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Research on the Consumption Function of Rural Residents in Hunan Province

CHEN Hui-min *

School of Economics and Management, Hunan Institute of Engineering, Xiangtan 411104, China

Abstract Based on literature review, according to relevant consumption data in *Hunan Statistical Yearbook* and *China Statistical Yearbook* during 1978 – 2009, the thesis selects three indexes involving the average income per rural resident, per capita living expenses of rural residents and per capita savings to conduct the unit root and co-integration test on the consumption and net income per rural residents in Hunan Province by adopting the generalized difference method and EVIEWS6.0, then according to the Modigliani Hypothesis of Consumption, Duesenberry Hypothesis of Consumption and Keynes Absolute Income Hypothesis, the thesis makes a fitting of Hunan consumption function model, aiming to find out the consumption function model suitable to Hunan Province. The results show that, Keynesian consumption function based on Absolute Income Hypothesis passes the statistical test and econometric test, while the consumption function model based on Relative Income Hypothesis and that based on Life Cycle Hypothesis do not, which proves that the consumption function model based on Absolute Income Hypothesis is better suited for describing the relations between rural consumption and income in Hunan Province. Taking into account the low marginal propensity of consumption of the rural residents in Hunan Province, the thesis proposes to expand consumption demand of rural residents: firstly, developing characteristic economy and improving the income level of rural residents; secondly, perfecting the social security system in rural areas and maintaining the consumption confidence of rural residents; thirdly, ameliorating the circulation system.

Key words Rural residents, Consumption function, Marginal propensity of consumption, Hunan Province, China

According to the expenditure approach in Keynesian theory of national income determination, consumption, investment and net exports are the " three horses " driving the economic growth, among them, consumption greatly promotes the development of the economy through the multiplier effect, while the size of the multiplier is determined by the marginal propensity of consumption. Since the reform and opening up, the economy of Hunan Province develops fast and grows rapidly, but due to the long-term existence of the rural-urban dual structure, there is still a large gap between the incomes of rural and urban residents. In 2009, the annual expenditure on consumption per urban resident in Hunan province is 10 828.23 yuan, while that of the rural resident is 4 020.87 yuan, the urban-rural income ratio is as big as 2.69, showing a large urban-rural gap. Thus, it becomes necessary to conduct the research on the consumption of residents in rural and urban areas in Hunan Province. Based on this, by using the relevant data during 1978 – 2009 and the generalized difference method, the author exercises a fitting analysis on the consumption function of the rural residents in Hunan Province, then studies the propensity to consume, explores its changing rules and at last proposes corresponding measures, aiming at providing theoretical support for the strategy of establishing a consumption and leisure city.

1 Literature review

The scholars both at home and abroad study the factors influencing the residents' consumption from different perspectives

by using different econometric test. In his absolute income hypothesis, John points out that the income is an important factor influencing the consumption, and as income grows, consumption increases, too, but the increase of consumption is less than the growth of incomes^[1]; while in J. S. Duesenberry's hypothesis of relative income consumption, on account of the ratchet effect and demonstration effect, there exists the short-run consumption function with positive intercept and the long-run consumption function through the origin^[2]; Franco proposes in his Life Cycle Hypothesis that the consumers will plan their living expenditures over their entire life so as to achieve the best consumption pattern in the whole life cycle^[3]; the permanent income hypothesis proposed by Milton states that the expenditures of the consumers are determined not by their current income but by their permanent income^[4]; Hall proposes in his random walk hypothesis that consumption follows the random walk, and if the consumption is expected to change, then the individual could achieve better consumption smoothing^[5]; as stated in the consumption theory of liquidity constraint proposed by Deaton, liquidity constraint will increase the savings while decrease the consumption, and whenever the liquidity constraint happens, it will make a person's consumption less than he expected^[6]; in his buffer-stock saving theory, Carroll points out that savings will act as the buffer stock, aiming at maintaining normal consumption at bad situation and increasing the consumption at good situation^[7]; Campbell states in his λ hypothesis that a " reliable " consumption function will not only fit in with the reasonable permanent income hypothesis, but also tally with the practical data^[8].

By using the dynamic econometric model, Qin Duo studies the relations between the residents' consumption and income in

China and finds out that they are in a dynamic conditional correlation with a positive intercept^[9]; Geng Tongjin conducts a research on the relations between consumption and saving, proves that they are not in a long-term stable relation, he deems that the best way to improve the residents' income is to stimulate consumption rather than suppress and divert the savings^[10]; through the study, Cao Linghua, etc., holds that the disposable income is still the main variable explaining the consumption of our urban residents while their incomes are mainly influenced by permanent income^[11]; after studying the consumption process of the urban residents in Chongqing City, Zhang Xiaoying finds out that their consumption mainly relies on permanent income^[12]; in the opinion of Yin Shanfu, the absolute income hypothesis and its consumption function model more tally with the practical consumption of our rural residents^[13]. The existing literatures provide strong support for studying the consumption function of the rural residents in Hunan Province.

2 Data processing and research method

2.1 Data processing

2.1.1 Data selection. The research data is selected from the *Hunan Statistical Yearbook* and *China Statistical Yearbook* during 1978–2009.

As the research needs, this paper selects a total of 32

groups of sample data during 1978–2009, the per capita net income in Hunan Province is selected from the data about the income of the rural residents in Hunan Province (yuan/per capita), and the living expenditure per rural residents in Hunan Province is chosen from the data about the consumption of the rural residents in Hunan Province (yuan/per capita), while the balance of savings deposits per rural residents is selected as the data about the rural savings of Hunan Province (yuan/per capita).

2.1.2 Data processing. The consumer price index of the rural residents in Hunan Province in 1978 is selected as the baseline (100%), and the nominal consumer price index of the rural residents in Hunan Province during 1979–2009 is converted into the actual one, by adopting the actual consumer price index of the rural residents in Hunan Province, the per capita consumption, per capita income and per capita savings are all transformed into the actual one with that in 1978 as the baseline. Since there is no rural consumer price index of Hunan Province during 1978–1983, the research will choose the retail price index instead, because the retail price index does not differ much from the consumer price index, which will produce little effect on the research result. The data about the Per capita consumption, per capita net income and per capita savings of rural residents in Hunan Province during 1978–2009 is shown in Table 1.

Table 1 Per capita consumption, per capita net income and per capita savings of rural residents in Hunan Province during 1978–2009
Yuan/per capita

Year	Per capita consumption (C_t)	Per capita net income (Y_t)	Per capita savings (S_t)	Year	Per capita consumption (C_t)	Per capita net income (Y_t)	Per capita savings (S_t)
1978	140.07	142.56	3.30	1994	276.02	292.82	110.79
1979	158.16	173.53	5.18	1995	290.08	302.35	127.96
1980	170.64	194.41	6.95	1996	340.53	351.42	145.44
1981	180.61	210.30	10.31	1997	347.35	389.68	152.15
1982	212.75	243.29	14.47	1998	361.03	394.60	170.92
1983	221.02	283.82	16.95	1999	361.88	404.67	173.65
1984	229.96	273.10	22.03	2000	361.12	408.37	201.25
1985	248.00	281.32	26.18	2001	372.53	430.39	230.85
1986	261.14	297.17	36.69	2002	389.55	451.53	262.72
1987	270.08	292.79	42.78	2003	386.94	458.16	291.60
1988	238.17	255.33	31.23	2004	423.09	485.63	311.07
1989	214.76	232.23	32.89	2005	458.86	519.01	354.30
1990	209.47	226.53	46.44	2006	491.31	552.66	410.81
1991	262.17	275.52	60.21	2007	514.64	594.92	472.49
1992	262.16	274.06	75.89	2008	453.01	661.80	582.89
1993	260.01	271.26	89.21	2009	475.51	706.67	688.92

2.2 Research method The research conducts the unit root and co-integration test on the consumption and net income per rural residents in Hunan Province by using the EVIEWS6.0 software, and then the Modigliani Hypothesis of Consumption, Duesenberry Hypothesis of Consumption and Keynes Absolute Income Hypothesis are taken for reference so as to find out the consumption function model suitable to Hunan Province.

3 Results and analysis

3.1 The test on the relation between the consumption and net income per rural residents in Hunan Province

Since the selected data are in a time series, there may exist

spurious regression and instability. In order to establish a reasonable consumption function model, the correlative analysis, stability test and the co-integration analysis should be firstly conducted before the practical setting.

3.1.1 Correlative analysis. The data in Table 1 and the EVIEWS6.0 software are adopted to draft the sequence diagram (Fig. 1) and scatter diagram (Fig. 2) between the per capita consumption and per capita net income in Hunan Province. As seen from Fig. 1, with the increase in the per capita net income comes an increase in the per capita consumption; and Fig. 2 shows that there is a strong correlation between the per capita consumption and per capita net income.

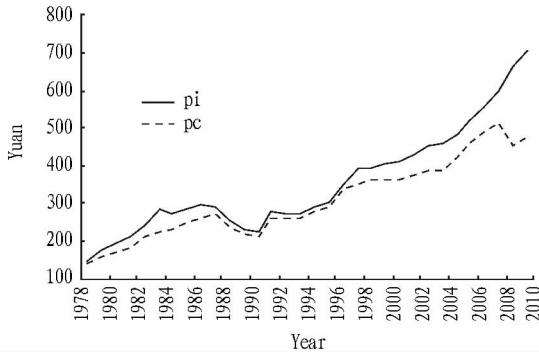


Fig. 1 Sequence diagram between the per capita consumption and per capita net income in Hunan Province

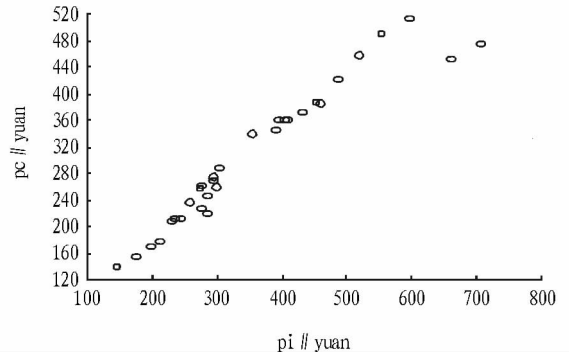


Fig. 2 Scatter diagram between the consumption and net income per rural residents in Hunan province

Table 2 The unit root test of the consumption and net income per rural residents in Hunan Province

variable	Inspection standard (c, t, k)	ADF value	1% critical value	5% critical value	10% critical value	D. W	Inspection result
C	c,0,0	-0.597 537	-3.661 661	-2.960 411	-2.619 160	1.923 960	Unstable
ΔC	c,0,0	-5.171 380	-3.670 170	-2.963 972	-2.621 007	1.984 944	Stable
Y	c,0,0	2.185 627	-3.661 661	-2.960 411	-2.619 16	1.331 472	Unstable
ΔY	c,t,0	-3.655 887	-4.296 729	-3.568 379	-3.218 382	1.968 587	Stable

Note: c, t, k refer respectively to the constant term, time trend and lagging number in unit root test

3.1.2 ADF test. The EViews6.0 software is adopted to conduct unit root test on the data about the consumption and net income per rural residents in Hunan Province in Table 1, the result is shown in Table 2.

As seen from Table 2, the ADF value of c is bigger than the significance level of 1% and 5% critical value but smaller than the critical value of 10%, and D.W=1.923 96 shows instability; the ADF value of ΔC is smaller than the significant level of 1%, 5% and 10% critical value, and D.W=1.984 944, so it is integrated of order one I(1); the ADF value of Y is above the significant level of 1%, 5% and 10% critical value, since D.W=1.331 472, so it is unstable; the ADF value of ΔY is below the significant level of 5% and 10% critical value, and D.W=1.968 587, so it is integrated of order one I(1).

As discussed above, the horizontal sequences of per capita consumption and per capita net income are not stable, but they become stable after the first-order difference.

3.1.3 Co-integration test. ΔC and ΔY are all integrated of order one I(1), meeting the prerequisite for co-integration test. For the purpose of a further test on their long-term relationship, here the method of Engle-Granger is adopted.

Firstly, the linear regression equation between C_t and Y_t is established, then by using the data in Table 1 and adopting the EViews 6.0, the following estimating function could be obtained after OLS analysis.

$$C_t = 159.007\ 950\ 14 + 0.464\ 653\ 446\ 212\ Y_t + 0.853\ 112\ AR(1) + U_t \quad (1)$$

t value (1.951 627) (3.160 62) (7.575 661)
 $R^2 = 0.961$ adjusted $R^2 = 0.959$ $F = 349.39$ $D.W = 1.924$.

Secondly, suppose the residual of formula (1) is resid,

and then conduct the unit root test on it, the results are: the inspection standard(c, t, k) = c,0,0; ADF = -5.129 31; 1% critical value = -3.670 17; 5% critical value = -2.963 97; 10% critical value = -2.621 01; D.W=2.001 596; the results show that it is stable.

As shown in the result, the ADF value of the residual is below the significant level of 1%, 5% and 10% critical point, and the value of D.W is around 2, so it is a stable time series, which proves that C and Y has a long-term and two-way s'relationship.

3.2 The model fitting of the consumption and net income per rural residents in Hunan Province

3.2.1 The model fitting of the consumption function based on life cycle hypothesis. Based on the Modigliani Hypothesis of Consumption, the savings per rural residents in Hunan Province is selected as the amount of asset (St), which can be nearly described in the following model:

$$C_t = a_0 + a_1 Y_t + a_2 S_t + u_t. \quad (2)$$

Using the generalized difference method, we could use model (2) to make a regression of the data in Table 1, after which we could find that the consumption is in an autocorrelation. So in order to eliminate the autocorrelation, we could use the generalized difference method to make a regression, the result is:

$$\hat{C}_t = 7\ 395.651 + 0.656\ 130 \hat{Y}_t - 0.399\ 070 \hat{S}_t + 0.998\ 939\ AR(1)$$

$$t = (0.013) (3.420) (-1.594) (11.884)$$

$$R^2 = 0.966\ D.W. = 2.340\ F = 254.969.$$

As seen in the above result, the economic significance of model parameter estimator is unreasonable, because there is certain colinearity between Y and S, so this model is not suitable to be applied.

3.2.2 The model fitting of the consumption function based on relative income hypothesis. According to the irreversibility and ratchet effects of consumption proposed by Duesenberry, the Duesenberry consumption function could be rewritten into the following form:

$$C_t = a_0 + a_1 Y_t + a_2 C_{t-1} + u_t \quad (3)$$

Using the generalized difference method, we could use model (3) to make a regression of the data in Table 1, after which we could find that the consumption is in an autocorrelation. So in order to eliminate the autocorrelation, we could use the generalized difference method to make a regression, the result is:

$$\begin{aligned} \hat{C}_t &= 145.732 + 0.473 \hat{Y}_t + 0.026 \hat{C}_{t-1} + 0.825 \text{AR}(1) \\ t &= (1.170) \quad (3.285) \quad (0.098) \quad (4.331) \\ R^2 &= 0.958 \quad D.W. = 1.933 \quad F = 199.813. \end{aligned}$$

The test results show that R^2 and F have better model fitting, and there is significant linear correlation between two variables, but since C_{t-1} does not pass the t test, so this model is not suitable for describing the changing rules of the consumption function in the rural areas of Hunan Province.

3.2.3 The model fitting of the consumption function based on absolute income hypothesis. Based on Keynes Absolute Income Hypothesis, the following consumption function could be established:

$$C_t = a_0 + a_1 Y_t + u_t \quad (4)$$

Using the generalized difference method, we could use model (4) to make a regression of the data in Table 1, after which we could find that the consumption is in an autocorrelation. So in order to eliminate the autocorrelation, we could use the generalized difference method to make a regression, the result is:

$$\begin{aligned} \hat{C}_t &= 159.008 + 0.465 \hat{Y}_t + 0.853 \text{AR}(1) \\ t &= (1.952) \quad (3.161) \quad (7.576) \\ R^2 &= 0.961 \quad \text{adjusted } R^2 = 0.959 \quad F = 349.39 \quad D.W. = 1.924. \end{aligned}$$

From the analysis of $D.W.$, there is no autocorrelation in this model, the values of R^2 and F show that the model has a good fitting, and the linear correlation between the variables is significant, moreover, since the model has past all tests, it is more suitable in explaining the consumption of the rural areas in Hunan Province.

3.3 Analysis of the model structure We can know from the test results that the consumption function model based on absolute income hypothesis has past the test while the consumption function model based on relative income hypothesis and the consumption function model based on life cycle hypothesis have not, so the Keynes Absolute Income Hypothesis is applicable to analyzing the rules of the rural consumption in Hunan Province. The empirical results of the consumption function model based on absolute income hypothesis show that the marginal propensity of consumption per rural residents in Hunan Province is 0.465, relatively low as contrasted with the net income per rural residents, which is in accordance with the actual situation that the current consumption of the rural residents in Hunan Province mainly depends on their current incomes.

4 Suggestions

The analysis shows that the marginal propensity of con-

sumption of the rural residents in Hunan Province (0.465) are quite low, whose reasons are quite difficult to be found in the model apart from the income. However, according to the actual situation of Hunan Province, it is quite important to improve the consumption level of its rural residents and promote its rural construction. The low marginal propensity of consumption also shows that there is still great room left to improving the consumption level of its rural residents. In order to further improve the livelihood of the people as well as improve the consumption level of the rural residents, we could focus on the following three aspects.

4.1 Developing characteristic rural economy and improving the income level of rural residents We could organize the experts to study the local conditions and then propose the strategy of developing characteristic rural economy; based on a rational planning, we could take full use of local advantages in geography, production, climate and environment according to the local condition, local people and household so as to promote the development of local characteristic rural economy, namely, the green agriculture and green farming; the government should increase its investment in agricultural technology and guide the agricultural expert to provide technical support in rural areas so as to prosper the agriculture by technology.

4.2 Perfecting rural social security system and maintaining the consumer confidence of rural residents Based on the local conditions, we should actively and steadily promote the reform of provincial social security system, and gradually establish the rural minimum living security system and rural old-age security system which adapt to the new rural construction requirements; the rural medical insurance system reform should also be promoted so as to gradually solve the difficult access to medical treatment in rural areas; the mutual funds for children's education in rural areas should also be established, which helps to solve the rural children's difficulty in receiving an education. The solving of the rural residents' livelihood problems will help to boost the consumer confidence of rural residents, decrease their uncertain future expenditure and improve their current consumption level.

4.3 Improving the circulation system of rural market At first, led by the government, we should make a statistical analysis of rural demands for goods, keep a good communication and relation with the production company, develop local logistics system, import a large number of products at a low price and cut the excessive circulation costs so as to decrease the costs in purchasing the needed products and enhance the purchasing capacity of rural residents. Latter, we could develop a comprehensive supermarket suitable for rural consumption, further accelerate the network construction of modern circulation system in vast rural regions and the transformation of agricultural trade market into the supermarket, expand the convenience-store chains in rural areas and community and perfect the distribution of commercial networks; then drawing upon the successful experience of home appliances to rural areas, we could vigorously promote the flow of more goods into the rural market.

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