

# The Pulling Effect of Residents' Information Consumption on Economic Growth

## -Evidences from Jiangsu Province

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**Abstract**—Information consumption is an important part of China's strategy of expanding domestic demand and stimulating consumption demand. Residents' information consumption in Jiangsu is taken as the research object and the information consumption data over the years are collated. By using comparative descriptive statistics and quantitative analysis, the current situation of residents' information consumption in Jiangsu as well as economic growth are systematically analyzed. The economic model deeply analyses the pulling effect of information consumption on economic growth, and finally draws the conclusion that there is a causal relationship between information consumption and economic growth, what's more, information consumption has a significant effect on pulling economic growth. Especially in the past ten years, the economic growth of Jiangsu is more dependent on residents' information consumption.

**Keywords**—residents' information consumption; economic growth; Jiangsu

### I. INTRODUCTION

As an important part of the final consumption, information consumption is instrumental in sustainable economic growth. Information consumption can not only expand the total consumption of residents, but also help guiding the upgrading of industrial structure. At present, the economic growth of Jiangsu and even the whole country is more dependent on investment. The potential of consumption, especially the information consumption, is not fully tapped.

### II. RESIDENTS' INFORMATION CONSUMPTION AND ECONOMIC GROWTH

#### A. Definition of Concept

Information consumption is the consumption of information-related products and services. The accounting of residents' information consumption generally includes residents' communication consumption and the consumption of culture, education and entertainment. The expenditure amount of these consumption is used to express the level of residents' information consumption.

Economists generally define economic growth from the

perspective of total output growth in kind. Generally, GDP is used to express gross output. It is believed that the change of GDP over a period of time can reflect the regional economic growth rate. This paper uses. Both the total and the per capita GDP of Jiangsu are used to reflect the economic growth of Jiangsu.

#### B. Theory of Information Consumption and Economic Growth

Consumption and economic growth have always been two basic propositions in economic academia. Consumption is considered as one of the important factors affecting economic growth. The growth of information consumption scale can stimulate the expansion of aggregate demand. The theory of Multiplier Effect holds that information consumption can magnify the total output. Structuralism holds that information consumption can promote sustainable economic development by attracting capital into information-related industries and optimizing the industrial structure. According to the endogenous economic growth theory, economic growth needs technological progress and capital accumulation, which can be precipitated by the expansion of information consumption scale.

It has been proved that the potential of the information-poor category exists so that information consumption has an impact on economic growth (Gary Madden etc). The added value of information consumption can indirectly lead to economic growth (Kang Bae Lee etc)<sup>[1]</sup>. Some scholars believe that the difference of information consumption may widen the gap of economic growth. Some empirical studies show that the increase of information consumption affects economic growth<sup>[2] [3]</sup>. Du Mengmeng makes regression analysis through panel data and finds that there is a long-term dynamic equilibrium and a causal relationship between information consumption and economic growth<sup>[4]</sup>. Wu Yongyi proposed that expanding and upgrading information consumption could enhance the momentum of economic development<sup>[5]</sup>. Qi Jie has verified the role of residents' information consumption in upgrading of industrial structure<sup>[6]</sup>.

III. THE IMPACT OF JIANGSU RESIDENTS' INFORMATION CONSUMPTION ON ECONOMIC GROWTH

Based on the traditional model of accounting economic growth:  $GDP = C+I+G+NX$ , a new coefficient equation is constructed .

$$GDP = aCI+bCN+cI+dG+eNX+K$$

The consumption C is divided into CI and CN. CI represents information consumption and CN represents other consumption.

A. Data Source and Variable Selection

Based on the Yearbook Data of Jiangsu Province from 2001 to 2018, taking Jiangsu GDP, information consumption (CI), other consumption (CN), investment (I), government purchase (G) and net export (NX) as variables, the coefficients are calculated by Eviews to analyze the information consumption's pulling effect on economic growth.

B. Empirical Analysis

1) Sample data

To weaken the heteroscedasticity in time series data, this study takes natural logarithms of each sequence and named them LnGDP, LnCI, LnCN, LnI, LnG and LnNX respectively. The numerical values of each sequence are taken and the quantitative tests and regression analysis are carried out by Eviews.

2) Unit root test

Unit root test has to be taken to test the stability of time series to avoid the interference of pseudo-regression phenomena in experimental results.

LnGDP, LnCI and LnCN are all second-order stationary, that is to say, the time series of these three economic variables are the same-order stationary.

TABLE I. LN GDP UNIT ROOT TEST

Null Hypothesis: D(LNY,2)has a unit root		
Exogenous: None		
Lag Length:0(Automatic-based on SIC, maxlag=3)		
	t-Statistic	Prob. *
Augmented Dickey-Fuller test statistic	-3.756925	0.0010
Test critical values:	1% level	-2.728252
	5% level	-1.966270
	10% level	-1.605026

TABLE II. LN CI UNIT ROOT TEST

Null Hypothesis: D(LNLCI,2)has a unit root		
Exogenous: None		
Lag Length:0(Automatic-based on SIC, maxlag=3)		
	t-Statistic	Prob. *
Augmented Dickey-Fuller test statistic	-7.218666	0.0000
Test critical values:	1% level	-2.728252
	5% level	-1.966270
	10% level	-1.605026

TABLE III. LNCN UNIT ROOT TEST

Null Hypothesis: D(LNCN,2)has a unit root		
Exogenous: Constant		
Lag Length:1(Automatic-based on SIC, maxlag=3)		
	t-Statistic	Prob. *
Augmented Dickey-Fuller test statistic	-4.933413	0.0020
Test critical values:	1% level	-4.004425
	5% level	-3.098896
	10% level	-2.690439

3) Constructing VAR Model

Every equation in VAR model system has the same lag period of endogenous variables. The important purpose of VAR model is to use every endogenous variable as a function of endogenous variables in economic relations and to determine the lag period of each endogenous variable. Compared with the traditional model, VAR model is more accurate in dynamic observation of economic variables, because it solves the problem of lag time of endogenous variables.

TABLE IV. VAR MODEL

	LN Y	LN CI
LN Y(-1)	1.016762 (0.32160) [3.16162]	1.208587 (0.53476) [2.26006]
LN Y(-2)	-0.275347 (0.18389) [-1.49731]	-0.496087 (0.30579) [-1.62234]
LN CI(-1)	0.361676 (0.13527) [3.16162]	0.400511 (0.22494) [2.26006]
LN CI(-2)	-0.114437 (0.17787) [-0.64338]	-0.176624 (0.29576) [-0.59718]
C	1.029853 (0.71672) [1.43690]	-1.671266 (1.19179) [-1.40232]
R-squared	0.998903	0.996629
Adj. R-squared	0.998504	0.995403
Sum sq. resid	0.007469	0.020652
S.E. equation	0.026058	0.043330
F-statistic	2530.277	812.9765
Log likelihood	38.65356	30.51719
Akaike AIC	-4.206695	-3.189649
Schwarz SC	-3.965261	-2.948215
Mean dependent	10.45188	7.394375
S.D. dependent	0.673619	0.639061
Determinant resid covariance (dof adj.)		1.20E-06
Determinant resid covariance		5.67E-07
Log likelihood		69.65268
Akaike information criterion		-7.456585
Schwarz criterion		-6.973717
Number of coefficients		10

4) Determining lag Order

The larger the lag order, the smaller the degree of freedom. Generally, the order is determined according to the minimum criterion of AIC and SC criteria. If AIC and SC are not the minimum values at the same time, the LR test is used for the trade-off. In this study, the lag order was established to be order 1.

TABLE V. LAG ORDER

VAR Lag Order Selection Criteria  
 Endogenous variables: LNY LNCI  
 Exogenous variables: C  
 Date: 04/18/19 Time:17:10  
 Sample: 2000 2017  
 Included observations: 14

Lag	LogL	LR	FPE	AIC	SC	HQ
0	17.54028	NA	0.000372	-2.220040	-2.128746	-2.228491
1	64.22820	73.36674*	8.48e-07*	-8.318315*	-8.044433*	-8.343667
2	65.60135	1.765470	1.30e-06	-7.943049	-7.486580	-7.985304
3	68.41062	2.809279	1.76e-06	-7.772946	-7.133889	-7.832103
4	74.63329	4.444759	1.70e-06	-8.090470	-7.268824	-8.166528

\* indicates lag order selected by the criterion  
 LR: sequential modified LR test statistic (each test at 5% level)  
 FPE: Final prediction error  
 AIC: Akaike information criterion  
 SC: Schwarz information criterion  
 HQ: Hannan-Quinn information criterion

5) Granger causality test

Granger causality test can help us determine whether there is causality between two variables. Generally, Granger causality test involves lag period. Different lag period may bring totally different results. In the empirical process, different lag period needs to be tested. Because the above test situation has shown that the optimal lag order is 1, so on this premise, the test is carried out, and finally the information consumption is explained. There is a causal relationship between (LnCI) and economic growth (LnY).

TABLE VI. GRANGER CAUSALITY TESTS

Pairwise Granger Causality Tests  
 Date: 04/18/19 Time: 17:14  
 Sample: 2000 2017  
 Lags: 1

Null Hypothesis	Obs	F-Statistic	Prob
LNCI does not Granger Cause LNY	17	17.0123	0.0010
LNY does not Granger Cause LNCI		0.14786	0.7064

The probability of “LNCI does not Granger Cause LNY” is 0.0010, less than 0.05, which indicates that this is not credible. It shows that there is a causal relationship between information consumption and economic growth.

6) OLS linear regression analysis

Through regression analysis of LnGDP, LnCI, LnCN, LnI, LnG and LnNX variables, the relevant estimation results are obtained.

TABLE VII. OLS LINEAR REGRESSION

Dependent Variable: LNY  
 Method: Least Squares  
 Date: 05/12/19 Time: 18:59  
 Sample: 2000 2017  
 Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	2.606200	0.084874	30.70663	0.0000
LNCI	0.036798	0.142863	0.257579	0.8011
LNCN	0.188159	0.043600	4.315573	0.0010
LNI	0.338303	0.147084	2.300063	0.0402
LNG	0.271089	0.085376	3.175228	0.0080
LNNX	0.030980	0.014003	2.212350	0.0471
R-squared	0.999310	Mean dependent var	10.30278	
Adjusted R-squared	0.999023	S.D. dependent var	0.767447	
S.E. of regression	0.023993	Akaike info criterion	-4.360915	
Sum squared resid	0.006908	Schwarz criterion	-4.064124	
Log likelihood	45.24823	Hannan-Quinn criter.	-4.319991	
F-statistic	3476.237	Durbin-Watson stat	1.071759	
Prob(F-statistic)	0.000000			

R<sup>2</sup> approaches to 1, indicating that the model has high goodness of fit for sample data, which means that GDP can be explained by the estimated consumption function. Therefore, the equation is composed of LnGDP, LnCI, LnCN, LnI, LnG and LnNX.

$$\text{LnGDP} = 2.606200 + 0.036798\text{LnCI} + 0.188159\text{LnCN} + 0.338303\text{LnI} + 0.271089\text{LnG} + 0.030980\text{LnNX} \quad (1)$$

The coefficient of LnCI is 0.036798, which shows that information consumption has a pulling effect on economic growth. Compared with LnCN, although the coefficient is small, it also shows that in the whole consumption structure, information consumption as a single consumption has a significant pulling effect on economic growth.

7) Linear Regression Analysis of Relevant Data in Recent Ten Years

Because of the rapid development of Jiangsu's information industry and information technology application in recent ten years, in order to more intuitively analyze the pulling effect of information consumption on economic growth, the data of Jiangsu in recent ten years are selected for regression analysis.

TABLE VIII. OLS LINEAR REGRESSION(DECADE DATA)

Dependent Variable: LNY  
 Method: Least Squares  
 Date: 05/12/19 Time: 19:17  
 Sample: 2007 2017  
 Included observations: 11

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	2.090617	0.298860	6.995313	0.0009
LNCI	0.673507	0.160564	4.194626	0.0085
LNCN	0.015482	0.067421	0.229634	0.8275
LNI	0.025753	0.137072	0.187880	0.8584
LNG	0.290371	0.087810	3.306797	0.0213
LNNX	0.060957	0.051535	1.182831	0.2901
R-squared	0.999268	Mean dependent var	10.82636	
Adjusted R-squared	0.998536	S.D. dependent var	0.393072	
S.E. of regression	0.015038	Akaike info criterion	-5.254059	
Sum squared resid	0.001131	Schwarz criterion	-5.037026	
Log likelihood	34.89733	Hannan-Quinn criter.	-5.390869	
F-statistic	1365.502	Durbin-Watson stat	1.830890	
Prob(F-statistic)	0.000000			

In the past decade, the equation composed of LnGDP, LnCI, LnCN, LnI, LnG and LnNX is:

$$\text{GDP}=2.090617+0.673507*\text{LnCI}+0.015482*\text{LnCN}+0.025753*\text{LnI}+0.290371*\text{LnG}+0.060957*\text{LnNX}. \quad (2)$$

Comparing (1) with (2), we can see clearly that the information consumption of residents in Jiangsu has made great efforts in the past ten years. The fulcrum of economic growth has changed from investment to information consumption. The coefficient in front of LnCI is the largest, which indicates that the information consumption of residents in Jiangsu Province has the greatest pulling effect on economic growth in 2007-2017. The potential of information consumption is huge. We should attach importance to the pulling role of information consumption in economic growth.

#### IV. POLICY SUGGESTION

Through the empirical analysis, we have determined that information consumption contributes significantly to economic growth. To break through the bottleneck of economic development in Jiangsu Province and even in China, it is an important way to vigorously develop the information consumption market.

First of all, the consumers' awareness of information consumption should be improved. It is not only necessary to improve the information quality of the whole people, but also necessary to establish the concept of residents' information consumption.

Secondly, we should improve the supply of information consumption. It is necessary to improve the core technological capabilities of information products and services, and promote the upgrading of the information industry structure. At the same time, we should seize the opportunity of 5G era.

Thirdly, the information consumption environment needs to be optimized. On the one hand, we should improve the policy and legal system of information consumption service, on the other hand, we should strengthen the infrastructure construction of information industry.

#### V. CONCLUSION

This paper takes Jiangsu residents' information consumption as the research object, collates the data of information consumption over the years, conducts unit root test, determines lag order, Granger causality analysis and other econometric tests on Jiangsu residents' information consumption and economic growth, and finds that there is a causal relationship between residents' information consumption and economic growth. Through OLS regression analysis of GDP, residents' information consumption, other consumption besides information consumption, investment, government purchase, net export and other related data in Jiangsu Province, it is found that information consumption has a significant pulling effect on economic growth. In recent ten years, information consumption in Jiangsu has played a greater role in promoting economic growth than other consumption, investment, government purchase and net export.

In recent years, the information industry in Jiangsu province and even the whole country has not fully released its vitality, and the potential of information consumption is

enormous. Especially in the current stage of 5G technology maturing and 5G commerce approaching, the whole information industry will accelerate its development, and the information consumption will enhance the total economic volume even more. Therefore, we must attach importance to the pulling role of information consumption in economic growth, strive to improve the scale of information consumption, strive to make information consumption a major force in the second stage of economic development in China, and support our economy to continue to soar up to a higher level.

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