

An Empirical Study on the Determinants of Resident Savings Balance in China

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Abstract. This is an empirical paper that explores the factors affecting the change in the savings balances in China. After extensive reading of existing studies, we will use the WLS regression model to conduct a regression analysis of several classical factors affecting the change in the savings balances and the new factors proposed in this paper, based on the reality of Eastern-Western differences in China. We provide evidence that six variables out of the eight factors we study are strongly correlated with the change in the savings balances. Further, we find that except for the Child dependency ratio, the other five variables are positively correlated with the change in savings balances. The purpose of this paper is to encourage the market to adjust development strategies, the government to adopt more targeted policies, and the society to give strong help to better guide residents' savings behavior by analyzing the factors that affect the change in savings balances at a macro level.

1. Introduction

In recent years, the global economy has experienced a significant downturn, and although recovery is expected in 2021, there is still significant downturn pressure due to the uncertainty of the global pandemic. China's GDP fell 6.8% year-on-year in the first quarter of 2020 due to the epidemic and resumed growth in the second quarter as the epidemic stabilized and continued its steady recovery. The tense economic environment reflects the important impact of savings on the normal functioning of Chinese society. In this paper, we intend to explore the factors affecting the change of savings balances, in the hope that this paper will be a good guide to the saving behavior of residents.

2. Literature Review

Savings are an important part of the national economy and an important source of funds in the country's economic turnover. Among them, resident savings are closely related to people's daily life, reflecting their balances in the past, representing the economic choices of the present, and revealing the expectations and planning for the future economic environment and the small environment of their own lives. On the one hand, resident savings depict the general environment of people's livelihoods. On the other hand, they are directly linked to consumption and thus to economic growth. Such a dual issue of the economy and people's livelihood has been one of the central themes of many researchers. Researchers have generally expressed strong curiosity about the factors influencing residents' saving behavior, while hoping that these studies can better regulate and guide residents' saving behavior from a macro perspective, thus achieving increased people's well-being and further economic prosperity.

It is generally accepted that the theoretical study of the saving function has its origins in Keynes' *The General Theory of Employment, Interest and Money* in 1936, with the principle of absolute income and diminishing marginal propensity to consume, i.e. consumption does not increase in the same proportion as absolute income and a greater proportion of income is devoted to saving. On the other hand, Duesenberry (1949) developed the theory of relative income, stating that consumption

depends not only on absolute income but also on relative levels to surrounding groups and that consumption is stable over time. In the 1950s, economists introduced the concept of expected income to the study of savings. Modigliani's (1954) life-cycle hypothesis stated that aggregate savings depended on the age distribution of the population. At the same time, Friedman's (1957) theory of persistent income argued that the main influence on the consumption expenditure of the residents was not the current income but the expected income obtained from the weighted average of past incomes. Afterward, representative theoretical models such as the liquidity constraint theory and precautionary saving theory introduced rational expectations and uncertainty into the study of saving functions. Leland's (1968) precautionary saving theory, for example, suggests that when people expect an increase in future risk, the amount of savings will increase accordingly. In the recent research area, the factors that have been proven to influence the saving behavior include GDP, per capita disposable income, interest rate, inflation, government current budget, social security, income gap, the elderly dependency ratio, and the juvenile dependency ratio.

The specific associations of these factors with residential saving have been examined. Several studies have revealed that it's not just GDP (GDP per capita) that is positively correlated with resident savings balance (Yin, 2020; Qin, 2020; Xu, 2020; Har Wai Mun et al, 2015)^[2,3,4,1], but also per capita disposable income (Yin, 2020; Wang, 2018; Feng et al, 2014)^[2,5,6]. Besides, a rich body of studies has focused on the interest rate. Recent studies by Qin (2020)^[3] and Xu (2020)^[4] hold the view that interest rate has a positive correlation with savings balance. On the contrary, Wang (2018)^[5] asserts that interest rate is negatively correlated with savings balance. In addition, some studies find no link between the interest rate and savings balance (Yin, 2020; Feng et al, 2014)^[2,6].

Furthermore, due to the worldwide economic downturn, several studies are attempting to explain the correlation between inflation and savings balance. Har Wai Mun et al (2015)^[1] point out that inflation increases savings balance. Xu (2020)^[4] holds the view that CPI has a negative correlation with savings balance. Besides, Yin (2020)^[2] and Feng et al (2014)^[6] assert that there is no significant correlation between the two.

Meanwhile, Har Wai Mun et al (2015)^[1] observe that the government's current budget will decrease private saving. Similarly, Feng et al (2014)^[6] support that social security has a positive correlation with savings balance. Inspired by the general environment of more equitable distribution and redistribution of the Chinese economy, there are also a few studies that examine if savings balance will be affected by the income gap. Wang (2018)^[5] proves that Gini Coefficient has a positive impact on resident savings balance. Opposite to Wang, Qin (2020)^[3] states there is no link between the two. As for the demographic structure, Qin (2020)^[3] concludes that opposite to the elderly dependency ratio, the juvenile dependency ratio has a negative correlation with resident savings balance.

3. Data

3.1. Year-end Balance of Savings of Urban and Rural Residents (Savings)

Savings balances deposited by urban and rural residents in banks and rural credit cooperatives at the end of the reporting period, including the year-end balances of urban residents' savings and rural individuals' savings, and excluding residents' cash in hand and deposits of industrial and mining enterprises, troops, institutions, and organizations. It does not include foreign currency deposits.

3.2. GDP

GDP is the value of goods and services produced and provided for end-use by all resident units within the territory of a country (region) over a given period.

3.3. Public Financial Expenditure: Social Security and Employment (Expenditure)

This type of public financial expenditure reflects government expenditure on social security and employment. Related matters include social security and employment administration affairs, civil administration affairs, financial subsidies to the Social Insurance Fund, etc.

3.4. Proportion of Primary Industry (Firstind)

The proportion of primary industry in the GDP. The primary industry refers to agriculture (including forestry, animal husbandry, fishing, etc.).

3.5. Proportion of Tertiary Industry (Thirdind)

The proportion of tertiary industry in the GDP. The tertiary sector, namely the services industry, refers to the other industries except the primary and the secondary sectors.

3.6. Region

Cities are divided into the eastern region and western region. The western part of China consists of 12 provinces, cities, and autonomous regions: Sichuan, Yunnan, Guizhou, Tibet, Chongqing, Shanxi, Gansu, Qinghai, Xinjiang, Ningxia, Inner Mongolia, Guangxi. The rest of the provinces are classified as Eastern China. In general, Eastern China is more developed than Western China.

3.7. Child Dependency Ratio (Child)

The ratio of the number of adolescents aged 0-14 years to the number of the working-age population.

3.8. The Elderly Dependency Ratio (Elder)

The ratio of the number of the elderly (over 65 years old) to the number of the working-age population.

3.9. Registered Unemployment Rate (Unemployment)

China uses the concept of the urban registered unemployment rate, which refers to the proportional relationship between the number of urban registered unemployed and the sum of the number of urban employees and the number of urban registered unemployed.

Table 1. Summary table.

Variable	Obs	Mean	Std. Dev.	Min	Max
Savings	295	90939.04	147150.1	839.6667	1469430
GDP	296	173.3459	238.9156	7.538097	1998.556
Proportion of primary industry	296	.1414435	.0835813	.0011126	.4657175
Proportion of tertiary industry	296	.3898461	.0793051	.1678964	.7633027
Child dependency ratio	295	.167945	.0440147	.0828012	.3124324
The elderly dependency ratio	295	.0885386	.0183851	.0179004	.1650044
Registered unemployment rate	289	.0319715	.0138654	.000425	.0903004
Public Financial Expenditure: social security and employment	295	2023.368	2973.07	119.7778	30259.63

4. Result and Interpretation

4.1. Correlation Coefficient

Pearson correlation coefficient is a good indicator for measuring the linear correlation between two variables and the related orientation. As $|\rho_{XY}|$ approaches 1, the linear correlation is stronger; on

the contrary, as $|\rho_{XY}|$ approaches 0, the linear correlation is weaker. According to Table 2, there are diverse correlations between the explained variable savings and all the explanatory variables: Year-end balance of savings of urban and rural residents (expressed as savings) shows negative correlations with Registered unemployment rate (expressed as unemployment), Proportion of primary industry (expressed as firstind), Child dependency ratio (expressed as child). Meanwhile, some positive correlations are found between savings and GDP, Region, Proportion of tertiary industry (expressed as thirdind), The elderly dependency ratio (expressed as elder) and Public financial expenditure of social security and employment (expressed as expenditure). Besides, as Table 2 shows, there is a significant positive correlation between savings and GDP.

Table 2. Correlation coefficient.

	savings	GDP	region	unemployment	firstind	thirdind	elder	child	expenditure
savings	1.0000								
GDP	0.9389	1.0000							
region	0.3908	0.3644	1.0000						
unemployment	-0.2374	-0.3057	-0.0771	1.0000					
firstind	-0.5073	-0.5432	-0.1996	0.2968	1.0000				
thirdind	0.4603	0.3440	0.1006	-0.1609	-0.2664	1.0000			
elder	0.0577	0.0339	0.0354	0.2300	0.1926	-0.1093	1.0000		
child	-0.4342	-0.3812	-0.2761	-0.0397	0.4127	-0.2598	-0.1702	1.0000	
expenditure	0.7344	0.7096	0.2560	-0.0207	-0.1778	0.4033	0.1457	-0.3002	1.0000

4.2. VIF

VIF (variance inflation factor) is used to analyze multicollinearity in multiple linear regression (MLR). High VIFs are a sign of multicollinearity. We usually consider that there is no significant bias in the regression results when $VIF < 10$. Table 3 shows VIFs are acceptable and that the explanatory variables chosen are reliable.

Table 3. VIF.

Variable	VIF	1/VIF
Log(GDP)	3.72	0.268643
Log(financial expenditure)	2.76	0.362875
First industry	1.96	0.509663
Child dependency ratio	1.48	0.676861
Proportion of third industry	1.33	0.753272
Unemployment rate	1.32	0.757194
The elderly dependency ratio	1.20	0.830150
Region	1.19	0.840904
Mean VIF	1.87	

4.3. Test and Adjustment of Variance

Table 4. OLS regression.

Source	SS	df	MS	Number of obs	=	289
Model	196.470282	7	28.0671831	F(7, 281)	=	320.51
Residual	24.6074529	281	.087571007	Prob > F	=	0.0000
Total	221.077735	288	.767631024	R-squared	=	0.8887
				Adj R-squared	=	0.8859
				Root MSE	=	.29592
savings	Coef.	Std. Err.	t	P > t	[95% Conf. Interval]	
GDP	.8950306	.0255326	35.05	0.000	.8447712	.94529
region	.1289432	.0438444	2.94	0.004	.0426381	.2152484
unemployment_p	.0373277	.0141952	2.63	0.009	.0093853	.0652702
firstind_p	.0025653	.0025691	1.00	0.319	-.0024918	.0076223
thirdind_p	.0177677	.0024429	7.27	0.000	.0129591	.0225764
elder_p	.0061711	.0109903	0.56	0.575	-.0154627	.0278049

child_p	-0.0137237	.0047989	-2.86	0.005	-.02317	-.0042773
_cons	5.959375	.2089038	28.53	0.000	5.54816	6.37059

Table 5. Heteroscedasticity Test.

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity	
H_0	Constant variance
Variables	fitted values of savings
chi2(1)	7.80
Prob > chi2	0.0052

Since the OLS estimator is no longer the best linear unbiased estimator in the case of heteroscedasticity, we must determine whether the variance is constant. Here we use the Breusch-Pagan/Cook-Weisberg test whose null hypothesis is that the error variances are all equal which means the presence of homoscedasticity. The p-value = 0.0052, so the null hypothesis is rejected, indicating the presence of heteroscedasticity in the samples. In this case, we need to deal with it, and in this paper, we take weighted least squares (WLS) estimation to adjust for the heteroscedasticity.

4.4. WLS Regression

Table 6. WLS regression.

Dependent variable: Year-end balance of savings of urban and rural residents	
GDP	0.836 ^{***} (24.989)
region	0.076 ^{**} (2.112)
Registered unemployment rate	0.026 ^{**} (1.984)
Proportion of primary industry	0.001 (0.184)
Proportion of tertiary industry	0.016 ^{***} (7.469)
The elderly dependency ratio	0.011 (1.164)
Child dependency ratio	-0.011 ^{**} (-2.411)
Public Financial Expenditure: social security and employment	0.085 ^{**} (2.401)
Intercept	5.681 ^{***} (25.521)
R^2	0.926
N	289

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: ***, **, and * indicate that null hypothesis will be rejected at the 1%, 5%, and 10% significance levels. Null hypothesis for this test is that the independent variables have no significant relation to the dependent variable.

Based on the data in Table 6, we can obtain the model of the dependent variable and independent variables as showed in Model 1:

Model 1

$$\begin{aligned} \log(\text{savings balances}) = & 5.681 + 0.836\log(\text{GDP}) + 0.085\log(\text{public financial expenditure}) \\ & \text{(S.E)} \quad (25.521) \text{***} \quad (24.989) \text{***} \quad (2.401) \text{**} \\ & + 0.016\text{thirdind} + 0.076\text{region} + (-0.011)\text{child} + 0.026\text{unemployment} \\ & \quad (7.469) \text{***} \quad (2.112) \text{**} \quad (-2.411) \text{**} \quad (1.984) \text{**} \\ & R^2 = 0.926 \quad F\text{-stat} = 437.85 \end{aligned}$$

From Model 1, we can observe that a 1% increase in GDP is correlated with a 0.836% increase in savings. Similarly, a 1% increase in public financial expenditure of social security and employment is associated with a growth of 0.085% in savings. Meanwhile, every 1% increase in the proportion of the tertiary industry is correlated with a 1.6% increase in saving. Next, as a dummy variable, region=1 correlates with an increase in savings of 7.6%. Besides, increasing 1% of child dependency ratio is accompanied by a 1.1% decrease in savings. Inconsistent with some previous studies, the model shows a positive correlation between the registered unemployment rate and savings: a 1% increase in unemployment is associated with a 2.6% increase in savings.

Additionally, Table 6 also indicates that GDP and proportion of tertiary industry both have a significant relationship to savings at 1% significant level, while region, registered unemployment rate, child dependency ratio, and expenditure are significantly correlated with savings at only 5% significant level. Finally, yet importantly, R^2 represents 92.6% of the variation in savings can be explained by this model. The level of economic development of a country or region can be visually measured by GDP, which will largely affect the per capita disposable income. Generally speaking, the higher the level of economic development of a country or region, the higher the disposable income of the residents. According to the savings function $S(Y) = -\alpha + (1 - \beta) * Y$, the higher the disposable income of the residents, the higher the value of income for savings. On the other hand, the higher the level of economic development, the more competitive the market, which leads to an increase in consumer surplus, and further increases the value of savings in the country or the region. The above two points support the positive correlation between GDP and the savings of the residents.

In recent years, due to the economic downturn, the Chinese government has increased financial expenditure to stimulate the market, hoping to boost economic development through the multiplier effect of fiscal spending. However, due to the existence of expected utility, people realize the existence of economic downturn from the government's expanding fiscal spending behavior and expect that the economic downturn situation will not change in the short term, which further stretches the demand for savings of residents in the precautionary motive.

China's development has achieved a certain amount of accumulation of quantitative changes, but to achieve qualitative leaps will require a longer time. This has made the phenomenon of involution increasingly serious in recent years. The pressure of involution does not only fall on teenagers but also parents. The social competition of involution has forced parents to reduce their savings and increase their expenses to acquire more educational and social resources for their children, making the child dependency ratio negatively correlated with resident savings.

In the last 20 years, China's industrial structure has been continuously optimized and upgraded, and the proportion of tertiary industry has been rising. On the one hand, this has promoted technological innovation, which has directly boosted the economy and increased the savings of residents. On the other hand, the rising technical composition of capital and the rapid development of labor-saving and capital-intensive industries have increased the unemployed population, while at the same time, technological innovation has led to a certain scale of structural unemployment, which has also increased the proportion of the unemployed population in the working population. As the proportion of the unemployed population rises, people present negative expectations about the future, which also further increases resident savings.

In line with our expectations, savings are higher in Eastern China. This may be related to the fact that Eastern China has a more developed economy than the western region, which leads to a higher per capita disposable income. From another point of view, the residents of Eastern China are under greater economic pressure than Western China in terms of employment pressure, consumption pressure, and pension and childcare pressure, which forces them to save more traditionally and stably to cope with internal and external pressures.

5. Conclusion

Since the reform and opening up, investment, export, and consumption have been the three major engines driving China's economic take-off. However, along with the continuous optimization and upgrading of structure and the changes in the global economic and political environment in China, consumption has replaced investment as the main driving force of domestic economic development. With a certain disposable income of residents, the requirement of rising consumption implies a decline in the amount of savings. From another perspective, in addition to the norm of low-interest rates, we observe a general trend of decreasing interest rates in China in the last two decades, which is an important monetary policy adopted to promote the increase of consumption and reduce excessive savings. Presently, it seems that the global market is sluggish due to the global epidemic. For China's economy to make steady progress, it must pay more attention to the development of the domestic market. In order to promote market prosperity, it is necessary to strengthen supply-side reform, optimize the investment structure and industrial structure, improve product quality, increase effective supply and meet the real needs of consumers. Supply-side reform will inevitably require further application of technology in the economy, which may cause certain structural unemployment in the short term, which also requires the government to positively guide the social labor force from the front, not just a direct redistribution policy of increasing income transfer payments, but more to enhance the social labor force's understanding of consumption upgrade and supply upgrade through knowledge training, talent introduction, and technology support, and strengthen the knowledge and skills of the social labor force to better adapt to this change. In terms of survival and life pressure in Eastern China, society and enterprises should pay more attention to the psychological pressure of workers, and the government should continue to promote the improvement of the social security system and education system, focus more on the fairness of distribution, to relieve social pressure and make families have the ability to consume and dare to consume. The development of Western China has improved with the help of government policies, but there are still certain obstacles. Western China should continue to strengthen the construction of infrastructure with reasonable urban planning and especially should pay attention to the important role of transportation and communication for economic development. Besides, the gap between the rich and the poor should be narrowed throughout the country to truly maximize the well-being of the people.

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