar{R}^2 = 0.995405$  , the maximum improvement, and the various parameters of the t test significantly, choose to retain SMV. When using GDP and SMV as the foundation, in order to add new variables by stepwise regression, the new RPI equation  $\bar{R}^2 = 0.996478$  and parameters of the t test are significant, choose to keep RPI. In GDP, SMV and RPI as the foundation, adding new variables in regression, when adding RATE,  $\bar{R}^2$  is Falling , RATE parameter of T statistic is not significant, and the parameter is negative unreasonable, which caused serious multicollinearity. After

accession to the CPI,  $\bar{R}^2$  has increased, and the various parameters of the t test are significant, so keep CPI.

Step 3: after the correction of severe multiple linear regression results

$$\begin{aligned} \hat{S}AV &= 40683.6 + 1.056334GD P - 1590.322RP I - 633.7106CP I - 0.091395SM V \\ &\quad (92752.66) \quad (0.064694) \quad (362.3025) \quad (178.8632) \quad (362.3025) \\ t &= (16.32807) \quad (16.32807) \quad (-4.389486) \quad (-3.542990) \quad (-3.865991) \\ R^2 &= 0.998453 \quad \bar{R}^2 = 0.998011 \quad F = 2258.475 \quad DW = 1.854741 \quad n = 19 \end{aligned} \quad (4)$$

This shows that, in the case of other factors constant, when GDP, RPI, CPI and SMV respectively increased 1%, the average total savings of urban residents will be respectively increased by 1.056334%, decreased by 1590.322%, reduced by 633.7106% and reduced by 0.091395%.

## 2.4 Cointegration Test of Model

### 2.4.1 Unit root test

Classical time series analysis and regression analysis have many assumptions, such as the stability of the sequence, the normality and so on. Under these conditions, the t test, F test and so on are highly reliable. However, most of the time series data in general economic analysis are not stable, and have a certain growth trend. Therefore, when the co integration analysis of these data, first of all, the method of smooth test, to determine the stability of the data by the unit root test. Test results are shown in table 5.

Table 5 ADF test results for each sequence

variable	The value of ADF	1% critical value	5% critical value	10% critical value	conclusion
SAV	2.403159	-3.9228	-3.0659	-2.6745	no stationary
D(SAV)	-3.448187	-4.6193	-3.7119	-3.2964	stable
GDP	2.237700	-3.9228	-3.0659	-2.6745	no stationary
D(GDP)	-3.548367	-4.6193	-3.7119	-3.2964	stable
RPI	-2.223015	-3.9228	-3.0659	-2.6745	no stationary
D(RPI)	-3.974797	-4.6193	-3.7119	-3.2964	stable
CPI	2.499277	-3.9228	-3.0659	-2.6745	no stationary
D(CPI)	-4.461076	-4.6193	-3.7119	-3.2964	stable
SMV	-0.431478	-3.9228	-3.0659	-2.6745	no stationary
D(SMV)	-6.790567	-4.6193	-3.7119	-3.2964	stable

From the test results, in 1%, 5% and 10% of the three significant level, SAV, GDP, RPI, CPI, SMV unit root test critical values of Mackinnon statistic were less than the corresponding T test value, and thus cannot reject the null hypothesis, that SAV, GDP, RPI, CPI series unit root is non-stationary series. In order to get the single integer order of the sequence, in the unit root test dialog box, the first order difference sequence is designated as the unit root test, and obtain respectively the sequence of S is one order single – integration,  $SAV, GDP, RPI, CPI, SMV \sim I(1)$ .

### 2.4.2 Cointegration test

In order to analyze whether there is a co integration relationship between SAV and various variables, we first make the regression between variables. Then, we test the stability of the regression residuals. Regression results have been given in this paper, i.e., co integration regression

$$\hat{SAV} = 40683.6 + 1.056334GDP - 1590.322RPI - 633.7106CPI - 0.091395SMV + \ell_t \quad (5)$$

In order to test the stability of the regression residuals, the unit root test of ET sequence was performed. The mean residual sequence is 0, so choosing no intercept, not rend DF test, the estimation results are shown in table 6.

Table 6 Estimation results of residual series stability test

ADF Test Statistic	1% Critical Value*	5% Critical Value	10% Critical Value
-4.666501	-2.7989	-1.9725	-1.6307

SAV and the existence of cointegration between the various variables, show that there is a long-term equilibrium relationship between.

### 2.4.3 Cointegration error correction

In the short term, there may be an imbalance. In order to enhance the accuracy of the model, we can think of the error term in cointegration regression ET as a balance error. By establishing the error correction model, we relate the short-term behavior and long-term changes of each variable. The structure of the error correction model is as follows:

$$\Delta SAV = \alpha + \beta_1 \Delta GDP + \beta_2 \Delta RPI + \beta_3 \Delta CPI + \beta_4 \Delta SMV + \gamma \ell_{t-1} + \varepsilon_t \quad (6)$$

According to the difference sequence of each variable, using DSAV as the explanatory variable and other variables as explanatory variables, the regression model is estimated, and the results are shown in table 7.

Table 7 regression model estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3111.200	5126.160	0.606926	0.5661
DCPI	427.3521	596.0692	0.716950	0.0003
DGDP	0.613931	0.241989	2.537022	0.0443
DRPI	-4166.654	1106.599	-3.765280	0.0093
DSMV	-0.073760	0.022144	-3.330883	0.0158
ET(-1)	-1012.306	424.9089	-2.382407	0.0046
R-squared	0.903610	F-statistic		11.24943

The estimation result of the error estimation model is finally obtained:

$$\Delta SAV = 3111.2 + 0.613931\Delta GDP - 4166.654\Delta RPI + 427.3521\Delta CPI - 0.073760\Delta SMV - 1012.306\ell_{t-1} \quad (7)$$

$$t = (0.606926) \quad (0.716950) \quad (2.537022) \quad (-3.765280) \quad (-3.330883) \quad (-2.382407)$$

$$R^2 = 0.903610 \quad F = 11.24943 \quad n = 19$$

The estimated results indicate that the changes of total savings of urban residents not only depend on the changes of GDP, RPI, CPI and SMV, but also depend on the deviation from the last stage of these explanatory variables to the equilibrium level. The coefficient of the error term ET-1 reflects the deviation from the correction. The greater the last period, the greater the amount of the current revision. That is, the system error correction mechanism.

### 3. CONCLUSION

Income levels have a significant effect on household savings, and the positive correlation between the two is positive. Compared with the income, the impact of interest rates on savings is relatively weak. However, interest rate plays a decisive role in the change of savings structure. From the above analysis, the impact of the nominal interest rate on savings is less than the actual rate of savings, which is due to the existence of inflation, to a certain extent, played a role in offsetting. Price level has a negative impact on the savings of residents. CPI rising, means that the inflation rate continues to rise. When CPI is greater than the nominal interest rate of bank deposits, indicates that the actual interest rate is negative, because residents will choose to invest more money in return for the project. Fewer and fewer people are willing to save, and less money. The market value of the stock market has a positive correlation with the residents' savings. However, under the premise of a certain level of income,

the increase in the stock investment will inevitably lead to a decline in bank savings, which should be a negative correlation between the two. Therefore, China's stock market system is not perfect, the market is not standardized, need to strengthen management.

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