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Quantitative Analysis on Influencing Factors of Chinese Resident Savings

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Abstract

Saving is the economic foundation of a family and a country. Residents' savings provide funds for various industries in the country, enabling them to operate and develop. However, excessive household savings will make banks unbearable, and the consumption and investment markets will not be supported by sufficient funds, resulting in slow development. This paper collects data on household savings, per capita disposable income, one-year fixed deposit interest rate, consumer price index and Gini coefficient from 1999 to 2018, and conducts quantitative analysis to find out that per capita disposable income and consumer price index have significant impact on residents. Savings have a greater impact, and finally put forward some targeted recommendations.

Keywords

Household Savings; Influencing Factors; Quantitative Analysis; Household Consumption.

1. Introduction

In 1978, my country's household savings amounted to 21.06 billion yuan. Since then, the amount of household savings has soared, reaching 68 trillion yuan in 2018, an increase of more than 3,000 times in 40 years. The rapid growth of household savings does reflect the huge economic growth brought about by reform and opening up, but at the same time, such a huge savings is not a healthy phenomenon for a country. For example, in my country, the level of savings is much higher than the level of investment, which brings a great loss of efficiency to investment.

"Population aging" is a hot word in recent years. As we all know, my country is gradually entering an aging society, and the population structure is slowly changing. Changes in the demographic structure will bring about changes in all aspects. The needs of each age are different. The aging of the population will be even more detrimental to the development of investment, and will ultimately affect the development of the economy. In addition, the gap in economic development is widening. With the continuous deepening of urbanization, the gap between urban and rural areas is also widening. The abnormal development has made China's economy seriously unbalanced, and it is difficult to build a moderately prosperous society in an all-round way.

As far as China's current situation is concerned, per capita consumption is still not high relative to per capita income, and there is still a lot of room for improvement. Judging from the comparison of resident consumption and gross national product, there is also a lot of room for improvement in consumption. As life gets better and better, urban and rural residents pay more and more attention to the quality of life. The improvement of consumption tendency can provide conditions for the transformation of economic structure and promote the transformation of economic growth from investment to consumption.

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Although the level of consumption has been increasing along with economic growth, and the state has taken many measures to encourage residents to consume, the feedback received is not very positive. Most of the older generation still adhere to the habit of diligence and thrift, resulting in high household savings . Under such conditions of economic development, we need to explore the influencing factors of household savings and find the reasons, so as to formulate reasonable solutions, better realize the transformation of the economic structure, and promote economic development.

2. Literature Review

Resident savings has always been one of the hot topics in domestic and foreign academic research.

Ruan Huimin (2006) discussed the reasons and motivation for the high savings stock and the rapid growth of household savings, and believed that household income is the decisive factor affecting household savings, institutional factors have a positive impact on household savings, and there is a positive correlation between nominal interest rates and household savings However, inflation has a weaker negative effect on savings [1]. Shi Dongmei (2010) analyzed three factors that affect the savings of Chinese residents—resident income, inflation rate and interest rate, and then put forward several suggestions: maintain a moderate growth of urban and rural residents' income, maintain a moderate level of inflation, deepen the reform of interest rate marketization, Improve the construction of supporting system [2]. Zhu Xuemeng, Zhang Zhonghui (2015) analyzed income, economic growth, stock market, real estate market and consumer market, and interest rates, and proposed to increase the income of rural residents, improve my country's social security system, and broaden diversified investment channels to enhance the stability of the stock market Suggestions on upgrading consumption to convert urban and rural residents' savings into current consumption[3]. Wang Yawen (2018) regarded the Gini coefficient as one of the important factors affecting household savings [4]. He Ling, Zhu Jiaming (2016) based on the research on the influencing factors of household savings in my country. From four influencing factors: disposable income, CPI (Consumer Price Index), interest rate, and the amount of stock funds, the final conclusion is that disposable income, CPI and interest rate are The main factors affecting the savings of urban residents [5].

There are many studies on household savings, each scholar analyzes from different directions based on the current situation at that time, and has different opinions. Combining the above literature, this paper selects four relatively important explanatory variables, uses Eviews software to carry out econometric analysis on the influencing factors of household savings, finds out the important factors affecting household savings, and puts forward some suggestions based on the final regression results.

3. Preparation of the Model

3.1. Analysis of Influencing Factors

3.1.1. Per Capita Disposable Income of Residents

From the perspective of economics, the income of urban and rural residents can be divided into two categories: savings and consumption. The other than consumption is savings. As income increases, consumption and savings levels will increase to a certain extent. Here, we take urban and rural per capita disposable income (x1) as an explanatory variable.

3.1.2. Interest Rate

Interest rates have both income and substitution effects on savings. Savings will grow only when the substitution effect brought about by changes in interest rates is greater than the income effect. Here, we choose the one-year fixed deposit rate (x2) as the explanatory variable.

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3.1.3. Consumer Price Index (CPI)

For some necessities of life, the price elasticity is relatively small, causing little change in demand, and the impact on savings is relatively small, while commodities with high price elasticity have a relatively large impact on savings. Here, we use the consumer price index (CPI) as the explanatory variable X3.

3.1.4. Gini Coefficient

The Gini coefficient is an indicator to measure the income gap between residents. It usually varies between 0 and 1. The closer it is to 0, the more balanced the income distribution. We take the Gini coefficient as an explanatory variable x4 to explore the impact of the average level of household income in my country on the level of household savings in my country.

3.1.5. Other

Parameters and Errors section. In addition to the above four factors, there are many other factors that affect savings, such as population aging, consumption preferences, etc. These factors have a relatively small impact on household savings and will not be specifically analyzed here.

3.2. Variable Setting

Table 1. Meaning of each variable

Variable1	Variable2
Y	Resident savings
X1	per capita disposable income of residents
X2	One-year time deposit rate
X3	CPI
X4	Gini Coefficient

4. Estimation of the Model

4.1. Correlation Coefficient, Correlation Diagram Analysis

The correlation analysis between the explanatory variables and the explained variables X1, X2, X3, X4, and Y was performed with Eviews software. The results are shown in Figure 1, Figure 2, Figure 3, Figure 4, and Figure 5.

Correlation

	Y	X1	X2	X3	X4
Y	1.000000	0.998981	-0.066623	0.987643	0.175366
X1	0.998981	1.000000	-0.039843	0.990246	0.189790
X2	-0.066623	-0.039843	1.000000	0.073715	0.081365
X3	0.987643	0.990246	0.073715	1.000000	0.213981
X4	0.175366	0.189790	0.081365	0.213981	1.000000

Figure 1. Correlation coefficient between variables

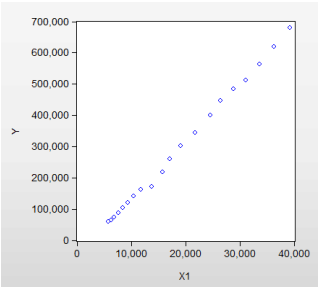

Figure 2. Correlation diagram of household savings Y and household per capita disposable income x1

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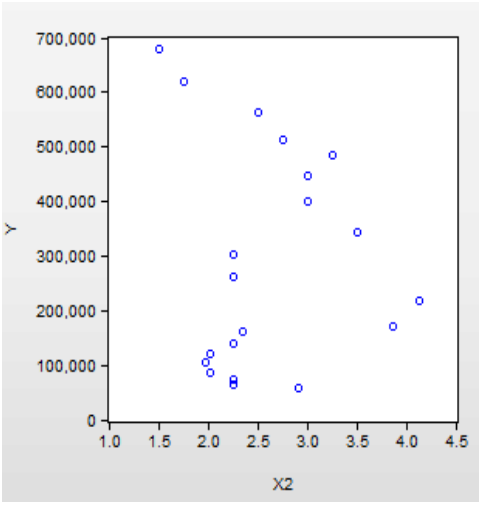

Figure 3. Correlation diagram of household savings Y and interest rate X2

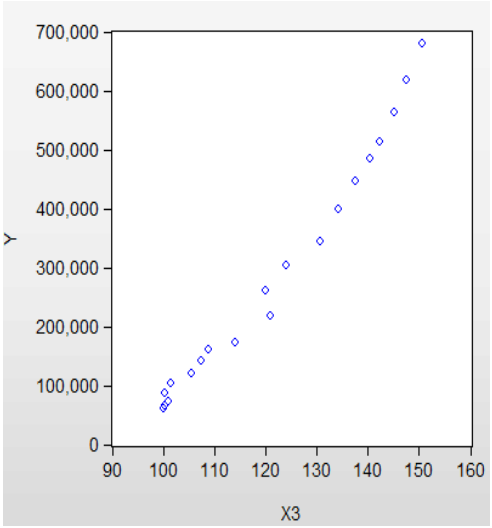

Figure 4. Correlation diagram of household savings Y and CPI x3

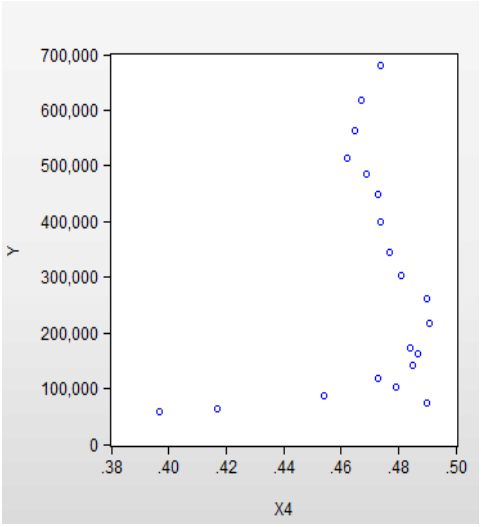

Figure 5. Correlation diagram of household savings Y and Gini coefficient x4

Figure 2, Figure 3, Figure 4, and Figure 5 are the correlation diagrams of explained variables and explanatory variables. In Figures 2 and 4, the explained variable Y and the explanatory

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variables x1 and x3 show a positive and highly linear correlation. In Figures 3 and 5, the correlation between the explained variable Y and the explanatory variables x2 and x4 is not clear.

4.2. Model Settings

Based on the above correlation analysis, a model is initially established:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

The result is

Y = -213615.6538+ 13.8198*X1 - 15837.74659*X2 + 2904.0670*X3 - 142316.1678*X4

$$R^2 = 0.9992 \quad F = 5051.839 \quad Prob(F) = 0.000000 \quad DW = 1.9637$$

Goodness of fit test: The coefficient of determination is 0.9992, which is close to 1, indicating that the goodness of fit of the model is very good.

F test: The value of the F statistic is 5051.839, and the accompanying probability of F is close to zero, indicating that the regression model is significant, and the common influence of the regression coefficients on the model is also significant.

The t test of the regression coefficient: the absolute value of the t statistic value of the regression coefficient is greater than 2, and the p value of the t statistic is less than 0.05, indicating that the regression coefficient is significant.

4.3. Test of the Model

4.3.1. Multicollinearity Test

Correlation coefficient test

Correlation				
	X1	X2	X3	X4
X1	1.000000	-0.039843	0.990246	0.189790
X2	-0.039843	1.000000	0.073715	0.081365
X3	0.990246	0.073715	1.000000	0.213981
X4	0.189790	0.081365	0.213981	1.000000

Figure 6. Correlation coefficient test results

It can be seen from the above figure that the correlation coefficient between the explanatory variables is greater than 0.8, indicating that the model has multicollinearity.

Therefore, the auxiliary regression model test and the variance inflation factor test are carried out.

Table 2. Statistics of parameters of auxiliary regression model

Model		F	F(P)	VIF	TOL
X1=f(X2,X3,X4)	0.9936	829.9424	0.000000	156.6171	0.0064
X2=f(X1,X3,X4)	0.6655	10.6131	0.000438	2.9900	0.3345
X3=f(X1,X2,X4)	0.9937	838.6221	0.000000	158.2529	0.0063
X4=f(X1,X2,X3)	0.0826	0.4804	0.7005	1.0901	0.9174

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In the above auxiliary regression model, there are two F-statistics with an adjoint probability equal to 0, indicating that the model has multicollinearity. obtained in less than 0.1.

4.3.2. Eliminating Multicollinearity with Stepwise Regression

Table 3. Stepwise regression result table

Equation	X1	X2	X3	X4	$\overline{R}^2$
①Y=f(x1)	18.5954 (93.9217)				0.9979
②Y=f(x1,x2)	18.5755 (113.3347)	-7756.22 (-3.0509)			0.9985
③Y=f(x1,x3)	20.1091 (14.2175)		-916.9441 (-1.0807)		0.9979
④Y=f(x1,x4)	18.6476 (94.8959)			-125588.7 (-1.3984)	0.9980
⑤Y=f(x1,x2,x3)	14.5104 (8.0237)	-14940.96 (-3.8123)	2451.319 (2.2553)		0.9988
⑥Y=f(x1,x2,x4)	18.6201 (114.7059)	-7437.696 (-2.9986)		-105372.3 (-1.4167)	0.9986

After repeated introduction-checking-elimination, the ideal model is finally determined as:

$$Y = -240616.7132 + 14.5104*X1 - 14940.9563*X2 + 2451.3186*X3$$
$$R^2 = 0.9988 \quad F = 5336.167 \quad Prob(F) = 0.0000000 \quad dw = 1.2371$$

The coefficient of determination of this model is 0.9988, which is close to 1, indicating that the model has a high goodness of fit for the sample; the F statistic is 5336.167, and its accompanying probability is 0.000000, which is close to zero, indicating that the overall linear relationship of the model is significant. The t test of the regression coefficient Pass, the regression coefficient is significant.

4.3.3. Autocorrelation Test

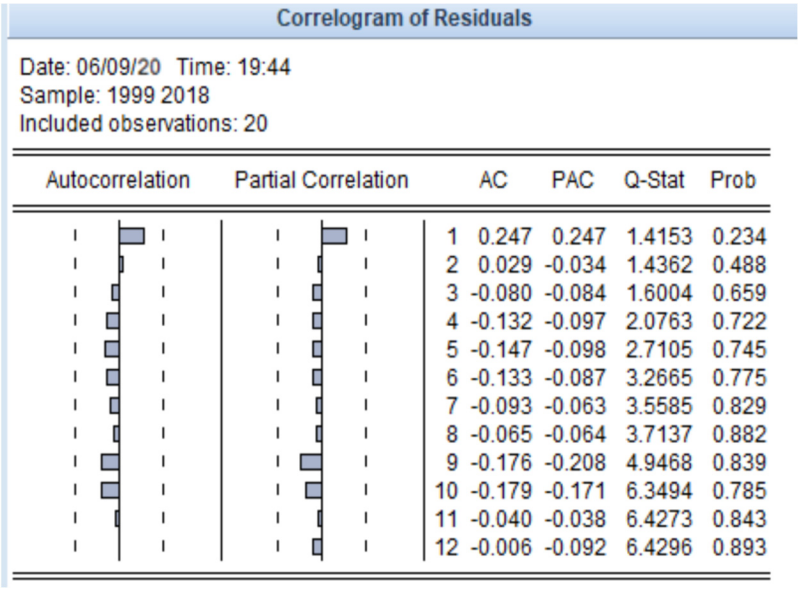

Figure 7. Partial autocorrelation coefficient test

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DW inspection

The number of model samples n=20, the number of explanatory variables k=3, at the significant level α=0.05, check the DW statistics table: d_l=1.00, d_u=1.68, and d_l= 1.00< DW= 1.2371< d_u= 1.68, Therefore, it is impossible to tell whether the model has autocorrelation.

All the histograms of the lag partial autocorrelation coefficients PAC do not exceed the dotted line, indicating that the regression model does not have autocorrelation.

LM test

With a lag of 1, the results are as follows:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.026968	Prob. F(1,15)	0.3269
Obs*R-squared	1.281550	Prob. Chi-Square(1)	0.2576

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/09/20 Time: 19:48
Sample: 1999 2018
Included observations: 20
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-10949.71	91010.14	-0.120313	0.9058
X1	-0.197089	1.817370	-0.108447	0.9151
X2	-294.8214	3926.611	-0.075083	0.9411
X3	127.1095	1093.222	0.116271	0.9090
RESID(-1)	0.259196	0.255771	1.013394	0.3269

R-squared	0.064078	Mean dependent var	7.15E-11
Adjusted R-squared	-0.185502	S.D. dependent var	6391.014
S.E. of regression	6958.584	Akaike info criterion	20.74566
Sum squared resid	7.26E+08	Schwarz criterion	20.99459
Log likelihood	-202.4566	Hannan-Quinn criter.	20.79425
F-statistic	0.256742	Durbin-Watson stat	1.692820
Prob(F-statistic)	0.901014		

Figure 8. LM test result 1

As can be seen from the above table, nR^2 =1.2816< χ_α^2 (1)=3.8415, prob(nR ^{2})=0.2576 is greater than the given significance level α =0.05, and the absolute value of the T statistic value of the et-1regression coefficient is less than 2, indicating that the model There is no first-order autocorrelation.

With a lag of 2, the results are as follows:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.488541	Prob. F(2,14)	0.6236
Obs*R-squared	1.304770	Prob. Chi-Square(2)	0.5208

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/09/20 Time: 19:49
Sample: 1999 2018
Included observations: 20
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7245.353	98247.93	-0.073746	0.9423
X1	-0.124146	1.959683	-0.063350	0.9504
X2	-172.4399	4166.588	-0.041386	0.9676
X3	82.82612	1179.701	0.070209	0.9450
RESID(-1)	0.268376	0.273587	0.980950	0.3433
RESID(-2)	-0.037878	0.287253	-0.131863	0.8970

R-squared	0.065238	Mean dependent var	7.15E-11
Adjusted R-squared	-0.268605	S.D. dependent var	6391.014
S.E. of regression	7198.350	Akaike info criterion	20.84442
Sum squared resid	7.25E+08	Schwarz criterion	21.14314
Log likelihood	-202.4442	Hannan-Quinn criter.	20.90273
F-statistic	0.195416	Durbin-Watson stat	1.712906
Prob(F-statistic)	0.959166		

Figure 9. LM test result 2

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As can be seen from the above table, nR^2 =1.3048< χ^2_α (2)=5.9915, prob(nR ^{2})=0.5208 is greater than the given significance level=0.05, and at the significance level of α =0.05, the t-statistic P of the et-1 regression coefficient If the value is greater than 0.05, the regression coefficient is significantly non-zero, and the t-statistic P value of the et-2 regression coefficient is greater than 0.05, and the regression coefficient is significantly zero, indicating that the model has no second-order autocorrelation at the significance level of 0.05.

To sum up, the model does not have autocorrelation.

4.3.4. Heteroskedasticity Test

White's test

Heteroskedasticity Test: White

F-statistic	1.177355	Prob. F(9,10)	0.3988
Obs*R-squared	10.28947	Prob. Chi-Square(9)	0.3276
Scaled explained SS	6.546603	Prob. Chi-Square(9)	0.6842

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/09/20 Time: 20:07
Sample: 1999 2018
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.42E+10	6.58E+10	-0.215541	0.8337
X1^2	-10.42984	28.66650	-0.363834	0.7236
X1*X2	4809.299	79984.22	0.060128	0.9532
X1*X3	9770.984	32789.80	0.297989	0.7718
X1	-844116.3	2734793.	-0.308658	0.7639
X2^2	24923877	84741176	0.294118	0.7747
X2*X3	-10451822	44598409	-0.234354	0.8194
X2	1.04E+09	3.71E+09	0.279985	0.7852
X3^2	-1895812.	9390888.	-0.201878	0.8441
X3	3.26E+08	1.57E+09	0.207283	0.8399

R-squared	0.514473	Mean dependent var	38802802
Adjusted R-squared	0.077500	S.D. dependent var	56135527
S.E. of regression	53916426	Akaike info criterion	38.75062
Sum squared resid	2.91E+16	Schwarz criterion	39.24849
Log likelihood	-377.5062	Hannan-Quinn criter.	38.84781
F-statistic	1.177355	Durbin-Watson stat	1.785392
Prob(F-statistic)	0.398776		

Figure 10. White Test

It can be seen from the figure that nR ^{2} =10.2895< χ^2_α (6)=12.592, and the prob(nR ^{2}) associated probability is 0.3276 greater than the given significance level α =0.05, so the model does not have heteroscedasticity.

ARCH test

Equation: EQ10 Workfile: 111111::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Heteroskedasticity Test: ARCH

F-statistic	0.574743	Prob. F(1,17)	0.4588
Obs*R-squared	0.621353	Prob. Chi-Square(1)	0.4305

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/09/20 Time: 22:45
Sample (adjusted): 2000 2018
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25240732	12710213	1.985862	0.0634
RESID^2(-1)	0.140274	0.185029	0.758118	0.4588

R-squared	0.032703	Mean dependent var	30836111
Adjusted R-squared	-0.024197	S.D. dependent var	44568826
S.E. of regression	45104820	Akaike info criterion	38.18618
Sum squared resid	3.46E+16	Schwarz criterion	38.28559
Log likelihood	-360.7687	Hannan-Quinn criter.	38.20300
F-statistic	0.574743	Durbin-Watson stat	1.377912
Prob(F-statistic)	0.458762		

Figure 11. ARCH test

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nR^2 =0.6214,at the significance level α=0.05, $nR^2 < \chi^2_{0.05}$ (1)=3.8415, Prob(nR^2) = 0.4305 >0.05,so there is no heteroscedasticity in the mode.

In summary, there is no heteroscedasticity in the model.

4.4. Final Model

After the autocorrelation test and the heteroscedasticity test, the final model is determined to be:

$$Y = -240616.7132 + 14.5104*X1 - 14940.9563*X2 + 2451.3186*X3$$

$$R^2 = 0.9988 \quad F = 5336.167 \quad Prob(F) = 0.0000000 \quad DW = 1.2371$$

The model shows that the amount of household savings Y mainly depends on the per capita disposable income of residents X1, the interest rate X2 and the consumer price index X3. Under the condition that other factors remain unchanged, for every 1 yuan increase in the per capita disposable income X1 of residents, the residents' savings Y will increase by 1.45104 billion yuan; under the condition that other factors remain unchanged, for every 1 unit increase in the interest rate X2, the residents' savings Y will increase by 1 yuan. A decrease of 1,494,095,630,000 yuan; for every 1 unit increase in the consumer price index X3, household savings Y will increase by 245,131,860,000 yuan.

5. Conclusions and Recommendations

Traditional Western economics holds that interest rates and savings are usually proportional. In our final model, however, interest rates have a negative impact on household savings, that is, an increase in interest rates will lead to a reduction in savings. This is understandable under China's interest rate policy. The income effect and substitution effect of interest rates work at the same time, and the impact of interest rates may change as we select the data range. Therefore, the deposit rate is less acceptable as an explanatory variable.Therefore the following scheme is recommended :

5.1. Divert the Savings of Urban and Rural Residents to Current Consumption

In my country's consumer market, the main force of consumption is young people. They have just entered the society and their wages are not high, but they like to consume. They are often "moonlight people" and have no savings. Most of the people with large deposits in their hands are middle-aged and elderly people. They are more cautious and less accepting of the e-commerce that has emerged in recent years, and they are more inclined to spend in brick-and-mortar stores. Moreover, there are also more consumer goods, luxury goods and services suitable for young people in the market, which leads to forced deposits of middle-aged and elderly people. I think it is necessary to open up more consumer markets and consumption directions to meet the spiritual needs of middle-aged and elderly people, such as tourism and housing. It is also necessary to provide better services for middle-aged and elderly people and explain them patiently. In terms of e-commerce, I think the government needs to improve the relevant credit policies and standardize business practices. In this way, it helps to mobilize the enthusiasm of consumption.

5.2. Divert the Savings of Urban and Rural Residents to the Financial Market

Although my country's investment is increasing year by year, it is still insufficient compared to the excessive savings rate, resulting in a situation of low utilization of funds with excess production capacity. And even though investment can bring high returns, its high risk discourages most people, and people are more willing to turn their money to the most reliable savings. There are too many uncertainties in the financial market and insufficient supervision to let customers go. Therefore, the government needs to strengthen the supervision of the

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financial market, develop diversified and reliable investment channels, provide the public with better products and services, and ultimately realize the Diversion of savings to investment.

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